U.S. Energy Information Administration

Smart Grid Legislative and Regulatory Policies and Case Studies

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The information presented in this overview is based on a report of emerging smart grid deployments and plans prepared by SAIC for the U.S. Energy Information Administration (EIA), the statistical and analytical agency within the U.S. Department of Energy. The full report is attached. By law, EIA's data, analyses, and forecasts are independent of approval by any other officer or employee of the United States Government. The views in this report therefore should not be construed as representing those of the Department of Energy or other Federal agencies.

Background

In recent years, a number of U.S. states have adopted or are considering smart grid related laws, regulations, and voluntary or mandatory requirements. At the same time, the number of smart grid pilot projects has been increasing rapidly. Recent activity includes the deployment of smart meters, distribution automation and demand response (DR) programs. This increased activity is supported by the disbursement of almost $4.5 billion of ARRA funding

(see http://energy.gov/oe/information-center/recovery-act) targeted specifically to smart grid initiatives. Federal mandates are promoting smart grid projects, specifically Energy Independence and Security Act of 2007, Title XIII, (see http://www.oe.energy.gov/DocumentsandMedia/EISA_Title_XIII_Smart_Grid.pdf), which establishes a national policy for grid modernization and provides incentives for stakeholders to invest in smart grid initiatives.

U.S. State Legislative and Regulatory Policies

The first document is a summary by state of legal and regulatory requirements related to the smart grid. The document contains three US maps that show how activities in the states are progressing. (See the right hand column.) The report contains a summary of legislative and regulatory activity in each state and also contains links to the resource material used to construct the summaries.

These state smart grid-related activities are centered on smart meters (Advanced Metering Infrastructure), data privacy issues, opt out policies and regulations promoting net metering and distributed generation programs. In addition, associated programs are discussed, such as energy efficiency goals and requirements, dynamic pricing policies and demand response programs. For many states, the document also includes a discussion of key drivers of increased activity.

U.S. Smart Grid Case Studies

The second document provides 23 case studies of smart grid pilots and programs in the U.S. It provides a sample of projects chosen to provide a variety of smart grid applications and approaches. They involve various technology types, pricing programs, and funding mechanisms. Each case study begins with a table that outlines important elements of the project and presents quantitative results and metrics when available. The tables are followed by more detailed descriptions of the projects, along with further supporting information.

The case studies are divided into two distinct sections: the first, “Successful or Progressing Projects,” comprises 13 case studies, and the second, “Cancelled or Postponed Projects,” comprises ten case studies. The first section provides examples of projects that have been completed successfully or are in progress with no significant delays or difficulties.

The second section covers examples of projects that have been completely cancelled or significantly postponed, or that have suffered serious setbacks, due to any number of factors, including technological difficulties, customer complaints, funding problems, etc. In most cases, the public utility commissions (PUCs) or other bodies overseeing

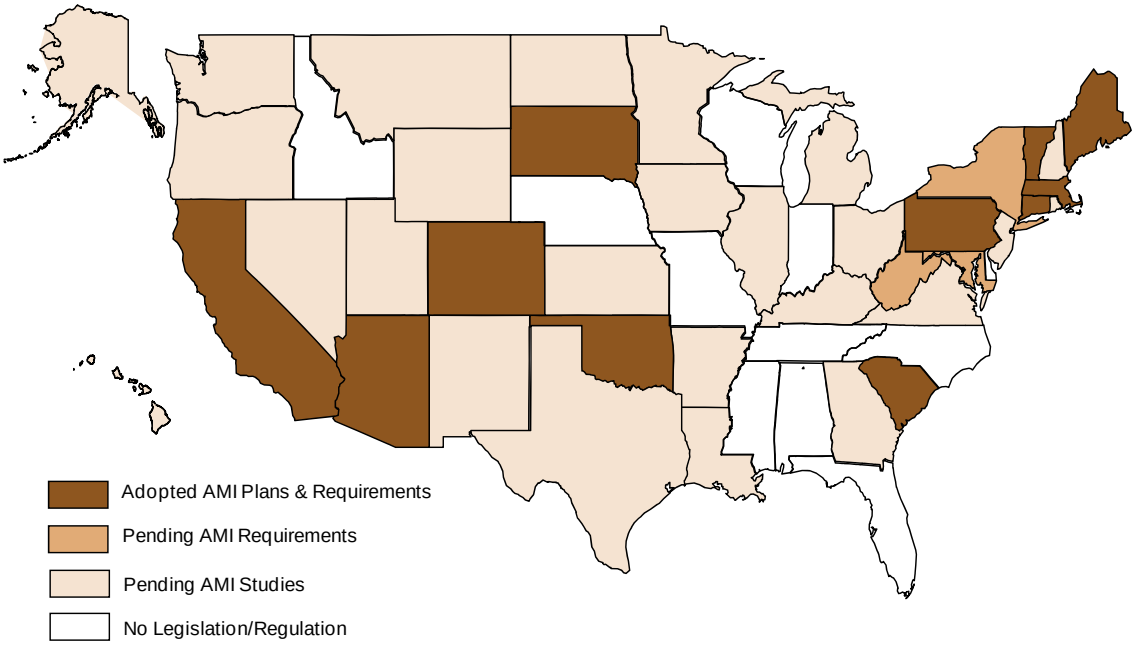
The projects have stipulated that these programs may continue as long as certain criteria are met, such as modifying a dynamic pricing structure or solving technical difficulties. The project case studies in the second grouping contain additional information, including a discussion of the reasons for the cancellation or postponement of the project.

International Smart Grid Activities

The third document contains research on international smart grid projects and looks at whether or not there are learns to be learned that could benefit the U.S. and/or how developments in the U.S. may proceed.

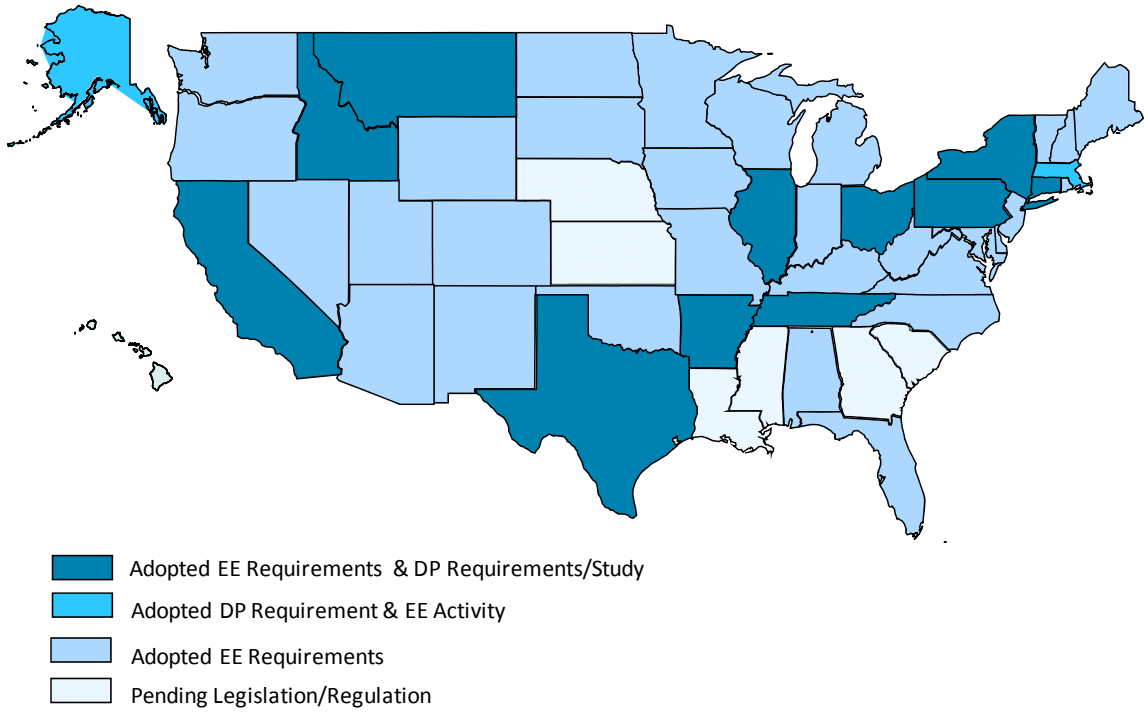
Below is a comparison of recent EIA-861 data for AMI and State driven AMI Legislation & Regulation:

Advanced Metering Legislation & Regulation



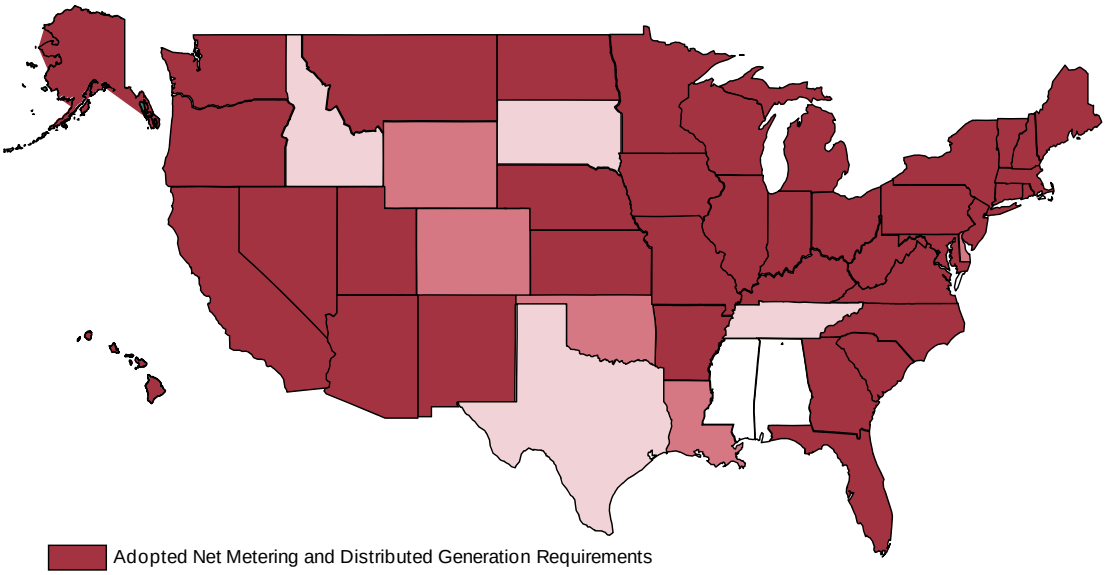
Notes:
Adopted AMI Requirements: *In addition to direct orders to deploy AMI, this includes orders from the state public utility commissions directing utilities to file deployment plans. Does not include regulation or laws that serve only to authorize or simply promote AMI deployment. The state of Maine also has pending legislation to place a temporary moratorium on deployment.*
Pending AMI Studies: *Includes states in which the legislature or public utility commission is studying the effects of pilot programs and large scale deployments. This also includes the public utility commission decisions to study the effectiveness of requiring implementation of PURPA Standard 14 (Time-Based Metering and Communications) of EPAct 2005 on a utility-by-utility basis.*
Source: SAIC

Demand Response Legislation & Regulation



Notes: DP = Dynamic Pricing, EE = Energy Efficiency
Dynamic Pricing Requirement: *Includes orders mandating that utilities offer dynamic pricing. Please note that some states have declined adoption of PURPA Standard 14 (Time-Based Metering and Communications) of EPAct 2005 and have not implemented other dynamic pricing mandates since the utilities in the state already offer these options.*
Dynamic Pricing Study: *Includes states which have indicated in a proceeding to address adoption of PURPA Standard 14 of EPAct 2005 that they would investigate time of use (TOU) rates on a utility-by-utility basis.*
Energy Efficiency Requirement: *Includes rules requiring the development of programs, development of standards, and rules requiring the incorporation of energy efficiency into the Integrated Resource Planning (IRP) process. Also includes changes to rules governing how energy efficiency and conservation are measured by the public utility commissions in evaluating achievement of goals and standards. New rules governing cost recovery in energy efficiency programs are also included.*
Source: SAIC

Net metering & distributed generation legislation & regulation



Notes:
***Net Metering or Distributed Generation Requirement**: Includes rules requiring utilities to offer net metering or distributed generation and rules guiding which types of systems qualify. Some states' proceedings are specific to renewable energy sources or energy storage. This also includes the rules throughout the states supporting homeowners' rights to solar and wind access for creating distributed generation systems on their property. States have also passed laws governing the creation of loan programs, solar rebate programs, goals for achieving certain amounts of distributed generation by IOU customers, and other measures supporting renewable distributed generation which have been included.*
Source: SAIC

Attachment A

Smart Grid Legislative and Regulatory Proceedings

November 15, 2011

Prepared by SAIC

Prepared for the
Energy Information Administration

Contents

Table of Acronyms

Abbreviation	Name
AB	Assembly Bill
ACC	Arizona Corporation Commission
ACEEE	American Council for an Energy-Efficient Economy
ADS	Association for Demand Response and Smart Grid
AEP	American Electric Power
AERS	Alternative Energy Resource Standard
AMI	Advanced Metering Infrastructure
APS	Arizona Public Service
ARRA	American Recovery and Reinvestment Act
BGE	Baltimore Gas & Electric
BPA	Bonneville Power Administration
BPU	Board of Public Utilities
CAISO	California Independent System Operator
CHP	Combined Heat and Power
CL&P	Connecticut Light and Power
CMP	Central Maine Power
CPP	Critical Peak Pricing
CVPS	Central Vermont Public Service
DG	Distributed Generation
DOE	Department of Energy
DPU	Department of Public Utilities
DRCC	Demand Response Coordinating Committee
DRWG	Demand Response Working Group
DSM	Demand Side Management
EDC	Electric Distribution Company
EERS	Energy Efficiency Resource Standard(s)
EISA	Energy Independence and Security Act
EPAct	Energy Policy Act
ETO	Energy Trust of Oregon
FEECA	Florida Energy Efficiency and Conservation Act
FERC	Federal Energy Regulatory Commission
FPL	Florida Power and Light
GW	Gigawatt
GWh	Gigawatt-hour

Abbreviation	Name
HB	House Bill
HCR	House Concurrent Resolution
HF	House File
HJR	House Joint Resolution
HOA	Homeowners Association
HP	House Paper
HR	House Resolution
HSB	House Study Bill
ICC	Illinois Commerce Commission
IOU	Investor Owned (Electric) Utility
IPL	Interstate Power and Light
IRP	Integrated Resource Plan
ISO	Independent System Operator
IUB	Iowa Utilities Board
IURC	Indiana Utility Regulatory Commission
KCC	Kansas Corporation Commission
KCP&L	Kansas City Power and Light
kV	Kilovolt
kW	Kilowatt
kWh	Kilowatt-hours
LB	Legislative Bill
LD	Legislative Decision
LR	Legislative Resolution
LEED	Leadership in Energy and Environmental Design
LIPA	Long Island Power Authority
MISO	Midwest Independent Transmission System Operator
MW	Megawatt
MWh	Megawatt-hour
NCEP	National Council on Electricity Policy
NCUC	North Carolina Utilities Commission
NEEA	Northwest Energy Efficiency Alliance
NPCC	Northwest Power and Conservation Council
OCC	Oklahoma Corporation Commission
PBF	Public Benefits Fund

Abbreviation	Name
PEPCO	Potomac Electric Power Company
PGE	Portland General Electric
PJM	Pennsylvania, New Jersey and Maryland (Interconnection)
PNM	Public Service Company of New Mexico
PRC	Public Regulation Commission
PSB	Public Service Board
PSC	Public Service Commission
PSO	Public Service Company of Oklahoma
PUC	Public Utility Commission
PURPA	Public Utility Regulatory Policies Act
PV	Photovoltaic
QF	Qualifying Facility
RCA	Regulatory Commission of Alaska
REC	Renewable Energy Credit(s)
REPS	Renewable Energy and Energy Efficiency Portfolio Standard(s)
RETA	Renewable Energy Transmission Authority
RIM	Ratepayer Impact Measure test
RMP	Rocky Mountain Power
RTP	Real Time Pricing
SB	Senate Bill
SCC	State Corporation Commission
SCR	Senate Concurrent Resolution
SCE	Southern California Edison
SEP	State Energy Plan
SEU	Sustainable Energy Utility
SGIC	Smart Grid Information Clearinghouse
SP	Senate Paper
SWEEP	Southwest Energy Efficiency Project
TEP	Tucson Electric Power
TOU	Time of Use
TVA	Tennessee Valley Authority
WUTC	Washington Utilities and Transportation Commission

Executive Summary

This report reviewed available legislation and/or regulation related to smart grid available in open source information for all 50 States and the District of Columbia. Key findings are summarized with maps displaying the extent of legislative and regulatory actions.

Advanced Metering Infrastructure (AMI)

By mid-2011, more states are considering smart grid deployment incentives, customer savings and protection, and cyber security at the legislative level. According to the National Conference of State Legislatures, at least nine state legislatures (Colorado, Hawaii, Illinois, Kansas, Massachusetts, Maine, Mississippi, New York and North Carolina) discussed bills in the 2011 session that promote smart grid deployment or smart meter installations. [1] In the 2007 to 2008 timeframe most of the states have ruled against adopting the "Time-Based Metering and Communications" standards included in the federal PURPA Standard 14 enacted in the 2005 EPAct, instead deciding to review the utility plans on a case by case basis. Several states, like Hawaii, are pursuing legislation to form technical guidance concerning smart grid implementation and AMI. In the District of Columbia, an AMI Task Force formed by the PSC is designing a detailed customer education plan to ensure customers are kept informed of how to take advantage of new energy usage data widely becoming available through the large scale smart meter rollout underway by PEPCO. The plan will address interval energy usage data availability, meter reading and billing, service restoration and reliability, and remote connect and disconnect features. [2] Figure ES-1 provides a map of legislative and regulatory efforts to deploy AMI.

Smart Meter Data Privacy

States continue to form "working groups," "task forces," and other collaborative forums to open a discussion of smart meter data security and privacy. Three states (California, Colorado, and Oklahoma) have made significant progress in forming laws and regulations regarding smart meter data privacy. In California, Governor Edmund G. Brown Jr. signed Senate Bill 674 legislation into law in September 2011 declaring that an electrical corporation shall not share, disclose, or otherwise make accessible to any third-party a customer's electrical consumption meter data without the consent of the customer. Earlier in the year, the California Public Service Commission also outlined 1) rules governing access to customer usage data by customers and by authorized third-parties and 2) rules to protect the privacy and security of customer data through Rulemaking 08-12-009, Decision No. 11-07-056. In February 2011, the Colorado State Legislature passed HB 1191 on "Utility Resource Usage Data Sharing" requiring the Public Utility Commission to certify independent data aggregators in sharing aggregated customer data with the requirement that a customer's personally identifiable information is removed. [3] Oklahoma House Bill 1079 was passed which allows electric utilities to utilize customer-identifiable usage data for certain internal business purposes without customer consent. [4]

Twelve other states are also in the process of forming rules governing data privacy. Illinois formed the Statewide Smart Grid Collaborative to address data security among other issues. Maine passed Legislative Decision 756 which requires the Maine Public Utility Commission address regulatory gaps between federal and state law regarding smart meters, customer data, and cyber security. [5] The Louisiana Public Utility Commission has a docket proceeding underway to addresses the release or sharing of customer data

1 States Providing for Smart Metering. Accessed 2/11/11. http://www.ncsl.org/?tabid=20672
2 DC PSC, Order No. 16484. Accessed 11/15/11. http://www.dcpsc.org/pdf_files/commorders/orderpdf/orderno_16484_FC1056.pdf
3 Colorado General Assembly, HB 1191. Accessed 9/20/11. http://www.leg.state.co.us/CLICS/CLICS2011A/csl.nsf/MainBills?openFrameset
4 Oklahoma State Legislature, Bill Information for HB 1079. Accessed 9/16/11. http://www.oklegislature.gov/BillInfo.aspx?Bill=HB1079&Tab=0
5 Maine PUC, HP0563, LD 756, Item 1, 125th Maine State Legislature. Accessed 9/15/11. http://www.mainelegislature.org/legis/bills/bills_125th/billpdfs/HP056301.pdf

(Docket No. R-29213).[6] The states of Maryland, Massachusetts, Nevada, New York, Ohio, Oregon, Pennsylvania, Texas, and Vermont have opened similar proceedings in recent months to address data security and are currently gathering comments from stakeholders and holding public meetings and hearings, though finalized orders from the commissions have yet to be created.[7]

Smart Meter "Opt-Out" Policy

The public outcry calling for smart meter alternatives earlier this year in California seems to have reverberated across the country regarding laws governing whether an "opt-out" choice must be provided. Four states have legislative or regulatory activity in this area; three states with pending laws and rules, and one state with finalized laws. Assembly Bill 37 pending passage in California would require utilities provide customers with a smart meter alternative. This particular bill has been in committee since May 2011, and may be brought forth again in the 2012 legislative session.[8] The Vermont Public Service Board has pending rules on an opt-out policy requiring a fee for declining smart meters. Massachusetts also has pending legislation for an opt-out choice. In one case, successful legislation has been passed. The passage of Maine Legislative Decision 756 allows a customer to decline the installation of the wireless smart meter or have a wired smart meter installed as an alternative to the wireless smart meter.[9]

Encouragement of Net Metering and Distributed Generation

In recent legislative sessions, bills have been proposed encouraging the development of distributed renewable generation. Section 20 CCR 2700 of California law now requires the California Energy Commission to implement regulations requiring sellers of production homes with subdivision maps completed after January 1, 2011 to offer a solar energy system option to all prospective homebuyers.[10] In July 2011, the Governor of Hawaii approved the creation of a working group to study the feasibility of requiring all new single-family residential construction to incorporate design elements and minimum equipment installation at the time of construction to facilitate the future adoption of a photovoltaic system.[11] California, Illinois, and Texas have already implemented laws preventing home owner associations (HOAs) from restricting the ability of homeowners to install solar electricity generation systems. Forty-seven States also have rules governing the interconnection of renewable distributed generation. Net metering enables customers to sell their distributed generation to utilities, but according to DSIRE six states (Texas, Idaho, South Dakota, Mississippi, Alabama, and Tennessee) do not have net metering policies, or have voluntary policies only.[12] . Figure ES-2 provides a map of legislative and regulatory efforts to promote net metering and distributed generation.

Demand Response

Figure ES-3 shows how prevalent energy efficiency laws and regulations are throughout the United States, while Dynamic Pricing efforts are just beginning. According to ACEEE, 21 states have yet to finalize energy efficiency resource standards.[13] A large portion of states with standards have updated their energy efficiency goals, and these updates are reflected in the individual state profiles.

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6 Louisiana PSC, Docket No. R-29213 Subdocket A. Accessed 9/22/11. http://lpscstar.louisiana.gov/star/portal/lpsc/page/docket-docs/PSC/DocketDetails.aspx

7 ADS, Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: May 2010 – June 2011 Accessed 9/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2010%20-%2011%20DR%20%20SG%20State%20Policy%20Survey_11%2007%2007_FINAL%20%282%29.pdf
Illinois Statewide Smart Grid Collaborative. Accessed 9/15/11. http://www.ilgridplan.org/default.aspx

8 California State Legislature, AB 37. Accessed 9/19/11. http://www.legislature.ca.gov/cgi-bin/port-postquery?bill_number=ab_37&sess=CUR&house=A&author=huffman

9 Maine PUC, HP0563, LD 756, Item 1, 125th Maine State Legislature. Accessed 9/15/11. http://www.mainelegislature.org/legis/bills/bills_125th/billpdfs/HP056301.pdf

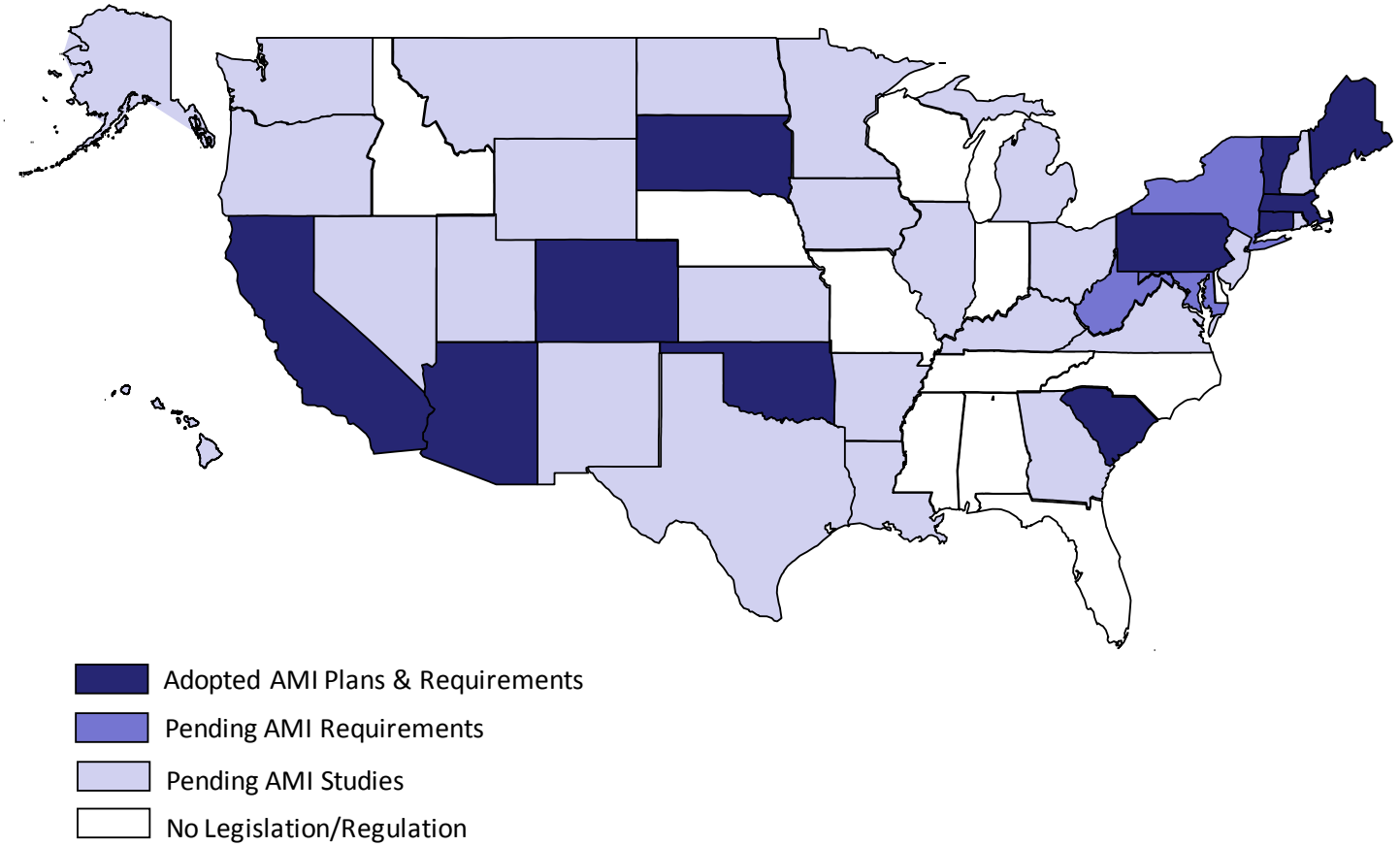
10 California Energy Commission, Proposed Regulations for the Homebuyer Solar Option and Solar Offset Program. Accessed 9/14/11. http://www.energy.ca.gov/2010-SOPR-1/documents/Text_of_Modified_Regulations_15-Day_Language.pdf

11Hawaii State Legislature, SB 181. Accessed 9/19/11. http://www.capitol.hawaii.gov/session2011/lists/measure_indiv.aspx?billtype=SB&billnumber=181

12 DSIRE, Net Metering Policies. Accessed 10/5/11. http://www.dsireusa.org/summarymaps/index.cfm?ee=1&RE=1

13 ACEEE, Energy Efficiency Resource Standards. Accessed 10/5/11. http://www.aceee.org/topics/eers

Figure ES-1. Advanced Metering Legislation & Regulation



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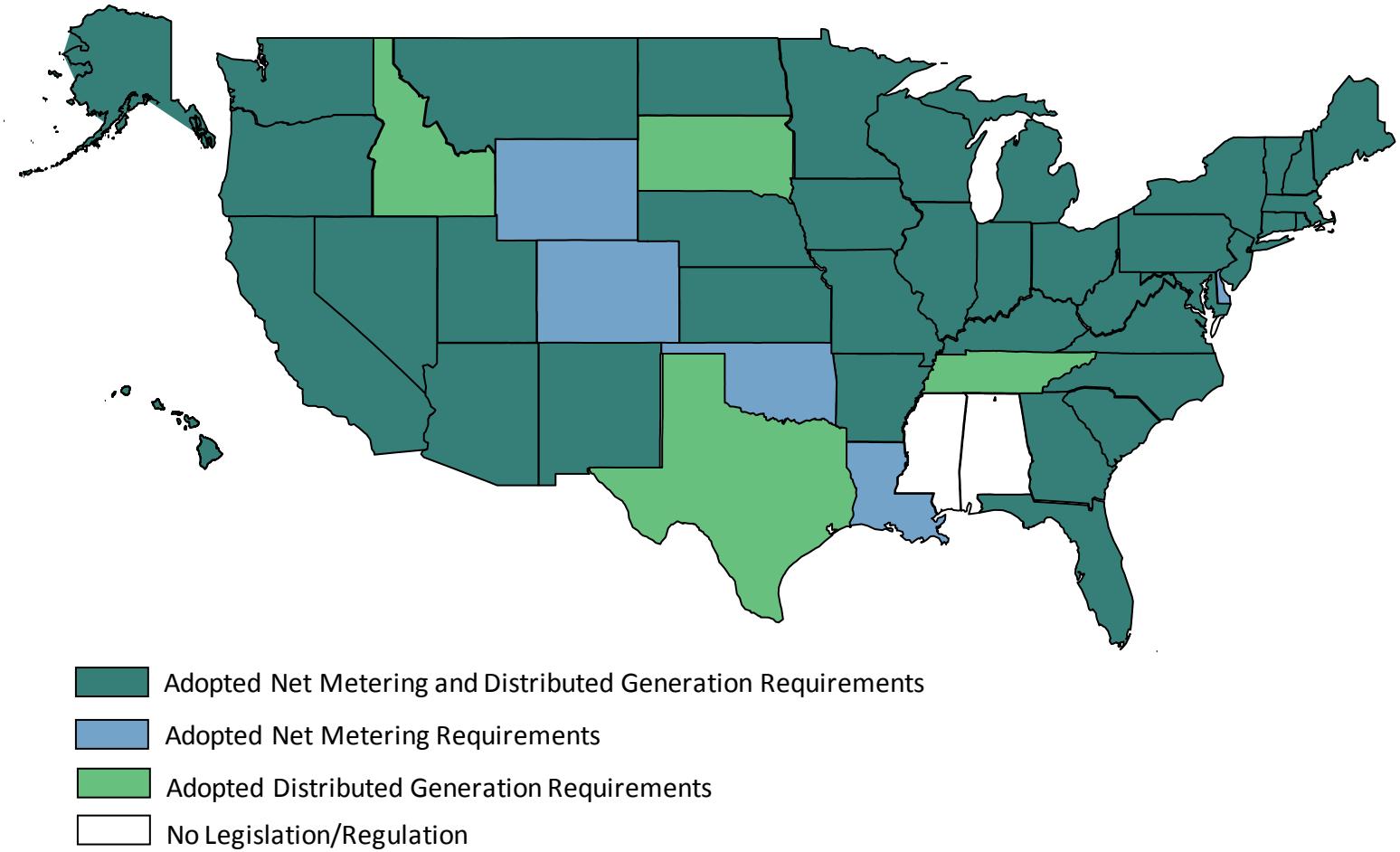
Source: SAIC

Figure ES-2. Net Metering & Distributed Generation Legislation & Regulation



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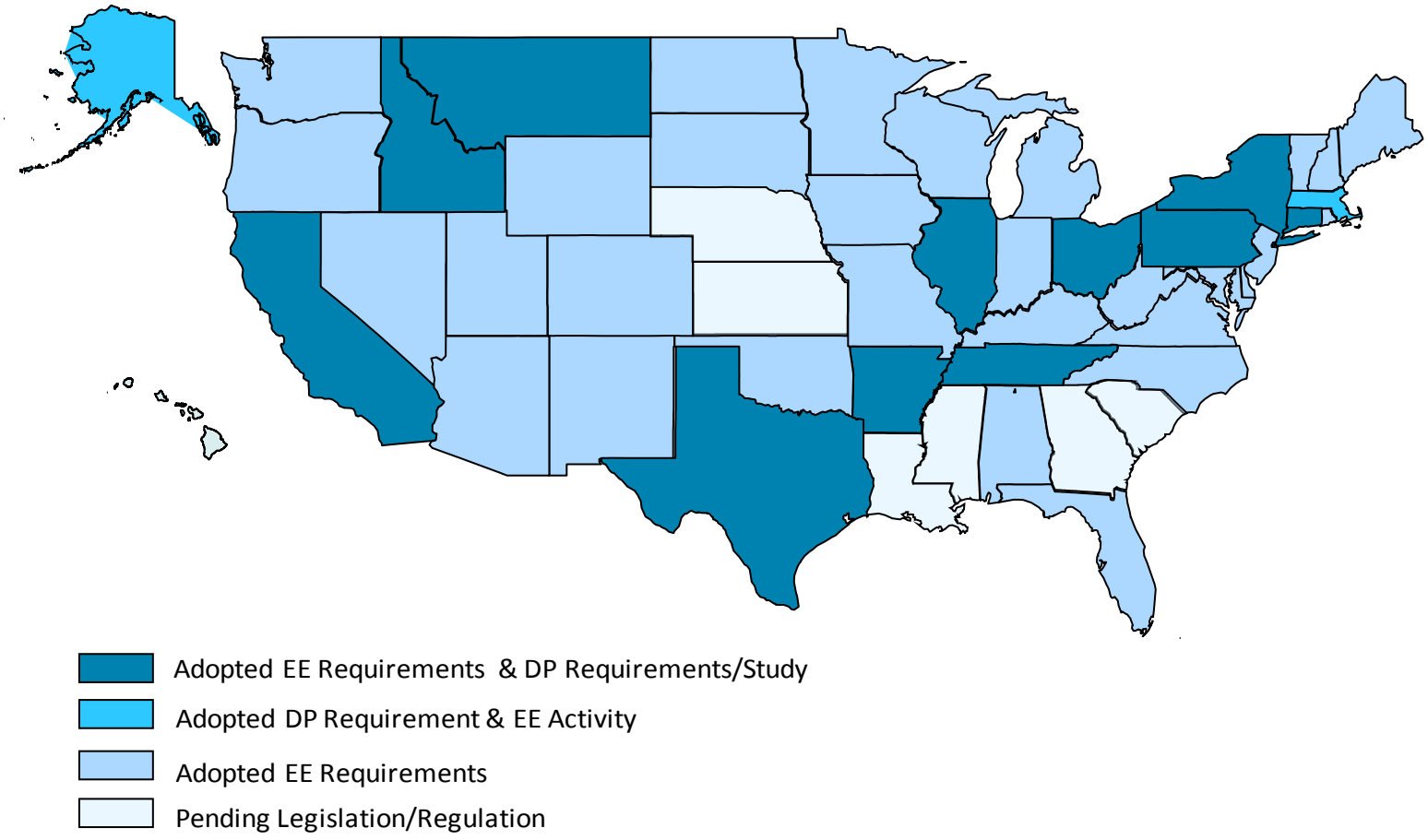
Source: SAIC

Figure ES-3. Demand Response Legislation & Regulation



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Source: SAIC

Introduction

This document, originally created in February and March 2011 and updated in September and October 2011, contains a summary of the smart grid legislative and regulatory proceedings at the state level as they relate to the smart grid programs. The review provides a high-level view of the most important and recent activities in the smart grid arena for each state. A table is provided for each state that summarizes significant and recent smart grid actions at the legislative and regulatory level. In additional, key smart grid initiatives are highlighted and described in more depth in a brief text overview provided for each state. Common sources referenced in this document include the Database of State Incentives for Renewable Energy (DSIRE) database, and the American Council for an Energy-Efficient Economy (ACEEE). The Smart Grid Information Clearinghouse (SGIC) website was frequently used in gathering information for the state legislation and regulation profiles. The U.S. Department of Energy selected the Virginia Tech Advanced Research Institute to develop and maintain the SGIC website as a source of information for demonstration projects, standards, legislation, policy, regulation, best practices, and other topics regarding smart grid technology. The Association for Demand Response and Smart Grid (ADS) report titled "State Legislative and Regulatory Policy Action Review: May 2010 – June 2011" and National Conference of State Legislatures' "2011 Smart Grid Legislation" webpage were also referenced in compiling the latest legislative and regulatory activities in each state.

This document also refers to the PURPA Standard 14 enacted in the 2005 Energy Policy Act (EPAct), which consists of the "Time-Based Metering and Communications" standards. This standard requires an electric utility provide a time-based rate schedule to consumers and enable the electric consumer to manage energy use and costs through smart meters.

In developing this document, the following topics were analyzed from a legislative and regulatory perspective for each U.S. state and the District of Columbia:

- Demand side management
- Demand response
- Energy efficiency projects
- Advanced/smart metering
- Net metering
- Distributed and intermittent generation interconnection
- Dynamic pricing

Three tables were created to characterize the types of regulatory and legislative activity currently existing or pending in each state. Many of the states have adopted legislation and/or regulations regarding Advanced Metering Infrastructure (AMI), net metering, distributed generation interconnections, and demand response. Where the law or regulation is proposed but not signed, it is called "pending," otherwise it is considered "adopted." To further differentiate the nature of the law, "Requirements" is used if goals or targets are set and "Study" is used if the law and/or regulation request that parties investigate an issue further and report back. "X" is shown in each cell to indicate what the legislation and/or regulation addresses in the subsequent pages organized by State.

- Table 1. Existing or Pending Legislative or Regulatory Activity for Advanced Metering Infrastructure (AMI)
- Table 2. Existing or Pending Legislative or Regulatory Activity for Net Metering and Distributed Generation/Interconnection
- Table 3. Existing or Pending Legislative or Regulatory Activity for Demand Response

Table 1. Existing or Pending Legislative or Regulatory Activity for Advanced Metering Infrastructure (AMI)

STATE	Adopted			Pending						
	AMI Deployment Plans	AMI Data Privacy/ Security Req't	AMI/Smart Meter Opt-Out Req't	AMI Deployment			AMI Data Privacy/ Security		AMI/Smart Meter Opt-Out	
				Req't	Mora-torium	Study	Req't	Study	Req't	Study
Alabama										
Alaska						X				
Arizona	X									
Arkansas						X				
California	X	X				X			X	
Colorado		X								
Connecticut	X									
Delaware										
District of Columbia						X				
Florida										
Georgia						X				
Hawaii						X				
Idaho										
Illinois						X		X		
Indiana										
Iowa						X				
Kansas						X				
Kentucky						X				
Louisiana						X		X		
Maine			X		X		X			
Maryland				X				X		
Massachusetts	X					X	X			
Michigan						X				
Minnesota						X				
Mississippi										
Missouri										
Montana						X				
Nebraska										
Nevada						X		X		

STATE	Adopted			Pending						
	AMI Deployment Plans	AMI Data Privacy/ Security Req't	AMI/Smart Meter Opt-Out Req't	AMI Deployment			AMI Data Privacy/ Security		AMI/Smart Meter Opt-Out	
				Req't	Mora-torium	Study	Req't	Study	Req't	Study
New Hampshire						X				
New Jersey						X				
New Mexico						X				
New York				X				X		
North Carolina										
North Dakota						X				
Ohio						X		X		
Oklahoma		X								
Oregon								X		
Pennsylvania	X					X		X		
Rhode Island						X				
South Carolina	X									
South Dakota	X									
Tennessee										
Texas						X		X		
Utah						X				
Vermont	X							X		X
Virginia						X				
Washington						X				
West Virginia				X						
Wisconsin										
Wyoming						X				

Notes:

***Adopted AMI Deployment**: In addition to direct orders to deploy AMI, this includes orders from the state public utility commissions directing utilities to file deployment plans. Does not include regulation or laws that serve only to authorize or simply promote AMI deployment. The state of Maine also has pending legislation to place a temporary moratorium on deployment.*

***Pending AMI Deployment**: Includes states in which the legislature or public utility commission is studying the effects of pilot programs and large scale deployments. This also includes the public utility commission decisions to study the effectiveness of requiring implementation of PURPA Standard 14 (Time-Based Metering and Communications) of EPAct 2005 on a utility-by-utility basis.*

Table 2. Existing or Pending Legislative or Regulatory Activity for Net Metering and Distributed Generation/Interconnection

	Adopted			Pending			
	Net Metering	Distributed Generation		Net Metering		Distributed Generation	
STATE	Req't	Req't	Study	Req't	Study	Req't	Study
Alabama							
Alaska	X	X			X		
Arizona	X	X					
Arkansas	X	X					
California	X	X					
Colorado	X		X				
Connecticut	X	X			X		
Delaware	X						
District of Columbia	X	X					
Florida	X	X					
Georgia	X	X				X	
Hawaii	X	X	X				
Idaho		X					X
Illinois	X	X		X	X		
Indiana	X	X					
Iowa	X	X					
Kansas	X	X	X				
Kentucky	X	X					
Louisiana	X						
Maine	X	X					
Maryland	X	X					
Massachusetts	X	X					
Michigan	X	X					
Minnesota	X	X					
Mississippi							
Missouri	X	X					
Montana	X	X					
Nebraska	X	X					
Nevada	X	X					
New Hampshire	X	X					
New Jersey	X	X					

	Adopted			Pending			
	Net Metering	Distributed Generation		Net Metering		Distributed Generation	
STATE	Req't	Req't	Study	Req't	Study	Req't	Study
New Mexico	X	X					
New York	X	X					
North Carolina	X	X					
North Dakota	X	X					
Ohio	X	X					
Oklahoma	X						
Oregon	X	X					
Pennsylvania	X	X					
Rhode Island	X	X					
South Carolina	X	X					
South Dakota		X					
Tennessee		X					
Texas		X					
Utah	X	X					
Vermont	X	X					
Virginia	X	X					
Washington	X	X					
West Virginia	X	X					
Wisconsin	X	X					
Wyoming	X						

Notes:

Net Metering or Distributed Generation Requirement*: Includes rules requiring utilities to offer net metering or distributed generation and rules guiding which types of systems qualify. Some states' proceedings are specific to renewable energy sources or energy storage. This also includes the rules throughout the states supporting homeowners' rights to solar and wind access for creating distributed generation systems on their property. States have also passed laws creating loan programs and other measures supporting renewable distributed generation.*

Net Metering or Distributed Generation Study*: Includes any current or pending study or investigation by the legislature or public utility commission into changes to net metering or distributed generation interconnection rules or other types of requirements stated above.*

Table 3. Existing or Pending Legislative or Regulatory Activity for Demand Response

	Adopted				Pending			
	Dynamic Pricing		Energy Efficiency		Dynamic Pricing		Energy Efficiency	
STATE	Req't	Study	Req't	Study	Req't	Study	Req't	Study
Alabama			X					
Alaska	X						X	
Arizona			X					
Arkansas		X	X			X		X
California	X	X	X					
Colorado			X	X				
Connecticut	X		X					
Delaware			X					
District of Columbia			X					
Florida			X					
Georgia						X	X	X
Hawaii							X	
Idaho	X		X					
Illinois	X		X	X		X	X	
Indiana			X					
Iowa			X			X		
Kansas				X	X			
Kentucky			X		X			
Louisiana				X		X		
Maine			X					
Maryland			X			X		
Massachusetts	X			X			X	
Michigan			X			X		
Minnesota			X			X		
Mississippi				X				
Missouri			X					
Montana	X		X			X		
Nebraska				X				
Nevada			X					
New Hampshire			X			X		
New Jersey			X				X	
New Mexico			X					

	Adopted				Pending			
	Dynamic Pricing		Energy Efficiency		Dynamic Pricing		Energy Efficiency	
STATE	Req't	Study	Req't	Study	Req't	Study	Req't	Study
New York	X		X			X		
North Carolina			X					
North Dakota			X			X		
Ohio	X		X					
Oklahoma			X					
Oregon			X					
Pennsylvania	X		X					
Rhode Island			X			X		
South Carolina							X	
South Dakota			X					
Tennessee	X		X					
Texas	X		X					
Utah			X			X		
Vermont			X					
Virginia			X					X
Washington			X	X		X		
West Virginia			X					
Wisconsin			X					
Wyoming			X					

Notes:

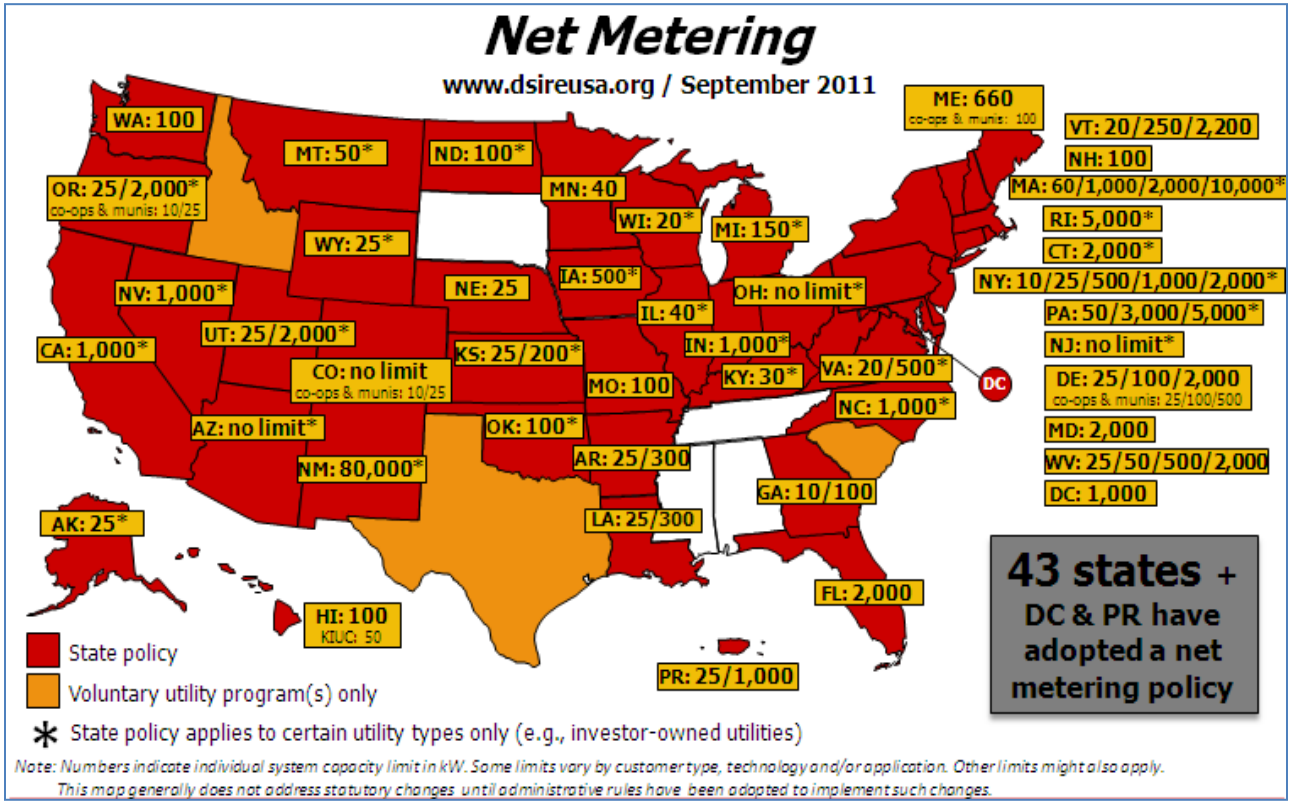
Dynamic Pricing Requirement: *Includes orders mandating that utilities offer dynamic pricing. Please note that some states have declined adoption of PURPA Standard 14 (Time-Based Metering and Communications) of EPAct 2005 and have not implemented other dynamic pricing mandates since the utilities in the state already offer these options.*

Dynamic Pricing Study: *Includes states which have indicated in a proceeding to address adoption of PURPA Standard 14 of EPAct 2005 that they would investigate time of use (TOU) rates on a utility-by-utility basis.*

Energy Efficiency Requirement: *Includes rules requiring the development of programs, development of standards, and rules requiring the incorporation of energy efficiency into the Integrated Resource Planning (IRP) process. Also includes changes to rules governing how energy efficiency and conservation are measured by the public utility commissions in evaluating achievement of goals and standards. New rules governing cost recovery in energy efficiency programs are also included.*

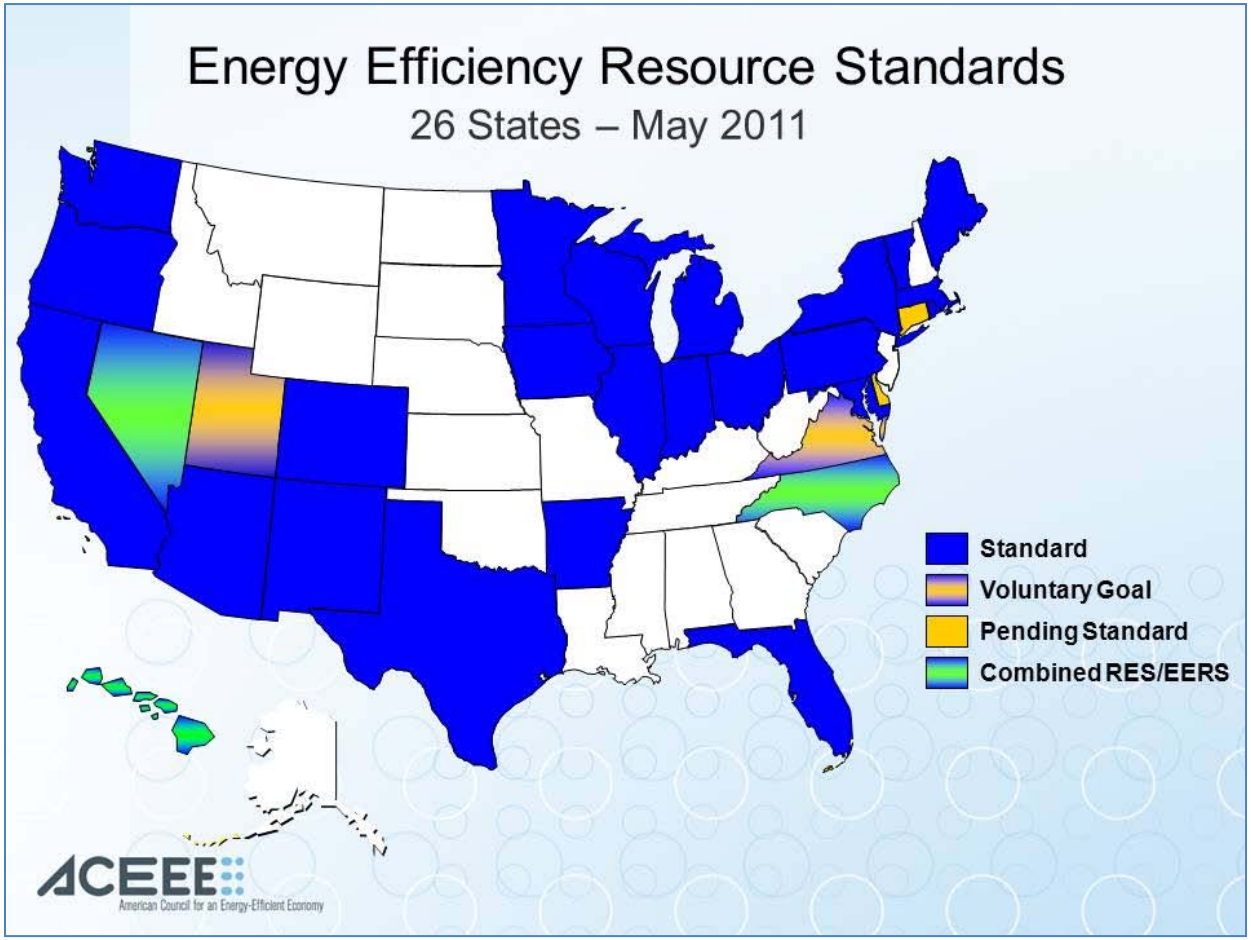
Figures 1 and 2, created by DSIRE and ACEEE, were used as a source in creating Tables 2 and 3.

Figure 1: U.S. States that Have Adopted a Net Metering Policy



Source: DSIRE

Figure 2: U.S. States that Have Adopted Energy Efficiency Resource Standards



Source: ACEEE

Alabama

Item	Title	Dates	Description
Legislative			
None Identified			
Regulatory			
Docket No. 30066	EPAct/PURPA Standard 14	June 2007	The Alabama PSC evaluated the EPAct, PURPA Standard 14 for adoption as a state mandate and decided against adoption since TOU pricing and smart meters have already been made available to customers. [14]
Executive Order 33	Executive Order 33	May 2006	Requires state agencies to reduce energy consumption in all conditioned facilities by 10 percent by the end of 2008 and 20 percent by the end of 2010 from 2005 levels. An Energy Officer is to be assigned by each agency to oversee the implementation of energy efficiency programs. [15]

Alabama Power Company offers TOU rates to all customer classes in accordance with the 2005 EPAct, PURPA Standard 14 though the Alabama PSC decided not to adopt PURPA Standard 14.[16] Alabama Power began installing smart meters in the city of Birmingham, and completed its installations for all customers at the end of 2010.[17] Southern Company, which owns Alabama Power (along with Georgia Power, Gulf Power, and Mississippi Power), is currently developing a customer web portal that enables customers to program their thermostats remotely and view their energy usage via the Internet. [18]

Alabama's state government offers energy efficiency-related retrofit and audit incentives for industry and the public sector and funds educational programs.[19] Alabama's Local Government Energy Loan Program offers zero-interest loans to local governments and schools for renewable energy systems (biomass, hydropower, geothermal energy, wind energy, and solar energy) as well as energy efficiency improvements that will eventually have a payback through utility savings.[20]

[14] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/11/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

[15] Alabama Lead by Example Initiatives. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Alabama/161/all/202

[16] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/11/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

[17] States Providing for Smart Metering. Accessed 2/11/11. http://www.ncsl.org/?tabid=20672
GreenBiz.com, Alabama Power Finds a New Benefit for Smart Meters: Disaster Recovery, 9/15/11. Accessed 9/26/11. http://www.greenbiz.com/news/2011/09/15/alabama-power-finds-new-benefit-smart-meters-disaster-recovery

[18] Southern Company, About Us. Accessed 2/7/11. http://www.southerncompany.com/aboutus/home.aspx
Southern Company, Championing Energy Efficiency. Accessed 9/26/11. http://www.southerncompany.com/corporateresponsibility/electricity/championing.aspx

[19] State Energy Efficiency Policy Database, Alabama Utility Policies. Accessed 2/14/11. http://www.aceee.org/sector/state-policy/alabama

[20] Alabama Clean Distributed Generation. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Alabama/161/all/195

Alaska

Item	Title	Dates	Description
Legislative			
HB 37	An Act Relating to the Net Metering of Electric Energy … Utility's Retail Consumers	1/18/2011	Promotes private investment in renewable energy systems by giving customers a net metering option; allows customers to apply credits towards the following billing period or sell unused credits back to the retailer. Referred to the Energy Committee on 1/18/2011.[21]
HB 306	An act declaring a state energy policy	June 2010	Addressed Alaska's state energy policy, including a renewable electricity goal, and a goal to reduce per capita electricity use in the state by 15 percent by 2020. This goal must be translated into specific requirements for utilities in order to qualify as an EERS. Signed into law 7/9/2010.[22]
SB 220	Energy Efficiency/ Alternative Energy	7/9/2010, 6/16/2010	Mandates energy efficiency retrofits by 2020 of 25 percent of the state's public buildings that are 10,000 square feet or larger, not including legislative or court buildings. Signed into law 7/9/2010.[23]
NA	State Energy Policy and Program Recommendations	October 2009	Recommendation of the Senate Energy Policy Group (including members of the Senate Resources Committee and Senate Energy Committee) that the state establish a larger pilot program to install smart meters in homes and businesses.[24]
AK Statutes 34.15.145	Alaska Solar Easements	1980	Created contractual methods for entering into solar easements such that multiple parties can create contracts for the purpose of ensuring adequate exposure of a solar energy system.[25]
Regulatory			
RCA Order R-09-2(4)	Order Adopting Regulations Implementing an Interconnection Standard	5/5/11	After declining to adopt the interconnection standard proposed by EPAct 2005, the RCA approved interconnection guidelines addressing liability insurance, external disconnect switches, and application details, and interconnection safety standards.[26]
RCA, Article 3. Section 900, 910, 920, 930, 940, 949	Net Metering Standards	2009	The RCA issued an order adopting finalized net metering rules.[27]

In 1980 the state legislature addressed the need for DG by creating contractual methods for entering into solar easements for solar energy systems.[28] The RCA rules allow net metering up to 1.5 percent of each electric utility's average retail demand (roughly equivalent to 1 percent of peak demand). Systems must be owned or leased, and operated,

[21] Alaska State Legislature. Accessed 9/21/11. http://www.legis.state.ak.us/basis/get_bill.asp?session=27&bill=HB37
Alaska State House of Representatives, Sponsor Statement: HB 37, Net Energy Metering, Sponsored by Rep. Kurt Olson. Accessed 9/21/11. http://www.housemajority.org/spon.php?id=27HB37
[22] Alaska Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/alaska/176/all/191
[23] Alaska Lead by Example Initiatives. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Alaska/176/all/202
[24]Smart Grid Legal News, Alaska Resources. Accessed 10/3/11. http://www.smartgridlegalnews.com/alaska-resources.html
Alaska State Senate Resources and Energy Committees, State Energy Policy and Program Recommendations. Accessed 10/3/11. http://www.aksenate.org/energy/101909_Draft_E_policies.pdf
[25] DSIRE, Alaska Solar Easements. Accessed 2/4/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=AK01R&re=1&ee=1
[26] DSIRE, Alaska – Interconnection Guidelines. Accessed 9/14/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=AK04R&currentpageid=3&EE=1&RE=1
RCA, R-09-2 Order No. 4. Accessed 9/14/11. http://rca.alaska.gov/RCAWeb/ViewFile.aspx?id=e96a536c-91ed-47e6-9055-4d4598b824c2
[27] Interstate Renewable Energy Council, "Alaska RCA Finalizes Net Metering Rules." Accessed 2/4/11. http://irecusa.org/2010/01/alaska-rca-finalizes-net-metering-rules/
[28] SGIC. Accessed 2/4/11. http://www.sgiclearinghouse.org/Legislation

by the consumer, and have a cumulative nameplate capacity 25 kW or less.[29] According to the ACEEE there are very few utility customer energy efficiency programs in Alaska. Golden Valley Electric Association, Inc. has reported spending on energy efficiency programs such as business, residential, and consumer energy savings programs however the state government has been the main source of energy efficiency programs in the state.[30]

[29] Interstate Renewable Energy Council, "Alaska RCA Finalizes Net Metering Rules." Accessed 2/4/11. http://irecusa.org/2010/01/alaska-rca-finalizes-net-metering-rules/
[30] State Energy Efficiency Policy Database. Alaska Utility Policies. Accessed 2/11/11. http://www.aceee.org/sector/state-policy/alaska

Arizona

Item	Title	Dates	Description
Legislative			
HB 2122	Energy Policy Study Committee	1/18/11	Establishes an Energy Policy Study Committee to examine energy policy including energy supply, production, transportation, delivery, distribution, demand and prices. Promotes achievements supporting a reliable energy supply. The Committee will submit findings on or before September 30, 2013 to the governor and legislature. The bill is currently held in Committee.[31]
Arizona Revised Stat. Sec. 33-1816	Solar Energy Devices…	9/19/2007	Addressed contractual methods for entering into solar easements for solar energy systems for the development of DG resources.[32]
Regulatory			
Docket No. RE-00000C-09—0427, Decision No. 71436 and 71819	Proposed Rulemaking On Electric Energy Efficiency	July 2010, 12/18/2009	In 2009, the ACC issued an order that all IOUs and rural electric cooperatives achieve 1.25 percent annual savings as a percent of the retail energy sales in the prior calendar year, ramping up to two percent beginning in 2014. By 2020, the state should reach 20 percent cumulative savings, plus up to a two percent credit for peak demand reductions from demand response programs, for a total standard of 22 percent. In 2010, a ruling stated that demand response and load management may comprise up to two percentage points of the 22% energy efficiency standard. Utilities must file plans for DSM programs that meet the standard every two years and provide a progress report to the ACC in March of each year.[33]
ACC R14-2-2301 et seq.	Net Metering Rules	May 2009	Rules for IOUs and cooperative utilities specifying that net metering is available to customers who generate electricity using CHP technologies. Systems must be sized to meet all or part of a customer's electric load in that the system may not exceed 125 percent of the customer's total connected load.[34]
Decision No. 69877	EPAct/PURPA Standard 14	8/28/2007	ACC adopted a modified version of PURPA Standard 14 (Time-Based Metering and Communications) in EPAct 2005.[35]

According to SWEEP, at least six utilities in Arizona currently offer electricity DSM programs, a significant expansion compared to previous years. These utilities include APS, TEP, Salt River Project, Dixie-Escalante Rural Electric Cooperative, Navopache Electric Cooperative, and Sulphur Springs Valley Electric Cooperative.[36]

The modified version of EPAct 2005, PURPA Standard 14 adopted by the ACC requires each utility to offer a time-based rate schedule to appropriate customer classes as well as report any variances in the utility's wholesale generation costs regarding these rates. Additionally, each utility must examine the feasibility and cost-effectiveness of implementing AMI and move forward in deploying the technology if feasible and cost-effective.[37]

Arizona Public Service (APS) and Tucson Electric Power (TEP) operate a variety of DSM and energy efficiency programs, funded uniquely by each utility. An APS request for a rate Increase in Docket No. E-01345A-08-0172S, was approved as part of its energy efficiency implementation plan. TEP also received approval for modifications made to its DSM Program Portfolio.[38]

[31] Arizona State Legislature, HB 2122. Accessed 9/26/11. http://www.azleg.gov//FormatDocument.asp?inDoc=/legtext/50leg/1r/bills/hb2122o.asp&Session_ID=102
[32] DSIRE, Arizona Solar Energy Covenant Restrictions, accessed 2/4/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=AZ07R&re=1&ee=1
[33] Arizona Utility Policies. http://www.aceee.org/energy-efficiency-sector/state-policy/arizona/177/all/191, ACC, Docket No. RE-00000C-09—0427, Decision No. 71819, August 10, 2011. Accessed 9/15/11. http://images.edocket.azcc.gov/docketpdf/0000116125.pdf
[34] Arizona Clean Distributed Generation. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Arizona/177/all/195
[35] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008, accessed 2/4/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[36] SWEEP, Arizona Utility Energy Efficiency Programs, September 2011. Accessed 9/26/11. http://www.swenergy.org/programs/utilities/arizona.htm
[37] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008, accessed 2/4/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[38] Arizona Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/arizona/177/all/191

Arkansas

Item	Title	Dates	Description
Legislative			
HB 1895, Act 910	To Amend The Utility Facility Environmental And Economic Protection Act; To Clarify Requirements For Major Utility Facilities; To Declare An Emergency; And To Make Technical Corrections	4/4/2011	The PSC may determine the need for additional energy supply and transmission resources by public utilities in an energy resource "declaration-of-need" proceeding (a utility-specific proceeding conducted by the PSC under certain rules) for the expeditious resolution of matters concerning the location, financing, construction, and operation of a major utility facility in a single proceeding to which access will be open to public bodies enabling them to participate in decisions.[39]
SB 721	Arkansas Clean Energy Act	3/23/2011	Requires a utility include renewable energy resources as an integral part of its energy resource plan by filing a feed-in tariff with the PSC. Specifies requirements for the tariff. Senate will review the bill in the next scheduled session.[40]
Regulatory			
Docket No. 10-102-U, Docket No. 10-103-U, Docket No. 10-104-U	Adoption of a Sustainable Energy Resources Action Plan	December 10, 2010	Arkansas PSC issues orders for monitoring smart grid projects in Arkansas by initiating a docket for the consideration of smart grid, AMI, and related demand response technologies. All three dockets remain open with the PSC seeking comments regarding these topics.[41]
HB 2325, Arkansas Code § 23-18-603 et seq. and HB 2334, AR PSC Order No. 8, Docket 06-105-U	Net-metering rules for certain renewable-energy systems	10/01/2001 and 11/27/2007	Defines the availability of net metering, capacity limit for non-residential systems, and clarifies the ownership of renewable-energy credits (RECs).[42]
Arkansas Code § 23-18-603 et seq.	Interconnection Guidelines	11/27/2007, 10/01/2001	Defines the interconnection requirements of net-metered facilities to existing electric power systems that generate electricity using solar, wind, hydro, geothermal and biomass resources.[43]
Docket NO. 08-144-U	EPAct/PURPA Standard 14	August 2007	The Arkansas PSC decides not to adopt PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005.[44]
Docket 06-004-R	Rules for Conservation and Energy Efficiency Programs	May 2007	Requires utilities to file energy efficiency plans to implement cost-effective energy efficiency programs.[45]
Docket 06-028-R	Guidelines on Resource Planning for Electric Utilities	January 2007	Requires utilities to consider all generation, transmission, and demand response options in the region including an investigation of energy efficiency, conservation, DSM, interruptible load, and price responsive demand.[46]

[39] Arkansas State Legislature, HB 1895. Accessed 9/21/11. http://www.arkleg.state.ar.us/assembly/2011/2011R/Pages/BillInformation.aspx?measureno=HB1895
[40] Arkansas State Legislature, The Clean Energy Act of 2011. Accessed 9/21/11. http://www.arkleg.state.ar.us/assembly/2011/2011R/Pages/BillInformation.aspx?measureno=SB721
[41] APSC Sustainable Energy Resources (SER) Action Guide, December 2010, Arkansas Public Service Commission. Accessed 2/11/11. http://www.apscservices.info/pdf/08/08-144-U_153_1.pdf
[42] DSIRE, Arkansas – Net Metering. Accessed 2/9/11. www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=AR03R&re=1&ee=1
[43] DSIRE, Arkansas Interconnection Standards. Accessed 2/9/11. www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=AR06R&re=1&ee=1
[44] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/9/1. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[45] Arkansas Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Arkansas/178/all/191
[46] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/9/1. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

Arkansas has enacted legislation and Arkansas PSC approved expanded net-metering rules in 2007. Later the capacity limit for non-residential systems was raised from 100 kW to 300 kW and ownership of RECs was defined. The rules state that residential renewable-energy systems (solar, wind, hydroelectric, geothermal, biomass systems, fuel cells, and microturbines using renewable fuels) up to 25 kW in capacity and non-residential systems up to 300 kW are eligible for net metering.[47] Additionally systems must meet all performance standards established by local and national electric codes and utilities must use a PSC-approved standard interconnection agreement for interconnected facilities.[48]

In February 2010 the Arkansas PSC issued an order approving energy-efficiency plans filed by four electric utilities, including the administrators of their energy-efficiency education programs. The PSC also required utilities to report in detail on their current use of and future plans for smart grid, demand response, and AMI projects and investments in Arkansas such that the Commission could review all cases by the end of 2010. The PSC created its "Sustainable Energy Resources Action Guide" in December 2010 as a result of comments gathered through Docket No.08-144-U.[49]

On December 10, 2010 the Arkansas PSC issued 10 orders including 1) a docket for the consideration of smart grid, AMI and related demand response technologies and 2) a docket to consider (a) how electric vehicles will affect the electric grid and to explore whether policy changes are needed to address the charging of electric vehicles form the electric grid; and (b) the potential impact of natural gas vehicle fleets and to explore if policy changes are needed to address the fueling of natural gas vehicles from the natural gas distribution system; and 3) a docket to explore efficiency opportunities on the utility side of the meter. All three dockets remain open with the PSC seeking comments regarding these topics [50]

[47] DSIRE, Arkansas – Net Metering. Accessed 2/9/11. www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=AR03R&re=1&ee=1
Arkansas PSC, Net Metering Rules. Accessed 9/26/11. http://www.apscservices.info/rules/net_metering_rules.pdf
[48] DSIRE, Arkansas Interconnection Standards. Accessed 2/9/11. www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=AR06R&re=1&ee=1
[49] Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: October 2008 – May 2010, Prepared by the DRCC. Accessed 2/10/11, http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2009_DR-SG_Policy_Survey_FINAL_10.06.17%282%29.pdf
APSC Sustainable Energy Resources (SER) Action Guide, December 2010. Accessed 9/26/11. http://www.apscservices.info/pdf/08/08-144-U_153_1.pdf
[50] APSC Sustainable Energy Resources (SER) Action Guide, December 2010, Arkansas Public Service Commission. Accessed 2/11/11. http://www.apscservices.info/pdf/08/08-144-U_153_1.pdf

California

Item	Title	Dates	Description
Legislative			
SB 674	Telecommunications: master-metering: data security	9/7/2011	An electrical corporation shall not share, disclose, or otherwise make accessible to any third-party a customer's electrical consumption meter data without the consent of the customer. Signed into law by Gov. Edmund G. Brown Jr. 9/7/2011.[51]
Executive Order S-21-09, SBX1 2	NA	4/12/2011, 9/15/2009	Increases the renewable-energy resources requirement to 33% by 2020 for all utilities, including publicly-owned municipal utilities. Gov. Edmund Brown, Jr. signed additional legislation in 2011 requiring one-third of the state's electricity to come from renewable sources.[52]
AB 37	An Act to Add Section 8370 to the Public Utilities Code, Relating to Electricity, and Declaring the Urgency Thereof, to Take Effect Immediately	12/6/2010	Mandates that the PUC direct utilities to allow customers to decline the installation of smart meters, to offer alternative options to such customers, and suspend deployments until these requirements are met. The bill has been in committee since 5/9/2011.[53]
AB 2514	An Act to Amend Section 9620 of, and to Add Chapter 7.7 (Commencing With Section 2835) to Part 2 of Division 1 of, the Public Utilities Code, Relating to Energy.	9/29/2010	Establishes an energy-storage portfolio standard, signed into law by Gov. Arnold Schwarzenegger. Requires the PUC open a proceeding to determine targets for each load-serving entity to procure cost-effective energy storage systems.[54]
CA Pub Util Code § 2827, et seq., AB 510	An act to amend Section 2827 of the Public Utilities Code relating to energy.	2/26/2010, 1/1/1996	Requires all utilities, with one exception, to offer net metering to all customers for solar and wind-energy systems up to one MW. IOUs are also required to offer net metering for biogas-electric systems and fuel cells.[55]
AB 45	An act to add and repeal …Chapter 4 of Division 1 of Title 7 of the Government Code, relating to land use.	9/2/2009	Authorized counties to adopt ordinances to provide for the installation of small wind systems. Bill was passed in 2009.[56]
AB 32	Global Warming Solutions Act of 2006	2006	Sets the 2020 greenhouse gas emissions reduction goal into law and directs the California Air Resources Board to develop actions to reduce greenhouse gases while preparing a scoping plan to identify how to reach the 2020 limit. Bill was passed in 2006.[57]

[51] California State Legislature, SB 674. Accessed 9/20/11. http://www.legislature.ca.gov/cgi-bin/port-postquery?bill_number=sb_674&sess=CUR&house=B&author=padilla
[52] Executive Orders S-21-09. Accessed 2/28/11. http://www.pewclimate.org/docUploads/CA%20Exec%20order%20S-21-09.PDF
Office of Gov. Edmund Brown Jr., Governor Brown Signs Legislation to Boost Renewable Energy. Accessed 9/19/11. http://gov.ca.gov/news.php?id=16974
[53] California State Legislature, AB 37. Accessed 9/19/11. http://www.legislature.ca.gov/cgi-bin/port-postquery?bill_number=ab_37&sess=CUR&house=A&author=huffman
[54] California State Assembly, Bill Number: AB 2514. Accessed 9/19/11. http://www.leginfo.ca.gov/pub/09-10/bill/asm/ab_2501-2550/ab_2514_bill_20100929_chaptered.html
[55] DSIRE, California – Net Metering. Accessed 2/18/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=CA02R&re=1&ee=1
[56] DSIRE, California – Net Metering. Accessed 2/18/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=CA02R&re=1&ee=1
[57] California Air Resources Board, AB 32: Global Warming Solutions Act. Accessed 9/19/11. http://www.arb.ca.gov/cc/ab32/ab32.htm

Item	Title	Dates	Description
Legislative			
SB 1	An act to add Sections … to, the Public Utilities Code, Relating to Solar Electricity	2006	Established the statewide California Solar Initiative, a solar rebate program for IOU customers with a goal to install approximately 1,940 MW of new solar generation capacity.[58]
CA Civil Code § 714 et seq., CA Health and Safety Code § 17959.1, CA Government Code § 65850.5	The Solar Rights Act	1/1/2005, 2003, 1978	Bars restrictions by HOAs on the installation of solar-energy systems, prohibits a public entity from receiving state grant funding or loans for solar-energy programs if the entity prohibits or places unreasonable restrictions on the installation of solar-energy systems, nullifies any restrictions relating to solar energy systems contained in the governing documents of a common interest development.[59]
Public Utilities Code §353.3(b), §393, and §739.11, and SB1976	An act relating to energy resources	2002	Legislation regarding demand response rates and technologies. Requires the CPUC look into the implementation of dynamic pricing for all customers as related to pilot programs with these rates.[60]
Regulatory			
CPUC Rulemaking 10-05-004, Decision 11-09-015, SB 412	Modifying the Self-Generation Incentive Program and Implementing SB 412	9/8/2011	Modifies the Self-Generation Incentive Program for projects going forward, including eligibility criteria and incentive amounts and payment structures for eligible technologies. Participation is now based on greenhouse gas emissions reductions. Wind turbines, fuel cells, organic rankine cycle/waste heat capture, pressure reduction turbines, advanced energy storage, and combined heat and power gas turbines, micro-turbines, and internal combustion engines that achieve these reductions can be eligible.[61]
CPUC Rulemaking 07-01-041	Administrative Law Judge's Ruling Soliciting Comments On Proposed Demand Response Rules	8/19/2011	Proceeding to address FERC order 719; IOU retail customers are prohibited from direct bidding of retail demand in CAISO market until rules are defined. In August 2011, the PUC proposed direct participation rules for bidding retail demand response into CAISO's wholesale markets governing interactions between IOUs as EDCs, load serving entities, demand response providers, meter service providers, and meter data management agents with all other entities performing these responsibilities.[62]
CPUC Rulemaking 08-12-009, Decision 11-07-056, SB 1476	Decision Adopting Rules to Protect the Privacy and Security of the Electricity Usage Data of the Customers of Pacific Gas and Electric Company, SCE, and San Diego Gas & Electric Company	7/28/2011	Rules to protect the privacy and security of customer data and policy to govern access to customer usage data by customers and by authorized third-parties as ordered by SB 1476.[63]

[58] California Energy Commission, Proposed Regulations for the Homebuyer Solar Option and Solar Offset Program. Accessed 9/14/11. http://www.energy.ca.gov/2010-SOPR-1/documents/Text_of_Modified_Regulations_15-Day_Language.pdf
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[59] DSIRE, California Solar Rights Act. Accessed 2/18/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=CA45R&state=CA&CurrentPageID=1&RE=1&EE=1
[60] Rates and Technologies for Mass-Market Demand Response. Accessed 2/28/11. http://www.osti.gov/bridge/purl.cover.jsp?purl=/890620-r4xDOW/
[61] California PUC, CPUC Improves and Streamlines Self-Generation Incentive Program. Accessed 9/20/11. http://docs.cpuc.ca.gov/published/News_release/142914.htm
http://docs.cpuc.ca.gov/published/Final_decision/143459-05.htm
[62] California PUC, Rulemaking 07-01-041 . Accessed 9/19/11. http://docs.cpuc.ca.gov/published/proceedings/R0701041.htm#decisions
[63] California PUC, Decision 11-07-056. Accessed 9/19/11. http://docs.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/140369.htm#P95_5541

Item	Title	Dates	Description
Regulatory			
FERC Docket No. RM11-2	Staff Seeks Authority to File Comments on FERC's docket on Smart Grid Interoperability Standards	April 2011	PUC submits comments: 1) supporting the goals of NIST/FERC; 2) indicating there is insufficient consensus on the five sets of smart grid standards for adoption; 3) recommending any standard adopted by FERC should be developed through a more inclusive, public process.[64]
20 CCR 2700, et seq.	Proposed Regulations for the Homebuyer Solar Option and Solar Offset Program	3/24/2011	Requires the California Energy Commission to implement regulations requiring sellers of production homes with subdivision maps completed after January 1, 2011 to offer a solar energy system option to all prospective homebuyers.[65]
Proceeding A0712009, Decision 10-12-031	Decision Denying the City And County of San Francisco's Petition to Modify Decision 09-03-026	12/17/2010	PUC denies San Francisco's petition requesting a suspension of Pacific Gas & Electric's smart meter deployment.[66]
Rulemaking 09-08-009, Decision 10-07-044	Order Instituting …alternative-fueled vehicle tariffs,infrastructure and policies…California's greenhouse gas emissions Reduction goals.	7/29/2010	Declares that people and facilities selling electric vehicle charging services do not qualify as utilities and therefore are not subject to regulation. Also established policies to overcome barriers to electric vehicle deployment[67]
CPUC Rulemaking 08-12-009, Decision 10-06-047, SB 17	Order Instituting Rulemaking to Consider Smart Grid Technologies Pursuant to Federal Legislation and on the Commission's own Motion to Actively Guide Policy in California's Development of a Smart Grid System	6/28/10, 1/1/10	The PUC is directed to determine the requirements for a smart grid deployment plan consistent with the policies set forth in SB 17 and federal law by July 1, 2010. The PUC provided criteria for the use, the development and the review of Smart Grid Deployment Plans required for all IOUs and municipalities. On 10/22/2010, Pacific Gas and Electric, SCE, and San Diego Gas and Electric distributed their report on "Consensus and Non-Consensus Smart Grid Metrics." A pre-hearing conference was scheduled for September 2011.[68]
CPUC Rulemaking 08-12-009, Decision 09-09-029	Decision Establishing Commission Processes for Review of Projects and Investments by Investor-Owned Utilities Seeking Recovery Act Funding	9/10/09	Establishes PUC processes for review of grid modernization projects and investments by investor-owned utilities seeking ARRA funding.[69]

[64] ADS, Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: May 2010 – June 2011 Accessed 9/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2010%20-%2011%20DR%20%20SG%20State%20Policy%20Survey_11%2007%2007_FINAL%20%282%29.pdf
California PUC, http://docs.cpuc.ca.gov/PUBLISHED/REPORT/132240.htm
[65] California Energy Commission, Proposed Regulations for the Homebuyer Solar Option and Solar Offset Program. Accessed 9/14/11. http://www.energy.ca.gov/2010-SOPR-1/documents/Text_of_Modified_Regulations_15-Day_Language.pdf
[66] California PUC, Proceeding A0712009. Accessed 9/19/11. http://docs.cpuc.ca.gov/proceedings/A0712009.htm#decisions
[67] California PUC, Rulemaking 09-08-009, Decision 10-07-044. Accessed 9/19/11. http://docs.cpuc.ca.gov/proceedings/R0908009.htm
[68] California PUC, Decision 10-06-047. Accessed 9/14/11. http://docs.cpuc.ca.gov/word_pdf/FINAL_DECISION/119902.pdf, http://docs.cpuc.ca.gov/efile/RULINGS/129000.pdf
[69] California PUC, Decision 09-09-029. Accessed 9/14/11. http://docs.cpuc.ca.gov/word_pdf/FINAL_DECISION/106992.pdf

Item	Title	Dates	Description
Regulatory			
AB 1X, CPUC Order No. 719	Demand Response Barriers Study	2009, February 2001	Authorized the California Department of Water Resources to purchase power and sell it to retail customers on behalf of utilities in California. Capped electric rates for the first two tiers (up to 130% of baseline usage) at February 1, 2001 rate levels which restricts the ability of the PUC or utilities to implement anything but voluntary dynamic or CPP rates. Dynamic rates limited to non-residential customers. Allows energy service providers to continue to serve existing day-ahead customers, but prohibits enrollment of new customers. As of 2009, the PUC was considering whether these issues constitute a state rule or regulation that in effect prohibits direct participation of demand response in CAISO markets, per FERC Order 719.[70]
CPUC Decision No. 08-07-047	Order Instituting Rulemaking to Examine the Commission's Post-2005 Energy Efficiency Policies, Programs, Evaluation, Measurement, and Verification, and Related Issues	7/31/2008	Sets new energy efficiency goals for years 2012 through 2020 consisting of separate electricity savings and demand reduction requirements for each of the three investor-owned electrical utilities.[71]
CPUC Decision 03-06-032	NA	6/5/2003	Adopted price-responsive demand response programs for large customers and set annual participation goals for utility demand response programs; initiated the exploration of AMI, RTP, and default CPP tariffs.[72]
NA	Energy Action Plan	5/8/2003	The California PUC and the California Power Authority prepared a plan which established the goal of achieving price-sensitive demand response capacity of 5 percent of annual peak loads by 2007.[73]

The Global Warming Solutions Act of 2006 set a 2020 greenhouse gas emissions reduction goal into law. The California Air Resources Board (ARB) was directed to develop a plan to reduce greenhouse gases. By Jan 1, 2011 the ARB completed major rulemakings for reducing greenhouse gases including market mechanisms. The ARB may revise the rules after 1/1/2011. On Jan 1, 2012 the rules adopted by the ARB are legally enforceable. [74]

California's 2010-2012 Energy Efficiency Plan sets targets for its four major electric and gas utilities. The plan calls for almost 1,500 MW of peak savings and 7,000 GWh to be saved over the three year period, or 0.94 percent of California's 2008 sales annually.[75]

California carried out the nation's first comprehensive dynamic pricing pilot program, known as the Statewide Pricing Pilot. This program involved approximately 2,500 residential, commercial and industrial customers. This provided information about the willingness of customers to lower their peak demand at different price levels. A large number of customers continued on the experimental rates despite a new metering charge, signifying that fully informed customers are more likely to participate in dynamic pricing programs.[76]

[70] CAISO, CAISO Demand Response Barriers Study (per FERC Order 719), April 28, 2009. Accessed 9/14/11. http://www.caiso.com/2410/2410ca792b070.pdf
[71] DSIRE – Energy Efficiency Resource Standard. Accessed 2/28/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=CA62R&re=1&ee=1
[72] PUC Continues Efforts to Improve Demand Response Programs for State to Help Meet Energy Needs. Accessed 2/28/11. http://docs.cpuc.ca.gov/published/News_release/63999.htm
[73] CAISO, Demand Response Barriers Study, CAISO, April 2009. Accessed 2/18/11. http://www.caiso.com/2410/2410ca792b070.pdf.
[74] AB 32: Global Warming Solutions Act. Accessed 3/2/11. http://www.arb.ca.gov/cc/ab32/ab32.htm
[75] California PUC. Rulemaking 06-04-010, Decision 08-07-021, Decision Approving 2010 to 2012 Energy Efficiency Portfolios and Budgets. Accessed 2/18/11. http://docs.cpuc.ca.gov/PUBLISHED/AGENDA_DECISION/107378.htm
[76] Draft for Comment of the National Action Plan on Demand Response The Federal Energy Regulatory Commission Staff Docket No. AD09-10, Prepared with the support of The Brattle Group, GMMB, Customer Performance Group, David Lineweber. Accessed 2/4/11. http://www.ferc.gov/legal/staff-reports/03-12-10-demand-response.pdf

Southern California Edison (SCE) currently offers several demand response programs including "Automated Demand Responses" which enables eligible SCE customers to participate in SCE Demand Response programs by reducing electricity usage during periods of peak demand without manual intervention. Customers pre-select their levels of participation and automatically take part in a demand response event, permitting customers increased flexibility and ease-of-use. SCE also has the "TOU Base Interruptible Program" which requires participants choose a firm service level that reflects the amount of electricity the customer determines is necessary to meet their operational requirements during a TOU base interruptible program event. [77]

Pacific Gas and Electric currently implements demand response programs for all business sizes. This includes the Peak Day Pricing Plan for large businesses where consumers receive credits for accepting additional charges during peak hours on certain "event" days. The credits then can be used during the summer months. In the PeakChoice program large business consumers receive an incentive to reduce their facility's load to or below a level that is pre-selected by the consumer.[78]

San Diego Gas and Electric also offers demand response programs, including a Base Interruptible Plan, Capacity Bidding Plan, CPP Plan, and a Summer Saver Plan. In the Base Interruptible Plan customers reduce power usage to a pre-determined level and receive monthly bill credits. In the Capacity Bidding Plan customers earn monthly payments by pledging or "bidding" power reduction levels. In the Summer Saver Plan, customers can allow the utility to remotely reduce the run-time of their air conditioner on summer days with high temperatures.[79]

[77] SCE website. Accessed 2/18/11. http://www.sce.com/b-rs/demand-response-programs/.
[78] Pacific Gas and Electric website. Accessed 3/2/11. http://www.pge.com/mybusiness/energysavingsrebates/demandresponse/.
[79] San Diego Gas and Electric website. Accessed 3/2/11. http://www.sdge.com/aboutus/longterm/longtermDemandResponse.shtml

Colorado

Item	Title	Dates	Description
Legislative			
SB 131	Concerning the Creation of a Smart Energy Grid In Colorado… Recommendations of the Colorado Smart Grid Task Force.	03/17/2011	Seeks to address issues related to the development of a smart energy grid and to make recommendations for future legislation. Implements the smart grid task force's recommendations in its January 2011 report. Bill is postponed indefinitely.[80]
HB 1191	Utility Resource Usage Data Sharing	02/24/2011	Directs the PUC to certify independent data aggregators in sharing aggregated customer data with the requirement that a customer's personally identifiable information is removed.[81]
SB 10-180	An act Considering the Development of a Smart Grid in Colorado and…Convening a Task Force	January 2011, May 2010	Addresses the creation of a smart grid task force. The task force is formed to recommend legislative and administrative measures to encourage the orderly implementation of smart grid technology.[82] In January 2011, the smart grid task force submits a report with consensus recommendations in the areas of: 1) challenges and opportunities in Colorado; 2) workforce and economic development; 3) consumer issues and data management; 4) distributed energy resources and grid management; 5) technical specifications; and 6) grid operations. The task force will meet annually to update the report.[83]
S. 39, 67th Gen. Assem., Reg. Sess. (Co. 2009) (amending CO Rev. Stat. § 40-9.5-106(2)	Cooperative Electric Associations, Prohibited Acts	8/5/2009	Includes legislation that permits cooperative electric associations to introduce inclining block rates for residential customers to promote energy efficiency.[84]
HB 1160	An act concerning net metering for customer-generators of electric utilities	3/26/2008	Requires municipal utilities with more than 5,000 customers and all cooperative utilities to offer net-metering. Signed into law by the Governor on 3/26/2008.[85]
HB 07-1037	An act concerning measures to promote energy efficiency…	5/22/2007	Requires the Colorado PUC to establish energy savings goals for electric utilities as well as provide utilities with financial incentives for implementing cost-effective energy-saving programs. The PUC must annually report on the progress made by IOUs in working toward their DSM goals. Signed into law by the Governor on 5/22/2007.[86]

[80] Colorado General Assembly, SB 131. Accessed 9/20/11. http://www.leg.state.co.us/CLICS/CLICS2011A/csl.nsf/MainBills?openFrameset
[81] Colorado General Assembly, HB 1191. Accessed 9/20/11. http://www.leg.state.co.us/CLICS/CLICS2011A/csl.nsf/MainBills?openFrameset
[82] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
SB 10-180. Accessed 2/16/11. http://rechargecolorado.com/images/uploads/pdfs/sb_10_180.pdf
[83] ADS, Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: May 2010 – June 2011 Accessed 9/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2010%20-%2011%20DR%20%20SG%20State%20Policy%20Survey_11%2007%2007_FINAL%20%282%29.pdf
Smart Grid Task Force, Deploying Smart Grid in Colorado, Recommendations and Options. Accessed 9/15/11. http://rechargecolorado.com/images/uploads/pdfs/Deploying_Smart_Grid_in_Colorado_Recommendations_and_Options.pdf
[84] Draft for Comment of the National Action Plan on Demand Response The Federal Energy Regulatory Commission Staff Docket No. AD09-10, Prepared with the support of The Brattle Group, GMMB, Customer Performance Group, David Lineweber. Accessed 2/4/11. http://www.ferc.gov/legal/staff-reports/03-12-10-demand-response.pdf
[85] DSIRE, Colorado - Net Metering. Accessed 2/14/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=CO26R
[86] Colorado Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/colorado/179/all/191

Item	Title	Dates	Description
Regulatory			
PUC Docket No. 10R-799E, Decision No. R11-0922	Rulemaking - Smart-Grid Data Privacy Rules, 4 CCR 723-3	08/29/2011	Recommended decision to revise the current rules applicable to smart meter data privacy and disclosure rules. Includes clarification of what constitutes customer data, data collection, cost of access to standard customer data associated with base rates, and rules regarding the sharing of customer data directly to a third-party by the utility in compliance with a customer's request.[87]
SB 51, C.R.S. 40-2-124, 4 CCR 723-3, Rule 3664, C.R.S. 40-9.5-118, HB 1342, PUC Decision C09-0990	Renewable energy standard - net metering	6/5/2010, 9/1/2009, 7/2/2006,	Net metering rules for solar thermal electric, PV, wind, biomass, hydroelectric, geothermal electric, recycled energy, small hydroelectric, fuel cells using renewable fuels.[88] SB 51 defined new rules for net metering, which changed the insurance requirements for interconnection, and addressed utility concerns with highly seasonal circuits and voltage flicker.[89]
NA	EPAct/PURPA Standard 14	March 2008	The Colorado PUC decided not to adopt PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005.[90]
Executive Order D 005-05	Executive Order, Greening of State Government	July 2005	Requires all state government agencies and departments to adopt the LEED rating system for existing and new buildings to ensure reductions in energy use to the extent practical and cost effective. Also requires an energy management program within state agencies to monitor and manage utility use and costs.[91]

The SWEEP is a public interest organization promoting greater energy efficiency in Arizona, Colorado, Nevada, New Mexico, Utah, and Wyoming that collaborates with utilities, state agencies, local governments, environmental groups, universities, private businesses, and other energy specialists. In 2010, SWEEP initiated new programs to improve energy efficiency in the industrial sector, and provide technical assistance to states, counties and cities that received federal stimulus funding for energy efficiency projects.[92]

The Colorado PUC is authorized to provide incentives for IOUs to provide DSM. [93]

Xcel Energy's Smart Grid City project in Boulder originally included plans to incorporate a web portal and in-home devices for customers to monitor energy use, including two-way meters for 25,000 residential and 300 commercial and industrial accounts. Currently 23,000 smart meters have been installed and the company has suffered some attrition regarding its dynamic pricing pilots associated with the project. On November 1, 2011, city residents will vote on two ballot measures which could lead to the creation of a municipal utility in Boulder, and effectively end the franchise agreement for Xcel Energy to supply power to Boulder. [94]

Poudre Valley Rural Electric Association has contracted with Landis & Gyr for the installation and deployment of AMI on the cooperative's 3,600 miles of power lines in Larimer, Weld, and Boulder counties. By the end of 2010 approximately 4,000 meters had been installed, and an additional 6,000-7,000 meters will be installed by the end of 2011. In 2014, all 36,000 meters will be deployed to customers.[95]

[87] Colorado PUC, Docket No. 10R-799E, Decision No. R11-0922. Accessed 9/15/11. https://www.dora.state.co.us/pls/efi/EFI.Show_Docket?p_session_id=&p_docket_id=10R-799E
[88] SGIC. Accessed 2/4/11, http://www.sgiclearinghouse.org/Legislation
[89] Colorado Clean Distributed Generation. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Colorado/179/all/195
[90] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/9/1.
http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[91] Colorado Lead by Example Initiatives. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Colorado/179/all/202
[92] Southwest Energy Efficiency Project. Accessed 2/4/11, http://www.swenergy.org/about/index.html
[93] Clean and Secure Energy Actions Report 2010 Update. Accessed 2/4/11, http://www.nga.org/Files/pdf/1008CLEANENERGYEFFICIENCYUTILITYDEMAND.PDF
[94] Tour of Smart Grid Projects and State Policies by Lisa Schwartz, Presentation to the Oregon PUC, Smart Grid Workshop – September 9, 2009, RAPOnline, Source: Ethnie Groves, Xcel Energy. Accessed 2/7/11
http://www.sgiclearinghouse.org/Legislation?q=node/2303&lb=1\
Colorado PUC, Decision No. C11-0869. Accessed 9/29/11. https://www.dora.state.co.us/pls/efi/efi_p2_v2_demo.show_document?p_dms_document_id=125674
Davidson, Michael, Lines Drawn in Boulder utility debate, Boulder County Business Report, September 2, 2011. Accessed 9/29/11. http://www.bcbr.com/article.asp?id=59526
95 Poudre Valley Rural Electric Association, Poudre Valley REA Is Installing Automated Meters. Accessed 9/26/11. http://www.pvrea.com/programs/smartgrid.html

Connecticut

Item	Title	Dates	Description
Legislative			
SB 1243, Public Act No. 11-80	An Act Concerning the Establishment of the Department Of Energy and Environmental Protection and Planning For Connecticut's Energy Future.	7/1/2011	Requires EDCs implement DSM, including energy efficiency, load management, demand response, CHP facilities, DG, and other emerging energy technologies. Creates the Department of Energy and Environmental Protection. Includes provisions related to peak demand reduction, a TOU pricing option, and notification of TOU meter availability.[96]
Public Act 07-242/HB 7432	An Act Concerning Electricity and Energy Efficiency	10/1/2007	Connecticut's two IOUs are required to provide net metering to customers that generate electricity using "Class I" renewable-energy resources up to two MW in capacity. Legislation enacted in June 2007 (HB 7432, Section 39) raised the individual system capacity limit to two MW (previously 100 kW) and extended net metering to all customer classes.[97] Mandates that every electric distribution company submit an AMI plan to the DPUC. Signed by the Governor on 6/4/2007 and took effect 10/1/2007.[98]
Public Act 98-28	An Act Concerning Electric Restructuring	1998	Created separate funds to support energy efficiency and renewable energy. The efficiency fund is known as the Energy Efficiency Fund, and the renewables fund is known as the Connecticut Clean Energy Fund. [99]
Conn. Gen. Stat. § 7-233y	NA	NA	Requires municipal electric utilities to establish a fund to provide renewable energy, energy efficiency, conservation and load-management programs.[100]
Regulatory			
Docket 10-03-13	Department of Public Utility Control (DPUC) Declaratory Ruling Concerning Net Metering	2010-2011	In mid 2010, the DPUC opened a docket (Docket 10-03-13) to consider revisions to net metering in Connecticut, including the possibility of virtual net metering. A draft decision was planned to be issued by the end of January 2011 with a final decision delivered in February 2011, but the decision has yet to be rescheduled.[101]

Connecticut enacted electricity restructuring legislation in 1998 that put the state in a good position to handle smart grid developments. Net metering is available for any customer in the state where energy production exceeds the energy supplied. Connecticut's two IOUs, Connecticut Light and Power (CL&P) and United Illuminating Company, are required to provide net metering to customers that generate electricity using "Class I" renewable-energy resources, which include solar, wind, landfill gas, fuel cells, sustainable

[96] ADS, Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: May 2010 – June 2011 Accessed 9/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2010%20-%2011%20DR%20%20SG%20State%20Policy%20Survey_11%2007%2007_FINAL%20%282%29.pdf
Colorado Department of Energy and Environmental Protection, SB 1243, Public Act No. 11-80. Accessed 9/15/11. http://www.cga.ct.gov/2011/ACT/PA/2011PA-00080-R00SB-01243-PA.htm
[97] Database of State Incentives for Renewables and Efficiency (DSIRE). Accessed 2/8/11. http://www.dsireusa.org/
[98] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/9/1.
http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[99] Database of State Incentives for Renewables and Efficiency (DSIRE). Accessed 2/8/11. http://www.dsireusa.org/
[100] Database of State Incentives for Renewables and Efficiency (DSIRE). Accessed 2/8/11. http://www.dsireusa.org/
[101] Database of State Incentives for Renewables and Efficiency (DSIRE). Accessed 2/8/11. http://www.dsireusa.org/
Colorado Department of Energy and Environmental Protection, Time Schedule for Docket No. 10-03-13. Accessed 9/15/11.
http://www.dpuc.state.ct.us/dockcurr.nsf/8e6fc37a54110e3e852576190052b64d/7785de2b9f280e818525773e005e3009?OpenDocument

biomass, ocean-thermal power, wave or tidal power, low-emission advanced renewable-energy conversion technologies, and hydropower facilities up to two MW in capacity. Legislation enacted in June 2007 (HB 7432, Section 39) raised the individual system capacity limit to two MW and extended net metering to all customer classes.[102]

In summer 2009, CL&P initiated a pilot program for demand response in order to discover how to most effectively reduce electricity usage during peak periods when demand for electricity reaches a critical level. Data from this program has been analyzed and the results have led to a number of conclusions about customer response to prices, both with and without various enabling technologies. [103]

Each of Connecticut's municipal electric utilities is required by statute (Conn. Gen. Stat. § 7-233y) to establish a fund to provide renewable energy, energy efficiency, conservation and load-management programs.[104]

[102] Database of State Incentives for Renewables and Efficiency (DSIRE). Accessed 2/8/11. http://www.dsireusa.org/
[103] FERC. Accessed 2/8/11. http://www.ferc.gov/legal/staff-reports/03-12-10-demand-response.pdf
[104] Database of State Incentives for Renewables and Efficiency (DSIRE). Accessed 2/8/11. http://www.dsireusa.org/

Delaware

Item	Title	Dates	Description
Legislative			
SB 124	An Act to Amend Title 26 of the Delaware Code Relating to Delaware's REPS And Delaware-Manufactured Fuel Cells	7/7/2011	Amended sections of the REPS Act. Allows the energy output from fuel cells manufactured in Delaware that can run on renewable fuels to be an eligible resource to fulfill a portion of the requirements for a PSC-regulated utility under the REPS Act. Creates a regulatory framework by which the PSC will review a tariff to be filed by Delmarva deploying Delaware-manufactured fuel cells as part of a 30 MW project. The PSC shall consider the incremental cost of the fuel cell project to customers. Bill was signed by the Governor on 7/7/2011.[105]
26 DE C. § 1014(d), SB 267, CDR § 26-3000-3001	Regulations Governing Service Supplied by Electrical Corporations	7/26/2010, 1/10/2010, 1999	Net metering is available to any customer that generates electricity using solar, wind or hydro resources, anaerobic digesters, or fuel cells powered by renewable fuels. Grid-interactive electric vehicles are also eligible for net metering treatment for electricity that they put on the grid, although these vehicles do not themselves generate electricity. The maximum capacity of a net-metered system is 25 kW for residential customers.[106]
SB 106	Energy Conservation and Efficiency Act of 2009	7/29/2009	Created EERS and set goals for consumption and peak demand for electricity and natural gas utilities. The goals are 15 percent peak reduction and electricity consumption savings and 10 percent natural gas consumption savings by 2015. Signed by the Governor on 7/29/2009.[107]
SB 8	An Act to Amend Title 26 of the Delaware Code Relating to Net Energy Metering	6/12/2007	Amends net energy metering standards to increase the net-metering capacity limit for non-residential facilities to 2 MW per Delmarva Power and Light meter, 500 kW per Delaware Electric Cooperative meter, and 500 kW per municipal electric meter. Allows net-metering customers to carry over excess energy credits from month to month during a 12 month period to account for seasonal variance in generation and consumption. All unused credits at the end of the 12 month period are forfeited to utilities to fund low-income energy assistance programs. Bill was substituted on 6/12/2007.[108]
HB 507	An Act to Amend Title 26 of the Delaware Code Relating to Net Metering and Billing	6/14/2006	Gives electric consumers, who own and operate an electric generation facility for the purposes of net energy metering, the right to demand that Delmarva personnel read their electric meter once per fiscal quarter and be billed based on the actual reading. Signed into law by the Governor on 6/14/2006.[109]

[105] State of Delaware, 144th General Assembly, SB 124. Accessed 9/22/11. http://www.legis.delaware.gov/LIS/LIS146.NSF/vwLegislation/SB+124?Opendocument
[106] DSIRE, Delaware – Net Metering. Accessed 2/18/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=DE02R&re=1&ee=1
[107] The Governor's Energy Advisory Council. Delaware Energy Plan, 2009-2014.
[108] State of Delaware, 144th General Assembly, SB 8. Accessed 9/22/11. http://www.legis.delaware.gov/LIS/LIS144.NSF/vwLegislation/SB+8?Opendocument
[109] State of Delaware, 143th General Assembly, HB 507. Accessed 9/22/11. http://www.legis.delaware.gov/LIS/LIS143.NSF/vwLegislation/HB+507?Opendocument

Item	Title	Dates	Description
Legislative			
HB 6	An Act to Amend Title 26…Oversight of Public Utilities that Distributed and Supply Electricity to Retail Electric Customers…	4/06/2006	Amends the Electric Restructuring Act of 1999 with provisions to stabilize electricity pricing for consumers. Allows EDCs, subject to PSC approval, to own and operate facilities enabling them to generate electricity for supply to customers. Authorizes EDCs to obtain supply in ways that are not necessarily reflective of short-term regional market prices. EDCs must create programs designed to reduce or shift electric consumption by customers at times of peak usage or at other times. Signed into law by the Governor on 4/06/2006.[110]
SB 74	An Act to Amend Title 26 of the Delaware Code Relating to Renewable Energy Portfolio Standards	7/21/2005	Establishes REPS requiring electricity suppliers to supply a percentage of their total annual electricity sales from renewable energy resources. This percentage incrementally increases from 1% in 2007 to 10% by 2019. Includes solar, wind energy, geothermal, ocean energy, fuel cells, small hydropower, landfill gas and sustainable biomass. Establishes a market-based renewable energy credit trading system encouraging regional exchange of electricity. Signed into law by the Governor on 7/21/2005. [111]
Regulatory			
Docket No. Reg. 49, Order No. 7984	In the Matter of the Adoption of Rules and Regulations … Competitive Market for Retail Electric Supply Service	7/7/2011	Approves the final net metering rules for implementation as required by SB 267.[112]
Docket Reg. 56, Order No. 8026	…Rules and Procedures to Implement the REPS…	6/6/2011	Order reopening docket to approve publication of proposed amended rules regarding implementation of the REPS Act, per SB 124, and establishing 11/3/2011 deadline for comments on the proposed amended rules.[113]
Docket No. 08-414, Order No. 7502	EPAct/PURPA Standard 14	12/16/2008, January 2007	The Delaware PSC decided not to adopt PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005.[114]

The nonprofit Sustainable Energy Utility (SEU) was created on June 28, 2007 through the passing of SB 18. The law created a nonprofit corporation under the direction of a State Energy Coordinator within the Delaware Energy Office, Department of Natural Resources and Environmental Control. The SEU's goals are to advance energy efficiency and affordable energy and to promote and help to achieve customer-sited renewable energy generation. The SEU has initiated an ENERGY STAR Appliance Rebate Program, Efficiency Plus Home Program, Efficiency Plus Business Program, the Low-Income Multi-family Housing Program, Home Lighting Discount Program, and a "Green for Green" program for building construction.[115]

Delmarva Power has a DSM program, Blueprint for the Future, contains a general awareness campaign which promotes customers DSM education, a home audit based program, HVAC efficiency, compact florescent lighting and high efficiency windows program, remotely controllable programmable thermostat, consulting/engineering services to improve building efficiency, site specific efficiency measures, and a web-based platform to facility participation in the PJM Demand Response Market.[116]In May 2011, Delmarva Power launched a new smart meter education campaign titled "Take Control" for educating its customers on the new technology and its capabilities. A key focus for the campaign is encouraging customers to sign up for My Account, a free online energy audit tool that can provide a personalized energy profile to help customers manage their energy use.[117]

[110] State of Delaware, 143th General Assembly, HB 6. Accessed 9/22/11. http://legis.delaware.gov/LIS/LIS143.NSF/vwLegislation/HB+6?Opendocument
[111] State of Delaware, 143th General Assembly, SB 74. Accessed 9/22/11. http://www.legis.delaware.gov/LIS/LIS143.NSF/vwLegislation/SB+74?Opendocument
[112] Delaware PSC, 2011 Commission Orders. Accessed 9/22/11. http://depsc.delaware.gov/orders/11orders.pdf
[113] Delaware PSC, 2011 Commission Orders. Accessed 9/22/11. http://depsc.delaware.gov/orders/11orders.pdf
[114] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/9/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[115] Delaware Utility Policies. Accessed 2/18/11. http://www.aceee.org/energy-efficiency-sector/state-policy/delaware/181/all/191
[116] Pepco and Delmarva Power. National Association of Regulatory Utility Commissioners/FERC Collaborative on Demand Response, 2007.
[117] Delmarva Power, Delmarva Power Launches Smart Meter Education Campaign, 5/18/11. Accessed 9/29/11. http://www.delmarva.com/welcome/news/releases/archives/2011/article.aspx?cid=1731

District of Columbia

Item	Title	Dates	Description
Legislative			
Code § 34-1431 et seq., DC Laws 18-0303, 18-0223, B19-0384, B19-10	REPS, Clean and Affordable Energy Act, Emergency Distributed Generation Amendment Act, and the Distributed Generation Amendment Act	8/9/2011, 10/2008, 1/2005	REPS that applies to all retail electricity sales. Includes a schedule of minimum percentages from eligible renewable resources for the years 2007 through 2023. Also clarifies the certification requirements for non-residential solar thermal systems. Tier 1 renewable resources include solar, wind, biomass, landfill gas, wastewater treatment gas, geothermal, ocean and fuel cells. Tier 2 renewable resources include hydropower (other than pumped-storage generation) and municipal solid waste.[118]
Council Bill 17-492, Code § 34-1501 et seq., PSC Order No. 15837	Retail Electric Competition and Consumer Protection, Net Metering	6/18/2010, 10/2008	Net metering is currently available to residential and commercial customer owned generators with systems powered by solar, wind, tidal, geothermal, biomass, hydroelectric power and digester gas energy sources, CHP, fuel cells, and microturbines, with a maximum capacity of 1 MW.[119]
Regulatory			
Order No. 16484, Case No. FC1056	In the Matter of the Application of PEPCO for Authorization to…Establish a DSM Collaborative and an AMI Advisory Group	8/4/2011	PSC requests the AMI Task Force determine a detailed customer education plan explaining how customers would be educated on the increased availability of energy usage data and the enablement of customer benefits, by November 1, 2011. PEPCO is directed not to utilize smart meters' remote disconnect and reconnect capability in any manner that deviates from the Commission procedures for termination of service as set out in the Consumer Bill of Rights.[120]
Order No. 15973, Case No. FC1056	In the Matter of the Application of PEPCO for Authorization to…Establish a DSM Collaborative and an AMI Advisory Group	9/13/2010	PSC hearing to address PEPCO's dynamic pricing proposal, particularly a bill protection mechanism, rationality of a phased approach, and critical peak rebate amounts.[121]
Order No. 15967, Case No. FC1083	In the Matter of the Investigation into the Policy Matters pertaining to the implementation of the Smart Grid	9/7/2010	Directs the PSC Office of the Commission Secretary to open a formal case to address policy matters pertaining to the implementation of the smart grid.[122]
Order No. 15182, DCMR 15-4000 et seq.	In the Matter of the Investigation of Implementation of Interconnection Standards…	2/2009	Interconnection rules applying to all distributed generation systems of 10 MW or smaller operated in parallel with the electric distribution system that are not subject to the interconnection requirements of the PJM Interconnection. The rules set four levels of review for interconnection requests.[123]

[118] DSIRE, District of Columbia - Renewables Portfolio Standard. Accessed 11/15/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=DC04R&re=1&ee=1
[119] DSIRE, District of Columbia - Net Metering. Accessed 11/15/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=DC01R&re=1&ee=1
[120] DC PSC, Order No. 16484. Accessed 11/15/11. http://www.dcpsc.org/pdf_files/commorders/orderpdf/orderno_16484_FC1056.pdf
[121] DC PSC, Order No. 15973. Accessed 11/15/11. http://www.dcpsc.org/pdf_files/commorders/orderpdf/orderno_15973_FC1056.pdf
[122] DC PSC, Order No. 15967. Accessed 11/15/11. http://www.dcpsc.org/pdf_files/commorders/orderpdf/orderno_15967_FC1083.pdf
[123] DSIRE, District of Columbia – Interconnection Standards. Accessed 11/15/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=DC03R&re=1&ee=1

Item	Title	Dates	Description
Regulatory			
Code § 8-1773.01 § 8-1774.01 et seq. , Code § 8-1774.01, Order No. 15164, Case No. 945	Clean and Affordable Energy Act	10/2008	Creates the Sustainable Energy Trust Fund as part of the PSC requirement to establish a PBF to provide energy assistance to low-income residents, and support energy efficiency and renewable energy programs. Administered by a third party SEU and financed by a non-bypassable surcharge on the electric bills of utility customers.[124]
Order No. 14405, Case No. FC1049	EPAct/PURPA Standard 14	8/2007	PSC issued an order declining to adopt PURPA Standard 14 ("Time-Based Metering and Communications") prior to completing two related proceedings. One proceeding was to consider PEPCO's application to establish a comprehensive demand response, advanced metering, and energy efficiency plan, and the other proceeding was to investigate the procurement process for Standard Offer Service.[125]
NA	NA	3/2007	PSC forms a "Smart Metering Working Group" to discuss EPACT 1252.[126]

As part of the required actions associated with the Sustainable Energy Trust Fund, the SEU contract was awarded to the non-profit Vermont Energy Investment Corporation in March 2011. This SEU is required to implement energy-saving measures in low-income multifamily homes, to arrange for energy-saving installations in commercial buildings, and create green jobs, along with other initiatives. Vermont Energy Investment Corporation has contributed to similar programs in Vermont, Oregon, Delaware, and Maine.[127]

In July 2008, the PSC approved a smart-meter tariff proposed by PEPCO and the District of Columbia Smart Meter Pilot Program, Inc., for the PowerCentsDC program.[128] The PowerCentsDC pilot program concluded in 2009 and smart meters, smart thermostats, and three pricing options (hourly pricing, critical peak pricing, and critical peak rebate) were provided for approximately 900 of PEPCO's residential customers. In a final report released around September 2010, the program resulted in a 51% peak-demand reduction for all electric customers with smart thermostats on the critical peak pricing option. The report also indicated over 74% of participants were satisfied with the program.[129]

[124] DSIRE, District of Columbia – Sustainable Energy Trust Fund. Accessed 11/15/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=DC05R&re=1&ee=1

[125] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 11/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf, http://www.dcpsc.org/pdf_files/commorders/orderpdf/orderno_14405_FC1049.pdf

[126] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 11/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

[127] DSIRE, District of Columbia – Sustainable Energy Trust Fund. Accessed 11/15/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=DC05R&re=1&ee=1

[128] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 11/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

[129] ADS, Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: May 2010 – June 2011 Accessed 11/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2010%20-%2011%20DR%20%20SG%20State%20Policy%20Survey_11%2007%2007_FINAL%20%282%29.pdf

Florida

Item	Title	Dates	Description
Legislative			
SB 7100, SB 2106	Florida Energy and Climate Commission	5/26/2011	Eliminates the Florida Energy and Climate Commission and transfers its duties with respect to a tax credit, an incentive program, and renewable energy policy to the Department of Environmental Protection. Transfers the duties of the Florida Energy and Climate Commission with respect to developing the state's energy policy and its duties under the Florida Energy and Climate Protection Act to the Department of Environmental Protection. Vetoed by the Governor on 5/26/2011; a similar bill SB 2156 passed which discusses energy policy.[130]
Florida Legislature, HB 7135, 25-6.065, FAC, PUC Decision C09-0990	Interconnection and Net Metering of Customer-Owned Renewable Generation	3/4/2008	Interconnection rules for renewable-energy systems up to two MW in capacity; applies only to the state's IOUs.[131] This also includes rules for net metering and HB 7135 requires newly constructed/renovated buildings financed by the state to meet nationally recognized green building standards.[132]
Regulatory			
NA	Florida Energy Efficiency and Conservation Act (FEECA)	2008, 1980	Utilities with sales of 2,000 GWh or more are subject to FEECA; requires each utility to implement cost-effective energy efficiency programs and conduct energy audits. It also addresses improving the efficiency of generation, transmission and distribution systems.[133]
Docket Nos. 080407-EG 080413-EG; Order No. PSC-09-0855-FOF-EG	Commission review of numeric conservation goals	December 2009	The PSC created goals for electric utilities at 3.5 percent energy savings over 10 years; a goal less than half of the goal recommended by the Commission staff's own expert.[134]
Order No. PSC-07-0212-PAA-EU	EPAct/PURPA Standard 14	April 2007	The PSC decided not to adopt PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005.[135]

Energy efficiency is considered a resource in Florida. While setting energy savings goals in 2009, the FPSC used multiple cost-effectiveness tests – the Ratepayer Impact Measure (RIM) test, the Total Resource Cost test and the Participant Test. The 1980 FEECA required utilities to implement cost-effective energy efficiency programs. Florida utilities have established DSM conservation goals for summer and winter demand (MW) and annual energy sales (GWh). The Florida PSC reviews DSM goals for each utility and most of these DSM plans include residential, commercial, and industrial sectors. The utilities provide conservation education programs and efficiency incentives to their customers, and recover costs by adding a surcharge to customer bills.[136]

Gulf Power, a subsidiary of Southern Company, has been operating the Energy Select program since the early 1990s. This program includes an automated energy management system and a CPP tariff. Gulf Power estimates that the program induces a drop of 2 kW per participating customer, amounting to approximately 40 to 50 percent of customer load during the top 1 percent of the hours of the year. Gulf Power indicates that Energy Select is credited with reducing its summer peak demand by as much as 20 megawatts.[137] FPL's demand response program, known as On Call, is one of the largest load management systems in the nation. The system uses more than 900,000 load control transponders connecting more than 780,000 users. FPL uses a power line communications system with many control strategies enabled by a two-way communications feature. This system can be an attractive economic alternative when compared with the total cost of adding new peak load power generating plants.[138]

[130] The Florida Senate, SB 2106. Accessed 9/22/11. http://www.flsenate.gov/Session/Bill/2011/2106
[131] DSIRE, Florida Interconnection Standards. Accessed 2/9/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=FL20R&re=1&ee=1
[132] Florida Clean Distributed Generation. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Florida/2926/all/195
[133] Florida Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/florida/2926/all/191
[134] SGIC. Accessed 2/4/11. http://www.sgiclearinghouse.org/Legislation
[135] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/9/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[136] SGIC. Accessed 2/4/11. http://www.sgiclearinghouse.org/Legislation
[137] Gulf Power, Conserving Energy and the Environment with Energy Select. Accessed 9/26/11. http://www.gulfpower.com/energyselect/environmental_impact.asp
[138] Draft for Comment of the National Action Plan on Demand Response The Federal Energy Regulatory Commission Staff Docket No. AD09-10, Prepared with the support of The Brattle Group, GMMB, Customer Performance Group, David Lineweber. Accessed 2/10/11. http://www.ferc.gov/legal/staff-reports/03-12-10-demand-response.pdf

Georgia

Item	Title	Dates	Description
Legislative			
HR 693	A Resolution urging developers …to offer the installation of solar energy systems; and for other purposes.	3/23/2011	Urges developers and builders of residential property in Georgia to offer the installation of solar energy systems. Bill is pending passage in the House.[139]
HR 520	A Resolution Creating the House Study Committee on Renewable and Sustainable Energy in Georgia…	3/11/2011	Forms the House Study Committee on Renewable and Sustainable Energy in Georgia to undertake a study of the conditions, needs, issues, and problems related to renewable energy advancement, and recommend any actions or legislation supporting renewable energy goals.[140]
HB 497	An Act to Amend Chapter 3A of Title 46 of the Official Code of Georgia Annotated, Relating to IRP for Certain Electric Suppliers…	3/8/2011	Addresses requirements, reports, and recommendations for IRPs for certain electric suppliers, so as to provide for energy savings plans to optimize the use of demand-side capacity options. Bill is pending passage in the House .[141]
SB 147	An Act To Amend Title 46 of the Official Code of Georgia Annotated, Relating to Public Utilities, so as to Provide for Portfolio Standard Goals for Renewable and Recoverable Energy and Energy Efficiency	2/12/2009	Sets a renewable and recoverable energy sources energy portfolio standard goal, including a cumulative reduction in consumption in MWh by 10 percent of its annual net electricity sales by December 31, 2022. Goals can be met through use of electric power that is supplied by a new renewable energy facility or saved due to the implementation of DSM or energy efficiency options. Bill was referred to a committee in February 2009.[142]
O.C.G. § 46-3-50 et seq.	The Georgia Cogeneration and Distributed Generation Act of 2001	6/1/2002	Requires all utilities to offer net metering to customers. Eligible technologies include PV systems, fuel cells and wind turbines up to 10 kW in capacity for residential applications, and systems up to 100 kW for commercial applications. Utilities must offer bi-directional metering or single directional metering to customers, depending on how the customer's facility is connected to the grid.[143]
O.C.G. § 44-9-21 et seq.	Solar Easements	1978	Easements may be established to allow owners of solar-energy systems to negotiate for assurance of continued access to sunlight.[144]
Regulatory			
NA	EPAct/PURPA Standard 14	August 2006	The Georgia PSC indicated it would consider PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005 through Georgia Power's 2007 IRP. Georgia Power was directed accordingly in its 2007 IRP.[145]

[139] Georgia General Assembly, 2011-2012 Regular Session - HR 693. Accessed 9/22/11. http://www.legis.ga.gov/legislation/en-US/display/33995
[140] Georgia General Assembly, 2011-2012 Regular Session - HR 520. Accessed Accessed 9/22/11. http://www.legis.ga.gov/legislation/en-US/display/33587
[141] Georgia General Assembly, 2011-2012 Regular Session – HB 497. Accessed 9/22/11. http://www.legis.ga.gov/legislation/en-US/display/33586
[142] Georgia General Assembly, 2009-2010 Regular Session - SB 147. Accessed 9/22/11. http://www.legis.ga.gov/legislation/en-US/display/26988
[143] DSIRE, Georgia – Net Metering. Accessed 2/18/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=GA02R&re=1&ee=1
[144] DSIRE, Georgia Solar Easements. Accessed 2/18/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=GA01R&re=1&ee=1
[145] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/9/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

Georgia Power currently offers 18 demand-response and energy efficiency programs to its customers, including a RTP, TOU and CPP program.[146] Around one million smart meters have been installed since January 2008, and installation of all meters is due to be complete by the end of 2012. The meters are being installed from north to south throughout the state.[147] Georgia EMCs provide a number of DSM and energy efficiency programs designed to reduce peak demand.[148]

Georgia Power participates in the national Change a Light program, supports Home Performance with ENERGY STAR, promotes ENERGY STAR appliances, helps customers with appliance recycling, provides free in-home audits, and runs home improvement programs for low-income customers. Tennessee Valley Authority (TVA) offers audits and incentives for residential and business customers and is encouraging industrial customers to install geothermal heat pumps. Many of the Georgia Electric Membership Corporation's cooperatives offer rebates for installation of certain energy-efficient appliances such as water heaters, heat pumps, programmable thermostats, and compact fluorescent light bulbs.[149]

[146] Georgia Power, Environmental Commitment.Accessed 9/26/11. http://www.georgiapower.com/environment/report/environmentalreport.pdf
[147] Georgia Power, Your Meter is About to Get Smarter, Accessed 2/18/11. http://www.georgiapower.com/residential/smartmeter.asp
[148] Information regarding EMCs comes from Georgia Electric Membership Corporation. Accessed 2/18/11. http://www.georgiaemc.com/documents/2010DSMReport-External.pdf
[149] Georgia Utility Policies. Accessed 2/18/11. http://www.aceee.org/energy-efficiency-sector/state-policy/georgia/183/all/191

Hawaii

Item	Title	Dates	Description
Legislative			
SB 181	Photovoltaic; New Construction; Residential; Feasibility Study	7/11/2011	Establishes a working group to study the feasibility of requiring all new single-family residential construction to incorporate design elements and minimum equipment installation at the time of construction to facilitate the future adoption of a photovoltaic system. Became law in July 2011.[150]
SB 367	Interisland High Voltage Electric Transmission Cable System	4/28/11	Establishes a regulatory structure for the installation and implementation of an interisland high voltage electric transmission cable system and for the construction of on-island transmission infrastructure. Effective July 1, 2030. Bill has reportedly "died in conference."[151]
SB 704	A Bill for an Act Relating To Renewable Energy	4/25/2011	Exempts certain third-party owners and operators of on-site renewable energy systems from regulation as public utilities by the PUC. Signed into law by Gov. Neil Abercrombie 4/25/11.[152]
SB 1346	Renewable Portfolio Standards	4/25/2011	Amends definition of renewable electrical energy to include, beginning 1/1/15, customer-sited, grid-connected renewable energy generation. Signed into law by Gov. Neil Abercrombie 4/25/11.[153]
SB 1456, HB 1518	Renewable Energy; Hawaii Electricity Reliability Council; Reliability and Interconnection Standards	2/9/2011	Establishes the Hawaii electricity reliability council to develop and implement grid reliability and interconnection standards for renewable energy, including development of technical guidance concerning smart grid implementation and AMI. The bill is pending and has been carried over to the 2012 session.[154]
HRS § 196-7	Placement of solar energy devices	2010	Provides solar rights for homeowners and prohibits restrictions on the installation and use of solar energy systems on residential dwellings.[155]
Regulatory			
Docket No. 2010-0037, HB 1464	Instituting a Proceeding to Investigate Establishing EEPS	June 2009	PUC proceeding to examine the creation of EEPS pursuant to state law passed in 2009 through HB 1464. The PUC collected final comments by 9/23/2011, after which it will issue its decision.[156]
HRS § 269-101 et seq., HI PUC Order, Docket 2006-0084, SB 1003	Net energy metering	12/28/2008, 6/25/2001	Hawaii's original net-metering law, expanded by HB 2048, increased the eligible capacity limit of net-metered systems from 10 kW to 50 kW. Net metering is available on a first-come, first-served basis to residential and small commercial customers (including government entities) that generate electricity using solar, wind, biomass or hydro-electric systems.[157]
HRS § 269-121 et seq., Docket No. 2007-0323	Hawaii Revised Statutes pertaining to Hawaii's Public Benefits Fund	2008	Legislation to create a public benefits fund (PBF) for energy efficiency and DSM, to be approved by the Hawaii PUC. The PUC issued Docket No. 2007-0323, establishing the structure of the PBF.[158]

[150] Hawaii State Legislature, SB 181. Accessed 9/19/11. http://www.capitol.hawaii.gov/session2011/lists/measure_indiv.aspx?billtype=SB&billnumber=181

[151] Hawaii State Legislature, SB 367. Accessed 9/19/11. http://www.capitol.hawaii.gov/session2011/lists/measure_indiv.aspx?billtype=SB&billnumber=367
Senate Energy Bills – Highlights 2011. Accessed 9/19/11. http://www.hawaiicleanenergyinitiative.org/storage/media/1.HCEI%20Plenary%20Update_5.02.11_Senate%20Energy%20Bills.pdf

[152] Hawaii State Legislature, SB 704. Accessed 9/19/11. http://www.capitol.hawaii.gov/session2011/lists/measure_indiv.aspx?billtype=SB&billnumber=704

[153] Hawaii State Legislature, SB 1346. Accessed 9/19/11. http://www.capitol.hawaii.gov/session2011/lists/measure_indiv.aspx?billtype=SB&billnumber=1346

[154] Hawaii State Legislature, SB 1456. Accessed 9/20/11. http://www.capitol.hawaii.gov/session2011/lists/measure_indiv.aspx?billtype=SB&billnumber=1456

[155] Placement of solar energy devices. Accessed 2/18/11. http://www.capitol.hawaii.gov/hrscurrent/Vol03_Ch0121-0200D/HRS0196/HRS_0196-0007.htm

[156] ADS, Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: May 2010 – June 2011 Accessed 9/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2010%20-%2011%20DR%20%20SG%20State%20Policy%20Survey_11%2007%2007_FINAL%20%282%29.pdf
Hawaii PUC, Docket No. 2010-0037 . Accessed 9/15/11. http://dms.puc.hawaii.gov/dms/DocketDetails?docket_id=85+3+ICM4+LSDB9+PC_Docket60+26+A1001001A10C04B44326F4341118+A10C04B44326F434112+184+1873&docket_page=4

[157] DSIRE, Hawaii – Net Metering. Accessed 2/18/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=HI04R&re=1&ee=1

[158] Public benefits fee authorization. Accessed 2/18/11. http://www.capitol.hawaii.gov/hrscurrent/Vol05_Ch0261-0319/HRS0269/HRS_0269-0121.htm

HECO began to implement a smart meter pilot program using Sensus FlexNet advanced metering technology. The meters were not configured to allow utility control over smart appliances. Problems with the first pilot of 9,400 meters led the Hawaii PUC to cancel a proposed second smart meter pilot program in 2010. HECO is now partnering with Maui Electric Company and the Hawaii Natural Energy Institute for the Maui Smart Grid Project. Organizers are looking for 200 volunteers for this voluntary program in which participants will have a smart meter installed in their home as well as access to a personalized, secure website displaying information on energy use measured by the new meter. They will also have the opportunity to try an in-home energy use display and a smart thermostat.[159]

Hawaiian Electric has implemented the EnergyScout Program in which the utility installs a free EnergyScout system that could turn off the participant's water heater during system emergencies. Typically, the water heater is not interrupted for more than one hour at a time. Hawaiian Electric is working to obtain PUC approval to expand the program.[160]

[159] Maui Electric Company, Maui Smart Grid Project Now Recruiting Volunteers, 9/22/11. Accessed 9/26/11. http://www.mauielectric.com/vcmcontent/StaticFiles/Maui_Smart_Grid_Project_Now_Recruiting_Volunteers.pdf
Various online sources. Accessed 2/18/11. http://na.sensus.com/Module/PressRelease/PressReleaseDetail/amr?id=34, http://gigaom.com/cleantech/hawaiian-electric-in-smart-meter-deal-with-sensus/, http://www.greentechmedia.com/articles/read/heco-requests-second-pilot-of-sensus-meters/, http://www.smartgridnews.com/artman/publish/Business_Policy_Regulation_News/Hawaii-PUC-Kicks-Back-Smart-Meter-Project-Tells-Utility-to-Try-It-Again-2795.html

[160] EnergyScout Program. Accessed 2/18/11. http://www.heco.com/portal/site/heco/menuitem.508576f78baa14340b4c0610c510b1ca/?vgnextoid=af3183a2e3576210VgnVCM1000005c011bacRCRD&vgnextfmt=default&cpsextcurrchannel=1

Idaho

Item	Title	Dates	Description
Legislative			
HB 265	Industrial Wind Farm and Wind Turbine Moratorium	3/14/2011	Pending moratorium on certain industrial wind farms and wind turbines for a specific length of time to address questions surrounding the need for more intermittent power in the state.[161]
HCR 4	Energy, Environment And Technology Issues - Study	2/22/2011	Authorizes the Legislative Council to appoint a committee to complete a study of the 2007 Integrated State Energy Plan that provides for the state's power generation needs and make any recommendations for necessary changes in both state law and the plan, and monitor other energy, environment and technology related issues.[162]
SB 1035	An Act Relating to Renewable Energy Projects; Amending Title 61, Idaho Code, by the Addition of a New Chapter 18, Title 61, Idaho Code…	1/21/2011	Provides an expedited permitting process from the state and local governments for renewable energy projects. Created in accordance with the Grow Green Idaho Jobs Act. Bill is pending passage in the Senate.[163]
NA	2007 Idaho Energy Plan	2007	Plan that establishes conservation, energy efficiency, and demand response as the highest priority resource for Idaho, and local renewable resources as the second highest priority.[164]
Idaho Code § 55-615	Solar Easements	NA	Idaho's solar easement provisions are defined regarding the development of DG resources.[165]
SB 1192, HB 106, Idaho Code § 67-8901 et seq.	Idaho Energy Resources Authority Act	4/6/2005	Legislation that allows independent (non-utility) developers of renewable energy projects in the state to request financing from the Idaho Energy Resources Authority, a state bonding authority created by the Environment, Energy and Technology Energy Resources Authority Act. SB 1192 extended the financing opportunities to independent renewable energy producers that are not qualifying facilities under PURPA. Signed by the Governor on 4/6/2005.[166]
Regulatory			
Docket No. GNR-E-08-04	Generic Electric -- EISA -- New PURPA Standards	12/18/2009	PUC reported it had previously adopted the same or comparable standards contained in 16 U. C. ~ 2621(16), (16), (17), and (17) of PURPA as amended by the EISA of 2007 regarding dynamic rates. The docket has been closed.[167]
IPC-E-08-10, Order No. 30722	Idaho Power Company, General Rate Case	3/6/2009	PUC approved a tiered-rate structure, which assesses higher rates on customers as consumption increases.[168]
Docket No. GNR-E-06-02	EPAct/PURPA Standard 14	January 2007	The Idaho PUC decided not to adopt PURPA Standard 14 (Time-Based Metering and Communications).[169]

[161] State of Idaho Legislature, HB 265. Accessed 9/22/11. http://legislature.idaho.gov/legislation/2011/H0265.htm
[162] State of Idaho Legislature, HCR 4. Accessed 9/22/11. http://legislature.idaho.gov/legislation/2011/HCR004.htm
[163] State of Idaho Legislature, SB 1035. Accessed 9/22/11. http://legislature.idaho.gov/legislation/2011/S1035.htm
[164] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/10/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[165] DSIRE, Idaho Solar Easements. Accessed 2/4/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=ID02R&re=1&ee=1
[166] DSIRE, Renewable Energy Project Bond Program. Accessed 2/16/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=ID06F&re=1&ee=0
[167] Idaho PUC, Docket No. GNR-E-08-04. Accessed 9/22/11. http://www.puc.idaho.gov/internet/cases/summary/GNRE0804.html
[168] Idaho PUC, IPC-E-08-10, Order No. 30722. Accessed 9/22/11. http://www.puc.idaho.gov/internet/cases/summary/IPCE0810.html

In January 2007, the Idaho PUC decided not to adopt PURPA Standard 14 as enacted in EPAct 2005. The Commission summarized its position with this statement: "While we concur with the intent of the standard, its ubiquitous scope and implementation timeline are unrealistic….We find that requiring smart meters across the board for each utility has not been demonstrated to be cost effective. Although we decline to adopt this federal standard…we have implemented Smart Metering communication programs for all three utilities."[170]

In January 2009, Idaho Power began the three-year process of installing smart meters for nearly all of its electric customers. The utility plans to have the installations complete in Idaho and Oregon by the end of 2011. With the grant of $47 million received through the federal Smart Grid Investment Grant Program, Idaho Power will be completing 11 other smart grid projects by April 1, 2013, including: 1) AMI Meter Data Management System; 2) AMI Stations Communication; 3) Customer Information System; 4) Enterprise Data Warehouse; 5) Energy Use Advising Tool; 6) Irrigation Load Control;7) Outage Management System; 8) Transmission Situational Awareness; 9) Renewable Integration Tool; 10) Self-Healing Network; and 11) Integration.[171]

Idaho's IOUs administer energy efficiency and other DSM programs with oversight from the Idaho PUC. There is no legislation requiring funding for energy efficiency programs. By 2006, the PUC required Idaho Power and Pacificorp (via operating companies in Idaho, Utah Power and Light and Rocky Mountain Power (RMP)) to file and implement a comprehensive DSM plan. Idaho's energy efficiency programs are supported and supplemented by regional organizations, including the Bonneville Power Administration (BPA), the Northwest Energy Efficiency Alliance (NEEA) and the Northwest Power and Conservation Council (NPCC). In recent years, Idaho has experimented with methods of providing incentives to utilities. The state does not have an EERS, though state energy plans consider energy efficiency to be a resource for utilities. RMP currently offers energy efficiency programs for residential, commercial and industrial customers.[172]

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[169] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/9/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
Idaho PUC. Accessed 9/22/11. http://www.puc.idaho.gov/internet/cases/summary/GNRE0602.html

[170] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/9/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

[171] States Providing for Smart Metering. Accessed 2/11/11. http://www.ncsl.org/?tabid=20672
Idaho Power, Smart Grid: Projects Information. Accessed 9/27/11. http://www.idahopower.com/AboutUs/CompanyInformation/SmartGrid/projectInfoUpdates.cfm

[172] Idaho Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/idaho/185/all/191

Illinois

Item	Title	Dates	Description
Legislative			
SB 1652	Amendment to Public Utilities Act	9/12/2011	Establishes requirements for the Illinois Power Agency's procurement of renewable energy resources from renewable DG, including a requirement to solicit the use of third-party organizations to aggregate distributed renewable energy into groups of no less than one MW in installed capacity. Requires each utility file: 1) an energy efficiency and demand response plan to meet the energy efficiency and demand response standards for 2011 through 2013; and 2) a Smart Grid AMI Deployment Plan with the ICC. Includes new provisions concerning energy efficiency analysis and net metering. Allows an electric utility to undertake an infrastructure investment program and recover the expenditures through the ratemaking process. Adds provisions concerning the approval of the formula rate by the ICC, annual formula rate, revenue-neutral rate design changes, and performance plans. Establishes the Illinois Science and Energy Innovation Trust.[173] Vetoed by Governor Pat Quinn on September 12, 2011.[174]
HB 1422, HB 1913, HB 1943, HB 3493, Amendments to Illinois Public Utilities Act	Comprehensive Energy Strategy	5/9/2011	Plan proposed by Gov. Pat Quinn. HB 1422: Requires the Illinois Power Agency to procure energy efficiency; offset the purchase of electricity by buying reductions in electricity consumption. HB 1913: Promotes distributed energy through net metering. HB 1943: Adds distributed generation to the REPS. HB 3493: Merges utility and alternative retail electric supplier REPS into a single initiative; solidification long term contracts for renewables. Bills have been referred to the Rules Committee since 5/31/11.[175]
HB 3754	Electric Vehicle Infrastructure Act	3/17/2011	Seeks input for the planning, deployment, and installation of electric vehicle public charging station infrastructure capable of being integrated with the electrical grid. Includes provisions concerning public charging station infrastructure standards. Since March 2011, bill has been referred to Rules Committee.[176]
HB 991 (Public Act 096-1436 and 097-0105)	Homeowners' Solar Rights Act	7/14/2011	Prohibits HOAs, common interest community associations and condominium unit owners' associations from preventing homeowners from using or installing solar energy systems. Signed by the Governor 7/14/2011.[177]
SB 680	Public Act 095-0420, An Act Concerning Regulation	03/01/10, 08/25/08, 08/24/07	Requires IOUs in Illinois to offer net metering and requires the ICC establish standards for net metering and interconnection for renewable energy systems.[178]
2010 HB 6154	Amendment to Public Utilities Act	2010	Adds a requirement that the ICC adopt minimum standards for smart grid technology. Bill later failed in 2010.[179]

[173] Illinois General Assemblly, Bill Status of SB 1652. Accessed 9/14/11. http://www.ilga.gov/legislation/BillStatus.asp?DocNum=1652&GAID=11&DocTypeID=SB&LegId=57620&SessionID=84&GA=97
[174] Governor Quinn Vetoes SB 1652, Illinois Government News Network Press Release September 12, 2011. Accessed 9/14/11. http://www.illinois.gov/PressReleases/ShowPressRelease.cfm?SubjectID=2&RecNum=9719
[175] Governor Quinn's Comprehensive Energy Strategy. Accessed 9/15/11. http://www2.illinois.gov/gov/Documents/Strategy/Energy%20Plan%20BACKGROUND%20050911.pdf
[176] Illinois General Assemblly, Bill Status of HB 3754. Accessed 9/20/11. http://www.ilga.gov/legislation/billstatus.asp?DocNum=3754&GAID=11&GA=97&DocTypeID=HB&LegID=61290&SessionID=84
[177] DSIRE, Illinois - Homeowners' Solar Rights. Accessed 2/28/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=IL18R&re=1&ee=1
[178] DSIRE, Ilinois - Interconnection Standards. Accessed 9/13/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=IL15R&re=1&ee=1
[179] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
National Conference of State Legislatures, Energy Security Legislative Update. Accessed 9/22/11. http://www.ncsl.org/?tabid=22492

Item	Title	Dates	Description
Legislative			
2010 HB 6202	Utilities – Net Metering	2010	Requires the creation of a net metering task force.[180]
SB 1592	Utilities – Electricity Rates	May 2011, August 2007	Directs utilities to reduce peak demand by 0.1 percent over prior year, for 10 years, through cost effective demand response and creates the Illinois Power Agency.[181] Creates utility energy efficiency programs in Illinois.[182] In May 2011, the bill was amended to allow the ICC to permit utilities to exceed a demand response spending cap to achieve target savings if the cap results in the utility foregoing cost-effective opportunities for savings that would otherwise create net aggregate bill reductions for its customers.[183]
Public Act 096-0033, SB 1918, SB 1592	Illinois Power Agency Act	July 2007	Defines requirements for energy efficiency and demand response programs. With help from the Illinois Department of Commerce and Economic Opportunity, utilities must implement cost-effective energy efficiency programs and measures to achieve annual energy savings of 0.2 percent of energy delivered in 2008, increasing by 0.2 percent per year until 2012 and increasing 0.4 percent from 2012 until 2014 and reaching 2 percent savings in 2015.[184]
2005 Ill. Laws 977 (amending 220 Ill. Comp. Stat. Ann. 5/16-101A, 16-102, 16-107)	Amendment to The Illinois Customer Choice and Rate Relief Law of 1997	2006	Requires each utility with 100,000 customers or more to: 1) file a tariff providing customers with the option of RTP by January 2007; 2) describe their methodology for implementing the plan; and 3) provide customers with smart meters capable of recording hourly intervals. [185]
Regulatory			
Order in Docket No. 10-0563	Illinois Power Agency Petition for Approval of Procurement Plan	12/21/2010	ICC issued a final order approving a modified 2011 Power Procurement Plan submitted by the Illinois Power Agency, noting that demand response should not be considered an energy supply resource due to uncertainty in 1) cost-effectiveness and 2) effectiveness of reducing capacity in the plan.[186]
Order in Docket No. 07-0566	Proposed general increase in electric rates.	10/1/2010, September 2008	A September 2008 order from the ICC required the formation of the Illinois Statewide Smart Grid Collaborative, which submitted its report to the ICC on 10/1/2010. The report includes recommendations for addressing smart grid definitions, applications, data privacy, data access, remote connection and disconnection, utility rates, consumer education, recovery of utility costs, technical characteristics, and technical requirements.[187]

[180] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf

[181] Tour of Smart Grid Projects and State Policies by Lisa Schwartz, Presentation to the Oregon PUC, Smart Grid Workshop – September 9, 2009, RAPOnline, Source: Ethnie Groves, Xcel Energy. Accessed 2/7/11. http://www.sgiclearinghouse.org/Legislation?q=node/2303&lb=1

[182] Illinois Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/illinois/186/all/191

[183] ADS, Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: May 2010 – June 2011 Accessed 9/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2010%20-%2011%20DR%20%20SG%20State%20Policy%20Survey_11%2007%2007_FINAL%20%282%29.pdf

[184] ADS, Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: May 2010 – June 2011 Accessed 9/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2010%20-%2011%20DR%20%20SG%20State%20Policy%20Survey_11%2007%2007_FINAL%20%282%29.pdf

[185] Draft for Comment of the National Action Plan on Demand Response The Federal Energy Regulatory Commission Staff Docket No. AD09-10, Prepared with the support of The Brattle Group, GMMB, Customer Performance Group, David Lineweber. Accessed 2/10/11. http://www.ferc.gov/legal/staff-reports/03-12-10-demand-response.pdf

[186] ADS, Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: May 2010 – June 2011 Accessed 9/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2010%20-%2011%20DR%20%20SG%20State%20Policy%20Survey_11%2007%2007_FINAL%20%282%29.pdf
ICC, Final Order in Docket No. 10-0563. Accessed 9/15/11. http://www.icc.illinois.gov/e-docket/reports/browse/document_view.asp?id=11119&no=10-0563&did=159790

[187] ADS, Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: May 2010 – June 2011 Accessed 9/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2010%20-%2011%20DR%20%20SG%20State%20Policy%20Survey_11%2007%2007_FINAL%20%282%29.pdf
Illinois Statewide Smart Grid Collaborative. Accessed 9/15/11. http://www.ilgridplan.org/default.aspx

Item	Title	Dates	Description
Regulatory			
NA	Initiative on Plug-In Electric Vehicles	January 2011, September 2010	Formed initiative from the three Illinois IOUs to assess the potential impacts of electric vehicles on the electric system, to address grid preparation, and to determine future regulatory considerations. Ameren Illinois, ComEd and MidAmerican provided their assessments in December 2010 and January 2011.[188]
Executive Order 7	Executive Order to Reduce Energy Consumption in State Facilities	April 2009	Directs the Department of Central Management Services to implement a program to increase energy efficiency, track and reduce energy usage, and improve energy procurement for all state-owned facilities. An energy efficiency committee is created which will oversee energy audits, implementation of recommendations, and other services designed to decrease energy consumption at these facilities. The Illinois Energy Efficiency Committee has been formed to perform study on energy performance of state-owned buildings. A report is due to the General Assembly by July 1, 2012. [189]
Order No. 06-0526	EPAct/PURPA Standard 14	June 2007	The ICC concluded that Illinois utilities have complied with state standards that satisfy the federal tests for PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005, and further analysis is required before the decision for adoption can be made.[190]

The 2010 HB 6154 indicates the ICC must create minimum standards for smart grid technology for electric service and oversee enforcement of the standards. Since January 2011 the bill has made no further progress in the House or Senate. [191]

The ComEd System Modernization Projects involve a 200,000-meter pilot with two-way communication along with an assessment of the pilot and analysis for full-scale deployment of 4 million meters. ComEd submitted its smart grid plan with possible full-scale deployment in 2013. The ICC orders for this project also established foundational policies and a statewide smart grid collaborative. [192] Ameren Illinois Utilities pilot was also approved by the ICC and the statewide collaborative will recommend future steps regarding the project. [193] SB 1652 would have helped fund the ComEd and Ameren Illinois projects, but was vetoed by Pat Quinn on September 12, 2011. The bill now returns to the legislature for revisions and possible override of the Governor's veto. [194]

Prior to 2007, there was limited funding and activity for utility energy efficiency programs. Illinois had little involvement with utility energy efficiency programs, other than a small annual funding requirement created in the Illinois restructuring legislation (HB 262) to support some small programs administered by the state. Legislation enacted in 2007 as the "Illinois Power Agency Act" (SB 1592) requires the development of more electric utility energy efficiency programs. The legislation set an EERS savings goal – beginning at 0.2 percent of sales per year in 2008 and ramping up to 2.0 percent of sales per year by 2015. [195]

[188] ICC, Initiative on Plug-In Electric Vehicles. Accessed 9/15/11. http://www.icc.illinois.gov/electricity/pev.aspx
[189] Illinois Lead by Example Initiatives. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Illinois/186/all/202
Governor Quinn Signs Legislation to Study Energy Performance of State Buildings, SB 3429 Furthers Illinois' Efforts to Adopt More Environmentally-Friendly Building Standards, 5/22/10. Accessed 9/21/11.
http://www.illinois.gov/PressReleases/PressReleasesListShow.cfm?RecNum=8467
[190] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11.
http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[191] Bill Status of HB6154, 96th General Assembly. Accessed 2/10/11. http://www.ilga.gov/legislation/BillStatus.asp?DocNum=6154&GAID=10&DocTypeID=HB&SessionID=76&GA=96
[192] Tour of Smart Grid Projects and State Policies by Lisa Schwartz, Presentation to the Oregon PUC, Smart Grid Workshop – September 9, 2009, RAPOnline, Source: Ethnie Groves, Xcel Energy. Accessed 2/7/11.
http://www.sgiclearinghouse.org/Legislation?q=node/2303&lb=1
[193] Tour of Smart Grid Projects and State Policies by Lisa Schwartz, Presentation to the Oregon PUC, Smart Grid Workshop – September 9, 2009, RAPOnline, Source: Ethnie Groves, Xcel Energy. Accessed 2/7/11.
http://www.sgiclearinghouse.org/Legislation?q=node/2303&lb=1
[194] Governor Quinn Vetoes SB 1652, Illinois Government News Network Press Release September 12, 2011. Accessed 9/14/11. http://www.illinois.gov/PressReleases/ShowPressRelease.cfm?SubjectID=2&RecNum=9719
[195] Illinois Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/illinois/186/all/191

Indiana

Item	Title	Dates	Description
Legislative			
SB 251	Clean Energy Portfolio Standard	5/10/11	Sets a voluntary goal of 10% clean energy by 2025, based on 2010 levels. Between January 1, 2013 and December 31, 2018, utilities must use an average of at least 4% qualifying clean energy. The average percentage increases to 7% between 2019 and 2024, and 10% in 2025.[196] Qualifying clean energy resources include energy storage as well as DSM initiatives that implement load management, demand response, or energy efficiency measures to shift customers' electric loads from periods of higher demand to periods of lower demand.[197]
Indiana Administrative Code, Title 170, Article 4	Electric utilities	2005	Indiana's interconnection regulations include three distinct tiers of interconnection, and CHP systems are eligible.[198]
Indiana Code § 32-23-4-1 et seq. and Indiana Code § 36-7-2-1 et seq.	Planning and regulation of real property; access to solar energy	7/01/2002, 1/1/1980	Allows parties to voluntarily enter into solar-easement contracts which are enforceable by law.[199]
Indiana Code 5-28-34-2	Green industry	NA	Revised the state definition of "green industry" to include smart grid related topics. [200]
Indiana Statute 8-1-2.5-1 et. Seq.	Alternative Utility Regulation, Legislative findings	NA	Allows for either shared savings or adjusted/bonus return on equity mechanisms as DSM incentives.[201]
Regulatory			
Docket No. 43566	Investigation into… Participation by Indiana End-Use Customers in Demand Response Programs Offered by the Midwest ISO and PJM interconnection	7/28/2010	End-use customers shall not be enrolled or otherwise participate in regional transmission organization demand response programs directly or through curtailment service providers or other aggregators. Respondent utilities that are members of PJM or Midwest ISO shall file tariffs or riders authorizing the participation of its retail customers in PJM or Midwest ISO demand response programs through the respondent utility; each utility must file an annual report with the IURC regarding this activity and report back in 2012 on its experience with any approved tariffs.[202]
IURC Case No. 42693	In the matter of the Commission's investigation Pursuant to IC § 8-1-2-58…	12/09/2009	Requires electric utilities establish DSM electric savings goals leading to 2.0% reduction of electricity sales by the year 2019. Utilities must file three year DSM plans which indicate progress and plans for reaching the targets. The goal is to develop a uniform set of energy efficiency programs.[203]
NA	EPAct/PURPA Standard 14	8/2007	The IURC decided not to adopt PURPA Standard 14.[204]
170 IAC 4-4.2	Net Metering	10/22/2004	The IURC adopted rules for net metering requiring the state's IOUs to offer net metering to residential customers and K-12 schools; applies to solar, wind and hydroelectric projects with a maximum capacity of 10 kW.[205]

[196] DSIRE, Indiana – Clean Energy Portfolio Goal. Accessed 9/14/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=IN12R&currentpageid=3&EE=1&RE=1

[197] ADS, Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: May 2010 – June 2011 Accessed 9/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2010%20-%2011%20DR%20%20SG%20State%20Policy%20Survey_11%2007%2007_FINAL%20%282%29.pdf

[198] Indiana Clean Distributed Generation. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Indiana/187/all/195

[199] Indiana Code IC 36-7-2. Accessed 2/6/11. http://www.in.gov/legislative/ic/code/title36/ar7/ch2.html

[200] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf

[201] Indiana Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/indiana/187/all/191

[202] IRUC, Docket No. 43566. Accessed 9/15/11. http://www.in.gov/iurc/files/43566order_072810.pdf

[203] DSIRE, Electric Efficiency Standard. Accessed 3/2/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=IN11R&re=1&ee=1

[204] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

[205] DSIRE, Indiana - Net Metering. Accessed 2/18/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=IN05R&re=1&ee=1

In August 2007, the IURC decided not to adopt PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005. The Commission agreed that each electric utility be prepared to offer advanced technologies to their customers, but a solid foundation of demand response programs needed to be established first and included in the utilities' IRPs.[206]

American Electric Power (AEP) implemented a program, known as "gridSMART," which included the deployment of 110,000 advanced meters and provided customer access to prior day hourly data, TOU rates, remote connect/disconnect, some utility-scale battery storage, and a distributed management system with fault location identification.[207]

Duke Energy has offered DSM programs in Indiana since the 1990s and energy efficiency programs began to appear more frequently in the state after 2007. Both natural gas and electric utilities in Indiana operate DSM and energy efficiency programs. These utilities include Duke Energy, Vectren, Indiana Michigan Power Company, Northern Indiana Public Service Company, and Northern Indiana Fuel and Light. The IURC ordered all jurisdictional electric utilities to begin submitting three-year DSM plans in July 2010. Duke Energy's "Save-A-Watt" model was one of the programs proposed. Some of the submitted goals begin at 0.3 percent annual savings in 2010, increasing to 1.1 percent in 2014, and leveling at 2 percent in 2019. Load management and direct load control initiatives, including peak-shaving will be counted towards the goal. Utilities that do not meet the goals must demonstrate to the IURC how they plan to increase savings. In 2013, the IURC will review the utility DSM filings again to evaluate the energy savings objectives.[208]

The EERS in Indiana established a statewide third-party administrator for certain "Core Energy" efficiency programs. Duke Energy currently has an application pending in front of the IURC for approval of its "Core Plus" portfolio of DSM programs. The company operates its current "core" DSM programs until it finalizes a third-party administrator to take over program operations.[209]

[206] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

[207] AEP Ohio, About the Demonstration Project. Accessed 9/27/11. https://www.aepohio.com/save/demoproject/about/Default.aspx

[208] Indiana Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/indiana/187/all/191

[209] IURC, Docket No.43955. Accessed 9/27/11. https://myweb.in.gov/IURC/eds/Guest.aspx?tabid=28

Duke Energy, Complying with Regulatory and Legislative Energy Efficiency Mandates, 1/12/11. Accessed 9/27/11. http://meeaconference.org/uploads/file/ppt2011/MES_2011-01-12_Duff.pdf

Iowa

Item	Title	Dates	Description
Legislative			
HF 561, H-1681, HSB 124	An Act Relating to the Permitting, Licensing, Construction, and Operation of Nuclear Generation Facilities	6/30/2011	Requires utilities board of the Department of Commerce conduct a study on baseload electrical generation options and costs and submit a final report by 1/1/2012. The board shall determine a long-term demand forecast and identify whether existing baseload generation, purchase power agreements, and DSM programs in this state are sufficient to meet the forecast. Bill was referred to Commerce Committee on 6/30/2011.[210]
HF 560, HB 158	A Bill For An Act Providing For The Installation And Operation Of An Automatic Metering And Termination Of Service System By Electric Utilities	4/1/2011	Permits an electric utility to install and operate, upon a customer's request a prepaid metering system and equipment. Requires the utility educate a customer in advance of installation concerning the use of the prepaid meter and the potential for disconnection. Bill was referred to Commerce Committee on 4/1/2011.[211]
IA Code § 476.6.16 (2009) and IA Code § 476.6.16(c)(2) (2009)	NA	2009, 2008	Requires utilities (rate-regulated IOUs) to develop energy efficiency programs including demand response.[212]
SB 2386	A Bill for an Act Relating to Energy Efficiency	5/6/ 2008	Requires utilities to file energy efficiency goals. In accordance with this mandate, the Iowa Utilities Board (IUB) issued an order asking IOUs to submit plans to achieve goals, including a 1.5 percent annual electricity savings goal. Effective 5/6/2008.[213]
HF 918	An Act Establishing the Office of Energy Independence and the Iowa Power Fund	5/23/2007	Establishment of Office of Energy Independence to provide recommendations for energy independence, including smart grid deployment. Effective 5/23/2007. [214]
IA Code § 476.41 et seq.	Public Utility Regulation, Alternate Energy Production Facilities	7/27/1984	Net metering rules for the state of Iowa.[215]
Iowa Code § 564A	Access to Solar Energy	NA	Iowa's solar access easement provision.[216]
Regulatory			
Docket No. NOI-2011-0001	Order Opening Inquiry on Prepaid Meters, Soliciting Comments, and Scheduling Workshop	6/29/2011	In response to recent legislation, the PSB opened a proceeding to investigate the use of prepaid metering in the electric and gas industries, with comments due in August 2011 and a workshop scheduled for the end of September 2011.[217]
IAC § 199-15.10, IAC § 199-15.10, Docket No. RMU-2009-0008 (NOI-06-4)	Electric Interconnection of Distributed Generation Facilities	May 2010	Iowa's interconnection standards apply to DG facilities of up to 10 MW. The definition of a DG facility includes qualifying facilities (QFs) under PURPA and alternative energy production facilities as defined by Iowa law. The Iowa rules set four levels of review for interconnection requests.[218]
NA	EPAct/PURPA Standard 14	March 2007	The IUB decided not to adopt PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005.[219]

[210] Iowa Legislature, HF 561. Accessed 9/22/11. http://coolice.legis.state.ia.us/Cool-ICE/default.asp?Category=billinfo&Service=Billbook&menu=false&hbill=h1681
211 Iowa Legislature, HF 560. Accessed 9/22/11. http://coolice.legis.state.ia.us/Cool-ICE/default.asp?Category=billinfo&Service=Billbook&menu=false&hbill=hf560
212 Draft for Comment of the National Action Plan on Demand Response The Federal Energy Regulatory Commission Staff Docket No. AD09-10, Prepared with the support of The Brattle Group, GMMB, Customer Performance Group, David Lineweber. Accessed 2/10/11. http://www.ferc.gov/legal/staff-reports/03-12-10-demand-response.pdf
213 Iowa Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/iowa/188/all/191
214 Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
215 DSIRE, Iowa – Net metering. Accessed 2/7/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=IA02R&re=1&ee=1
216 DSIRE, Iowa Solar Easements. Accessed 2/7/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=IA04R&re=1&ee=1
217 Iowa PSB, Docket No. NOI-2011-0001. Accessed 9/22/11. https://efs.iowa.gov/efiling/groups/external/documents/docket/070758.pdf
[218] Iowa Clean Distributed Generation. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Iowa/188/all/195
[219] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/7/11
http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

In March 2007, the IUB decided that PURPA Standard 14 in EPAct 2005 was not cost-beneficial and that it would be difficult to regulate a single standard for advanced metering. However the IUB will discuss the possibilities of smart meter pilot programs, and whether current rates send accurate price signals to customers, with the utilities included in the proceeding. [220]

Iowa's utilities administer energy efficiency programs regulated by the IUB with significant input from the Office of Consumer Advocate. In the last decade, the state has increased its commitment to energy efficiency programs. Municipal utilities and electric cooperatives were required to develop new energy efficiency plans and the IUB was required to report on these plans by January 1, 2011. Plans must include programs for all types of customers and must include performance standards in terms of energy and capacity savings. [221]

In March 2009, MidAmerican Energy Company received approval for its energy efficiency plan, under which it planned to achieve savings of 1.5 percent of retail electric sales by 2010. In June 2009, Iowa Power and Light Company received approval for a modified energy efficiency plan. IPL plans to achieve 1.3 percent electricity and 1.2 percent natural gas savings by 2013. [222]

[220] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/7/11 http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

[221] Iowa Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/iowa/188/all/191

[222] Iowa Clean Distributed Generation. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Iowa/188/all/195

Kansas

Item	Title	Dates	Description
Legislative			
HB 2303	Utilities; Rate-Making and Variable Time-Of-Day Pricing	3/4/2011	By July 1, 2012, any electric public utility that has deployed smart meters to a majority of its residential customers shall file a tariff for variable time-of-day pricing of electricity used in the electric public utility's service area in which the smart meters have been deployed. Bill is pending in the Committee on Energy and Utilities as of 3/4/2011.[223]
HCR 5012	Establishing Policy Goals for Energy Development, Consumption and Costs	2/10/2011	The KCC shall investigate the potential for energy storage to address transmission line constraint relief, DG reliability, electric distribution system reliability, and to firm renewable energy generation. KCC shall work with utilities to increase smart grid compliant distribution line segments and appurtenances and electric meters. Bill is pending in the Committee on Energy and Utilities as of 2/10/2011.[224]
HCR 5005	Establishing Targets for Energy Development, Consumption and Costs	1/21/2011	In cooperation with the KCC, electric utilities shall ensure that at least 70% of transmission and distribution line segments and appurtenances and at least 50% of all electric meters for each public utility are smart grid compliant. Bill is pending in the Committee on Energy and Utilities as of 1/21/2011.[225]
HB 2369, Kansas Statutes 66-1263, et seq. and K.A.R. 82-17-1, et seq.	Net Metering	7/9/2010, 7/1/2009	Net metering rules for the state of Kansas.[226] The rules apply to renewable sources of DG and only apply to systems with capacities up to 200 kW.[227]
HR 6005-0	NA	2009	Establishment of goal of making 25 percent of electric meters smart grid compliant.[228]
Kansas Statute 58-3801 et seq.	Solar Easement Provisions	7/15/1982	Solar easement provisions regarding DG resources.[229]
Regulatory			
Docket No. 08-GIMX-441-GIV	General Investigation Regarding Cost Recovery and Incentives For Energy Efficiency Programs	11/14/2008	The KCC chose not to require energy efficiency programs from the state's electric and natural gas utilities but determined that it would collaborate with utilities as they pursue energy efficiency as a resource, including program proposals that included decoupling, cost recovery and shared savings performance incentives.[230]
NA	EPAct/PURPA Standard 14	August 2007	The KCC decided not to adopt PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005.[231]

[223] Kansas Legislature, HB 2303. Accessed 9/20/11. http://www.kslegislature.org/li/b2011_12/year1/measures/hb2303/
[224] Kansas Legislature, HCR 5012. Accessed 9/20/11. http://www.kslegislature.org/li/b2011_12/year1/measures/hcr5012/
[225] Kansas Legislature, HCR 5005. Accessed 9/20/11. http://www.kslegislature.org/li/b2011_12/year1/measures/hcr5005/
[226] DSIRE, Kansas – Net metering. Accessed 2/7/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=KS08R&re=1&ee=1
[227] Kansas Clean Distributed Generation. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Kansas/189/all/195
[228] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
[229] DSIRE, Kentucky Solar Easements. Accessed 2/7/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=KY01R&re=1&ee=1
[230] Kansas Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/kansas/189/all/191
[231] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

In August 2007, the KCC decided not to adopt PURPA Standard 14 as enacted in EPAct 2005. The KCC encouraged voluntary pilot programs as the best vehicle for deploying smarting metering and TOU rates.[232]

Kansas City Power and Light (KCP&L) and Kansas City Board of Public Utilities (BPU) are the primary electric companies that offer energy efficiency programs in Kansas, and most are rebate or financing programs. Kansas does not have any laws or regulatory rules that mandate energy efficiency programs. KCP&L offers rebates for commercial and residential customers, home builders, and subdivision developers for energy-efficient electric heating and water heating systems, weatherization, free programmable thermostats, heat pumps, and load management programs. Kansas City BPU offers commercial customers rebates for lighting, air conditioning, motors and custom measures and offers residential customers rebates for air conditioning and programmable thermostats, as well as weatherization assistance and energy audits. [233]

[232] SGIC. Accessed 2/4/11. http://www.sgiclearinghouse.org/Legislation
[233] Kansas Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/kansas/189/all/191
KCP&L, Programs & Services. Accessed 9/29/11. http://www.kcplsave.com/business/programs_and_services/default.html
Kansas City BPU, Energy-Efficiency Programs for your Home. Accessed 9/28/11. http://www.bpu.com/customer_service/energy_eff_residential.jsp?zone=residential

Kentucky

Item	Title	Dates	Description
Legislative			
HB 239	An Act Relating to Energy…	2/2/2011	For each calendar year, beginning in 2013, all retail electric suppliers shall take energy efficiency measures and implement energy efficiency programs that achieve incremental and cumulative electricity savings. In calendar year 2021, the incremental electricity savings requirement shall be 2 percent and the cumulative savings achieved shall be 10.25 percent. Bill has been referred to Tourism Development & Energy Committee since February 2011.[234]
HB 240	An act relating to the promotion of the efficient use of energy…	2/25/2010	Allows the state PSC to create requirements for DSM programs. Signed by Governor 2/25/2010.[235]
HB 1	Incentive for Energy Independence Act	7/9/2007	Attempts to eliminate impediments to the adoption by utilities of cost-effective demand-management strategies for addressing future demand prior to PSC consideration of any proposal for increasing generating capacity. Bill passed in 7/9/2007.[236]
KRS § 381.200	Deeds construed to include buildings and appurtenances - Solar easements	7/15/1982	Solar easement provisions regarding DG resources.[237]
Kentucky Revised Statute 278.285	Demand-side Management plans - Review and Approval of Proposed Plans and Mechanisms	NA	Allows utilities to recover the full costs of DSM programs via rates and encourages implementation of cost-effective DSM programs.[238]
Regulatory			
Case No. 2008-00408	Consideration of the New Federal Standards of the EISA of 2007	3/17/2010-3/2011, 11/13/2008	Smart grid and smart meter collaborative effort for the PSC to provide guidance to the associated parties regarding the smart grid and smart meter issues it believes should be addressed. Resulted in issuance of the report "Commission Staff Smart Meter and Smart Grid Guidance" on 2/19/2010. In March 2010 through March 2011, parties filed a response that encouraged smart grid pilots and trials built to understand customer behavior, and encouraged new efforts focused on customer education. The utilities also responded that smart grid investments should be treated the same as other utility investments.[239]
SB 83, KRS § 278.465 et seq. and KY PSC Order 2008-00169	Interconnection and Net Metering Guidelines - Kentucky	01/08/2009, 07/15/2008, 4/22/2004	Net metering rules for Kentucky.[240]

[234] Kentucky Legislature, HB 239. Accessed 10/3/11. http://www.lrc.ky.gov/record/11RS/HB239.htm
[235] Kentucky Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/kentucky/190/all/191
[236] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11, http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[237] DSIRE, Kentucky Solar Easements. Accessed 2/7/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=KY01R&re=1&ee=1
[238] Kentucky Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/kentucky/190/all/191
[239] ADS, Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: May 2010 – June 2011 Accessed 9/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2010%20-%2011%20DR%20%20SG%20State%20Policy%20Survey_11%2007%2007_FINAL%20%282%29.pdf
Kentucky PSC, Case No. 2008-00408. Accessed 9/15/11. http://psc.ky.gov/Home/Library?type=Cases&folder=2008%20cases/2008-00408
[240] DSIRE, Kentucky – Net metering. Accessed 2/7/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=KY07R&re=1&ee=1

Item	Title	Dates	Description
Legislative			
NA	Intelligent Energy Choices for Kentucky's Future	November 2008	Gov. Steve Beshear's 7-point strategic energy action plan that provides a framework around existing policies to aggressively increase use of renewable energy sources, improve energy efficiency, develop cleaner methods to utilize fossil energy resources, and diversify electricity and transportation energy portfolios.
NA	EPAct/PURPA Standard 14	December 2006	The Kentucky PSC decided not to adopt PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005.[241]

In April 2008, SB 83 expanded the state's net-metering law by requiring utilities to offer net metering to customers that generate electricity with PV, wind, biomass, biogas or hydroelectric systems up to 30 kW in capacity. The customer retains ownership of any RECs. When time-of-day or TOU metering is used, the electricity fed back to the grid by customers is net-metered and accounted for in accordance with the time-of-day or TOU billing agreement.[242]

Kentucky's regulated utilities administer and implement DSM programs with oversight from the Kentucky PSC. At least one IOU, Duke Energy, has offered DSM programs in Kentucky since 1996. Customers support DSM programs through utility surcharges. Kentucky's 2007 Energy Act recommended that utilities examine specific issues regarding energy efficiency. In 2008, Duke Energy proposed the "Save-A-Watt" program which makes energy efficiency a high-priority fuel choice in the company's Kentucky operations. Several publicly-owned utilities are also discussing energy efficiency programs with the Kentucky PSC. Owen Electric Cooperative is developing plans to expand its DSM programs and is one of 18 cooperatives participating in the Regional Smart Grid Demonstration Project headed by the National Rural Electric Cooperative Association researching distribution automation and DSM technologies, including a test of end-to-end demand management. Currently no EERS are in place and regulated utilities are required to prepare and file annual IRPs that consider how to use demand-side resources to meet forecasted requirements reliably and at the lowest possible cost.[243]

[241] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11, http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

[242] DSIRE, Kentucky – Net metering. Accessed 2/7/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=KY07R&re=1&ee=1

[243] Kentucky Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/kentucky/190/all/191

Smartgrid.gov, NRECA Releases "Interoperability and Cyber Security Plan,"June 2011. Accessed 9/27/11. http://www.smartgrid.gov/news/nreca_releases_%E2%80%9Cinteroperability_and_cyber_security_plan%E2%80%9D

Louisiana

Item	Title	Dates	Description
Legislative			
SB 359, Act 543	To Amend and Reenact R.S. 51:3062(5)(b) and to Enact R.S. 51:3063(C), Relative to the Definition of "Net Energy Metering Facility"	9/17/2009, 6/30/2008	Revises the definition of "net energy metering facility." Adopted by City Council of New Orleans 9/17/2009.[244]
Executive Order BJ 2008-8, SB 240	Executive Branch – Green Government, Louisiana major facility project; energy efficiency and conservation; requirements	1/30/2008, 7/6/2007	Directs the Division of Administration to set energy efficiency goals for state facilities, office buildings, and complexes for 2009 to 2011. SB 240 requires state-funded facilities to be designed and built to exceed state energy codes by at least 30 percent and to develop or increase standards using ENERGY STAR as a minimum standard. Bill was signed by the Governor as Act 270 in 2007.[245]
Chapter 50, §3061. Acts 2003, No. 653, §1	Louisiana Renewable Energy Development Act	10/1/2003	Declares that the state should actively encourage the manufacture of new technologies through promotion of emerging energy technologies. Promotes net energy metering.[246]
Regulatory			
Docket No. R-31417, General Order 7-22-11; Docket No. R-27558	Re-examination of the Commission's Net Metering Rules Found in General Order No. R-27558	7/22/2011, 11/30/2005	Approved proposed changes to net metering rules for systems 100-300 kW. Large net metering projects are 1) limited to 2 MW per project; total of 10 MW installed nameplate capacity; 2) must meet other requirements of order; 3) must reimburse the utility for reasonable and necessary engineering analyses and/or studies performed prior to project approval; 4) must compensate the utility for necessary upstream and/or downstream system infrastructure improvements triggered by the net metering project.[247]
Docket No. R-28271, Sub Docket B, General Order 11-12-10	The Commission Approved, with Modifications, the Staff's October 11 Revised Proposed Renewable Energy Pilot Program Implementation Plan	11/12/2010, 3/3/2009	Feasibility study of REPS. Outlines a "Renewable Energy Pilot Program Implementation Plan" as an experimental study of the resources available to utilities to meet a REPS goal. Utilities are to report findings on yearly basis to the PSC through 2012 after which the PSC will consider a possible mandatory REPS program.[248]

[244] Louisiana State Legislature, SB359 - 2008 Regular Session (Act 543). Accessed 9/22/11. http://www.legis.state.la.us/billdata/streamdocument.asp?did=503709
[245] Louisiana Lead by Example Initiatives. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Louisiana/191/all/202
[246] Louisiana PSC, Docket No. R-31417 Net Metering, Technical Conference 5/31/2011, Accessed 9/22/11. http://www.lpsc.org/_docs/_General/Tech%20Conf%20Presentation%205%2031%20V2%20formatted.pdf
[247] Louisiana PSC, Docket No. R-31417 Net Metering, Technical Conference 5/31/2011, Accessed 9/22/11. http://www.lpsc.org/_docs/_General/Tech%20Conf%20Presentation%205%2031%20V2%20formatted.pdf
Louisiana PSC, Docket No. R-31417. Accessed 9/22/11. http://lpscstar.louisiana.gov/star/ViewFile.aspx?Id=da62f01f-aedc-4211-9a41-7b9d19ccbe18
[248] Louisiana PSC, Docket No. R-28271, Sub Docket B. Accessed 9/22/11. http://lpscstar.louisiana.gov/star/ViewFile.aspx?Id=15a3f0c9-af82-4047-ba71-ece80c7de9df

Item	Title	Dates	Description
Regulatory			
Docket No. R-29213 Subdocket A	Investigation … Time-Based Meters and Communication Devices …Time-Based Pricing Rate Schedules and Other Demand Response Programs	9/22/2009	Investigation to determine if electric utilities should install time-based meters and communication devices for each of their customers which enable such customers to participate in time-based pricing rate schedules and other demand response programs. Order issued 9/22/2009, section 3.7, addresses the release or sharing of customer data. Data sharing outside the customer-utility working relationship is not permitted without customer approval. Docket currently remains open with a "pending" status.[249]
NA	EPAct/PURPA Standard 14	August 2007	The Louisiana PSC does not specifically adopt or reject PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005 but chooses to adopt its staff rules.[250]
LA R.S. 51:3061 et seq. and LA PSC Order, Docket No. R-27558	Louisiana Renewable Energy Development Act	11/30/2005, 10/1/2003	Louisiana law requiring IOUs, municipal utilities and electric cooperatives to offer net metering to customers that generate electricity using solar, wind, hydropower, geothermal or biomass resources.[251]

The Louisiana PSC chose to adopt its Staff 's April 2007 Final Proposed Rule, which does not specifically adopt or reject PURPA Standard 14 as enacted in EPAct 2005. The PSC indicated that smart meters and demand response must be on a voluntary basis. The PSC provides guidance for the deployment of demand response programs and requires utilities implementing smart meters to file bi-annual reports with deployment details. Additionally, the smart meters must be compliant with standards developed by the American National Standards Institute. The PSC oversees investigations of new pilot programs.[252]

Entergy currently offers energy efficiency programs for New Orleans residential, small commercial, and industrial customers, though there are currently no EERS in place for the state. Entergy customers can get reduced interest home improvement loans to make energy-related improvements to their existing homes and the Louisiana Home Energy Rebate Option offers a cash payments for residents who build or improve homes to high levels of energy efficiency.[253]

[249] Louisiana PSC, Docket No. R-29213 Subdocket A. Accessed 9/22/11. http://lpscstar.louisiana.gov/star/portal/lpsc/page/docket-docs/PSC/DocketDetails.aspx
[250] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11, http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[251] DSIRE, Louisiana – Net metering. Accessed 2/7/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=LA02R&re=1&ee=1
[252] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11, http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[253] Louisiana Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/louisiana/191/all/191
Entergy, Energy Efficiency Programs and Tax Credits. Accessed 9/27/11. http://www.entergy-louisiana.com/your_home/rebuilding.aspx

Maine

Item	Title	Dates	Description
Legislative			
LD 756 (HP 563)	An Act To Limit the Use of Smart Meters	6/15/2011	Requires the PUC to open a proceeding to establish the terms and conditions under which a utility may install wireless smart meters. The customer must be allowed to decline the installation of the wireless smart meter or have a wired smart meter installed as an alternative to the wireless smart meter. Also requires the PUC address regulatory gaps between federal and state law regarding smart meters, customer data, and cyber security and report findings to the Joint Standing Committee on Energy, Utilities and Technology by January 15, 2012. Approved by the Governor In June 2011.[254]
LD 795	An Act To Expand Net Energy Billing	6/8/2011	Requires the PUC amend the net energy rules to address net energy billing and interconnection agreements. Allows the PUC to amend net energy billing rules following "routine technical rules" without sending the amendments to the legislature for approval. Gov. Paul LePage approved the net metering legislation in June 2011.[255]
LD 1396 (HP 1025)	An Act To Require…Safeguards to Consumers Prior To Installing Wireless Smart Meters	6/3/2011	Would have required the PUC to open a proceeding when a utility initiated plans to deploy wireless smart meters. Included additional customer protections related to installations and rate increases. Bill failed to pass in June 2011 and no further action has been taken. [256]
LD 1106 (HP 818)	An Act To Lower the Cost of Health Care through Improved Energy Efficiency	6/1/11	Certain capital expenditures before January 1, 2017 that meet certification standards adopted by the Efficiency Maine Trust as likely to produce energy cost savings through energy efficiency, renewable energy technology or smart grid technology would not require a certificate of need. Bill failed to pass in June 2011 and no further action has been taken.[257]
LD 620 (SP 201)	Resolve, To Protect…Ratepayers Regarding the Installation of Smart Meters	4/14/2011	A transmission and distribution utility may not install a smart electric meter until one year after the effective date of the legislation. At customer request, a utility shall remove a smart electric meter from the customer's premises and replace it with an electric meter similar to the type installed previously for a fee not exceeding $30. The PUC shall study the safety of smart electric meters, including, but not limited to, health risks to customers posed by smart meters. Bill was referred to the Senate in April 2011.[258]
HB 1535	An act to create a smart grid policy in the state	3/23/2010	Legislation to establish a smart grid policy in the state of Maine. Governor signed bill into law on 3/23/2010.[259]
HB 1079	NA	3/23/2010	Establishes a state policy on smart grid infrastructure including employment of a smart grid to improve reliability and efficiency of the power resource and delivery system, while reducing energy consumption. Includes adoption of technologies for smart metering. Governor signed bill into law on 3/23/2010.[260]

[254] Maine PUC, HP0563, LD 756, Item 1, 125th Maine State Legislature. Accessed 9/15/11. http://www.mainelegislature.org/legis/bills/bills_125th/billpdfs/HP056301.pdf
[255] State of Maine Legislature, Summary of LD 795. Accessed 9/27/11. http://www.mainelegislature.org/LawMakerWeb/summary.asp?ID=280040031
[256] State of Maine Legislature, Summary of LD 1396. Accessed 9/20/11. http://www.mainelegislature.org/LawMakerWeb/summary.asp?ID=280041059
[257] State of Maine Legislature, Summary of LD 1106. Accessed 9/20/11. http://www.mainelegislature.org/LawMakerWeb/summary.asp?ID=280040620
[258] Maine PUC, LD 620 (SP 201). Accessed 9/15/11. http://www.mainelegislature.org/legis/bills/bills_125th/billtexts/SP020101.asp
[259] Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: October 2008 – May 2010, Prepared by the DRCC. Accessed 2/10/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2009_DR-SG_Policy_Survey_FINAL_10.06.17%282%29.pdf

Item	Title	Dates	Description
Legislative			
Public Law Chapter 518	An Act To Enhance Maine's Clean Energy Opportunities	March 2010	Sets the goal for the Efficiency Maine Trust to capture all cost-effective energy efficiency resources available for electric utility ratepayers.[261]
33 M.R.S. §1421 seq.	Solar Rights	9/30/2009	Solar access laws for the state of Maine.[262]
Public Law 372	An Act Regarding Maine's Energy Future	June 2009	Creates the Efficiency Maine Trust, an independent entity which, as of July 2010, creates, coordinates, and implements energy efficiency and alternative energy programs.[263]
MRS 3210-C (4)	Capacity resource adequacy	2007	An order that requires utilities to use energy efficiency before any other traditional resource.[264]
LD 2041	Maine's Energy Independence and Security Act	June 2006	Gives permission to the Maine PUC to incorporate cost-effective demand response and energy efficiency into standard offer supply.[265]
33 M.R.S. §1401 et seq.	Establishment of solar easements	1981	Solar easement provisions regarding DG resources.[266]
Regulatory			
Docket No. 2011 - 274	Maine Public Utilities Commission Inquiry Into Cyber Security and Privacy Issues Regarding Smart Meters…	8/10/2011	PUC initiated an inquiry to obtain information and viewpoints regarding current cyber security and privacy requirements that exist under federal and state law, rules and utility policies and practices, and potential regulatory gaps that may exist regarding smart meters and related systems.[267]
Docket No. 2010-345, 2010-389, 2010-398, 2010-400, 2011-085	Request for Commission Investigation…Smart Meter Initiative	5/17/2011	Requires Central Maine Power (CMP), as a public utility that provides a monopoly service, to offer two opt-out options for the company's smart meter program: the availability of the smart meter with its transmitter turned off and the ability to retain the existing (or analog) meter.[268]
Docket No. 2010-267, Docket No. 2011-138	Investigation into Need For Smart Grid Coordinator and Smart Grid Coordinator Standards	9/8/2010	As part of Maine's Smart Grid Policy Act 2010, the PUC is required to investigate whether it is in the public interest to have one or more smart grid coordinators at a state-wide or territory-wide level. A technical conference was held in June 2011 regarding the investigation.[269]

[260] States Providing for Smart Metering. Accessed 2/11/11. http://www.ncsl.org/?tabid=20672
[261] Maine Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/maine/192/all/191
[262] DSIRE, Maine Solar Rights. Accessed 2/10/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=ME12R&re=1&ee=1
[263] Maine Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/maine/192/all/191
[264] Maine Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/maine/192/all/191
[265] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11, http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[266] DSIRE, Maine Solar Easements. Accessed 2/10/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=ME03R&re=1&ee=1
[267] Maine PUC, Docket No. 2011 - 274. Accessed 9/20/11. http://mpuc.informe.org/easyfile/easyweb.php?func=easyweb_query
[268] MPUC Decides Smart Meter Investigation, May 17, 2011. Accessed 9/15/11. http://www.maine.gov/tools/whatsnew/index.php?topic=puc-pressreleases&id=245859&v=article08
[269] Maine PUC, Docket No. 2010-267. Accessed 9/15/11. http://mpuc.informe.org/easyfile/cache/easyfile_doc230317.PDF

Item	Title	Dates	Description
Regulatory			
Docket No. 210-116	Review of Efficiency Maine Trust Triennial Plan	7/19/2010	Maine PUC provides conditional approval of Efficiency Maine Trust's Triennial Plan with a supplemental plan in October 2010 addressing programs, budgets, evaluation plans, and performance metrics.[270]
Docket No. 2009-219	Order Adopting Small Generator Interconnection Forms and Agreements	January 2010	Maine's PUC adopted interconnection procedures applying to all transmission and distribution utilities operating in Maine. The interconnection procedures set four tiers of review for interconnection requests for all eligible technologies and systems.[271]
CMR 65-407-313 and LD 336	Net Energy Billing Rule To Allow Shared Ownership	04/30/2009	Defines net-metering standards for the state of Maine.[272]

In March 2010, Governor Baldacci signed legislation known as the "Act to Create a Smart Grid Policy in the State" to work toward creating a statewide smart grid policy. The smart grid policy goals include: 1) deployment and integration into the electric system of demand response technologies, demand-side resources and energy-efficiency resources; 2) deployment of smart grid technologies, including real-time, automated, interactive technologies that optimize the physical operation of energy-consuming appliances and devices, for purposes of metering, communications concerning grid operation and status and distribution system operations; 3) deployment and integration into the electric system of advanced electric storage and peak-reduction technologies, including plug-in electric and hybrid electric vehicles; and 4) identification and elimination of barriers to adoption of smart grid functions and associated infrastructure, technology and applications.[273]

In 2002, Maine established a state-wide public benefits energy efficiency program, known as Efficiency Maine, was became a division of the Maine PUC. Efficiency Maine administered a portfolio of energy efficiency programs available to all electric utility customers in Maine. Efficiency Maine also administered low-income programs. In 2010, the Efficiency Maine Trust replaced Efficiency Maine and a related program, the Energy and Carbon Savings Trust. An Act Regarding Maine's Energy Future, Public Law 372, was signed by the Governor in June 2009. It set up the Efficiency Maine Trust. The Efficiency Maine Trust plans to receive funding from many sources including the private sector, the ARRA, the Regional Greenhouse Gas Initiative, and an increased system benefits charge on utility bills.[274] The first triennial plan created by the Efficiency Maine Trust was approved by the PUC in July 2010, and will expire in June 2013. It aims to help Maine achieve 1) reductions in electricity and natural gas consumption of 30 percent within a decade; 2) reductions in oil heating use of 20 percent within a decade; and 3) weatherization of 100 percent of homes and 50 percent of businesses by 2030, with a focus on performance metrics such as net energy and carbon savings.[275]

All of Maine's electric utilities must offer net energy billing (net metering) for individual customers. IOUs are required to offer net metering to eligible facilities with capacity limits up to 660 kW. Customer owned utilities are required to offer net metering to customer-generators up to 100 kW, though they are authorized to offer net metering to eligible facilities with capacity limits up to 660 kW.[276]

[270] Maine PUC, Review of Efficiency Maine Trust Triennial Plan, July 19, 2010. Accessed 9/14/11. http://www.dsireusa.org/documents/Incentives/MPUC2010-116.pdf
[271] Maine Clean Distributed Generation. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Maine/192/all/195
[272] DSIRE, Maine – Net metering. Accessed 2/10/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=ME02R&re=1&ee=1
[273] Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: October 2008 – May 2010, Prepared by the DRCC. Accessed 2/10/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2009_DR-SG_Policy_Survey_FINAL_10.06.17%282%29.pdf
[274] Maine Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/maine/192/all/191
[275] Triennial Plan of the Efficiency Maine Trust 2011-2013, April 2010. Accessed 9/14/11. http://www.efficiencymaine.com/docs/other/EMT_Final_Tri_Plan.pdf
[276] Maine Clean Distributed Generation. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Maine/192/all/195

Maryland

Item	Title	Dates	Description
Legislative			
HB 665, SB 557	Commission on Maryland Cybersecurity Innovation and Excellence	5/10/2011	Establishes the Commission on Maryland Cybersecurity Innovation and Excellence which shall conduct a comprehensive review of inconsistencies in policies, standards, and best practices for ensuring the security of computer systems and networks used by state government and organizations that work with health care records, personal identification information, public safety, and public service and utilities. Signed into law by Gov. Governor Martin O'Malley.[277]
HB 801 and HB 821, MD Public Utility Companies Code § 7-306	Electricity – Net Energy Metering – Credits…Fuel Cell	10/01/2010	Revised net-metering laws for bi-directional metering.[278] The rules apply to IOUs, electric cooperatives and municipal utilities and residents, businesses, schools or government entities with systems that generate electricity using micro-CHP resources are eligible for net metering. Bills were signed into law by the Governor in May 2010.[279]
Code of Maryland Regulations Title 20, Subtitle 50, Chapter 9	Small Generator Interconnection Standards	2009	Interconnection rules delineate four distinct tiers of interconnection, covering interconnection for systems up to 10 MW in size, and specifically allow for the interconnection of CHP.[280]
HB 368, SB 268	Regional Greenhouse Gas Initiative, Maryland Strategic Energy Investment Program Act	4/24/2008	Defines that the Maryland Strategic Energy Investment Program (housed in the Maryland Energy Administration) will fund demand response programs.[281]
SB 205/HB 374	Maryland's EmPOWER Maryland Energy Efficiency Act	4/5/2008	Sets goals for reductions in energy consumption and peak demand.[282] This includes a statewide goal of reducing both per capita electricity consumption and peak demand by 15 percent by the end of 2015. Maryland utilities are required to provide cost-effective energy efficiency and conservation programs. Bill passed on 4/5/2008.[283] Utilities filed plans with the PUC and funding was approved by the PSC in June 2011 for the Northeastern Energy Efficiency Partnership's Evaluation Monitoring and Verification Forum which will encourage the application of evaluation monitoring and verification practices in the utilities' EmPOWER Maryland programs.[284]

[277] Maryland General Assembly, HB 665. Accessed 9/20/11. http://mlis.state.md.us/2011rs/billfile/hb0665.htm
[278] DSIRE, Maryland – Net Metering. Accessed 2/7/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MD03R&re=1&ee=1
[279] Maryland Clean Distributed Generation. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Maryland/66/all/195
[280] Maryland Clean Distributed Generation. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Maryland/66/all/195
[281] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11, http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[282] Draft for Comment of the National Action Plan on Demand Response The Federal Energy Regulatory Commission Staff Docket No. AD09-10, Prepared with the support of The Brattle Group, GMMB, Customer Performance Group, David Lineweber. Accessed 2/7/11. http://www.ferc.gov/legal/staff-reports/03-12-10-demand-response.pdf
[283] Maryland Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/maryland/66/all/191
[284] ADS, Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: May 2010 – June 2011 Accessed 9/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2010%20-%2011%20DR%20%20SG%20State%20Policy%20Survey_11%2007%2007_FINAL%20%282%29.pdf

Item	Title	Dates	Description
Regulatory			
Order No. 84275, Case No. 9241	In The Matter of an Investigation of the Regulation of Curtailment Service Providers	8/22/2011	Curtailment service providers operating within Maryland qualify as "electricity suppliers" under PUA § 1-101(j) and shall be licensed as electricity suppliers as a condition of doing business in this State. Opens a discussion of proposed amendments to the electric supplier license application form and a discussion of data collection and dissemination with the PSC regarding curtailment service provider activities. [285]
Order No. 84262, Case No. 9236	In the Matter of an Investigation of Demand Response Billing Service by Electric Utilities to Federal End-User Customers	8/19/2011	Orders that: 1) each EmPower Maryland utility research expanding its demand response programs to more effectively engage customers, especially federal end-user customers, for the 2012-2014 planning cycle; and 2) each EmPower Maryland utility begin actively informing qualifying federal entities of the benefits of demand response programs offered through curtailment service providers or through the utility directly.[286]
Case No. 9059	EPAct/PURPA Standard 14	February 2007	The Maryland PSC deferred its decision about whether to adopt PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005.[287]

The EmPower Maryland Energy Efficiency Act sets goals for efficiency and peak-demand reduction and requires utilities provide demand response plans for achieving the goal. The legislation also requires the Maryland PSC evaluate the cost effectiveness of mandating the integration of smart meters and other smart grid technologies into these plans. In 2009, the Maryland PSC approved plans from BGE, Delmarva Power and Light, PEPCO, and Southern Maryland Electric Cooperative. Allegheny Power offers two energy efficiency programs (load response during peak periods and interruptible load programs) for its large commercial and industrial customers as well as advanced meters.[288] In September 2011, the Maryland Energy Administration filed a report with the PSC assessing the performance of EmPower Maryland programs with suggestions for improvements. These suggestions included: 1) stronger utility management support and attention, structural changes in PSC program implementation, and greater investment in energy efficiency programs; 2) additional performance incentives and penalties, and a clearer definition of cost-effectiveness; and 3) the addition of new statewide programs including conservation voltage reduction and on-bill financing.[289]

BGE proposed a smart meter pilot program, including AMI, with initial plans to complete smart meter installations by 2012.[290] This includes approximately 2 million gas and electric meters for residential, industrial and commercial customers.[291] However, the Maryland PSC initially denied BGE's proposal stating that "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."[292] Approval was later granted by the PSC, and beginning in spring 2012, BGE will install digital electric meters in every home and small business in its service area. Smart energy pricing programs will also be introduced.[293]

The PEPCO Smart Community Plan included the deployment of power line sensors and smart meters in order to create a platform for customer program offerings and improve efficiencies of energy delivery. Between 2,500 and 3,500 selected customers were included in the demonstration project. [294] As part of its "Blueprint for the Future" plan, PEPCO will be installing smart meters to all District of Columbia customers through December 2011. Installations for all Maryland customers will take place through December 2012.[295]

[285] Mayland PSC, Order No. 84275, Case No. 9241. Accessed 9/15/11. http://webapp.psc.state.md.us/Intranet/Casenum/CaseAction_new.cfm?CaseNumber=9241
[286] Maryland PSC, Order No. 84262, Case No. 9236 . Accessed 9/16/11. http://webapp.psc.state.md.us/Intranet/Casenum/CaseAction_new.cfm?CaseNumber=9236
[287] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11, http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[288] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11, http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
Maryland Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/maryland/66/all/191
Allegheny Power, Energy Conservation Programs. Accessed 2/16/11. http://www.alleghenypower.com/Bus2Bus/Bus2BusEngEffeciency.asp
[289] DemandResponseInfo.org, Maryland Energy Administration Recommends Improvements to EmPower Maryland Programs, 9/12/11. Accessed 9/16/11. http://www.demandresponseinfo.org/library/posting/3678/
[290] States Providing for Smart Metering. Accessed 2/11/11. http://www.ncsl.org/?tabid=20672
[291] Smart Grid Maryland, Smart Grid Technologies and Programs, Maryland Energy Administration. May 2009. Accessed 2/14/11. http://www.smartgridmd.org/events/Documents/MSG%20Final%206-8-09.pdf
[292] Order No. 83410. Accessed 3/2/11. http://www.smartgridnews.com/artman/uploads/1/maryland_psc_order.pdf
[293] BGE, Smart Meters. Accessed 9/27/11. http://www.bge.com/learnshare/smartgrid/smartmeters/Pages/default.aspx
[294] Smart Grid Maryland, Smart Grid Technologies and Programs, Maryland Energy Administration. May 2009. Accessed 2/14/11. http://www.energetics.com/resourcecenter/products/studies/Documents/Smart-Grid-Maryland.pdf
[295] PEPCO, Our Smart Grid Plan. Accessed 9/27/11. http://www.pepco.com/energy/blueprint/

Massachusetts

Item	Title	Dates	Description
Legislative			
HB 563	NA	NA	Requires the PUC establish provisions addressing the installation of smart meters, including an option to opt-out of installation or have smart meters removed.[296]
SB 201	NA	NA	Would impose a one-year moratorium on the installation of smart electric meters. Bill remains pending in the legislative process.[297]
SB 1670	An Act Relative to Utility Service Call Centers	1/20/2011	Requires every EDC and municipal lighting plant provide call center service assistance for certain services, including preparing meter and service orders and obtaining access to meters, investigating trouble order forms, and initiating high bill investigations. Bill remains pending in the legislative process.[298]
SB 1685	An Act to create a Repower Massachusetts Emergency Task Force	1/21/2011	Forms the RePower Massachusetts Emergency Task Force to develop a plan for meeting the target of 100% emission reductions by January 1, 2020, in part by reducing electricity demand through efficiency. Subcommittees shall evaluate the challenge of intermittency and smart grid, battery storage, and other solutions. Bill has been referred to the Joint Committee on Telecommunications, Utilities and Energy.[299]
HB 2024	An Act to repower Massachusetts	1/20/2011	Creates a special task force to study interim and longer-term actions necessary to reduce greenhouse gas emissions, including smart grid implementation. Bill has been referred to the Joint Committee on Environment, Natural Resources and Agriculture.[300]
SB 2768	An Act Relative to Green Communities	7/2/2008	Includes demand response, smart metering, and smart grid provisions mandating smart meter pilots. Bill was passed into law in 2008.[301] Requires the Department of Public Utilities (DPU) to review and approve mandatory EDC pilot programs that include TOU or hourly pricing for commodity service.[302]
M.G.L. ch. 187 § 1A.	Solar easements	NA	Solar access provisions allow for the creation of voluntary solar easements to protect solar exposure and authorize zoning rules that prohibit unreasonable infringements on solar access.[303]
Regulatory			
Docket No. 10-82	Smart Grid Pilot Evaluation Working Group	May 2011, 7/23/2010	DPU creates the Smart Grid Pilot Evaluation Working Group as a collaborative effort for the DPU, EDCs and other interested persons to develop uniform statewide smart grid evaluation approaches and standards. In May 2011, the Technical Subcommittee of the working group filed two survey documents with the DPU: 1) the "Smart Grid Collaborative Post-Installation Survey;" and 2) the "Smart Grid Collaborative Non-Participating Customer Survey" which could provide information to analyze results of smart grid pilots.[304]

[296] National Conference of State Legislatures, Energy Security Legislative Update, April 2011. Accessed 9/26/11. http://www.ncsl.org/default.aspx?TabId=22492
[297] National Conference of State Legislatures, Energy Security Legislative Update, April 2011. Accessed 9/26/11. http://www.ncsl.org/default.aspx?TabId=22492
[298] 187th General Court of the Commonwealth of Massachusetts, Bill S.1670. Accessed 9/26/11. http://www.malegislature.gov/Bills/187/Senate/S01670
[299] 187th General Court of the Commonwealth of Massachusetts, Bill S.1685. Accessed 9/20/11. http://www.malegislature.gov/Bills/187/Senate/S01685
[300] 187th General Court of the Commonwealth of Massachusetts, Bill H.2024. Accessed 9/20/11. http://www.malegislature.gov/Bills/187/House/H02024
[301] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[302] D.T.E./D.P.U. 06-101. Accessed 2/28/11. http://www.env.state.ma.us/dpu/docs/electric/06-101/81408dpuord.pdf
[303] DSIRE, Massachusetts Solar Access Laws. Accessed 2/18/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MA02R&re=1&ee=1
[304] Massachusetts DPU, Docket No. 10-82. Accessed 9/16/11. http://db.state.ma.us/dpu/qorders/frmDocketSingle.asp?docnum=10-82

Item	Title	Dates	Description
Regulatory			
M.G.L. ch. 164, § 1G et seq., SB 2768, 220 CMR 11.04, 220 CMR 18.00 et seq., 220 CMR 8.00 et seq., Net Metering Model Tariff, HB 2058	Manufacture and sale of gas and electricity	10/15/2010, 8/20/2009, 7/2/2008, 1997	Adoption of amended net-metering rules.[305]
DPU 08-50-A	Investigation… Updating its Energy Efficiency Guidelines Consistent with An Act Relative to Green Communities	3/16/2009	Addressed the criteria of energy efficiency program cost-effectiveness, shareholder performance incentive and penalty mechanisms, DPU review of rate and average bill impact analyses.[306]
225 CMR 16.00, MA General Laws in Chapter 25A Section 11F and Section 11F1/2	Alternative Energy Portfolio Standard	3/2009	Created in response to the Green Communities Act (SB 2768); establishes the Alternative Energy Portfolio Standard requiring that 5% of the state's electric load be met with "alternative energy" by 2020.[307]
DTE/DPU 06-101	Petition…investigation into dynamic pricing for basic service customers in Massachusetts.	8/14/2008	The DPU declines to vote to open an investigation of dynamic pricing for basic service customers at this time. Is reviewing commodity pricing options as part of broader mandate of the Green Communities Act, which currently requires review/approval of pilots that include TOU/hourly pricing for commodity service.[308]
Case 07-50-A	Decoupling	7/16/2008	Orders utilities to develop, by end of 2012, base revenue adjustment mechanisms to fully decouple revenues from sale. Decides that full decoupling removes disincentives to demand resource deployment better than partial decoupling or other shareholder incentives.[309]

ISO New England has conducted a study called Demand Response Reserve Pilot which was designed to test the ability of smaller demand response resources to respond to ISO dispatch instructions in a manner similar to operating reserve resources. Load reduction assets were directed to reduce the amount of energy their facilities used during an event. Generation assets would then start a behind-the-meter generator and direct load control assets would apply direct load control over a large number of small customers. The entities involved were categorized as grocery stores, manufacturing entities, large retail entities, education sector entities, wastewater treatment facilities, and aggregated air conditioning curtailment generators.[310]

National Grid, reports that a total of 388,221 customers participated in the company's 2009 energy efficiency programs. Participants included 377,076 residential customers, 9,239 low-income customers, and 1,906 commercial and industrial customers.[311] In March 2011, a total of 225,000 electric customers were enrolled in the Home Energy Report program, which allows randomly selected National Grid customers to view the past twelve months of their household energy usage and anonymously compare and contrast their energy consumption and costs with others in the same neighborhood.[312]

[305] DSIRE, Massachusetts – Net metering. Accessed 2/18/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MA01R&re=1&ee=1
[306] D.P.U. 08-50-A. Accessed 2/28/11. http://www.ma-eeac.org/docs/DPU-filing/08-50-A%20Order.pdf
[307] Massachusetts Executive Office of Energy and Environmental Affairs, 225 CMR 16.00. Accessed 9/14/11. http://www.mass.gov/Eoeea/docs/doer/rps/rps-225-cmr16-mar-12-2009.pdf
[308] D.T.E./D.P.U. 06-101. Accessed 2/28/11. http://www.env.state.ma.us/dpu/docs/electric/06-101/81408dpuord.pdf
[309] State Regulatory Update: Energy Efficiency, Edison Electric Institute, September 2008. Accessed 2/28/11. http://www.eei.org/ourissues/EnergyEfficiency/Documents/state_reg_update_efficiency.pdf
[310] ISO New England Inc.. ISO New England Load Response Program Manual, Revision 12. Effective Date: October 1, 2007. Accessed 2/18/11. http://www.iso-ne.com/rules_proceds/isone_mnls/MLRP/index.html
[311] 2009 Energy Efficiency Annual Report, Massachusetts Electric Company, Nantucket Electric Company d/b/a National Grid, August 2010. Accessed 2/18/11. http://www.nationalgridus.com/non_html/eer/ma/MECO%202009%20Annual%20Report_Vol1.pdf
[312] National Grid, National Grid Receives Top Honor for Energy Efficiency Program, Powergrid International Magazine Names Company's 'Home Energy Report' Program 'Best Energy Efficiency / Demand Response Project of the Year, 3/10/11. Accessed 9/27/11. http://www.nationalgridus.com/masselectric/a3-1_news2.asp?document=5903

Michigan

Item	Title	Dates	Description
Legislative			
HB 5524	An act to amend 1939 PA 3	10/6/2008	Incorporates energy efficiency into the IRP process. Approved by the Governor on 10/6/2008.[313]
HB 5525 and HB 5548	Energy Efficient Michigan Act	June 2008	Legislation that would foster the deployment of demand response and would reduce peak demand. Bills were referred to Committee on Education and Committee on Energy Policy And Public Utilities in 2008.[314]
Regulatory			
Case No. U-15278	Commencing proceeding to implement smart grid infrastructure initiatives	May 2011, 4/24/2007	PSC forms a Smart Grid Collaborative requiring all regulated EDCs to participate in establishing criteria and standards that require pilot programs or broader deployment when cost-effective and practical. Has resulted in the need for additional forums to discuss coordinating pilot projects in AMI, dynamic pricing, load control and distribution automation. A Smart Grid Symposium of panel sessions was held in May 2011. [315]
Public Act 295 (2008), PSC Order, Docket U-15787, SB 213	Public Act 295 (2008), Energy Optimization Savings Standard	5/27/2009, 10/06/2008	Formal adoption of revised net metering and interconnection rules. Authorizes net metering for renewable energy systems using solar, wind, biomass, geothermal, anaerobic digester gas, landfill gas, municipal solid waste, and moving water.[316] Also requires all electric providers (other than alternative electric suppliers) and all rate-regulated natural gas utilities to file energy efficiency programs with the Michigan PSC.[317]
Temporary Order in Case No. U-15800	Formats of Renewable Energy Plans	12/4/2008	Addressed filing requirements for the utility energy efficiency plans.[318]
Executive Directive 2006-02	Michigan's 21st Century Energy Plan	January 2007	Sets forth targets to reduce energy consumption and peak demand for the utilities and/or load serving entities operating as a regulatory or legislative action to encourage demand response and energy efficiency.[319]
NA	EPAct/PURPA Standard 14	January 2007	The Michigan PSC did not use language in its January 2007 order specifically indicating that it was deciding not to adopt PURPA Standard 14.[320]
Case # U-13745	Commission's Own Motion (electric interconnection)	9/11/2003	Michigan's interconnection standard delineates five separate tiers of interconnection, and covers systems of all sizes with the largest interconnection tier – 2 MW systems and above. Utilities are the final arbiters of which types of systems and sizes are suitable for their distribution systems.[321]

[313] Michigan Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/michigan/194/all/191
[314] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11, http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[315] Michigan PSC, Case No. U-15278. Accessed 9/16/11. http://efile.mpsc.state.mi.us/efile/viewcase.php?casenum=15278
ADS, Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: May 2010 – June 2011 Accessed 9/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2010%20-%2011%20DR%20%20SG%20State%20Policy%20Survey_11%2007%2007_FINAL%20%282%29.pdf
[316] DSIRE, Michigan – Net metering. Accessed 2/7/11. http://dsireusa.org/incentives/incentive.cfm?Incentive_Code=MI15R&re=1&ee=1
[317] Michigan Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/michigan/194/all/191
[318] Michigan Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/michigan/194/all/191
[319] Draft for Comment of the National Action Plan on Demand Response The Federal Energy Regulatory Commission Staff Docket No. AD09-10, Prepared with the support of The Brattle Group, GMMB, Customer Performance Group, David Lineweber. Accessed 2/10/11. http://www.ferc.gov/legal/staff-reports/03-12-10-demand-response.pdf
[320] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11, http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[321] Michigan Clean Distributed Generation. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Michigan/194/all/195

In January 2007, the Michigan PSC submitted its 21st Century Electric Energy Plan. One of the recommendations in the energy plan is that Michigan's PSC be authorized to require the use of active load management measures by utilities. The plan also recommends pilot programs employing AMI to provide RTP information to customers.[322]

DSM programs are currently being designed and implemented by Consumers Energy and Detroit Edison. In Consumers Energy's Balanced Energy Initiative, the company forecasted that load management, demand response, and interruptible load programs would reduce retail peak by 9.3 percent by 2030. The reduction would be implemented through a comprehensive AMI program that includes central air conditioning load management and demand response programs for residential and small commercial customers. Consumers Energy also plans to conduct a demand response and information pilot aimed at assessing customer behavior in the smart grid environment. The pilot program places AMI-enabled customers into various dynamic pricing and information treatments while comparing them with strategic control groups.[323] Detroit Edison maintains a significant Direct Load Control Interruptible Air Conditioning program.[324] In July 2008 the Michigan PSC issued standards for a previously approved AMI pilot program.[325]

Energy efficiency programs are supported by customer rates via a volumetric charge for residential customers and monthly per meter charges for commercial and industrial customers. SB 213 establishes an EERS for utilities. Electric utilities must achieve 0.3 percent savings in 2009; 0.5 percent in 2010; 0.75 percent in 2011; and 1.0 percent in 2012 and each year thereafter. There is no penalty for failing to achieve the savings amounts, but incentives are provided for exceeding the targets.[326]

[322] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11, http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

[323] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11, http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
Draft for Comment of the National Action Plan on Demand Response The Federal Energy Regulatory Commission Staff Docket No. AD09-10, Prepared with the support of The Brattle Group, GMMB, Customer Performance Group, David Lineweber. Accessed 2/4/11. http://www.ferc.gov/legal/staff-reports/03-12-10-demand-response.pdf

[324] Draft for Comment of the National Action Plan on Demand Response The Federal Energy Regulatory Commission Staff Docket No. AD09-10, Prepared with the support of The Brattle Group, GMMB, Customer Performance Group, David Lineweber. Accessed 2/10/11. http://www.ferc.gov/legal/staff-reports/03-12-10-demand-response.pdf

[325] States Providing for Smart Metering. Accessed 2/11/11. http://www.ncsl.org/?tabid=20672

[326] Michigan Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/michigan/194/all/191

Minnesota

Item	Title	Dates	Description
Legislative			
Chapter 110	2009 Energy Policy Act	2010	Modifies the criteria the Minnesota PUC uses to set energy conservation incentives.[327]
Chapter 136–S.F.No. 145	Next Generation Energy Act of 2007	May 2007	Changes how conservation is measured from the amount spent on conservation to the amount of electricity conserved. Load management is considered to be a conservation measure.[328]
MN Stat. § 216B.164, MN R. 7835.3300, 7835.9910	Net energy billing rate	2000, 1983	Minnesota's net-metering law applies to all IOUs, municipal utilities and electric cooperatives. All qualifying facilities less than 40 kW in capacity are eligible.[329]
Minn. Stat. § 500.30	Solar or wind easements	1978	Provides for the creation of solar and wind easements (voluntary contracts) for solar and wind-energy systems. Also allows local zoning boards to restrict development for the purpose of protecting access to sunlight.[330]
Regulatory			
Docket No. E999/CI-09-1449	In the Matter……Demand Response Bid Directly into the MISO Markets by Aggregators of Retail Customers under FERC Orders 719 and 719-A	February 2011, 5/18/2010, 1/13/2010	Order prohibits bidding of demand response into organized markets by aggregators of retail customers and requires further filings by utilities. In February 2011, a second PUC order affirms the potential benefit of allowing utilities to consider expansion of demand response options through contracts with third-parties. Xcel Energy, Minnesota Power, IPL, and Otter Tail Power are to file comments about expanding options to achieve demand response potential by September 2011.[331]
NA	EPAct/PURPA Standard 14	August 2007	The Minnesota PUC decided not to adopt PURPA Standard 14) as enacted in EPAct 2005 but did adopt a modified version which it will apply on a utility-by utility basis.[332]

Due to the Next Generation Energy Act of 2007, utilities were required to achieve 1.5 percent annual energy savings through DSM and efficiency. To achieve this Interstate Power and Light (IPL) provides cash rebates to residential customers for energy efficient appliances, air conditioners, and CFLs, as well as professional home energy audits, appliance recycling, and low-interest financing.[333] IPL implemented an AMI program in 2007.[334] Minnesota Power's Power of One program offers rebates and savings to customers for a variety of efficiency measures.[335] Otter Tail Power Company offers a program for residential customers where they can receive rebates for installing residential demand controllers which notify their owners of high demand and automatically shut off certain appliances during peak periods to maintain preset demand levels.[336]

[327] Minnesota Utility Policies. Accessed 2/18/11. http://www.aceee.org/sector/state-policy/minnesota

[328] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11, http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

[329] DSIRE, Minnesota – Net Metering. Accessed 2/18/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MN01R&re=1&ee=1

[330] DSIRE, Minnesota Solar and Wind Easements. Accessed 2/18/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MN02R&re=1&ee=1

[331] Minnesota PUC, Docket No. E999/CI-09-1449. Accessed 9/16/11. https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId={B1A67D22-C1F8-4FD0-B63C-D692D589A592}&documentTitle=20111-58690-01

ADS, Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: May 2010 – June 2011 Accessed 9/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2010%20-%2011%20DR%20%20SG%20State%20Policy%20Survey_11%2007%2007_FINAL%20%282%29.pdf

[332] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11, http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

[333] Alliant Energy's success in promoting energy efficiency. Accessed 2/18/11. http://www.alliantenergy.com/wcm/groups/wcm_internet/documents/contentpage/016942.pdf

[334] Interstate Power and Light (Minnesota) AMI Project. Accessed 2/18/11. http://www.sgiclearinghouse.org/ProjectMap?q=node/2064, http://www.alliantenergy.com/UtilityServices/CustomerService/MeterReading/016361

[335] 2011 Rebates and Energy Saving Tools. Accessed 2/18/11. http://www.mnpower.com/powerofone/one_home/energystar/special_offers/index.php

[336] Otter Tail, Conservation Improvement Program. Accessed 2/18/11. http://www.otpco.com/SaveEnergyMoney/ConservationImproveProg.asp

Mississippi

Item	Title	Dates	Description
Legislative			
SCR 665, HCR 120	A Concurrent Resolution Urging All State Agencies to Define the Smart Grid…	3/30/2011	Urges all agencies to define the smart grid as one that applies technologies, tools and techniques available now to 1) bring knowledge to power, making the grid work more efficiently 2) maintain its affordability; 3) reinforce global competitiveness; 4) fully accommodate renewable and traditional energy sources; 5) reduce carbon footprint; and 6) introduce advancements yet to be envisioned. Legislation signed by Gov. Barbour.[337]
HB 1356	NA	2010	Encouragement for utilization of smart grid systems by utilities, regulated by the PSC. This bill is listed with a "failed" status in the state legislature. [338]
Regulatory			
None Identified			

Utilities in Mississippi offer few energy efficiency programs. South Mississippi Electric Power Association and Mississippi Power Company accounted for all MWh of savings reported to the EIA in 2008. TVA has reported energy efficiency savings in 2008. Mississippi Power Company offers loans for residential customers. There are currently no EERS in place for the state.[339]

As part of the ARRA, Mississippi was allocated over $40 million dollars in funds to implement the State Energy Plan (SEP). The SEP will provide assistance to public and private entities to move toward greater energy efficiency. The Mississippi Development Authority Energy Division is responsible for administering the program.[340]

[337] Mississippi Legislature 2011 Regular Session, SCR 665. Accessed 9/20/11. http://billstatus.ls.state.ms.us/2011/pdf/history/SC/SC0665.xml
[338] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
[339] Mississippi Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/mississippi/196/all/191
[340] Mississippi Clean Distributed Generation. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/mississippi/196/all/195

Missouri

Item	Title	Dates	Description
Legislative			
SB 376	Missouri Energy Efficiency Investment Act	July 2009	Modifies provisions relating to energy and energy efficiency. The PSC must allow electric companies to implement and recover costs related to the approved energy efficiency programs. The act prohibits any customer from participating in a company's energy efficiency program that offers a monetary reward for participating if the customer has received a tax credit through the low-income housing or historic preservation tax credit programs.[341]
SB 54, HB 869, Revised Statute MO § 386.890 and 4 CSR 240-20.065	Easy Connection Act, Net Metering	02/28/2009	Establishes net metering rules for the state of Missouri.[342]
R.S. MO § 442.012	Solar energy is a property right - eminent domain not permitted - easement requirements	1979	Solar easement provisions regarding DG resources.[343]
Regulatory			
File No. EX-2010-0368	In the Matter of the Consideration and Implementation of Section 393.1075, the Missouri Energy Efficiency Investment Act	2/9/2011	Order adopting four rules regarding electric utility DSM program investment mechanisms, programs filing and submission requirements, investment mechanisms filing and submission requirements, and DSM programs to meet requirements of the Missouri Energy Efficiency Investment Act.[344]
File No. EW-2010-0187	Order Temporarily Prohibiting the Operation of Aggregators of Retail Customers	January 2011, 3/31/2010, January 2010	PSC initiated proceeding to investigate its obligations regarding the Missouri Energy Efficiency Investment Act (SB 376) and respond to FERC Order 719 (Dockets AD07-7 and RM07-19). PSC order states that demand response load reductions of customers of the four regulated electric utilities are prohibited from being transferred to ISO or regional transmission organization markets directly by retail customers or third-party aggregators of retail customers.[345] The PSC issued a draft rule in January 2011 further addressing aggregators of retail customers and demand response, and as of April 2011 the PSC continued to collect informal comments.[346]
Docket No. 070022-EU, Order No. PSC-07-0273-CO-EU	EPAct/PURPA Standard 14	July 2007	The Missouri PSC decided not to adopt PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005.[347]

[341] SB 376, Current Bill Summary. Accessed 2/11/11. http://www.senate.mo.gov/09info/BTS_Web/Bill.aspx?SessionType=R&BillID=834581
[342] DSIRE, Missouri – Net Metering. Accessed 2/8/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MO07R&re=1&ee=1
[343] DSIRE, Missouri Solar Easements. Accessed 2/8/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MO01R&re=1&ee=1
[344] Missouri PSC, File No. EX-2010-0368. Accessed 9/16/11. http://pre.psc.mo.gov/orders/2011/031410368.htm
[345] Missouri PSC, Order Temporarily Prohibiting the Operation of Aggregators of Retail Customers. Accessed 9/16/11. https://www.efis.psc.mo.gov/mpsc/commoncomponents/viewdocument.asp?DocId=935484458
[346] ADS, Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: May 2010 – June 2011 Accessed 9/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2010%20-%2011%20DR%20%20SG%20State%20Policy%20Survey_11%2007%2007_FINAL%20%282%29.pdf
[347] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

In July 2007, the Missouri PSC decided not to adopt PURPA Standard 14 as enacted in EPAct 2005 because utilities already provide time-based rates.[348]

Fundamental rules have been in place since the early 1990s for IRPs and DSM, though utilities have increased DSM spending only recently. Missouri utilities such as AmerenUE have begun implementing a portfolio of residential and commercial energy efficiency programs. AmerenUE's approved 2009 budgets for electric efficiency programs in the commercial, residential, and industrial sectors totaled $22.7 million, according to the Consortium for Energy Efficiency. According to an AmerenUE DSM Market Potential Study released in January 2010, the achievable savings from demand response programs are in the range of 914 to 1,126 MW and a realistic achievable potential from energy efficiency is 3,165 GWh by the year 2030.[349] Through its "Act On Energy" programs, AmerenUE offers rebates on energy efficient products for residential and business customers, however the company recently closed its Business Energy Efficiency Incentive Programs on August 31, 2011.[350]

There are currently no EERS in place, though SB 376 requires timely cost-recovery for utilities investing in energy efficiency programs.[351]

[348] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[349] AmerenUE DSM Market Potential Study Volume 1: Executive Summary, Global Report Number 1287-1, January 2010. Accessed 9/27/11. http://www.ameren.com/sites/aue/Environment/Renewables/Documents/AmerenUEVolume1ExecutiveSummary.pdf
[350] AmerenUE, Act On Energy. Accessed 9/27/11. http://www.ameren.com/sites/aue/UEfficiency/Pages/home.aspx
[351] Missouri Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/missouri/197/all/191

Montana

Item	Title	Dates	Description
Legislative			
SB 305	Revise Energy Policy	5/12/2011	Promotes 1) the generation of low-cost electricity with large-scale utility wind generation and small-scale distributed generation; 2) building new transmission lines in the state if not otherwise mitigated through energy efficiency, distributed energy, demand response, and smart grid technologies; 3) increasing capacity of existing transmission lines in existing corridors and maximizing the potential of existing transmission lines; 4) using compressed air energy storage, batteries, flywheels, hydrogen production, smart grid, smart garage, and intra-hour balancing services to address wind integration. Signed by Gov. Schweitzer.[352]
SB 104	Limiting a Public Utility's Ability to Implement Inverted Block Rates	04/28/2011, 12/30/2010	Prohibits the PSC from prescribing inverted block rate structures unless a utility's actual costs justify an inverted block rate; indicates that inverted block rate structures can create discrimination between electric customers in similar rate classes. Bill failed in Standing Committee in April 2011 and was declared "dead."[353]
SB 49, MCA § 17-7-213	High-performance building standards	4/1/2009	Creates energy efficiency standards for state-owned and state-leased buildings. Signed into law by Governor on 4/1/2009.[354]
2009 Drafts 51	Advanced metering infrastructure	2009	Requires the creation of a smart grid task force to consider and develop smart grid deployment plans. Draft bill currently is listed with cancelled status.[355]
Montana Code Annotated Sec. 69-8-419(2)	Electricity Supply Resource Planning…Commission Rules	2007	The electricity supply procurement process must evaluate the full range of cost-effective electricity supply and DSM options.[356]
SB 390, SB 337, State statute Chapter 55	The Green Electricity Buying Cooperative Bill	2007	Established a universal system benefits charge for each customer meter assessed by the utility for energy efficiency program funding. SB 337 failed in Standing Committee, but additional activity commenced in March 2009 by the PSC in response to successful legislation.[357]
MT Code § 69-8-601 et seq. and MT Code § 69-8-601 et seq.	Net Metering	1999	Establishes Montana's net-metering laws. Systems up to 50 kW in capacity that generate electricity using solar, wind or hydropower are eligible.[358]

[352] Montana Legislature, SB 305. Accessed 9/20/11.
http://laws.leg.mt.gov/laws11/LAW0203W$BSRV.ActionQuery?P_BLTP_BILL_TYP_CD=SB&P_BILL_NO=305&P_BILL_DFT_NO=&P_CHPT_NO=&Z_ACTION=Find&P_SBJ_DESCR=&P_SBJT_SBJ_CD=&P_LST_NM1=&P_ENTY_ID_SEQ=
[353] Montana Legislature, SB 104. Accessed 9/16/11.
http://laws.leg.mt.gov/laws11/LAW0203W$BSRV.ActionQuery?P_BLTP_BILL_TYP_CD=SB&P_BILL_NO=104&P_BILL_DFT_NO=&P_CHPT_NO=&Z_ACTION=Find&P_SBJ_DESCR=&P_SBJT_SBJ_CD=&P_LST_NM1=&P_ENTY_ID_SEQ=
ADS, Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: May 2010 – June 2011 Accessed 9/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2010%20-%2011%20DR%20%20SG%20State%20Policy%20Survey_11%2007%2007_FINAL%20%282%29.pdf
[354] Montana Lead by Example Initiatives. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Montana/198/all/202
[355] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
Montana Legislature, Bill Draft Number: LC0051. Accessed 9/21/11.
http://laws.leg.mt.gov/laws09/LAW0203W$BSRV.ActionQuery?P_BLTP_BILL_TYP_CD=&P_BILL_NO=&P_BILL_DFT_NO=51&P_CHPT_NO=&Z_ACTION=Find&P_SBJ_DESCR=&P_SBJT_SBJ_CD=&P_LST_NM1=&P_ENTY_ID_SEQ=
[356] Montana Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/montana/198/all/191
[357] Montana Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/montana/198/all/191
[358] DSIRE, Montana – Net Metering. Accessed 2/8/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MT05R&re=1&ee=1

Item	Title	Dates	Description
Legislative			
MT Code 69-3-712	Commission to include conservation in rate base – rate of return	1983	Statute that allows the Montana PSC to add 2 percent to the authorized rate of return for DSM investments.[359]
MCA § 70-17-301 et seq.	Solar and Wind Energy Easements	1983, 1979	Establishes Montana's solar and wind easement provisions.[360]
Regulatory			
NA	EPAct/PURPA Standard 14	December 2006	The Montana PSC deferred a decision to adopt PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005.[361]

In December 2006, the Montana PSC deferred a decision to adopt PURPA Standard 14 as enacted in EPAct 2005. The PSC indicated it will consider whether to adopt the standard for each utility in each utility's next general rate case.[362]

Customer energy efficiency programs in Montana are provided by utilities or by a state agency. Programs receive funding from a universal system benefits charge paid by all customers of competitive electricity providers and cooperative utilities. The Montana PSC oversees the programs and the Montana Department of Revenue ensures all of the money is spent on qualifying programs. Each utility or cooperative responsible for collecting the universal system benefits charge can choose to conduct the energy efficiency and renewable energy programs itself or turn the funds over to the Montana Department of Environmental Quality to administer.[363]

Western Montana is included in the activities of the NPCC and the NEEA. NorthWestern Energy is participating in a five-year smart grid demonstration project, extending through 2014, initiated by the BPA with support from the U.S. DOE. The pilot includes conservation voltage reduction, volt/ Value-at-Risk optimization, and distribution automation on the utility side, and the deployment of interval meters and home area networks for a sample of customers in Helena and Philipsburg, Montana.[364] NorthWestern Energy currently offers rebates to residential customers for energy efficient products and home improvements, including the installation of programmable thermostats.[365]

[359] Montana Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/montana/198/all/191
[360] DSIRE, Montana Solar and Wind Easements. Accessed 2/8/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MT03R&re=1&ee=1
[361] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[362] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[363] Montana Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/montana/198/all/191
[364] Montana Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/montana/198/all/191
Northwestern Energy, Smart Grid Demonstration Project. Accessed 9/27/11. http://www.northwesternenergy.com/display.aspx?Page=Smart_Grid&Item=429
[365] Northwestern Energy, Efficiency Plus (E+). Accessed 9/27/11. http://www.northwesternenergy.com/NWEplus/at-work/rebates.aspx

Nebraska

Item	Title	Dates	Description
Legislative			
LB 1048	For An Act Relating to Power Generation…	4/12/2010	Encourages the development, ownership and operation of renewable energy facilities for the export of wind energy from Nebraska. Allows the Nebraska Power Review Board to approve wind energy operations designed to export energy. Approved by the Governor on 4/12/2010.[366]
LR 195	NA	2010	The Natural Resources Committee of the Legislature shall conduct an interim study to examine energy efficiency.[367]
R.R.S. 70-2001, et seq. and LB 436	Legislative findings	5/13/2009	Established statewide net metering rules applying to electricity generating facilities which use solar, methane, wind, biomass, hydropower or geothermal energy, and have a rated capacity at or below 25 kW. LB 436 includes implementation guidelines of smart metering systems.[368]
R.R.S. 66-901 et seq. and LB 568	Legislative findings	1979, May 2009	Nebraska's solar and wind easement provisions allow property owners to create binding solar and wind easements for the purpose of protecting and maintaining proper access to sunlight and wind.[369]
Regulatory			
None Identified			

Nebraska's electric utilities are all publicly-owned and there is limited utility-sector energy efficiency activity statewide, with the Omaha Public Power District accounting for the majority of utility program spending in the state. The Nebraska Energy Office administers a loan program for energy efficiency improvements using federal and state funding. The Energy Office also drafts energy plans. There are few utility customer energy efficiency programs in Nebraska. In its draft 2009 Energy Plan, the Nebraska Energy Office encouraged energy efficiency in buildings by enforcing building codes and designing programs to improve energy performance in residential, commercial, and public buildings. The 2011 Energy Plan includes a strategy to increase opportunities for DSM and energy efficiencies, with the greatest opportunity for DSM through the management of irrigation resources. There are currently no EERS in place for the state.[370]

Omaha Public Power District has recently expanded its Watt Detector Program, which allows customers to check out watt meters from local libraries. The meters can measure energy consumption of household appliances in kWh so that customers can better manage their energy use.[371]

[366] Office of Gov. Dave Heineman, Gov. Heineman Signs Bill Promoting Wind Energy. Accessed 9/22/11. http://www.governor.nebraska.gov/news/2010/04/12_wind_energy.html
[367] Nebraska Legislature, LR 195. Accessed 9/22/11. http://www.legislature.ne.gov/FloorDocs/101/PDF/Intro/LR195.pdf
[368] DSIRE, Nebraska – Net Metering. Accessed 2/10/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NE07R&re=1&ee=1
[369] DSIRE, Nebraska Solar and Wind Easements. Accessed 2/10/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NE01R&re=1&ee=1
[370] Nebraska Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/nebraska/199/all/191
Nebraska Energy Office, 2011 Energy Plan. Accessed 9/27/11. http://www.neo.ne.gov/Energyplan2011.pdf
[371] Omaha Public Power District, Watt Detector Program. Accessed 9/27/11. http://www.oppd.com/AimGreen/EnergyInformationCenter/22_006850, http://www.oppd.com/prodconsump10g/groups/web/documents/webcontent/22_007075.pdf

Nevada

Item	Title	Dates	Description
Legislative			
SB 426	An Act Relating to Energy; Eliminating the Renewable Energy and Energy Efficiency Authority…	6/13/2011	A previously enacted law established a Renewable Energy and Energy Efficiency Authority headed by the Nevada Energy Commissioner. This bill repeals these authorities and requires the Office of Energy and its Director to assume the duties of those entities. Requires addition of members to the New Energy Industry Task Force. Bill was approved by the Governor on 6/13/2011.[372]
SB 59	An Act Relating to Public Utilities…	6/2/2011	Requires a public utility that supplies electricity to offer net metering to the customer-generators operating within the service area of the utility until the cumulative capacity of net metering systems operating within the service area exceeds 5 percent (increased from 1 percent) of the peak capacity of the utility. Signed into law by the Governor on 6/13/2011.[373]
AB 150	An Act Relating to Energy; Revising the Definition of "Energy Efficiency Measure" for the Purposes of the Portfolio Standard for Providers of Electric Service…	5/18/2011	Revises the definition of the REPS "energy efficiency measure" to include any measure that: 1) is installed or implemented on or after 1/1/2005 at the service location of (or for) a retail customer; 2) reduces the consumption of energy by one or more retail customers; and 3) the costs of the acquisition, installation or implementation of which are directly reimbursed, in whole or in part, by the provider of electric service. The term does not include any demand response measure or load limiting measure that shifts the consumption of energy by a retail customer from one period to another period. Bill became law 5/18/2011.[374]
AB 287	An Act Relating to Energy; Creating the Nevada RETA…	3/16/2011	Creates the Nevada RETA to facilitate the rapid development of renewable energy resources through the identification and establishment of corridors for the transmission of electricity and the financing, planning, acquisition, maintenance and operation of eligible facilities. As of 6/6/2011 no further action was taken regarding bill passage.[375]
NRS § 111.370 et seq., NRS § 111.239 et seq., NRS § 278.0208 , NRS § 116.2111 and SB 114	Creation of easement by grant… Prohibition against prohibiting or unreasonably restricting use of system for obtaining solar energy.	5/29/2009	Provides owners of solar and wind energy systems protection against restrictions that would otherwise prevent them from installing these systems on their property.[376]
2009 SCR 19	Committee on energy, infrastructure and transportation	June 2009	Creation of a committee to conduct a study reviewing smart grid technologies and their suitability in the state. Adopted in June 2009.[377]
SB 358	An act relating to energy; creating the Renewable Energy and Energy Efficiency Authority…	5/28/2009	Raised the REPS to 25 percent by 2025. In any given year, energy efficiency savings can meet up to a quarter of the total standard. Bill was signed into law by the Governor on 5/28/2009.[378]

[372] Nevada Legislature, SB 426. Accessed 9/23/11. http://www.leg.state.nv.us/Session/76th2011/Reports/history.cfm?ID=1065
[373] Nevada Legislature, SB 59. Accessed 9/23/11. http://www.leg.state.nv.us/Session/76th2011/Reports/history.cfm?ID=147
[374] Nevada Legislature, AB 150. Accessed 9/23/11. http://www.leg.state.nv.us/Session/76th2011/Reports/history.cfm?ID=358
[375] Nevada Legislature, AB 287. Accessed 9/23/11. http://www.leg.state.nv.us/Session/76th2011/Reports/history.cfm?ID=603
[376] DSIRE, Nevada Solar and Wind Easements, Accessed 2/8/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NV03R&re=1&ee=1
[377] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
[378] Nevada Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/nevada/200/all/191

Item	Title	Dates	Description
Legislative			
NRS 331.095	Program to track use of energy in buildings owned by state or occupied by state agency.	May 2009	Directs the Chief of the Buildings and Grounds Division of the Department of Administration to establish a program to track the use of energy in public buildings, allowing for comparison of utility bills as well as the identification and projection of energy costs and savings. [379]
NRS 704.766 et seq. and NAC 704.8901 et seq.	Net Metering Systems and System of Portfolio Energy Credits	2004, 7/1/1997	Net-metering law for renewable-energy systems; systems up to one MW in capacity that generate electricity using solar, wind, geothermal, biomass and certain types of hydropower are generally eligible.[380]
Regulatory			
Docket No. 11-08019	Investigation to further an integrated analysis of resource acquisition related to conventional power plants, renewable energy, and DSM	8/22/2011	The PUC will develop an integrated analytical framework to help Nevada Power Company, or other power companies, in establishing priorities among demand and supply to assist with evaluation of issues related to resource planning in the areas of conventional power plants, renewable energy, and DSM.[381]
NA	NA	2010	The PUC is investigating effects on the existing Consumer Bill of Rights with regard to remote disconnection and service termination. A customer must be $50 and 30 days behind in payments before termination is considered. With the implementation of smart meters, the PUC may revise the disconnection requirements upon investigation completion.[382]
Nevada Administrative Code §704.934	Preparation, contents and submission of demand side plan; annual analyses regarding programs for energy efficiency and conservation.	1/31/2008	Directs each regulated utility to submit a plan for conservation and load management as part of its resource plan.[383]
NA	EPAct/PURPA Standard 14	January 2007	The Nevada PUC issued an order closing a proceeding it opened in consideration of whether to adopt PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005 concluding that more research was needed before adopting the standard. No additional dockets have been opened regarding EPAct 2005, PURPA Standard 14. [384]
Docket No. 02-5030	In re-investigation and rulemaking into revision of resource planning regulations…	May 2004	The revised regulations for DSM allow electric utilities to earn an extra 5 percent return-on-equity for applicable, approved DSM costs.[385]

[379] Nevada Lead by Example Initiatives. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Nevada/200/all/202
[380] DSIRE, Nevada – Net Metering. Accessed 2/8/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NV04R&re=1&ee=1
[381] Nevada PUC, Docket No. 11-08019. Accessed 9/21/11.
http://pucweb1.state.nv.us/wx/ISubmitQuery.aspx?Credentials=28:94C2FC7D931B3F4ECAA4F41A202064580941F8BE7B063F5F90AC2B4B1AA9F42A1E483018485F7BA4D1AD8041ACA6CC5CE3C73A69C61B0D3339207AEDD5626ACD&DSN=PUCN%20Imaging&Appname=DOCKETS_2010_THRU_PRESENT&DOCKET%20NUMBER=11-08019&~~field1=on&~~field2=on&~~field3=off&~~field4=on&~~field5=on&~~field6=on&~~field7=on&~~field8=off&~~field9=off&~~field10=on
[382] Nevada PUC, Smart Meters. Accessed 9/23/11. http://pucweb1.state.nv.us/pucn/SmartHome.aspx
Las Vegas Review Journal, NV Energy's plan for future power gets early approval, 9/5/10. Accessed 9/23/11. http://www.lvrj.com/business/plan-to-obtain-and-finance-electricity-on-track-for-approval-99041659.html
[383] Nevada Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/nevada/200/all/191
[384] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11.
http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[385] Nevada Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/nevada/200/all/191

In May 2009 legislation was signed that expands the state's REPS. Whereas the standard previously had a cap of 20 percent, the law changed it so that by 2025 electricity providers must generate electricity from renewable resources or reduce consumption through energy efficiency in an amount that equals 25 percent of the total electricity sold to retail customers that year.[386]

The levels of funding and program services have grown rapidly since Nevada reestablished requirements for energy efficiency programs provided by the state's electric utilities. Nevada's vertically integrated IOUs are required to perform IRP and related DSM programs. The utility companies administer the energy efficiency programs with oversight by the Nevada PUC. Nevada Power Company and Sierra Nevada Power (now known as NV Energy after a merger in 2008) administer customer energy efficiency programs that are funded by a systems benefits charge on customer bills. [387]

NV Energy smart meter installations began in September 2010 in southern Nevada and will begin in December 2011 in northern Nevada. The deployments are scheduled to be completed by December 2012. [388]

[386] Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: October 2008 – May 2010, Prepared by the DRCC. Accessed 2/10/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2009_DR-SG_Policy_Survey_FINAL_10.06.17%282%29.pdf

[387] Nevada Utility Policies. Accessed 2/14/11. http://www.aceee.org/energy-efficiency-sector/state-policy/nevada/200/all/191

[388] NV Energize, Rollout. Accessed 9/27/11. http://www.nvenergy.com/NVEnergize/

New Hampshire

Item	Title	Dates	Description
Legislative			
HB 381	An Act Authorizing Net Metering for Micro-CHP Systems	5/18/2011	Redefines "eligible customer-generator" in order to authorize net metering for micro-CHP systems. Limits the total rated generated capacity from CHP systems to no more than 2 MW of total rated generating capacity. Bill has been approved by the Governor.[389]
HB 1377	Permitting Utilities to Establish Loan Programs …	5/19/2010	Permits utilities to establish loan programs for owners of residential and business property engaging in renewable energy and energy efficiency projects. Establishes a committee to study methods of encouraging the installation and use of small scale renewable energy resources by homeowners and businesses. Bill has been approved by the Governor.[390]
NH Statutes §362-A:1-a, NH Statutes § 362-A:9, NH Admin. Rules, HB 1353	Limited Electrical Energy Producers Act	8/13/2010, 2007, 2001	Net-metering policy requiring all utilities selling electricity in the state to offer net metering to homeowners and small businesses that generate electricity using renewable-energy systems up to 100 kW in capacity.[391]
SB 451	An act authorizing rate recovery for electric public utilities investments in distributed energy resources.	July 2008	Authorizes rate recovery for utility investments in distributed energy resources to stimulate public-utility investment in distributed resources. Bill was approved by the Governor.[392]
NH Statutes § 477:49 et seq.	Solar Skyspace Easements	1985	Solar skyspace easement provisions allow property owners to create solar easements in order to create and preserve a right to unobstructed access to solar energy.[393]
Regulatory			
Executive Order No. 2011-1	An Order For State Government to Continue to Lead-by-Example in Energy Efficiency	4/15/2011	Orders 25 percent reduction in fossil fuel use by state agencies. Directs agencies to make smart investments in state facilities that will result in costs savings and reduce energy usage. When renovating or building new state facilities, the state must use the most cost-effective, energy efficient designs and include renewable energy components when practicable.[394]
NA	EPAct/PURPA Standard 14	January 2008	The New Hampshire PUC issued an order in its proceeding to consider adopting PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005 in which it deferred the actual creation and implementation to future proceedings and directed its Staff to create a working group regarding AMI and time-based rates.[395]

[389] New Hampshire General Court, HB 381. Accessed 9/23/11. http://www.gencourt.state.nh.us/bill_Status/bill_status.aspx?lsr=454&sy=2011&sortoption=&txtsessionyear=2011&txttitle=meter
[390] New Hampshire General Court, HB 1377. Accessed 9/23/11. http://www.gencourt.state.nh.us/bill_Status/bill_status.aspx?lsr=2471&sy=2010&sortoption=genstat&txtsessionyear=2010&txttitle=renewable&txtgstatus=05
[391] DSIRE, New Hampshire – Net Metering. Accessed 2/8/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NH01R&re=1&ee=1
[392] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11, http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[393] DSIRE, New Hampshire Solar Easements. Accessed 2/8/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NH02R&re=1&ee=1
[394] State of New Hampshire By His Excellency John H. Lynch, Governor, Executive Order No. 2011-1. Accessed 9/23/11. http://www.governor.nh.gov/media/orders/documents/2011-01.pdf
[395] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11, http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

Item	Title	Dates	Description
Regulatory			
Order No. 23,982 in Docket No. DE 01-057	Order Approving Settlement Agreement and Authorizing Implementation of Programs	5/31/2002	Approves the implementation of core energy efficiency programs by the state's electric utilities through 2003. This order established the basis for the "NHsaves" statewide energy efficiency program. [396]
Chapter PUC 900	Net metering for customer-owned renewable energy generation resources of 100 kW or less	January 2001	Established interconnection rules for net-metered systems. Only CHP systems fueled by renewable sources are permitted to interconnect under these standards. [397]

In 2008 the New Hampshire legislator created the Energy Efficiency & Sustainable Energy Board to promote and coordinate energy efficiency, demand response, and sustainable energy programs in the state. [398] New Hampshire's regulated electric distribution utilities jointly develop and offer customers energy efficiency programs under a statewide umbrella program, NHSaves. These programs are funded via a system benefits charge included in customer rates. The New Hampshire PUC reviews and approves program plans and budgets submitted by the utilities. Utilities can earn performance incentives based on successful implementation of their programs. According to the Vermont Energy Investment Corporation's September 2011 report "New Hampshire Independent Study of Energy Policy Issues" (required for SB 323) the 10 years of utility administered energy efficiency programs which cost around $17-18 million per year (funded through the system benefits charge) have resulted in 70,000 MWh per year in savings and $90 million per year in total benefits per utility filings. There are currently no EERS in place for the state.[399]

The Enterprise Energy Fund is a revolving loan funded through New Hampshire's State Energy Program (under the ARRA) to help business owners and non-profit organizations make energy improvements in their buildings. The New Hampshire Business Resource Center was the co-creator of the Renewable Energy and Energy Efficiency Business Loan Program offering reduced interest loans for structural and equipment upgrades to reduce energy consumption.[400]

[396] New Hampshire Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/new%20hampshire/201/all/191
[397] New Hampshire Clean Distributed Generation. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/New%20Hampshire/201/all/195
[398] Title X Public Health, Chapter 125-o Multiple Pollutant Reduction Program. Accessed 2/15/11. http://www.gencourt.state.nh.us/rsa/html/X/125-O/125-O-5-a.htm
[399] New Hampshire Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/new%20hampshire/201/all/191
Vermont Energy Investment Corporation, New Hampshire Independent Study of Energy Policy Issues, September 2011.
http://www.puc.nh.gov/EESE%20Board/20110909Mtg/NH%20Independent%20Study%20of%20Policy%20Issues%20for%20EESE%20Board%209-9-11%20Final.pdf
[400] New Hampshire Clean Distributed Generation. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/New%20Hampshire/201/all/195

New Jersey

Item	Title	Dates	Description
Legislative			
AB 912	Limits Electric Public Utility Cost Recovery to Equipment or Software that is Compatible with, and Capable of Interoperating With, a Smart Grid System	2010	Establishment of cost-recovery mechanism for equipment compatible with smart grid. Bill has been reported out of Assembly Committee since 3/4/2010.[401]
AB 915	Authorizes Creation Of Local Renewable Energy Collaboratives and Central Renewable Energy Generation Systems, and Provides for Sale of Renewable Power Generation	2010	Establishes AMI standards and regulations. In September 2010 the bill was sent out of the Assembly Committee with amendments.[402]
AB 3071	NA	6/24/2010	Includes re-allocation of $158 million of ratepayer funds, which had been dedicated to energy efficiency and alternative energy programs, from the Clean Energy Fund to help balance the state budget. Bill has been referred to the Assembly Budget Committee as of 6/24/2010.[403]
LB A2507/S1932	An Act concerning the use of revenue from the retail margin assessed on certain classes of basic generation service customers and amending P.L.1999, c.23.[404]	3/31/2009	Authorizes New Jersey's Board of Public Utilities (BPU) to use the Retail Margin Fund to provide grants for CHP production, energy efficiency projects, and programs promoting renewable energy and energy efficiency. Bill was approved by the Governor on 3/31/2009.[405]
NJ Stat. § 45:22A-48.2	Solar collectors on certain roofs, homeowners association authority limited	08/21/2007	Legislation preventing homeowners associations from prohibiting the installation of solar collectors on certain types of residential properties.[406]
NJ Administrative Code 14:4-9	Net metering and interconnection standards for class I renewable energy systems	2006	Interconnection of DG systems, including CHP at the discretion of the applicable EDC. These standards are applicable to the state's IOUs. There are three separate levels of interconnection, and systems up to two MW in size are covered by the interconnection standard.[407]
NJ Stat. § 48:3-87, NJ A.C. 14:8-5.1 et seq.	Energy Rate Competition, Environmental disclosure requirements; standards; rules and Interconnection of Class I Renewable Energy Systems.	10/04/2004, 09/13/2004, 1999	Interconnection guidelines for solar, wind, fuel cells powered by renewable fuels, geothermal technologies, wave or tidal action, landfill gas, anaerobic digester gas, and sustainable biomass.[408]

[401] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
[402] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
http://www.njleg.state.nj.us/bills/BillView.asp
[403] New Jersey Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/new%20jersey/202/all/191
[404] Senate, No. 1932, State of New Jersey, 213th LEGISLATURE. Accessed 2/15/11. http://www.njleg.state.nj.us/2008/Bills/S2000/1932_I1.HTM
[405] New Jersey Clean Distributed Generation. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/New%20Jersey/202/all/195
[406] DSIRE, New Jersey Residential Solar Access Law. Accessed 2/8/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NJ15R&re=1&ee=1
[407] New Jersey Clean Distributed Generation. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/New%20Jersey/202/all/195
[408] DSIRE, New Jersey Interconnection Standards. Accessed 2/8/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NJ11R&re=1&ee=1

Item	Title	Dates	Description
Legislative			
NJ Stat. § 46:3-24 et seq.	Solar easements	1978	Provides for the creation of solar easements to ensure that proper sunlight is available to those who operate solar-energy systems. Also establishes requirements for certain types of information that must be included in the easement agreement. [409]
Regulatory			
SB 2936, NJ Stat. § 48:3-87, NJ A.C. § 14:8-4.1 et seq., AB 3520, NJ BPU Order, Docket No. EX09110910	An act concerning electric power net metering, safety and power quality interconnection standards, and renewable energy credit rules, and amending P.L.1999, c.23.	7/6/2010, 7/01/2010, 10/4/2004, 1999	Required EDCs to offer net metering to residential and small commercial customers with PV and wind-energy systems. Amendments were made to the net metering law, most notably extending net metering to large commercial and industrial customers and expanding the list of eligible technologies to include all "Class I" renewable energy resources.[410]
NA	New Jersey BPU Energy Master Plan	2008	Sets targets to reduce energy consumption and peak demand for the utilities and/or load serving entities to encourage demand response and energy efficiency.[411] Public hearings were held and additional comments were requested by the BPU in August 2011 regarding the 2011 Draft Energy Master Plan which includes promotion of a diverse portfolio of new, clean, in-state generation, REPS of 22.5% by 2021, opposition to new coal-fired generation, support for energy efficiency, energy conservation and cost-effective renewable resources, and support for emerging technologies for transportation and power production.[412]

NJ Clean Energy Plan, also known as the New Jersey's Clean Energy Program, promotes increased energy efficiency and the use of clean, renewable sources of energy including solar, wind, geothermal, and sustainable biomass. Customers can support renewable energy through the program's New Jersey CleanPower Choice Program which offers green pricing.[413]

The New Jersey Demand Response Working Group (DRWG), formed in June 2007, was charged with developing a demand response procurement program that would enable the deployment of demand response. The group recommended a pilot program that would procure 300 MW of demand response. The DRWG stated that the costs of the pilot program should be funded by the EDC's "Retail Margin collections" and recommended any demand response program be offered statewide to all EDC customers. The New Jersey BPU Energy Master Plan with the state's strategy through 2020 was created shortly thereafter in April 2008.[414]

[409] DSIRE, New Jersey Solar Easements. Accessed 2/8/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NJ01R&re=1&ee=1
[410] DSIRE, New Jersey Interconnection Standards. Accessed 2/8/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NJ11R&re=1&ee=1
[411] Draft for Comment of the National Action Plan on Demand Response The Federal Energy Regulatory Commission Staff Docket No. AD09-10, Prepared with the support of The Brattle Group, GMMB, Customer Performance Group, David Lineweber. Accessed 2/10/11. http://www.ferc.gov/legal/staff-reports/03-12-10-demand-response.pdf
[412] ADS, Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: May 2010 – June 2011 Accessed 9/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2010%20-%2011%20DR%20%20SG%20State%20Policy%20Survey_11%2007%2007_FINAL%20%282%29.pdf
[413] About New Jersey's Clean Energy Program. Accessed 2/11/11. http://www.njcleanenergy.com
[414] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

Energy efficiency and renewable energy programs in New Jersey are administered by the Office of Clean Energy within the BPU under the New Jersey Clean Energy Program. A collaborative called the New Jersey Clean Energy Council, provides input on programs. The BPU has yet to pursue a binding EERS that would require each electricity supplier/provider to meet energy efficiency goals.[415]

The New Jersey Clean Energy Solutions Capital Investment program is intended to provide grants and loans for end-use energy efficiency, CHP, and state-of-the-art electricity production projects, including renewable energy projects that use "Class I" and "Class II" resources as defined under the state REPS. To qualify, applicants must be New Jersey-based commercial, industrial, or institutional entities.[416]

In August 2011, Gov. Christie created a new $20 million pilot program designed to promote self-investment in energy efficiency and CHP DG projects at the state's largest commercial and industrial facilities using New Jersey BPU Clean Energy Program pilot program funds. To be eligible, large energy users must demonstrate that their 2010 contributions to the societal benefit charge, collected through the state's utility bills, totaled at least $300,000.[417]

[415] New Jersey Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/new%20jersey/202/all/191
[416] New Jersey Clean Distributed Generation. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/New%20Jersey/202/all/195
[417] New Jersey BPU, Energy Efficiency Pilot Program Launched for Large Energy Users, 8/18/11. Accessed 9/27/11. http://www.nj.gov/bpu/newsroom/news/pdf/20110818.pdf

New Mexico

Item	Title	Dates	Description
Legislative			
NMAC 17.9.570	Governing cogeneration and small power production	10/15/2008	Extends the availability of net metering to systems up to 80 MW in capacity. Net metering is available to all qualifying facilities (QFs), as defined by the federal 1978 PURPA, which generally include CHP systems. Previously, net metering in New Mexico was limited to systems up to 10 kW in capacity.[418]
HB 305	An act relating to energy; amending sections of the NMSA 1978 to provide for energy efficiency and load management for public utility customers.	2/27/2008	Directs utilities to include load management and energy efficiency programs in their resource portfolio along with a minimum threshold for action. Utilities must report on the effectiveness of programs associated with load management and energy efficiency. Signed into law by the Governor 2/27/2008. [419]
NMSA § 47-3-1 et seq.	New Mexico's Solar Rights and Solar Recordation Acts in 1977	2007, 1977	Addressed DG and reduces a county or municipality's ability to place restrictions on solar access. [420]
NM Stat. 6-21D-1 et seq. (Amended 2007)	Energy Efficiency and Renewable Energy Bonding Act	2007, April 2005	Authorizes up to $20 million in bonds to finance energy efficiency and renewable energy improvements in state government and school district buildings. A state agency or school district may install or enter into contracts for the installation of energy efficiency measures on the building identified in an assessment.[421]
NM Stat. § 62-17-1 et seq., NMAC 17.7.2	Efficient Use of Energy Act	2005	Directed utilities to develop and implement cost-effective DSM programs, established cost recovery mechanisms for electric utilities, and directed the New Mexico Public Regulation Commission (PRC) to remove financial disincentives for utilities to reduce customer energy use through DSM programs.[422]
N.M.S.A. 1978, § 62-17-7	Alternative energy efficiency provider	NA	Restrains third-party arrangements for energy efficiency services. Alternative energy efficiency providers must get utility and PRC consent to provide ratepayer-funded energy efficiency and load management to the utility's customers.[423]

[418] DSIRE, New Mexico – Net Metering. Accessed 2/8/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NM01R&re=1&ee=0

[419] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11, http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
New Mexico Legislature, 2008 Regular Session, HB 305. Accessed 9/21/11. http://www.nmlegis.gov/lcs/_session.aspx?Chamber=H&LegType=B&LegNo=305&year=08

[420] DSIRE, New Mexico Solar Access Laws. Accessed 2/8/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NM02R&re=1&ee=1

[421] DSIRE, Energy Efficiency & Renewable Energy Bond Program. Accessed 2/8/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NM07F&re=1&ee=0

[422] New Mexico Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/new%20mexico/203/all/191

[423] Galvin Electricity Initiative, Smart Grid Issues in State Law and Regulation Ashley Brown, Esq. and Raya Salter, Esq., October 2010. Accessed 9/28/11. http://galvinpower.org/sites/default/files/SmartGridIssuesInStateLawAndRegulation_Whitepaper_Final.pdf
N.M.S.A. 1978, § 62-17-7. Accessed 9/28/11. http://law.justia.com/codes/new-mexico/2009/chapter-62/article-17/section-62-17-7/

Item	Title	Dates	Description
Regulatory			
Executive Order 2010-27	New Mexico Task Force on Statewide Electricity Transmission Planning	July 2010	Formed the Statewide Electricity Transmission Task Force to assist the New Mexico RETA in creating a blueprint of the future renewable energy transmission system to prepare recommendations and steps for statewide transmission grid enhancements, including collector systems, construction financing, and cost-recovery options. Its first report was released in November 2010 with a recommendation for 1) RETA to be the statewide independent transmission planning authority for all transmission lines greater than 240 kV and 2) transmission development cost-recovery through customer bills.[424]
Executive Order 2010-001	New Mexico Clean Energy Economy Action	1/12/2010	Legislation to encourage high penetration of renewables into the smart grid, through collaboration with Los Alamos and Sandia National Laboratories, New Mexico's research universities, congressional delegation, and other stakeholders. Sets goal of 100% smart grid with as much clean and renewable energy resources as current fossil energy resources. Signed by Gov. Richardson in 1/12/2010.[425]
NA	Energy efficiency rules	4/8/2010	The PRC established new energy efficiency rules that encourage electric utilities to look toward low-cost energy efficiency programs before building costly and potentially unnecessary power plants to meet the state's energy demand.[426]
New Mexico PRC rules 568 (NMAC 17.9.568) and 569 (NMAC 17.9.569)	Interconnection of Generating Facilities with a Rated Capacity Up to and Including 10 MW Connecting to a Utility System	July 2008	Defines interconnection requirements of qualifying facilities up to 10 MW in capacity, and specifically allows for the interconnection CHP. Four levels of capacity are distinguished, with smaller capacity systems requiring less stringent interconnection processes.[427]
NA	EPAct/PURPA Standard 14	January 2007	The New Mexico PRC opened a proceeding to consider whether to adopt PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005 and New Mexico utilities were asked to file white papers on AMI and time-based rates before coming to a decision on adoption. [428]

In February 2008, legislation was signed that directs utilities to include load management and energy efficiency programs in their resource portfolio (HB 305). It also sets a minimum threshold for action: By 2014, savings of 5 percent of total 2005 retail kWh sales; by 2020, savings of 10 percent of total 2005 retail kWh sales. The new law mandates public utilities to file every three years with the New Mexico PRC a comprehensive measurement, verification and program evaluation report that evaluates energy and demand savings, cost-effectiveness of programs, and how well public utilities implement programs. [103] A utility that cannot achieve the energy saving requirements shall report to the PRC and propose alternative requirements based on acquiring all cost-effective and achievable energy efficiency and load management resources. The rules adopted in April 2010 provide a financial bonus to utilities for energy savings achieved through their approved efficiency programs.[429]

[424] Governor Richardson's Task Force on Statewide Electricity Transmission Planning , New Mexico Electricity Transmission Planning Report. Accessed 9/16/11. http://www.emnrd.state.nm.us/main/documents/NMElectricityTransmissionReport.pdf
[425] Gov. Richardson, Governor Bill Richardson Sets Bold Agenda for Future of New Mexico's Green Economy, 1/12/10. Accessed 9/27/11. http://www.brendanmiller.com/NMgreen/NMGreenformywebsite/www.edd.state.nm.us/greenEconomy/overview/20100113EO.PDF
[426] New Mexico Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/new%20mexico/203/all/191
[427] New Mexico Clean Distributed Generation. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/New%20Mexico/203/all/195
[428] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11, http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[429] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11, http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

The New Mexico PRC approved an agreement regarding DSM programs to be implemented by Public Service Company of New Mexico (PNM). The agreement called for PNM to spend $14 million per year on nine DSM programs starting in July 2009. PNM currently offers the Peak Saver Program and Power Saver programs to residential and large commercial customers to reduce peak demand. PNM is also collaborating with the Electric Power Research Institute, Mesa del Sol, Sandia National Laboratories, the University of New Mexico and Northern New Mexico Community College as a host site for a smart-grid demonstration project that will combine DSM, energy storage and solar PV to study integration technologies and standards required for energy efficiency and mass deployment of renewables at the utility distribution level. [430]

[430] New Mexico Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/new%20mexico/203/all/191
PNM, Rebates and Discounts. Accessed 9/28/11. http://www.pnm.com/rebates/home.htm?source=col4
PNM, Climate Change: What We're Doing. Accessed 9/28/11. http://www.pnm.com/climate/we-doing.htm

New York

Item	Title	Dates	Description
Legislative			
SB 4149, AB 2144, SB 3466, AB 6484	An Act to Amend the Public Authorities Law… Establishing the Nodal Metering Initiative Pilot Demonstration Project…	6/7/2011	Establishes the Nodal Metering Initiative Demonstration Project to select appropriate nodal points along the transmission and distribution grids for the installation of smart meters to measure the electricity consumption within a community of the Northern Westchester Energy Action Consortium, carry out test and operation procedures, and provide results for evaluation. As of 6/7/2011 bill was "committed to finance."[431]
SB No. 3000	An Act to Amend the Public Service Law… "Fair Electricity Auction Market Act"	2/4/2011	Abolishes the use of a market clearing price relating to the buying of electricity at an auction held by the ISO. As of 2/4/2011 bill was referred to the Energy And Telecommunications Committee.[432]
AB 2441	An Act to Amend the Executive Law, in Relation to Local Disaster Preparedness Plans…	1/18/2011	Establishes a New York State Energy Transportation and Storage Security Program for disaster preparedness plans. Bill has remained in Governmental Operations Committee since 1/18/2011.[433]
AB 1656	An Act to the Public Authorities Law, In Relation to Smart Grid Systems	1/11/2011	Establishes smart grid as the policy of the state, where smart grid systems will allow two-way digital communication between electric utilities, their distribution grid and customers, with the goal of improving efficiency and reliability of the electrical distribution system and decreasing electric prices. Bill referred to corporations, authorities and commissions on 1/11/2011.[434]
AB 296	An Act to Amend the Energy Law, in Relation to the Installation of Smart or Advanced Meters	1/5/2011	Authorizes tenants to request the installation of smart or advanced meters where the building they occupy is being converted to an electric meter that measures usage of any end-use customer of electricity services. Bill referred to Energy Committee on 1/5/2011.[435]
SB 1084	An Act to Amend the Public Service Law… Providing Real Time Smart Metering Technology to Residential Electricity Customers	1/5/2011	Provides residential electric customers with an option for greater control of the cost of electricity service by the installation of real time smart meters; establishes sales, rental and service providers to be certified by the PSC. Bill referred to Energy and Telecommunications Committee on 1/5/2011.[436]
NY CLS Real Property § 335-b, NY CLS General City § 20 (24), NY CLS Town § 263, NY CLS Vill § 7-704	Recording of solar energy easements	1981, 1979	Real property laws allow for the creation of solar easements (voluntary contracts) in order to ensure uninterrupted solar access for solar energy devices.[437]

[431] New York State Assembly, SB 4149. Accessed 9/20/11. http://assembly.state.ny.us/leg/?default_fld=&bn=S04149&term=2011&Summary=Y&Actions=Y&Votes=Y&Memo=Y&Text=Y
[432] New York State Assembly, SB No. 3000. Accessed 9/16/11. http://assembly.state.ny.us/leg/?default_fld=&bn=S03000&term=2011&Summary=Y&Actions=Y&Text=Y
[433] New York State Assembly, AB 2441. Accessed 9/26/11. http://assembly.state.ny.us/leg/?default_fld=&bn=A02441&term=2011&Summary=Y&Actions=Y&Votes=Y&Memo=Y&Text=Y
[434] New York State Assembly, AB 1656. Accessed 9/20/11. http://assembly.state.ny.us/leg/?default_fld=&bn=A01656&term=2011&Summary=Y&Actions=Y&Votes=Y&Memo=Y&Text=Y
[435] New York State Assembly, AB 296. Accessed 9/20/11. http://assembly.state.ny.us/leg/?default_fld=&bn=A00296&term=2011&Summary=Y&Actions=Y&Votes=Y&Memo=Y&Text=Y
[436] New York State Assembly, SB 1084. Accessed 9/20/11. http://assembly.state.ny.us/leg/?default_fld=&bn=S01084&term=2011&Summary=Y&Actions=Y&Votes=Y&Memo=Y&Text=Y
[437] DSIRE, New York Solar Easements. Accessed 2/18/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NY01R&re=1&ee=1

Item	Title	Dates	Description
Regulatory			
Case No. 09-E-0310	Order Granting Reconsideration and Modifying Two-Prong Test	4/19/2011	Grants Con Edison's petition for reconsideration and modifying the "two-prong test" for cost recovery which was originally specified in the PSC order "Establishing Recovery Mechanisms" issued 10/19/2010. The new order addressed potential for a double recovery of labor costs associated with ARRA projects. [438]
NY PSC Order, Case 94-E-0952, NY PSC Order, Case 02-E-1282, Case 10-E-0406, AB 2442	New York Standard Interconnection Requirements (SIR)	12/20/2010, 2/13/2009, 11/17/2004, 12/31/1999	Standard Interconnection Requirements (SIR) that address technical guidelines for interconnection and application procedures. The SIR contains two separate sets of interconnection procedures and processes. All systems up to 25 kilowatts (kW) are governed by a simplified six-step process, while larger systems up to 2 MW generally use an 11-step process.[439]
Matter No. 10-01355, Case No. 10-E-0285	Proceeding on Motion of the Commission to Consider Regulatory Policies Regarding Smart Grid Systems and the Modernization of the Electric Grid.	8/18/2011, 7/16/2010	Proceeding to investigate the regulatory policies needed to encourage the development of the smart grid, particularly to address questions surrounding: 1) a vision for the smart grid design; 2) implementation priorities; 3) engaging customers; 4) benefit-cost analysis; 5) cost uncertainties; 6) interoperability/cyber-security standards; 7) consumer data privacy/access; 8) communications; and 9) timing. The PSC has directed all utilities to file comments, and subsequently closed a related case, Case No. 09-M-0074. On 8/18/2011, the PSC released a policy statement that would establish regulatory policies and set forth guidelines for regarding the development of smart electric grid systems, mentioning that it expects smart grid technologies will utilize a hybrid of both public and private networks (carrier networks).[440]
NY CLS Public Service § 66-j and § 66-l, NY PSC Order Case 08-E-1305 et al. , NY PSC Order Case 09-E-0284 et al. , NY PSC Order Case 09-E-0819 et al.	Net energy metering for residential solar, farm waste, non-residential solar electric generating systems…	02/26/2010, 07/01/2009, 02/27/2009, 08/02/1997	Net metering is available to customers of the state's major IOUs, subject to technology, system size and aggregate capacity limitations. Publicly-owned utilities are not obligated to offer net metering; however, the Long Island Power Authority (LIPA) offers net metering on terms similar to those in the state law.[441]

[438] New York PSC, In the Matter of the American Recovery and Reinvestment Act of 2009 - Utility Filings for New York Economic Stimulus. Accessed 9/16/11. http://documents.dps.state.ny.us/public/Common/ViewDoc.aspx?DocRefId={78A80D43-F9C4-4C9E-981F-7BC1E97739E0}
ADS, Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: May 2010 – June 2011 Accessed 9/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2010%20-%2011%20DR%20%20SG%20State%20Policy%20Survey_11%2007%2007_FINAL%20%282%29.pdf
[439] DSIRE – Interconnection Standards. Accessed 2/28/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NY02R&re=1&ee=1
[440] New York PSC, Matter Number: 10-01355, Case Number:10-E-0285. Accessed 9/16/11. http://documents.dps.state.ny.us/public/MatterManagement/CaseMaster.aspx?MatterSeq=34399
http://www3.dps.state.ny.us/pscweb/WebFileRoom.nsf/ArticlesByCategory/8FC200347CDAEF6C852578F00056D875/$File/pr11069.pdf?OpenElement
[441] DSIRE, New York – Net Metering. Accessed 2/18/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NY05R&re=1&ee=1

Item	Title	Dates	Description
Regulatory			
NA	New York State Smart Grid Consortium	8/25/2009	Governor's order establishing the New York State Smart Grid Consortium comprised of leaders from government, utility companies and universities, as well as consumers. Formed to develop a strategic vision on how best to deploy secure, efficient and reliable smart grid technologies in New York. Published report in 2009 indicating that all of New York's stimulus proposals submitted under the DOE smart grid funding solicitations complement one another. [442]
Cases 09–E–0310 and 09-M-0074	In the Matter of Advanced Metering Infrastructure	7/27/2009	Directs utilities, unless otherwise waived, to adhere to the AMI minimum functional requirement that customers or their competitive providers will be able to access meter data in an open, standard, nonproprietary format.[443]
NY PSC Order, Case 07-M-0548; Case 07-M-0748	Proceeding on Motion of the Commission Regarding an Energy Efficiency Portfolio Standard.	5/19/2009	Sets an energy efficiency goal of reducing electricity usage in New York by 15% from projected electricity usage in 2015.[444]
NA	EPAct/PURPA Standard 14	July 2007	The New York PSC decided not to adopt PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005. Time-based metering and communications standard comparable to PURPA already exist for the state. The PSC has mandated and voluntary dynamic rates for various customer classes.[445]
Case 03-E-0641	Proceeding on Motion of the Commission Regarding Expedited Implementation of Mandatory Hourly Pricing for Commodity Service	4/2006, 4/2003	The PSC evaluates comments on the need for changes to the utilities' RTP tariffs to more effectively reduce demand and peak period pricing and to encourage conservation. Directs utilities to: 1) develop comprehensive evaluation plans, including the impact on New York's electricity demand profile and the future potential for mandatory hourly pricing; 2) submit evaluation plans to the PUC; and 3) to survey each of its eligible hourly pricing customers after the first six months following each tariff's implementation.[446]

The New York Power Authority and LIPA have energy efficiency and DSM programs, including audits and rebates for residential and commercial customers.[447] Consolidated Edison measured the effectiveness of demand response programs for 3.2 million customers in the City of New York and Westchester County. Demand response programs in that area were designed so that customers can participate in multiple programs at once and these included a distribution load relief program, direct Load control, mandatory hourly pricing and voluntary TOU pricing. In a December 2010 report submitted to the PSC by Consolidated Edison, data from the new peak load shaving programs was not complete enough to evaluate whether the programs were cost or operationally effective. With the distribution load relief program, 18% of the Consolidated Edison networks had an achieved reduction impact of 2% or greater and 88% of the networks and load areas achieved some level of load reduction. In a July 2011 order, the PSCs staff recommended the PSC give Consolidated Edison permission to provide all commercial participants in demand response programs the ability to directly view 15 minute meter demand data during notification periods and demand response events over the Internet, with plans for the for the system to be fully functional and reliable prior to May 2012. Consolidated Edison is required to submit another program evaluation report in December 2011.[448]

[442] New York Governor's Office, Governor Paterson Announces Kick-Off Of "Smart Grid" Consortium to Promote State-Of-The-Art, Reliable and Cost-Effective Power Delivery System. Accessed 9/16/11. http://www.governor.ny.gov/archive/paterson/press/press_0825091.html
ADS, Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: May 2010 – June 2011 Accessed 9/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2010%20-%2011%20DR%20%20SG%20State%20Policy%20Survey_11%2007%2007_FINAL%20%282%29.pdf
[443] In the Matter of the Application of PEPCO for Authorization to Establish a DSM Surcharge and an AMI Surcharge and to Establish a DSM Collaborative and an AMI Advisory Group. Accessed 2/28/11. http://www.energymarketers.com/Documents/nem_pepco_dynamic_pricing_final.pdf
[444] DSIRE, New York - Energy Efficiency Portfolio Standard. Accessed 2/28/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NY19R&re=1&ee=1
[445] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[446] 03-E-0641: Mandatory Hourly Pricing. Accessed 2/28/11. http://www3.dps.state.ny.us/W/PSCWeb.nsf/All/521076489C0E55EE85257687006F38C3?OpenDocument
[447] Long Island Power Authority programs. Accessed 2/18/11. http://www.lipower.org/efficiency/
448New York PSC, Case No. 09-E-0115: Demand Response Initiative. Accessed 2/18/11. http://www3.dps.state.ny.us/W/PSCWeb.nsf/All/A424588D473ED4EF85257687006F3900?OpenDocument, http://documents.dps.state.ny.us/public/Common/ViewDoc.aspx?DocRefId={CC7D6608-389B-4EFF-9ED3-68A25B4BB14E}
Consolidated Edison, Evaluation of Program Performance and Cost Effectiveness of Demand Response Programs, 12/1/2010. Accessed 9/28/11. http://documents.dps.state.ny.us/public/Common/ViewDoc.aspx?DocRefId={B389CA60-E5A9-4E8E-B42D-29AE291DDC61}

North Carolina

Item	Title	Dates	Description
Legislative			
SB 671, HB 872	Smart Grid Job Creation and Retention Act	4/19/2011	A taxpayer that develops smart grid technology is eligible for a credit equal to a percentage of the taxpayer's qualifying expenses (determined as provided) that exceed $50,000. Bill referred to Commerce and/or Finance Committee on 4/20/2011.[449]
HB 1387 / Session Law 2009-553	Limitations on regulating solar collectors	8/28/2009, 10/1/2007	Cities and counties generally may not adopt ordinances prohibiting the installation of a solar collector that gathers solar radiation as a substitute for traditional energy for water heating, active space heating and cooling, passive heating, or generating electricity for residential property. Deed restrictions, covenants or similar binding agreements that run with the land recorded on or after October 1, 2007 that would prohibit the installation of solar-energy collectors for residential property on land subject to the deed restriction, covenant or agreement are void and unenforceable. Signed into law by the Governor on 8/28/2009.[450]
SB 3/Session Law 2007-397	Renewable Energy and Energy Efficiency Portfolio Standard	8/20/2007	Considers demand response to be an eligible activity for cooperative and municipal utilities to meet the REPS. Public utilities may not use demand response to meet the REPS/EERS. Signed into law by the Governor on 8/20/2007.[451]
Regulatory			
Docket No. E-100, Sub 113, Docket No. E-100, Sub 121	Order Amending Rules R8-64 Through R8-69 and Approving Final Operating Procedures for NC-RETS	1/31/2011	Order amending REPS/EERS rules (Rules R8-64 through R8-69). Includes a new requirement for utilities to report peak-demand reduction.[452]
NCUC Order, Docket No. E-100, Sub 83	Order Adopting Net Metering	6/1/2009, 7/6/2006, 12/27/2005, 10/20/2005	Requires the three investor-owned utilities to make net metering available to customers that own and operate systems generating electricity using solar, wind, hydropower, ocean or wave energy, biomass resources, CHP using waste heat derived from eligible renewable resources, hydrogen derived from eligible renewable resources, or battery storage. The individual system capacity limit is one MW.[453]
NA	EPAct/PURPA Standard 14	August 2007	The North Carolina Utilities Commission (NCUC) decided not to adopt PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005. The NCUC stated that it did not adopt the PURPA standard because it the Commission and the utilities have been actively promoting time-based rates for at least the last three decades. Utilities already offer a variety of programs essentially identical to all but one of those suggested by EPAct 1252.[454]

[449] North Carolina General Assembly, SB 671. Accessed 9/20/11. http://www.ncleg.net/gascripts/BillLookUp/BillLookUp.pl?Session=2011&BillID=SB671&submitButton=Go
[450] North Carolina General Assembly, HB 1387 / S.L. 2009-553. Accessed 9/21/11. http://www.ncleg.net/gascripts/BillLookUp/BillLookUp.pl?Session=2009&BillID=h1387
[451] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[452] NCUC, Docket No. E-100, Sub 113, Docket No. E-100, Sub 121. Accessed 9/16/11. http://www.ncuc.net/selorder/rules/KJ013111.pdf
[453] DSIRE, North Carolina – Net Metering. Accessed 3/2/11. http://dsireusa.org/incentives/incentive.cfm?Incentive_Code=NC05R&re=1&ee=1
[454] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

The IOUs and cooperatives of Virginia offer a variety of different energy efficiency and DSM programs to their customers. Dominion offers three DSM rate tariffs that provide participant incentive payments for load reductions that Dominion can call for when capacity is needed. [455] In its September 2011 Biennial Report, the NCUC indicates Dominion intends to file applications for a Commercial Energy Audit Program and a Voltage Conservation Program after they have been approved by the Virginia SCC. After a review, Dominion decided not to file applications for a Curtailment Service Program, Energy Management System Program, In-Home Energy Display Program, Programmable Thermostat Program or a Residential Water Heater Cycling Program, among others. Dominion reports that the companies ICF, Power Secure and GoodCents may act as third-party vendors to assist Dominion in evaluating and delivering DSM and EE programs. [456]

In 2009, the NCUC approved Duke Energy's Save-A-Watt program. The proposal estimated the program would pay Duke 90 percent of the costs it avoids by not having to build new plants or buy additional electricity.[457] In the last two years, Duke Energy Carolinas has had several programs and pilots approved by the NCUC including a Smart Energy Now Pilot Program (Envision Charlotte), Residential Energy Management System Pilot, and a PowerShare Call Option for Non-Residential Load Curtailment.

Progress Energy Carolinas has recently added three DSM programs in response to legislation in SB 3: 1) Residential EnergyWise Home; 2) Commercial, Industrial, and Governmental Demand Response Automation; and 3) Distribution System Demand Response. [458]

[455] North Carolina Utilities Commission. Biennial Report, 2009.
[456] North Carolina Utilities Commission, Biennial Report 9/1/11. Accessed 9/28/11. http://www.ncuc.net/reports/EE-DSM%20Report.pdf
[457] North Carolina Utility Policies. Accessed 2/18/11. http://www.aceee.org/energy-efficiency-sector/state-policy/north%20carolina/205/all/191
[458] North Carolina Utilities Commission, Biennial Report 9/1/11. Accessed 9/28/11. http://www.ncuc.net/reports/EE-DSM%20Report.pdf

North Dakota

Item	Title	Dates	Description
Legislative			
SB 2186	An Act to Amend and Reenact Section 54-35-18 of the North Dakota Century Code, Relating to the Energy Development And Transmission Committee	4/19/2011	The legislative management shall appoint an energy development and transmission committee that will study the impact of a comprehensive energy policy and the development of each facet of the energy industry, from the obtaining of the raw natural resource to the sale of the final product in this state, other states, and other countries. The study may include the review of and recommendations relating to policy affecting extraction, generation, processing, transmission, transportation, marketing, distribution, and use of energy. The bill was approved on 4/19/2011.[459]
ND Cent. Code, § 47-05-01.1 et seq.	Solar easement	1977	Allows a property owner to obtain a solar easement from another property owner for the purpose of ensuring adequate exposure of a solar-energy system to sunlight.[460]
ND Cent. Code, § 17-04-02 et seq.	Wind easement	2005	Allows property owners to grant an easement that ensures adequate exposure of a wind-energy system to the wind.[461]
Regulatory			
Case No. PU-08-884	Electric DSM Rulemaking	10/14/2010, 11/20/2008	The PSC announced a workshop to explore policies and methodology for evaluating electric utility energy efficiency and load management programs, including goals, cost-benefit tests, policy goals, policy goals, and dynamic pricing couples with AMI. Comments were gathered through 2009, and the case was closed on 10/14/2010.[462]
Case No. PU-09-20, Case No. PU-08-884	EPAct/PURPA Standard 14	12/18/2009, August 2007	The North Dakota PSC issued an order announcing that it would initiate a rulemaking to pursue a modified version of PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005 indicating it anticipates mandating utilities to offer TOU pricing, CPP, RTP, and credits for customers with pre-established load reduction programs—to large C&I customers, provide a time-based meter to reflect the rate, and create a progress report of its effort toward making smart metering available for all customers. In December 2009, the PSC ruled that no further action will be taken to adopt the EISA standards; it will continue to consider deployment of smart grid technologies on a case-by-case basis. [463]

[459] North Dakota State Government, Senate Measure No. 2186. Accessed 9/23/11. http://www.legis.nd.gov/assembly/62-2011/bill-actions/ba2186.html
[460] DSIRE, North Dakota Solar Easements. Accessed 2/8/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=ND02R&re=1&ee=1
[461] DSIRE, North Dakota Wind Easements. Accessed 2/8/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=ND05R&re=1&ee=1
[462] North Dakota PSC, Case No. PU-08-884. Accessed 9/23/11. http://www.psc.nd.gov/database/docket_view_list.php?s_dept=PU&s_year_case=08&s_seq_num=884&s_company_name=Public+Service+Commission
[463] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
North Dakota PSC, Case No. PU-09-020. Accessed 9/21/11. http://www.psc.nd.gov/database/docket_view_list.php?s_dept=PU&s_year_case=09&s_seq_num=20&s_company_name=Public+Service+Commission

Item	Title	Dates	Description
Regulatory			
ND Century Code § 49-02-24 et seq., ND Admin. Code 69-09-08, ND PSC Order, Case No. PU-07-318	Renewable electricity and recycled energy credit trading and tracking system	March 2007	Establishes an objective that 10 percent of all retail electricity sold in the state be obtained from renewable energy and recycled energy by 2015. This objective is voluntary; there is no penalty or sanction for a retail provider of electricity that fails to meet the objective. Eligible resources include recycled energy systems producing electricity from currently unused waste heat resulting from combustion or other processes.[464]
ND Administrative Code 69-09-07-09	Rates for Purchases	5/1/1991	The net-metering policy applies to renewable-energy systems and CHP systems up to 100 kW. Net metering is available to all customers of IOUs, but is not available to customers of municipal utilities or electric cooperatives.[465]

North Dakota's utilities historically have generally not funded or offered energy efficiency programs to their customers, with the exception of a few publicly owned utilities. In January 2009, the PSC held a workshop to explore policies and methodologies for evaluating utility energy efficiency and load management programs. In February 2009, Otter Tail Power Company submitted a two-year energy efficiency plan and cost recovery mechanism. The plan proposed to save 7,400 MWh annually. Funds allocated to Otter Tail Power Company by the State of North Dakota through the ARRA are no longer available, however in the first half of 2011 the company offered customers special rebates for installing select energy-efficient electric technologies. [466]

In November 2008, the Commission approved a DSM Program and cost recovery rider proposed by Xcel Energy in Case PU-08-171. Customers can save on electric base rates by allowing Xcel Energy to control (interrupt) their primary electric heat source during peak heating times (in October through May) in the Backup Relief program. Residential customers can also receive a special off-peak rate when they run appliances during off-peak hours in the late evening and early morning in the company's Time of Day program. In the Limited Off-Peak program, customers can pay an off-peak rate for operating specific electric equipment at off-peak times. There is currently no EERS in place for North Dakota.[467]

[464] North Dakota Clean Distributed Generation. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/North%20Dakota/206/all/195
[465] DSIRE, North Dakota - Net Metering. Accessed 3/2/11. http://dsireusa.org/incentives/incentive.cfm?Incentive_Code=ND01R&re=1&ee=1
[466] North Dakota Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/north%20dakota/206/all/191
Otter Tail Power Company, Big Rebates, 4/11. Accessed 9/28/11. http://www.otpco.com/NewsInformation/InsertsNewslettersPDF/2011AprilND_ARRArebates.pdf, http://www.otpco.com/SaveEnergyMoney/ARRA_ND_FAQs.asp
[467] North Dakota Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/north%20dakota/206/all/191
Xcel Energy, Rate Options Directory . Accessed 9/28/11. http://www.xcelenergy.com/Save_Money_&_Energy/For_Your_Home/Rate_Options

Ohio

Item	Title	Dates	Description
Legislative			
SB 232	Renewable Energy Facilities-Property Tax Exemption/Payments in Lieu of Taxes	6/17/2010	Amends the tax code as applied to energy efficiency and renewable energy projects and clarifies that alternative energy resources supported by a revolving loan may be used to meet Ohio's energy-efficiency and peak demand reduction standards established by SB 221.[468]
Chapter 4901:1-22	Interconnection Services	06/29/2009, 10/22/07, 9/18/00,	Interconnection standards (applicable to DG, including CHP) are separated into three tiers. A third tier provides a process for generators up to 20 MW.[469]
ORC § 5301.63	Solar access easement requirements.	8/14/1979	Solar-easement provisions regarding DG. [470]
Regulatory			
Case No. 11-277-GE-UNC	Review of the Consumer Privacy Protection, Customer Data Access, and Cyber Security Issues…Advanced Metering and Smart Grid Programs	1/18/2011	Order soliciting comments regarding whether the PUC should consider, develop, and adopt additional rules, policies, and procedures addressing smart grid related privacy or data access issues. As of July 2011, parties continue to submit comments to the PUC.[471]
ORC 4928.67, 4901:1-10-28, 4901:1-21-13, Finding and Order Docket 06-0653-EL-ORD	Standard contract or tariff providing for net energy metering.	6/29/2009, 9/18/2000, 10/5/1999	Requires electric distribution utilities to offer net metering to customers who generate electricity using wind energy, solar energy, biomass, landfill gas, hydropower, fuel cells or microturbines.[472]
Substitute SB 221, ORC 4928.66 et seq., Case No. 08-777-ELORD	Implementing energy efficiency programs.	7/31/2008, May 2008	Encourages time-differentiated pricing and AMI; requires EDCs to file Electric Security Plans that may propose a Distribution Infrastructure Modernization Plan with single issue rate-making and incentives; requires time-differentiated and dynamic pricing options to be offered.[473] Established the Ohio Alternative Energy Resource Standard (AERS).[474] Ohio utilities are also required to meet cumulative energy savings and peak demand reduction goals.[475]

[468] ADS, Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: May 2010 – June 2011 Accessed 9/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2010%20-%2011%20DR%20%20SG%20State%20Policy%20Survey_11%2007%2007_FINAL%20%282%29.pdf
Gov. Ted Strickland, Governor Continues to Lay Foundation for New Energy Jobs in Ohio. Accessed 9/16/11. http://www.tedstrickland.com/6-17-10-governor-continues-to-lay-foundation-for-new-energy-jobs-in-ohio/
[469] Ohio Clean Distributed Generation. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Ohio/207/all/195
[470] DSIRE, Energy Efficiency Portfolio Standard. Accessed 2/8/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=OH16R&re=1&ee=1
[471] Ohio PUC, Case No. 11-277-GE-UNC. Accessed 9/16/11. http://dis.puc.state.oh.us/CaseRecord.aspx?CaseNo=11-0277
[472] DSIRE, Ohio – Net Metering. Accessed 2/8/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=OH02R&re=1&ee=1
[473] Tour of Smart Grid Projects and State Policies by Lisa Schwartz, Presentation to the Oregon PUC, Smart Grid Workshop – September 9, 2009, RAPOnline, Source: Ethnie Groves, Xcel Energy. Accessed 2/7/11. http://www.sgiclearinghouse.org/Legislation?q=node/2303&lb=1
[474] DSIRE, Energy Efficiency Portfolio Standard. Accessed 2/8/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=OH16R&re=1&ee=1
[475] Ohio Clean Distributed Generation. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Ohio/207/all/195

Item	Title	Dates	Description
Legislative			
NA	EPAct/PURPA Standard 14	March 2007	The PUC of Ohio issued a Finding and Order that adopts the Staff's recommendations regarding PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005. Their findings state all EDUs should offer tariffs to all customer classes which are, at a minimum, differentiated according to on and off -peak wholesale periods. TOU meters should be made available to customers subscribing to the on and off -peak tariffs. Staff should analyze the cost benefit of AMI deployment strategies and hold a series of technical conferences to discuss further associated issues. [476]

AEP implemented the smart grid pilot "gridSMART" with a supervisory control and data acquisition system expansion, remote station surveillance and advanced sensing. The pilot will run from 2009 through 2011 with AMI and HAN for 110,000 meters and distribution automation on 90 circuits. The PUC approved a rider to recover costs, but required AEP to seek federal stimulus funds for 50 percent of project cost. AEP was awarded federal funds in November 2009. In September 2011, AEP announced an available rebate on ENERGY STAR refrigerators as part of the "gridSMART" pilot. As part of the project, AEP is also installing and testing 80 Community Energy Storage battery units that will serve up to 300 homes in northeast Central Ohio. The Community Energy Storage battery units are expected to be operational by the end of 2011. [477]

Dayton Power & Light had their electric security plan approved by the PUC, which extends their existing generation rate plan through Dec. 31, 2012. First Energy and AEP have had performance incentives approved. Duke Energy was also approved for more than a dozen residential and commercial DSM programs and related cost recovery.[478]

In May 2008, Ohio enacted broad electric industry restructuring legislation (SB 221) containing energy efficiency requirements for the state's electric distribution utilities and electric service companies. SB 221 established the Ohio AERS, requiring utilities to obtain 12.5 percent of their energy for distribution from alternative and renewable resources by 2025, and the Ohio EERS. This requires electric utilities implement cost-effective demand response measures to meet the goals. Failure to comply with energy efficiency or peak demand reduction requirements will result in PUC of Ohio assessing a forfeiture upon the utility.[479]

The Ohio Energy Resources Division oversees the Advanced Energy Fund, which supports energy efficiency programs throughout the state. These mostly consist of commercial and industrial projects. The Advanced Energy Fund supports an Energy Efficiency Revolving Loan Fund that is administered by the state. The Ohio Department of Development's Ohio Energy Office is offering grants for both the installation of new distributed energy resources projects and the implementation of certain manufacturing energy efficiency projects. Eligible distributed energy resources projects include industrial heat recovery and CHP, microturbines, and clean-burning reciprocating engines. The Ohio Energy Resources Division indicates that support through the Advanced Energy Fund for individual projects will not be at the same incentive level or offered in the same manner as in previous years, due to limited funding, though new programs are expected to be released in fall 2011. [480]

[476] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11.
http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
AEP, New Technologies. Accessed 9/28/11. https://www.aepohio.com/save/demoproject/newtechnology/CES.aspx
AEP, gridSMART from AEP Ohio Offers ENERGY STAR® Refrigerator Rebate, 9/26/2011. Accessed 9/28/11. https://aepohio.com/info/news/ViewRelease.aspx?releaseID=1133
[477] Tour of Smart Grid Projects and State Policies by Lisa Schwartz, Presentation to the Oregon PUC, Smart Grid Workshop – September 9, 2009, RAPOnline, Source: Ethnie Groves, Xcel Energy. Accessed 2/7/11.
http://www.sgiclearinghouse.org/Legislation?q=node/2303&lb=1
[478] Ohio Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/ohio/207/all/191
[479] DSIRE, Energy Efficiency Portfolio Standard. Accessed 2/8/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=OH16R&re=1&ee=1
[480] Ohio Clean Distributed Generation. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Ohio/207/all/195
Ohio Energy Resources Division, Advanced Energy Fund Grants , 7/15/11. Accessed 9/28/11. http://www.development.ohio.gov/Energy/Incentives/AdvancedEnergyFundGrants.htm

Oklahoma

Item	Title	Dates	Description
Legislative			
HB 1079	Electric Utility Data Protection Act	5/24/2011	Allows electric utilities to utilize customer-identifiable usage data for certain internal business purposes without customer consent. Electric utilities must provide access to a customer's standard usage data upon written request from the customer. Utilities may collect a fee for nonstandard usage data requests. Bill authorizes the disclosure of customer information to third-parties under certain circumstances and allows electric utilities to use aggregate usage data for internal or other business purposes under certain circumstances. Signed into law by the Governor 5/24/2011.[481]
HB 3028	Oklahoma Energy Security Act	5/26/2010	Defines development of renewable energy standards, including promotion of DSM.[482] The goal calls for 15 percent of the total installed generation capacity in Oklahoma to be derived from renewable sources by 2015 (no interim targets, does not extend past 2015). Eligible renewable energy resources include wind, solar, hydropower, hydrogen, geothermal, biomass, and other renewable energy resources approved by the Oklahoma Corporation Commission (OCC). Energy efficiency can also be used to meet up to 25 percent of the goal. The standard also counts as eligible for certain DSM applications, including the reuse of energy from exhaust gases. Bill was approved by the Governor in 5/26/2010.[483]
Regulatory			
Case RM 200700007; ID: 4010862	Notice of Proposed Rulemaking	12/4/2008	The OCC issued a Notice of Proposed Rulemaking to amend its current rules for electric utilities as set forth in Oklahoma Administrative Code. The OCC is proposing to add a subchapter to the Administrative Code entitled Demand Programs, which would establish demand response and other DSM requirements for utilities. The OCC adopted proposed rules by 12/4/08.[484]
O.A.C. § 165:40-9, OCC Order 326195	Optional Net Energy Billing Purchase Rate	5/23/1988	Requires investor-owned utilities and electric cooperatives under the OCC's jurisdiction file net-metering tariffs for customer-owned renewable-energy systems and CHP facilities up to 100 kW. Net metering is available to all customer classes with no limit on the amount of aggregate net-metered capacity. [485]

Public Service Company of Oklahoma (PSO) has begun to implement energy efficiency programs; a shift from no activity in the state. In 2008, the OCC initiated a "Demand Programs Collaboration" to examine issues associated with the funding and provision of customer energy efficiency programs by the state's energy utilities. The OCC also approved a portfolio of DSM programs proposed by PSO in accordance with a 2006 order. According to PSO, the PSO Cool Rewards pilot program, which reduces electricity usage during the high demand summer months by "cycling" central air conditioners of participating customers, was so successful that it has reached its capacity and is unable to accept new customers. Approximately 14,000 smart meters have been installed in homes and businesses in the Owasso, Oklahoma area as part of the PSO's gridSMART Owasso Pilot Project. The company is also installing automated equipment and controls on the distribution system as part of the project. [486] Currently no EERS exist for Oklahoma.[487]

[481] Oklahoma State Legislature, Bill Information for HB 1079. Accessed 9/16/11. http://www.oklegislature.gov/BillInfo.aspx?Bill=HB1079&Tab=0
[482] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
[483] Oklahoma Clean Distributed Generation. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Oklahoma/208/all/195
[484] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11.
http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
National Town Meeting on Demand Response and Smart Grid, Policy Overview by Dan Delurey, 7/13/2009. Accessed 9/21/11.
http://www.smartgridtownmeeting.com/presentations/ppt/2009/Dan%20Delurey%20DC%20Policy%20Presentation%2009.07.13.ppt
[485] DSIRE, Oklahoma - Net Metering. Accessed 3/2/11. http://dsireusa.org/incentives/incentive.cfm?Incentive_Code=OK01R&re=1&ee=1
[486] Oklahoma Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/oklahoma/208/all/191
PSO, Residential Programs. Accessed 9/28/11. https://www.psoklahoma.com/save/programs/
PSO, gridSMART Owasso Pilot Project. Accessed 9/28/11. https://www.psoklahoma.com/save/SmartMeters/
[487] Oklahoma Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/oklahoma/208/all/191

Oregon

Item	Title	Dates	Description
Legislative			
HB 3156	An Act Relating to Solar Energy Generation by Retail Electricity Consumers	6/21/11	Simplifies the permitting process for commercial, residential, multi-family residential sectors as long as 1) the solar system does not expand the footprint or peak height of the residential or commercial structure on which it is installed and 2) is aligned so that it is parallel to the slope of the roof.[488]
HB 2626	Energy Efficiency and Sustainable Technology Act	2009	Establishes the Oregon Energy Efficiency and Sustainable Technology loan program which provides financing for residential and commercial energy efficiency and renewable energy projects through 100% upfront long term loans to property owners.[489]
SB 80	Printed pursuant to Senate Interim Rule 213.28 …Relating to Greenhouse Gas Emissions…	2009	Establishment of Climate Policy Advisory Council to coordinate state agency actions, including smart grid measures, to reduce green house gas emissions. Bill has been referred to committee as of 6/29/2009.[490]
Funding Opportunity No. DE-FOA-0000091	Oregon Smart Grid Resiliency Initiative	9/14/2009	Preparation of Workforce Development Plan to investigate aspects of smart grid applications, strengths, and weaknesses. The plan will address smart grid applications and vulnerabilities, critical infrastructure interdependencies, cyber security, energy supply systems, energy data analysis, and communications.[491]
OR Revised Statutes 757.300, OR Admin. R. 860-039, 860-022-0075	General Rate Revisions	7/24/2007, 11/30/2005, 9/1/1999	Established separate net-metering programs for the state's primary investor-owned utilities (PGE and PacifiCorp), and for its municipal utilities and electric cooperatives. [492]
SB 838	Oregon Renewable Energy Act	6/6/2007	Oregon's public purpose charge funds energy efficiency, renewable energy, and low-income programs in Oregon. This funding supports the Energy Trust of Oregon's (ETO) electric programs as well as electric low-income programs provided by Oregon Housing and Community Services, a state agency. SB 838 extended the public purpose charge through 2025. Bill was signed into law by the Governor on 6/6/2007.[493]

[488] 76th OREGON LEGISLATIVE ASSEMBLY, 2011 Regular Session Enrolled HB 3516. Accessed 9/14/11. http://www.leg.state.or.us/11reg/measpdf/hb3500.dir/hb3516.en.pdf
[489] Oregon Energy Efficiency and Sustainable Technology. Accessed 9/14/11. http://www.oregon.gov/ENERGY/LOANS/EEAST/
[490] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
[491] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
Oregon Energy Assurance Initiative, The Enhancing State Government Energy Assurance Capabilities and Planning for Smart Grid Resiliency Initiative. Accessed 9/28/11. http://www.oregon.gov/ENERGY/Recovery/ODOE_application.pdf?ga=t
[492] DSIRE, Oregon - Net Metering. Accessed 2/28/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=OR03R&re=1&ee=1
[493] Oregon Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/oregon/209/all/191

Item	Title	Dates	Description
Legislative			
SB 1149 and ORS 757.612 et seq.	Requirements for public purpose expenditures; electric bill payment assistance charge; rules	7/23/1999	Established the Oregon Energy Trust as part of the electric utility restructuring. The Oregon Energy Trust provides funds to support renewable at a rate of 17.1 percent of the funds collected by the trust.[494] The Energy Trust's renewable energy programs include financial incentives for small-scale and utility-scale projects that generate energy from solar, wind, hydro, biomass and geothermal resources. Efficiency programs include incentives for improvements to residential, commercial and new buildings, retrofit, appliances and manufacturing processes. Bill was signed into law by the Governor on 7/23/1999. [495]
ORS § 105.880 et seq., 215.044 et seq., 227.190 et seq.	Conveyance prohibiting use of solar energy systems void; Solar access ordinances…	1981, 1979	Oregon legislation and laws regarding access to solar and wind resources.[496]
Regulatory			
Order No. 07-319, Oregon Revised Stat. Chapter 757	Rulemaking to Adopt Rules Related to Net Metering…	2007	Oregon has two separate interconnection standards: one for its IOUs, Portland General Electric (PGE) and PacifiCorp, and one for municipal utilities and electric cooperatives. These rules delineate standards for systems up to two MW in size for businesses, and 25 kW for all residential customers. The PGE and PacifiCorp standard delineates multiple levels, or tiers, of interconnection. Systems that are appropriately vetted and 25 kW or smaller can be interconnected under the first level without fee.[497]

In May 2008, the Oregon PUC approved PGE's plan to deploy over 850,000 smart meters using a wireless fixed network operating on a licensed radio frequency spectrum to deliver meter readings daily from residential and commercial meters. Deployment was completed in September 2010. PGE will use the smart meters to facilitate future demand response and direct-load-control programs. The project includes creating a web portal through which customers using the smart meters can access information about their daily energy consumption. When the system is released in late 2011, PGE's new Energy Tracker program will enable customers to monitor their energy usage online. [498]

Oregon's 1999 restructuring law, SB 1149, established a public purpose charge to support electric energy efficiency, renewable energy, and low-income programs. The ETO, a nonprofit organization established by the Oregon PUC in 2002, administers most of the statewide energy efficiency and renewable energy programs. Oregon's energy efficiency programs are also supported by strong regional organizations—the BPA, the NEEA, and the NPCC. Some utilities also provide programs. The ETO has been successful in its goal and developed and implemented a comprehensive menu of programs and services for customer energy efficiency. The NPCC has identified energy efficiency and conservation as the priority resource for meeting load growth in the region and expects that this resource can address all load growth through 2012 and about 85 percent of all load growth through 2030.[499]

The NEEA is a non-profit organization working to maximize energy efficiency to meet future energy needs. NEEA is supported by, and works in collaboration with the BPA, Energy Trust of Oregon and more than 100 Northwest utilities on behalf of more than 12 million energy consumers. [500]

[494] DSIRE, Oregon Energy Trust. Accessed 2/11/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=OR05R&re=1&ee=1
[495] DSIRE, Oregon Energy Trust. Accessed 2/11/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=OR05R&re=1&ee=1
[496] DSIRE, Oregon Solar and Wind Access Laws. Accessed 2/9/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=OR02R&re=1&ee=1
[497] Oregon Clean Distributed Generation. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Oregon/209/all/195
[498] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
PGE, FAQs, Capabilities and Benefits of Smart Meters. Accessed 9/28/11. http://www.portlandgeneral.com/our_company/news_issues/current_issues/smart_meters_faq.aspx
[499] Oregon Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/oregon/209/all/191
[500] About NEEA. Accessed 2/15/11. http://neea.org/aboutus/index.aspx

Pennsylvania

Item	Title	Dates	Description
Legislative			
73 P.S. § 1648.2 et seq. and 52 PA Code Chapter 75, Subchapter B	Interconnection standards for customer-generator facilities	11/29/2008	Net-metering rules and interconnection standards for net-metered systems and other forms of DG. Systems eligible include those using PV, solar-thermal energy, wind energy, hydropower, geothermal energy, biomass energy, fuel cells, CHP, municipal solid waste, waste coal, coal-mine methane, other forms of DG and certain DSM technologies. [501]
Act 129 (66 Pa. C.S. § 2807(f), Docket No. M-2009-2092655	Pennsylvania's Act 129	11/14/08	Requirement that utilities with 100,000 or more customers establish smart meter installation plans.[502] It also set goals for reductions in energy consumption and peak demand. [503] Each EDC with at least 100,000 customers must reduce energy consumption by a minimum 1 percent by May 31, 2011, increasing to 3 percent by May 31, 2013. Peak demand must be reduced by 4.5 percent by May 31, 2013. Failure to achieve the reductions required (load and/or peak demand) subject the EDC to a civil penalty of not less than $1M and not to exceed $20M. [504]
HB 2200	An Act amending Title 66 (Public Utilities) of the Pennsylvania Consolidated Statutes	10/15/2008	Requires smart meter deployment within the state. EDCs are required to file a smart meter deployment plan that would provide smart meters to all customers within 10 years. Bill was approved by the Governor on 10/15/2008. [505]
Regulatory			
Docket No. Docket No. M-2009-2092655	Tentative Order , Smart Meter Implementation Order	6/30/2011	PUC discussion on the development of Smart Meter Data Exchange Standards to comply with Pennsylvania's Act 129.[506]
Docket No. M 00051865	Implementation of the Alternative Energy Portfolio Standards Act of 2004: Standards for the Participation of Demand Side Management Resources – Technical Reference Manual 2011 Update	2/24/2011	Annual update of Energy Efficiency and DSM Rules for Pennsylvania's Alternative Energy Portfolio Standard, Technical Reference Manual. The Technical Reference Manual standards will be used to measure and verify applicable DSM/energy efficiency measures used by EDCs to meet the Act 129 consumption and peak demand reduction targets in 2011-2012.[507]

[501] DSIRE, Pennsylvania – Net Metering. Accessed 2/9/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=PA03R&re=1&ee=1
[502] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
[503] Draft for Comment of the National Action Plan on Demand Response The Federal Energy Regulatory Commission Staff Docket No. AD09-10, Prepared with the support of The Brattle Group, GMMB, Customer Performance Group, David Lineweber. Accessed 2/10/11. http://www.ferc.gov/legal/staff-reports/03-12-10-demand-response.pdf
[504] Pennsylvania Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/pennsylvania/210/all/191
[505] States Providing for Smart Metering. Accessed 2/11/11. http://www.ncsl.org/?tabid=20672
[506] Pennsylvania PUC, EDEWG Proposal for the Development of Smart Meter Data Exchange Standards (Preliminary Proposal), Tentative Order, June 2011. Accessed 9/28/11. http://www.puc.state.pa.us/electric/Act129/Smart_Meter_Technology.aspx
[507] Pennsylvania PUC, Technical Reference Manual. Accessed 9/16/11. http://www.puc.state.pa.us/electric/Act129/TRM.aspx

Item	Title	Dates	Description
Regulatory			
73 P.S. § 1648.5, 52 Pa. Code § 75.21 et seq., 52 Pa. Code § 69.2101 et seq., PUC Opinion and Order Docket M-00051865	Net Metering	4/4/2009, 2/27/2009 12/16/2006	Interconnection rules for net-metered DG systems.[508]
Docket No. M-00061984	Demand-Side Response Working Group	September 2006	Pennsylvania PUC reconvened of the "Demand-Side Response Working Group" to analyze demand response programs and investigate the development and timeline and standards that should be established for AMI.[509]

Pennsylvania's Act 129 requires electric EDCs with more than 100,000 customers to file smart meter installation plans for PUC approval. The technology must be capable of bidirectional communication and record electricity usage at least hourly, must provide customers direct information on hourly consumption, and enable TOU rates and RTP. Additional minimum functionality requirements include upgrade capabilities with technological advances. As of June 30, 2011, Duquesne Light Company, Metropolitan Edison Company, Pennsylvania Electric Company, Pennsylvania Power Company, West Penn Power Company (collectively FirstEnergy), PECO Energy Company and PPL Electric Utilities Corporation filed a Smart Meter Technology Procurement and Installation Plan with the PUC for approval, and all received approval except West Penn Power Company. In Docket No. Docket No. M-2009-2092655 the PUC is seeking comments on proposed Smart Meter Data Exchange Standards to be developed by the Electronic Data Exchange Working Group in collaboration with the EDCs.[510]

Pennsylvania has developed a multi-sector portfolio of efficiency programs within three years. This is one of the fastest expansions of any state in the country according to ACEEE. Under the new legislation, the EDCs' energy efficiency and conservation plans propose a cost-recovery tariff mechanism to fund the energy efficiency and conservation measures and to ensure recovery of reasonable costs. The utilities can also recover the costs through a reconcilable adjustment mechanism.[511]

[508] DSIRE, Pennsylvania Interconnection Standards. Accessed 2/9/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=PA07R&re=1&ee=1

[509] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

[510] Tour of Smart Grid Projects and State Policies by Lisa Schwartz, Presentation to the Oregon PUC, Smart Grid Workshop – September 9, 2009, RAPOnline, Source: Ethnie Groves, Xcel Energy. Accessed 2/7/11. http://www.sgiclearinghouse.org/Legislation?q=node/2303&lb=1

Pennsylvania PUC, EDEWG Proposal for the Development of Smart Meter Data Exchange Standards (Preliminary Proposal), Tentative Order, June 2011. Accessed 9/28/11. http://www.puc.state.pa.us/electric/Act129/Smart_Meter_Technology.aspx

[511] Pennsylvania Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/pennsylvania/210/all/191

Rhode Island

Item	Title	Dates	Description
Legislative			
SB 721	An Act Relating to Public Utilities And Carriers - Statewide Interconnection Standards	6/29/2011	Establishes statewide interconnection standards for small generator facilities and expedites the application process for renewable DG resources. Bill was signed by the Governor on 6/29/2011.[512]
HB 5939	An Act Relating to Public Utilities And Carriers - Renewable Energy Standard	6/29/2011	Increases the maximum allowable DG capacities and provides for public/private partnerships and multi-municipal nonprofit energy consortiums. Bill was signed by the Governor on 6/29/2011.[513]
SB 457	An Act Relating to Public Utilities and Carriers - Renewable Energy Standard	6/29/2011	Raises the cap on net-metering, provides further definition to net-metering facilities and related crediting mechanisms, and provides incentives for municipal and other governmental authorities to invest in renewable generation facilities. Bill was signed by the Governor on 6/29/2011.[514]
SECTION 1. Section 39-2-1.2 of the General Laws, Chapter 39-2; HB 5281	Duties of Utilities and Carriers; An Act Relating to Public Utility - Rates	5/27/2011	Addresses cost recovery through base rates associated with advertising for DSM and renewable energy programs to harmonize electric and natural gas energy efficiency funding with the provisions of the least-cost procurement law. Updates were approved by the Governor on 5/27/2011.[515]
SB 327	An Act Relating to Towns and Cities - Clean Energy Programs	5/10/2011	Authorizes municipalities to provide loans to property owners to finance clean energy installation and improvement projects. Bill has been pending in Committee as of 5/10/2011.[516]
HB 5461	An Act Relating to Public Utilities and Carriers - Renewable Energy Standard	7/15/2009	Provides that EDCs operating within the state are authorized to propose and implement smart metering and smart grid demonstration projects within the state, subject to the approval of the state's PUC. Bill was signed into law by the Governor on 7/15/2009.[517]
SB 485	An Act Relating to Public Utilities and Carriers - Renewable Energy Standard	7/9/2009	Development of renewable energy generation by promoting smart grid demonstration projects, including implementation of smart meters. Bill was signed into law by the Governor on 7/9/2009.[518]
SB 2851	Renewable Energy Standard (establish net metering to measure…electricity delivered by an EDC and electricity generated by a solar or wind net metering facility)	7/08/2008	Amendment to implement smart meters and smart grid demonstrations. Bill became effective 7/08/2008.[519]

[512] Rhode Island General Assembly, SB 721. Accessed 9/23/11. http://www.rilin.state.ri.us/billtext11/senatetext11/s0721a.pdf
[513] Rhode Island General Assembly, HB 5939. Accessed 9/23/11. http://www.rilin.state.ri.us/billtext11/housetext11/h5939.pdf
[514] Rhode Island General Assembly, SB 457. Accessed 9/23/11. http://www.rilin.state.ri.us/billtext11/senatetext11/s0457.pdf
[515] Rhode Island General Assembly, HB 5281. Accessed 9/23/11. http://www.rilin.state.ri.us/billtext11/housetext11/h5281.pdf
[516] Rhode Island General Assembly, SB 327. Accessed 9/23/11. http://www.rilin.state.ri.us/billtext11/senatetext11/s0327.htm
[517] States Providing for Smart Metering. Accessed 2/11/11. http://www.ncsl.org/?tabid=20672
[518] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
[519] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf

Item	Title	Dates	Description
Legislative			
HB 8025 Substitute A	Comprehensive Energy Conservation, Efficiency and Affordability Act of 2006	2006	Creates the Rhode Island Energy Efficiency and Resources Management Council which advises the Office of Energy Resources about demand response. The law directs for the standards and guidelines for demand response to be created.[520]
R.I. Gen. Laws § 34-40 and R.I. Gen. Laws § 45-24-33	NA	1981	Establishes rules regarding solar easements and solar access for DG.[521]
Regulatory			
R.I. Gen. Laws § 39-1-27.7, R.I. Gen. Laws § 39-26-6, Rhode Island PUC Order 19821, Docket No. 4079, National Grid Tariff Docket No. 4079	System reliability and least-cost procurement and Renewable Energy Standard.	9/30/2009, 7/2/2007, 2006	Defines that net metering is available to customers that generate electricity using solar or wind resources. The PUC has approved an interconnection tariff for National Grid customers that generate electricity using net-metered systems and certain other forms of DG.[522]
Docket No. 4052, Order No. 19766	EPAct/PURPA Standard 14	9/22/09, February 2008	The Rhode Island PUC opened a proceeding to consider adoption of PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005 and creates the "Rhode Island Distributed Generation Working Group" as a result.[523] PUC issued Order No. 19766 to close docket 4052 because the requirements of the EISA have or are being considered in other dockets.[524]

In June 2006, legislation for the Comprehensive Energy Conservation, Efficiency and Affordability Act of 2006 was signed and the new law includes several provisions that foster demand response, particularly the creation of the Rhode Island Energy Efficiency and Resources Management Council that is to address demand response. Each EDC is directed to file a plan triennially with the PUC for system reliability and for energy efficiency and conservation procurement that addresses demand response.[525]

Narragansett Electric (National Grid) administers and operates a portfolio of energy efficiency programs for its customers, which account for 99 percent of statewide sales of electricity. The company offers rebates and in-home energy assessments. Pascoag Utility District also operates its own programs, including ENERGY STAR rebates and compact fluorescent light bulb recycling. Utility programs are funded by a conservation and load adjustment factor, a rider assessed on all customer rates established as part of Rhode Island's restructuring legislation. The Rhode Island PUC annually reviews and authorizes utility DSM program plans, including budget amounts.[526]

[520] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

[521] DSIRE, Rhode Island Solar Easements. Accessed 2/9/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=RI02R&re=1&ee=1

[522] DSIRE, Rhode Island – Net Metering. Accessed 2/9/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=RI01R&re=1&ee=1

[523] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

[524] Rhode Island PUC, Docket No. 4052 - Commission's Review into Smart Grid Pursuant to the PURPA (1978), as amended by the federal EISA. Accessed 9/21/11. http://www.ripuc.ri.gov/eventsactions/docket/4052page.html

[525] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

[526] Rhode Island Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/rhode%20island/211/all/191
National Grid – Rhode Island, Energy Efficiency . Accessed 9/28/11. https://www.powerofaction.com/rireenergywise/
Pascoag Utility District. Accessed 9/28/11. http://www.pud-ri.org/

South Carolina

Item	Title	Dates	Description
Legislative			
SB 719	Bill to Amend Title 58 of the 1976 Code, Relating to Public Utilities, Services, and Carriers, By Adding Chapter 39 to Establish REPS…	3/22/11	Establishes REPS target of generating 20 percent of total retail sales of electricity from eligible renewable energy resources by December 31, 2022. Standards are measured as a percentage of annual retail sales: 4% in 2015, 7% in 2016, 10% in 2017, 12% in 2018, 14% in 2019, 16% in 2020, 18% in 2021, and 20% in 2022. As of 3/22/11 the bill was referred to the Judiciary Committee.[527]
SB 547	Energy Efficiency Resource Standards	June 2010, 03/10/2009	Legislation to set EERS, define the funding sources for programs, establish cost recovery for regulated utilities, and create an energy efficiency resource credit certification and tracking plan. SB 547 was referred to Committee on Agriculture and Natural Resources on 3/10/2009.[528]
SB 1096	Ann act to amend the code of laws of South Carolina, 1976, by adding section 58-37-50, so as to authorize electricity providers…to implement financing agreements for the installation of energy efficiency and conservation improvements.	3/31/2010	Authorized electric cooperatives and municipal electric utilities to implement financing systems for energy efficiency improvements. Bill was signed into law by the Governor on 3/31/2010.[529]
Regulatory			
Docket No. 2005-386-E, Order No. 2007-618	EPAct/PURPA Standard 14 - Order on Consideration of the Appropriated Standards to Be Used for Net Metering and Smart Metering in South Carolina	August 2007	The South Carolina PSC decided not to adopt PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005. The Commission stated that all regulated utilities within the state already offer time-based rates. [530]
PSC Order, Docket No. 2005-387-E	Order Adopting Model Interconnection Standard	12/19/2006	In 2006, the South Carolina PSC enacted interconnection standards for small DG with a maximum capacity of 100 kW for non-residential systems. The standards do not apply to three-phase generators, and only apply to the state's four IOUs.[531]

In August 2007, the South Carolina PSC decided not to adopt PURPA Standard 14 as enacted in EPAct 2005. The PSC stated that all regulated utilities within the state already offer time-based rates, though there is a "lack of focus" on residential and commercial smart metering, which may be due to a lack of awareness. The PSC directed utilities to

[527] South Carolina Legislature, Session 119 (2011-2012), SB 719. Accessed 9/23/11. http://www.scstatehouse.gov/cgi-bin/query.exe?first=DOC&querytext=%22metering%22&category=Legislation&session=ALL&conid=6704209&result_pos=40&keyval=1190719
[528] South Carolina Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/south%20carolina/212/all/191
[529] South Carolina Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/south%20carolina/212/all/191
[530] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[531] South Carolina Clean Distributed Generation. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/South%20Carolina/212/all/195

continue to make smart meters available to all customers and to propose within 180 days a campaign to educate consumers about smart metering. In February 2008, South Carolina Electric & Gas Company, Duke Energy Carolinas, and Progress Energy Carolina complied with the August 2007 Order and filed their plans. [532]

In June 2010, the South Carolina Legislature was considering SB 547, which would set EERS, define the funding sources for programs, establish cost recovery for regulated utilities, and create an energy efficiency resource credit certification and tracking plan. The bill has remained in the Committee on Agriculture and Natural Resources since that time.

Some of the utilities have incorporated DSM and energy efficiency programs, though such programs are not currently required. The commission has approved a portfolio of energy efficiency programs for Duke Energy and experimental programs for Progress Energy Carolinas. Progress Energy Carolinas provides energy audits and loans and operates the "Save the Watts" website and some limited residential and commercial programs. In July 2011, Progress Energy announced the launch of a new energy-efficiency program consisting of 50,000 randomly selected customers that will receive reports with their electricity usage patterns and their home's energy profile. In addition, customers will receive an anonymous comparison of their usage to similar nearby households. Progress Energy expects the program will reduce annual electricity usage by more than 14 million kWh.[533]

Cooperatives offer residential efficiency programs as well. Funding for DSM and energy efficiency programs is included in the utilities' base rates.[534]

[532] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

[533] South Carolina Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/south%20carolina/212/all/191
Progress Energy, Progress Energy Reports Aim to Help Customers to Save Energy and Money, 7/5/11. Accessed 9/28/11. https://www.progress-energy.com/company/media-room/news-archive/press-release.page?title=Progress+Energy+reports+aim+to+help+customers+to+save+energy+and+money&pubdate=07-05-2011

[534] South Carolina Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/south%20carolina/212/all/191

South Dakota

Item	Title	Dates	Description
Legislative			
SB 58	An Act to Revise Certain Real Property Taxes For Small Renewable Energy Facilities	3/29/2010	Simplifies tax incentives and tax assessment procedures for small renewable energy projects that are less than 5 MW of capacity. Designed to reduce property tax and ensure fair prices for the sale of excess energy for owners of small renewable energy facilities. Signed by the Governor on 3/29/2010.[535]
SD Codified Laws § 43-13-16, et seq. and HB 1263	Wind easement defined and an act to revise certain provisions relating to the terms of wind easements and wind energy leases.	3/29/2010, 1996	Guidelines conveying that any property owner in South Dakota may grant a wind easement with the same effect as a conveyance of an interest in real property.[536] Revises certain provisions relating to the terms of wind easements and wind energy leases. Gives developers of large wind projects that involve building transmission lines up to 12 years to start construction, rather than the standard five years allowed before wind easements expire. Signed by the Governor on 3/29/2010.[537]
SB 61	An Act to Require…Rates for Purchases of Electricity Produced by Small Renewable Power Facilities		Requires each electric utility file with the PUC the electric utility's minimum rates for purchases of electricity generated from renewable resources produced by a small renewable power facility that has a capacity of 100 kW or less. Signed by the Governor on 3/11/2010.[538]
2009 SB 60	NA	3/12/2009	Authorization of PUC to implement smart grid policies pursuant to 2007 EISA. Approved by the Governor on 3/12/2009.[539]
HB 1123, SDCL § 49-34A-101 et seq., SB 57 , SDCL § 49-34A-94 et seq.	State renewable, recycled, and conserved energy objective established.	2/21/2008	Establishes a voluntary objective that 10 percent of all retail electricity sales in the state be obtained from renewable and recycled energy by 2015. This policy was modified by also allowing conserved energy to meet the objective. The objective applies to all retail providers of electricity in the state. Approved by the Governor on 2/21/2008.[540]
Regulatory			
Docket No. EL1 0-003	Order Prohibiting Customers and Aggregators from Participating in Wholesale Electric Markets	5/25/2010	Demand response load reductions of retail customers of regulated electric utilities are prohibited from being bid or transferred into any wholesale market, either directly or through an aggregator of retail customers.[541]

[535] South Dakota Legislature, SB 58. Accessed 9/26/11. http://legis.state.sd.us/sessions/2010/Bill.aspx?Bill=58
South Dakota PUC, New PUC legislation is friendly to small renewable energy systems. Accessed 9/26/11. http://puc.sd.gov/News/2010/040710.aspx
[536] DSIRE, South Dakota Wind Easements. Accessed 2/9/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=SD06R&re=1&ee=1
[537] South Dakota Legislature, HB 1263. Accessed 9/26/11. http://legis.state.sd.us/sessions/2010/Bill.aspx?Bill=1263
[538] South Dakota Legislature, SB 61. Accessed 9/26/11. http://legis.state.sd.us/sessions/2010/Bill.aspx?Bill=61
[539] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
[540] DSIRE, Renewable, Recycled and Conserved Energy Objective. Accessed 2/9/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=SD02R&re=1&ee=1
[541] South Dakota PUC, Docket No. EL1 0-003. Accessed 9/26/11. http://puc.sd.gov/commission/orders/electric/2010/el10-003b.pdf

Item	Title	Dates	Description
Regulatory			
Docket No. EL08-028	Order Adopting Modified Electric PURPA Standards	12/18/2009	PUC adopts modified versions of the Integrated Resource Planning standard, the Rate Design Modifications to Promote Energy Efficiency Investments standard, and the Consideration of Smart Grid Investments standard included among the four EISA federal PURPA standards. Each electric utility shall file an annual report with the PUC that sets forth smart grid deployment opportunities, why or why not deployment was made, the extent of the deployment, possible deployments that could be made in the forthcoming year, and what considerations affect deployment.[542]
Rule 20:10:36	Small Generator Facility Interconnection	May 2009	Interconnection standards, which apply to customers of IOUs, delineate four levels of interconnection for systems up to 10 MW in capacity.[543]
NA	EPAct/PURPA Standard 14	July 2007	The South Dakota PUC decided not to adopt PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005.[544]
Statute 49-34A-93, SL 2006, ch 240, § 1; SL 2009, ch 240, § 1.	Implementation of and compliance with certain federal energy acts.[545]	2009	State statutes were updated to comply with changes to federal laws which empower the PUC to implement a variety of energy efficiency measures (Chapter 240).[546]

In July 2007, the South Dakota PUC decided not to adopt PURPA Standard 14 as enacted in EPAct 2005. The PUC claimed it arrived at this decision since there was little evidence presented that demonstrated the adoption of this standard at this time would meet the PURPA goals of energy conservation, efficiency of facilities and resources and equitable consumer rates. The PUC believed that adoption of the standard could result in the utilities being required to offer uneconomic programs that result in higher rates.[547]

Historically, South Dakota's utilities have not funded or offered many customer energy efficiency programs. The South Dakota Energy Smart Initiative is bringing together partners to pledge their support of improving energy efficiency in South Dakota. Partners include both investor-owned and publicly owned utilities, which report numerous plans and new efforts to offer energy efficiency programs and services to their customers. In July 2008, the South Dakota PUC approved a one-year pilot energy efficiency program for Otter Tail Power which began in the fall of 2008. In March 2009, the commission also approved a revised portfolio of energy efficiency programs proposed by MidAmerican Energy Company. Xcel Energy also filed proposed energy efficiency plans, and Northwestern Energy has created its own DSM plan. There are currently no EERS in place for the state.[548]

[542] South Dakota PUC, Docket No. EL08-028. Accessed 9/26/11. http://puc.sd.gov/commission/orders/electric/2009/el08-028C.pdf
[543] South Dakota Clean Distributed Generation. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/South%20Dakota/213/all/195
[544] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[545] South Dakota Legislature, South Dakota Codified Laws, 49-34A-93. Accessed 2/15/11. http://legis.state.sd.us/statutes/DisplayStatute.aspx?Statute=49-34A-93&Type=Statute
[546] South Dakota Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/South%20Dakota/213/all/191
[547] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[548] South Dakota Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/South%20Dakota/213/all/191

Tennessee

Item	Title	Dates	Description
Legislative			
HJR Number 472	A resolution urging the Board of Directors of the Tennessee Valley Authority to pursue energy efficiency efforts.	6/18/2007	Calls for TVA to initiate large-scale efforts to improve energy efficiency. Noted energy conservation can easily meet and exceed the growing demand for electricity. TVA used energy efficient means of creating power in the 1970s to supplant the need to build new power plants. Therefore, the legislature urged TVA to consider using energy efficiency to address the state's growing demand for electricity. Approved by the Governor on 6/18/2007.[549]
Tenn. Code § 66-9-201 et seq.	Solar Access Law of 1979	1979	Law that allows for the creation of easements for the purpose of ensuring access to direct sunlight.[550]
Regulatory			
NA	Wholesale Rate Change	April 2011	TVA approves a change in the wholesale rate structure, including options for TOU rates that more closely reflect the cost of electricity production, for the purpose of encouraging energy efficiency and peak demand reduction.[551]
NA	EPAct/PURPA Standard 14	January 2007, August 2006	The Tennessee Regulatory Authority determined that Entergy Arkansas's rates and services already met the standard set by PURPA Standard 14 and EPAct 1252 so there was no need to adopt it.[552]

The majority of rates that have an impact on smart grid come from Entergy Arkansas, however Entergy Arkansas only serves approximately 22 accounts in Tennessee. TVA is the primary electricity provider in Tennessee. In the past, TVA had provided few energy efficiency programs and services to its customers. In 2006, TVA's directors established a task force that examined energy conservation needs and made recommendations for an energy conservation plan for low-income households. In June 2007, the Tennessee Legislature approved a joint resolution calling for TVA to initiate large-scale efforts to improve energy efficiency. HJR number 472 urged TVA to consider using energy efficiency to address the state's growing demand for electricity. In response, TVA has released a suite of pilot energy efficiency programs, including in-home energy auditing programs, Energy Star appliance rebates and prescriptive incentive programs for HVAC technologies.[553]

Based on a DOE Industrial Loan program, Pathway Lending's Energy Efficiency Loan Program provides Tennessee business and non-profit entities with below market loans for energy efficiency and renewable energy improvements. Through September 30, 2011 borrowers could received a reduced interest rate of 3% (down from 5%) for financing up to 100% of their energy efficiency project costs - including retrofits, building upgrades, replacement purchases or other energy efficiency or renewable energy projects. [554]

[549] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

[550] DSIRE, Tennessee Solar Easements. Accessed 2/9/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=TN01R&re=1&ee=1

[551] TVA Chief Executive Officer Outlines TVA's Vision and Strategy for Future Operations, August 20, 2010. Accessed 9/19/11. http://www.tva.gov/news/releases/julsep10/0820_board.html

[552] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

[553] Tennessee Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/tennessee/214/all/191
TVA, EnergyRight Solutions. Accessed 9/28/11. http://www.energyright.com/

[554] Tennessee Clean Distributed Generation. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Tennessee/214/all/195
Pathway Lending, Summer Rate Sale. Accessed 9/28/11. https://www.pathwaylending.org/loans/energy/summer-rate-sale

Texas

Item	Title	Dates	Description
Legislative			
SB 943, PUC Project No. 39657	Relating to the Classification, Use, and Regulation of Electric Energy Storage Equipment or Facilities.	6/17/2011	Establishes energy storage equipment and facilities as generation assets. Requires the PUC amend §25.5 Definitions, and §25.109 Registration of Power Generation Companies and Self-Generators to add references to energy storage equipment and facilities and address the registration, interconnection, and operation of electric energy storage equipment and facilities. Signed into law by Gov. Rick Perry 6/17/2011.[555]
HB 362	An Act Relating to the Regulation by a Property Owners' Association of the Installation of Solar Energy Devices and Certain Roofing Materials on Property	6/17/11	Prohibits an HOA from including or enforcing provisions within their regulations or by-laws that restrict homeowners from installing a solar energy device unless the device is illegal or violates public health and safety.[556]
SB 1125, HB 3693, Texas Utilities Code § 39.905, Texas PUC Electric Rules §25.181	EERS	9/01/2011, 2008, June 2007	Encourages utilities to deploy demand response and requires the PUC adopt rules allowing load participation in all energy markets (residential, commercial, and industrial). The EERS applies to residential and commercial customers and directs utilities to reduce their customers' consumption.[557] The standard was been updated in 2008 and 2011 to 20% peak demand reduction in annual growth in demand 2010 and 2011; 25% reduction in annual growth in demand 2012; 30% reduction in annual growth in demand 2013 and beyond. Amendment was adopted by the PUC in an August 2010 order. [558]
Ordinance No. 040527-79, Council Vote Distributed Generation Ordinance	An Ordinance…to Add Distributed Generation from Renewable Sources Rider	9/16/2010, 6/7/2004	Austin Energy offers net metering for renewable energy systems up to 20 kW to all of its retail electricity customers. The definition of renewable includes solar, wind, geothermal, hydroelectric, wave and tidal energy, biomass, and biomass-based waste products, including landfill gas. The City of Brenham passed an ordinance adopting net metering and interconnection procedures. Customer generators up to 10 MW are eligible to participate.[559]
HB 2129	An act relating to energy-saving measures that reduce the emission of air contaminants	6/18/2005	Promotes the integration of demand response technologies by allowing the PUC of Texas to set a non-bypassable surcharge for a utility to recover costs incurred from deploying DSM technologies. Bill was signed by the Governor on 6/18/2005.[560]

[555] Texas Legislature Online, SB 943. Accessed 9/19/11. http://www.capitol.state.tx.us/billlookup/history.aspx?legsess=82r&bill=sb943
Texas PUC, Project No. 39657. Accessed 9/19/11. http://www.puc.state.tx.us/industry/projects/rules/39657/39657.aspx
[556] DSIRE – Texas – Solar Rights. Accessed 9/14/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=TX33R&currentpageid=3&EE=1&RE=1
[557] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11.
http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[558] DSIRE, Texas – Energy Efficiency Goal. Accessed 9/14/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=TX28R&currentpageid=3&EE=1&RE=1
[559] DSIRE – Texas Incentives/Policies for Renewables & Efficiency. Accessed 2/28/11. http://www.dsireusa.org/incentives/index.cfm?re=1&ee=1&spv=0&st=0&srp=1&state=TX
[560] Report to the 82nd Texas Legislature – A Report on Advanced Metering as Required by HB 2129, PUC of Texas, September 2010. Accessed 2/18/11.
http://www.puc.state.tx.us/electric/reports/AMS/Commission_Report_on_Advanced_Metering_2010.pdf

Item	Title	Dates	Description
Regulatory			
PUC Project No. 39537, HB 971	Rulemaking to Implement HB 971…Certificate of Convenience and Necessity for an Electric Transmission Project	9/23/11	HB 971 requires the PUC establish criteria for evaluating a certificate of convenience and necessity for an electric transmission project that serves the Electric Reliability Council of Texas power region, that is not necessary to meet state or federal reliability standards, and that does not serve a competitive renewable energy zone. Criteria must include a comparison of the estimated cost and savings that may result. Proposed rules are expected 9/23/11.[561]
PUC Project No. 34610	Implementation Project Relating to Advanced Metering	September – December 2011, 11/28/2007	PUC forms the "Advanced Metering Implementation Team" to identify and implement changes needed in retail and wholesale markets as a result of advanced metering, including topics of web portals, security, home area networks, demand response, and customer education. Future meetings are scheduled for 9/17/2011, 10/24/2011, 11/29/2011, and 12/6/2011.[562]
PUC Project No. 38674	Amendments to Customer Protection Rules Relating to Advanced Meters	5/13/2011	Amendments to relevant customer protection rules, including expansion of the days and hours that advanced metering system service requests will be processed and an option for customers to switch retail electric providers within one business day.[563]
PUC Case 39191-12	Order Adopting Amendments to §25.507 on an Emergency Basis…	3/25/2011	Amendments to emergency interruptible load service rules on an emergency basis: 1) removing the 90-day notice requirement for announcing changes to the contract period schedule; and 2) modifying the contract so as to enable additional emergency interruptible load service capacity procurement.[564]
PUC Project No. 38053	Smart Meter Testing: Monitoring and Evaluation of Deployment of Advanced Meters.	7/30/2010	In response to customer complaints of higher electric bills, a PUC investigation revealed the smart meters being deployed in Texas by Oncor, AEP and Centerpoint Energy are accurately measuring electricity usage, and the new meters are more accurate than those they replaced.[565]
Project No. 31418 and 32854, PURPA §§14.001, 14.002, and 39.107	EPAct/PURPA Standard 14, Rulemaking Related to Advanced Metering	5/30/2007	Initiated a proceeding to consider amendments part of EPAct, PURPA Standard 14 for net metering, time-based pricing, smart metering, and interconnection standards. The PUC accepted the TOU pricing standard and addressed cost information required for AMI surcharge requests.[566]
SB 7, Substantive Rule 25.181	Energy Efficiency Rule	2004, 1999	The Texas Legislature passed SB 7 which required utilities to administer energy savings programs, provide access to energy efficiency alternatives, among other requirements. These requirements lead the PUC of Texas to respond with Substantive Rule 25.181, outlining energy efficiency goals and guidelines. These guidelines set the goal of demand reductions of 136 MW in 2003 and 147 MW in 2004.[567]
Texas Administrative Code Title 16, Part 2, §25.211 and §25.212	Texas Public Utility Regulatory Act	2001, 1999	Determined that on-site generation was an entitlement to all customers. The PUC of Texas developed generous interconnection regulations. The rules allow the interconnection of DG, including CHP, up to 10 MW, and do not establish a limit on the total interconnected DG capacity at any one facility.[568]

[561] Texas PUC, Project No. 39537. Accessed 9/19/11. http://www.puc.state.tx.us/industry/projects/rules/39537/39537.aspx
[562] Texas PUC, Project No.34610. Accessed 9/19/11. http://www.puc.state.tx.us/industry/projects/electric/34610/34610.aspx
[563] Texas PUC, Project No. 38674. Accessed 9/19/11. http://www.puc.state.tx.us/industry/projects/rules/38674/38674.aspx
[564] Texas PUC, Case 39191-12. Accessed 9/19/11./ http://interchange.puc.state.tx.us/WebApp/Interchange/application/dbapps/filings/pgSearch_Results.asp?TXT_CNTR_NO=39191&TXT_ITEM_NO=12
[565] Texas PUC, Filings for 38053. Accessed 9/19/11. http://interchange.puc.state.tx.us/WebApp/Interchange/application/dbapps/filings/pgSearch_Results.asp?TXT_CNTR_NO=38053&TXT_ITEM_NO=17
[566] Tour of Smart Grid Projects and State Policies by Lisa Schwartz, Presentation to the Oregon PUC, Smart Grid Workshop – September 9, 2009. Accessed 2/28/11.
http://www.raponline.org/docs/RAP_Schwartz_SmartGridProjectsandPoliciesORwks_2009_09_09.pdf
[567] PUC of Texas, "Independent Audit of Texas Energy Efficiency Programs in 2003 and 2004", 2006. Accessed2/18/11. http://www.puc.state.tx.us/electric/reports/EEP/EEP_Audit_Rpt_03-04.pdf.
[568] Texas Clean Distributed Generation. Accessed 2/18/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Texas/215/all/195

HB 2129 laid out specific requirements for AMI deployed by a utility, including that the AMI must have the capability to provide direct, real time access of customer usage data to the customer and the residential energy provider, and must have a means by which the residential energy provider can provide price signals to the customer.[569]

Oncor intends to install 3.4 million smart meters by 2012, and as of August 2011, has installed its two millionth advanced meter in its service territory. AEP Texas has a 4 year plan to install smart meters in its Texas North and Texas Central markets, with 78,705 smart meters installed as of August 2010 and 335,000 installed as of August 2011. CenterPoint Energy has also deployed 1.5 million smart meters in Texas as of August 2011.[570]

TXU Energy and Reliant Energy also offer TOU programs to customers to help encourage customers to shift their demand to lower prices off-peak time periods.[571]

[569] Report to the 82nd Texas Legislature – A Report on Advanced Metering as Required by HB 2129, PUC of Texas, September 2010. Accessed 2/18/11. http://www.puc.state.tx.us/electric/reports/AMS/Commission_Report_on_Advanced_Metering_2010.pdf

[570] Report to the 82nd Texas Legislature – A Report on Advanced Metering as Required by HB 2129, PUC of Texas, September 2010. Accessed 2/18/11. http://www.puc.state.tx.us/electric/reports/AMS/Commission_Report_on_Advanced_Metering_2010.pdf
Oncor, Oncor Installs Two Millionth Advanced Meter , 8/22/11. Accessed 9/28/11. http://www.oncor.com/news/newsrel/detail.aspx?prid=1310
ERCOT Board of Directors, Smart Meter Functionality Implementation Update, 8/16/2011. http://www.puc.state.tx.us/industry/projects/electric/34610/presentations/ERCOTBoard_0811.ppt

[571] Report to the 82nd Texas Legislature – A Report on Advanced Metering as Required by HB 2129, PUC of Texas, September 2010. Accessed 2/18/11. http://www.puc.state.tx.us/electric/reports/AMS/Commission_Report_on_Advanced_Metering_2010.pdf

Utah

Item	Title	Dates	Description
Legislative			
SB 47	Electrical Utility Amendments - Efficiency And Conservation Tariff	3/30/2010	Addresses PSC approval of a tariff proposed by an electrical utility for DSM or energy efficiency programs including direct load control programs. Vetoed by Governor in March 2010.[572]
NA	Smart Grid Work Force Training Programs	April 2010	Development of program to train over 30,000 workers to modernize smart grid and implement new technologies. [573]
Utah Admin Code R746-312	Electrical Interconnection	4/1/2010	Interconnection rules based on the FERC interconnection standards for small generators. Includes provisions for three levels of interconnection for systems up to 20 MW, based on system complexity. An eligible facility includes waste gas and waste heat capture or recovery.[574]
Utah Code 54-17-101 et seq., Utah Code 10-19-101 et seq. , HB 192, HB 28, SB 104	Energy Resource Procurement Act, Municipal Electric Utility Carbon Emission Reduction Act	5/29/2010, 3/29/2010, 3/23/2010	A renewable portfolio goal which requires that utilities only need to pursue renewable energy to the extent that it is cost-effective. Adjusted retail sales include the total kWh of retail electric sales reduced by the kWh attributable to nuclear power plants, DSM measures, and fossil fuel power plants that sequester their carbon emissions. The first compliance year is 2025. Eligible renewables include electric generation facilities that became operational after 1/1/1995, and produce electricity from solar, wind biomass, hydroelectric, wave, tidal or ocean-thermal energy, geothermal, or waste gas and waste heat, and solar-thermal installations, along with additional energy source types. HB 192 and SB 104 were approved by the Governor on 5/23/2010 and 5/29/2010 respectively.[575]
HJR 9	Joint resolution on cost effective energy efficiency and utility DSM	3/19/2009	Urges the Utah PSC to set energy savings goals of at least 1 percent per year for regulated electric utilities and at least 0.5 percent per year for gas utilities. The bill does not penalize utilities that do not meet the savings goals, as long as they make good faith efforts. A docket is open at the PSC (09-035-T08) that is reviewing a wide range of DSM policies including the issues addressed in the resolution. Bill passed and was enrolled on 3/19/2009.[576]
Utah Code 57-13 and Utah Code 10-9a-610	Solar Easements	1979	Utah's solar easement law states that parties may voluntarily enter into written solar easement contracts that are enforceable by law. State law also stipulates that local zoning authorities may adopt regulations that mandate solar access and specifically grants governing bodies the right to refuse any plat or subdivision plan if deed restrictions, covenants or other agreements running with the land prohibit or have the effect of prohibiting reasonably sited and designed solar collectors.[577]

[572] Utah State Legislature, SB 47. Accessed 9/19/11. http://le.utah.gov/search.jsp?Sess=2010GS&String=sb+47&Submit=Find
[573] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
[574] Utah Clean Distributed Generation. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Utah/216/all/195
[575] Utah Incentives/Policies for Renewables & Efficiency. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/utah/216/all/191
[576] Utah Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/utah/216/all/191
[577] DSIRE, Utah Local Option Solar Access Law. Accessed 2/9/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=UT01R&re=1&ee=1

Item	Title	Dates	Description
Regulatory			
Item	**Title**	**Dates**	**Description**
Utah Code § 54-15-101 et seq., PSC Order, Docket No. 08-035-78, Utah Admin Code R746-312-15, HB 145	Net Metering of Electricity	5/10/2010. 4/1/2009, 5/6/2002	Requires their only IOU, RMP, and most electric cooperatives to offer net metering to customers who generate electricity using solar energy, wind energy, hydropower, hydrogen, biomass, landfill gas or geothermal energy. Net metering is available for residential systems up to 25 kW in capacity and non-residential systems up to two MW in capacity. A February 2009 order issued by the PSC changed some of the net metering rules for RMP, but the cooperatives are not obligated to adopt them.[578]
Docket No. 08-999-05	In the Matter of the Consideration of the Amendment of Title 16 U.S.C. 2621(d) and the Addition of Title 42 USC 6344 by the US EISA of 2007	8/28/08	A Utah Commission EISA proceeding in process. PSC has requested utilities work with the DSM Advisory Group to fully discuss remaining concerns regarding home energy reports. The PSC is also gathering comments regarding its 12/17 2009 determination concerning the PURPA Smart Grid Investment and Smart Grid Information Standards and the discussions in the March 30, 2010 technical conference pertaining to smart grid monitoring reporting.[579]
NA	EPAct/PURPA Standard 14	February 2007	The Utah PSC declined to adopt PURPA Standard 14 within EPAct 2005. The PSC directed RMP to file a report summarizing the results of its survey of utilities with advanced metering, and other studies and data supporting the company's conclusion that it is not cost-effective, for review by DSM advisory group.[580]

In February 2007, the Utah PSC decided not to adopt PURPA Standard 14 as enacted in EPAct 2005. The PSC determined the standard is unnecessary because RMP, the only PURPA-covered utility, already offers TOU rates which are mandatory for customers using more than one MW, seasonal rates, and a peak-load reduction program. The PSC also stated that the timeframe for consideration and implementation of the standard is unrealistic.[581]

Utah's utilities administer and implement energy efficiency programs as required and approved by the Utah PSC. Its largest electric utility, RMP, serves around 80 percent of Utah's population. These programs are part of IRPs that are filed biennially by the utilities. Programs are funded via a 3 percent tariff rider on customer bills. In September 2009, the PSC approved RMP's request to increase its utility bill surcharge to pay for DSM programs. RMP currently offers energy efficiency rebates and tiered rates during the summer months. Utah's funding and commitment to energy efficiency programs has increased significantly over the past several years.[582]

[578] DSIRE, Utah – Net Metering. Accessed 2/9/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=UT04R&re=1&ee=1

[579] Tour of Smart Grid Projects and State Policies by Lisa Schwartz, Presentation to the Oregon PUC, Smart Grid Workshop – September 9, 2009, RAPOnline, Source: Ethnie Groves, Xcel Energy. Accessed 2/7/11. http://www.sgiclearinghouse.org/Legislation?q=node/2303&lb=1
Utah PSC, Docket Number: 08-999-05. Accessed 9/21/11. http://www.psc.utah.gov/utilities/misc/miscindx/0899905indx.html

[580] Tour of Smart Grid Projects and State Policies by Lisa Schwartz, Presentation to the Oregon PUC, Smart Grid Workshop – September 9, 2009, RAPOnline, Source: Ethnie Groves, Xcel Energy. Accessed 2/7/11. http://www.sgiclearinghouse.org/Legislation?q=node/2303&lb=1

[581] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

[582] Utah Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/utah/216/all/191
RMP, Efficiency Programs & Incentives. Accessed 9/28/11. http://www.rockymountainpower.net/res/sem/epi.html

Vermont

Item	Title	Dates	Description
Legislative			
SB 78	An Act Relating to the Advancement of Cellular, Broadband and Other Technology Infrastructure in Vermont	5/27/2011	Establishes policies and programs designed to facilitate statewide cellular, smart grid, and broadband deployment by the end of 2013. Bill was signed by the Governor on 5/27/2011.[583]
HB 56	Energy; Public Service; Taxation; Air Quality; Renewable Electricity Generation; Energy Efficiency; Heating Oil; Sulfur Content	May 2011	Amends Vermont's net metering policy. Utilities may offer additional credits or incentives to net metering customers beyond the benefits provided by net metering itself. Utilities will be required offer additional credits of $0.20 per kWh minus the highest residential rate for solar net metering customers. Bill was enacted in May 2011.[584]
30 V.S.A. § 219a, Rule 5.100, HB 781, 10 V.S.A. § 6523	Self-generation and net metering	6/4/2010, 1998	Establishes Vermont's original net-metering legislation and creates the Vermont's Clean Energy Development Fund. Net metering is generally available to systems up to 250 kW in capacity that generate electricity using eligible renewable-energy resources, and to micro-CHP systems up to 20 kW. Net metering is also available under a TOU metering arrangement.[585]
2009 SB 288	An act relating to the Vermont recovery and Reinvestment Act of 2010	4/15/2010	Applicant may propose and board may approve or require applicant to adopt a rate design that includes dynamic pricing. Bill was signed by Governor on 4/15/2010.[586]
27 V.S.A. § 544	Energy devices based on renewable resources	05/27/2009	Forbids ordinances, deed restrictions, covenants, declarations or similar binding agreements from prohibiting (or having the effect of prohibiting) the use of solar collectors or other energy devices based on renewable resources. [587]
2009 HB313	An Act Relating to Near-Term and Long-Term Economic Development	6/1/2009	Pursuit of ARRA funding opportunities by the department of public service to implement smart grid technologies, projects, and workforce training. Bill was signed by Governor on 6/1/2009 [588]
HB 446	Vermont Energy Act of 2009	2009	Directs the Vermont Department of Public Service to create a self-managed energy efficiency pilot program for select transmission and industrial utility customers whose individual contributions to the public benefits fund exceeded $1.5 million in 2008. Program guidelines were released late 2009 by the PSB.[589]
HB 520, SB 2009	Energy Efficiency and Affordability Act of 2008	March 2008	Directs Vermont's Public Service Board (PSB) to investigate opportunities for Vermont electric utilities cost effectively to install advanced smart metering equipment capable of sending two way signals and sufficient to support advanced TOU pricing during periods of critical peaks or hourly differentiated TOU pricing. After its investigation, the PSB is to require each utility to file plans for deploying smart meters and TOU pricing. HB 520 was vetoed by the Governor on 6/06/2007.[590]

[583] Vermont Legislature, SB 78. Accessed 9/21/11. http://www.leg.state.vt.us/database/status/summary.cfm?Bill=S.0078&Session=2012
[584] HB 56, . Accessed 9/28/11. http://www.leg.state.vt.us/docs/2012/bills/Passed/H-056.pdf
[585] DSIRE, Vermont – Net Metering. Accessed 2/9/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=VT02R&re=1&ee=1
[586] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
Vermont Legislature. Accessed 9/21/11. http://www.leg.state.vt.us/database/status/summary.cfm?Bill=S.0288&Session=2010
[587] DSIRE, Vermont Renewable Energy Access Law. Accessed 2/9/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=VT10R&re=1&ee=1
[588] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
[589] Vermont Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/vermont/217/all/191
[590] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11.
http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

Item	Title	Dates	Description
Legislative			
CVR 30 000 048. 5.500	Interconnection Rules	9/10/2006	Outlines separate interconnection standards for net-metered energy systems that are 150 kW or less, and for distributed-generation systems that are net metered but greater than 150 kW (up to 250 kW) as well as systems that are not net-metered. DG systems that meet certain technical screening criteria are eligible for the fast track interconnection process.[591]
Regulatory			
PSB Public Hearing No.7307	Investigation into Vermont Electric Utilities' Use of Smart Metering and Time-Based Rates	9/15/2011	The PSB is collecting input from the public on issues related to smart meter data privacy and cybersecurity. The PSB also will address the opt-out policy requiring a monthly fee if the customer chooses to retain the traditional electric meters.[592]
NA	EPAct/PURPA Standard 14	February 2007	The Vermont PSB decided not to adopt PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005. Instead, it will consider the standard's applicability on a utility-specific basis in a future rate case or rate-design case, as appropriate.[593]

One of the many proposed ARRA Projects is eEnergy Vermont which is a utility consortium proposing wireless broadband from substations to devices and for data backhaul, 300,000 or more smart meters, meter data management system, information technology integration, dynamic pricing trials, in-home displays, smart thermostats, smart appliances, usage data on Web, grid automation (fiber, sensors, breakers, reclosers) integrated with an AMI and outage management system. In 2010, a $68.9 Million Smart Grid Investment Grant was secured for the project and plans for deployment in 2011 and 2012 were approved.[594]

Green Mountain Power, an IOU operating in Vermont, offers a bonus payment to customers with net-metered PV systems. In addition to the benefits of net metering, Green Mountain Power customers with a PV system receive a payment of $0.06 per kWh of electricity generated by the system. This payment is available to all customers of Green Mountain Power, which serves roughly one-quarter of Vermont's population. This program, known as Solar GMP, took effect in July 2008. HB 56 may significantly change or eliminate this program due to pending revisions in the net metering rules.[595]

In August 2008, Central Vermont Public Service (CVPS) and the Vermont Department of Public Service launched a collaborative smart-grid pilot program open to participation by any utility in the state. The collaboration, according to the utility and the state agency, establishes templates and standards for new meter and communications technology. It also develops CVPS SmartPower, a systematic program to analyze and install the latest in metering technology over several years. CVPS SmartPower is expected to run through 2013, with meters installed in late 2011 and 2012. CVPS and the Vermont Department of Public Service expect that ultimately CVPS SmartPower will yield expanded time-of-day rate programs and new real-time rate programs.[596]

Vermont Legislature. Accessed 9/21/11. http://www.leg.state.vt.us/database/status/summary.cfm?Bill=H.0520&Session=2008

[591] DSIRE, Vermont Interconnection Standards. Accessed 2/9/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=VT01R&re=1&ee=1

[592] Battleboro Reformer, State hearing to address smart meters and privacy concerns, 9/14/2011. Accessed 9/19/11. http://www.reformer.com/ci_18889150?source%253Dmost_viewed.20F88DA3D7D369F5BB70F372987EAE1F.html

Vermont PSB, No.7307 Public Hearing. Accessed 9/19/11. http://psb.vermont.gov/node/811

[593] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

[594] Tour of Smart Grid Projects and State Policies by Lisa Schwartz, Presentation to the Oregon PUC, Smart Grid Workshop – September 9, 2009, RAPOnline, Source: Ethnie Groves, Xcel Energy. Accessed 2/7/11. http://www.sgiclearinghouse.org/Legislation?q=node/2303&lb=1

SAIC, eEnergy Vermont (ARRA) Update. Accessed 9/28/11. http://www.uvm.edu/~vtsandia/conference/pdfs/SmartMeters_Allen.Stamp.pdf

[595] DSIRE, Vermont – Net Metering. Accessed 2/9/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=VT02R&re=1&ee=1

[596] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

CVPS SmartPower, Implementation Plan. Accessed 9/28/11. http://www.cvps.com/ProgramsServices/smartpower/ImplementationPlan/index.asp

Energy efficiency programs were run by the state's utilities under jurisdiction of the Vermont PSB, but in 1999 the PSB transferred operations to Efficiency Vermont, a statewide energy efficiency utility supported by public benefits funding. In late 2006, Efficiency Vermont began to expand its programs, targeting four areas of the state with significant transmission and distribution constraints. Efficiency Vermont now provides a comprehensive portfolio of services and has achieved significant success in meeting its objectives. Efficiency Vermont is run by a competitively selected contractor, namely the nonprofit Vermont Energy Investment Corporation.[597]

[597] Vermont Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/vermont/217/all/191

Virginia

Item	Title	Dates	Description
Legislative			
2009 HJR 704	NA	2009	Requirement that the SCC review and evaluate an increase in implementation of smart grid technologies, specifically smart meters, in the state. As of 2/10/2009 the bill has been left in the Committee on Rules.[598]
2009 SB 1348	An Act to Direct The SCC to Conduct a Proceeding to Determine Appropriate Energy Conservation and Demand Response Targets	4/8/2009	Requirement that SCC develop a study that considers other states' smart grid deployment measures and evaluates smart grid technologies. Approved by Governor and enrolled on 4/8/2009.[599]
HB 2506	An Act to Amend and Reenact §§ 56-576, 56-585.1, and 56-585.3 of the Code of Virginia, Relating to Base Rates of Return for Certain Types of Electrical Generation	4/8/2009	Authorized IOUs to recover the costs of designing, implementing, and operating energy efficiency programs by adjusting their rates, if such programs are found to be in the public interest. Approved by Governor and enrolled on 4/8/2009.[600]
HB 2531	2009 VA Acts of Assembly, Chapters 855 & 752	3/30/2009	Directed the SCC to conduct a proceeding to determine achievable, cost-effective energy conservation and demand response targets through DSM portfolios of generating electric utilities, including a cost-benefit analysis. Approved by the Governor on 3/30/09.[601]
VA Code § 67-700 et seq.	Covenants Restricting Solar Energy Collection Devices	7/1/2008	Solar-access law stating community associations generally may not prohibit a homeowner from installing or using a solar energy collection device on their property.[602]
SB 596 and SB 1416	Virginia Electric Utility Regulation Act	5/12/2008, April 2007	Renews the state's "Commission on Electric Utility Restructuring" and tasks the SCC with educating retail electricity consumers about demand response. The law requires the SCC to convene a working group pertaining to demand response, DSM, efficiency, and conservation. Supports further deployment of load management. SB 596 was approved by the Governor on 5/12/2008.[603]
VA Code § 55-352 et seq.	Virginia Solar Easements Act	1978	Allows property owners to create binding solar easements for the purpose of protecting and maintaining proper access to sunlight.[604]

[598] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
Virginia Legislative Information System. Accessed 9/21/11. http://lis.virginia.gov/cgi-bin/legp604.exe?ses=091&typ=bil&val=hj704
[599] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
Virginia Legislative Information System. Accessed 9/21/11. http://lis.virginia.gov/cgi-bin/legp604.exe?ses=091&typ=bil&val=sb1348
[600] Virginia Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/virginia/67/all/191
Virginia Legislative Information System. Accessed 9/21/11. http://lis.virginia.gov/cgi-bin/legp604.exe?ses=091&typ=bil&val=hb2506
[601] Virginia Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/virginia/67/all/191
[602] DSIRE, Virginia Solar Access Laws. Accessed 2/9/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=VA15R&re=1&ee=1
[603] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11.
http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[604] DSIRE, Virginia Solar Easements. Accessed 2/9/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=VA08R&re=1&ee=1

Item	Title	Dates	Description
Regulatory			
VA Code § 67-102, SB 862	An Act to amend the Code of Virginia …Relating To The Commonwealth Energy Policy; Local Renewable Energy Facility Siting Ordinances.	03/28/11	Enacts broad guidelines for local ordinances for solar and wind. Any local ordinance related to the siting of solar or wind energy facilities must: 1) be consistent with the Commonwealth Energy Policy; 2) provide reasonable criteria for wind and solar energy siting while promoting wind and solar development; and 3) must include reasonable requirements for noise limitations, buffer areas, set backs, and facility decommissioning.[605]
VA Code § 56-594, 20 VAC 5-315-10 et seq. , HB 2155, SCC Order Adopting Net Metering Regulations (PUE-2009-00105)	Net energy metering provisions	4/28/2010, 5/25/2000, 7/1/2000	Net-metering applying to residential generating systems up to 10 kW in capacity and non-residential systems up to 500 kW in capacity (utilities may choose to offer net metering to larger non-residential systems). Permits customers that are served on TOU tariffs to participate in net metering.[606] The qualifying generator must use as its total source of fuel renewable energy.[607]
NA	EPAct/PURPA Standard 14	July 2006	The Virginia SCC decided not to adopt PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005. The Commission is not convinced that adoption of this standard is in the public interest.[608]

In December 2007 the SCC reported to the Governor and the General Assembly how to meet the legislation's goal of reducing electricity consumption by 10 percent (of 2006 levels) by 2022 through DSM, conservation, energy efficiency, and load management programs. SCC's working group concluded with the single recommendation that utilities should provide the SCC with an expansion plan that weighs the avoided costs accrued from the implementation of a DSM program such as demand response.[609]

Dominion Virginia Power offers a small set of energy efficiency programs for its residential and commercial customers. The Virginia SCC issued an order on January 17, 2008 approving nine pilot projects proposed by Dominion Virginia Power. The nine pilots included: 1.) Standard Residential In-Home Energy Audits; 2) ENERGY STAR Qualified Homes Energy Audits; 3) Energy Efficiency Welcome Kits; 4) a PowerCost Monitor pilot; and 5) Small Commercial On-Site Energy Audits. Four DSM response/load management pilots were also created: 1) Direct Load Control — Outdoor Air-Conditioning Control Device; 2) Programmable Thermostats — Indoor Air-Conditioning Control Device; 3) Programmable Thermostats with AMI and CPP; and 4) DG/Load Curtailment Pilot. On July 11, 2011 the SCC approved Dominion's plans for an electric vehicle recharging pilot program with two experimental rate options designed to test whether electric vehicle owners will choose to recharge their vehicles during off-peak hours. [610]

[605] DSIRE, Virginia - Guidelines for Solar and Wind Local Ordinances. Accessed 9/14/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=VA22R&currentpageid=3&EE=1&RE=1
[606] DSIRE, Virginia – Net Metering. Accessed 2/9/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=VA02R&re=1&ee=1
[607] § 56-594. Net energy metering provisions. Accessed 2/11/11. http://leg1.state.va.us/000/cod/56-594.HTM
[608] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[609] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[610] Virginia Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/virginia/67/all/191
Dominion News, Dominion Virginia Power Moving Forward with Electric Vehicle Recharging Pilot, 7/26/2011 . Accessed 9/28/11 http://dom.mediaroom.com/index.php?s=43&item=1005

Washington

Item	Title	Dates	Description
Legislative			
HB 1639, SB 5464	Creating the Clean Energy Partnership	4/26/2011	Establishes a clean energy partnership as a joint endeavor between the Washington Technology Center and Spokane Intercollegiate Research and Technology Institute that will implement the strategy and recommendations of the clean energy leadership council regarding energy efficiency, green buildings, integration of renewable energy, and smart grid. Bill remains with pending status in the state legislature.[611]
RCW 64.04.140 and SB 5136	Legislative Declaration; Solar Energy Systems; Solar Easements Authorized and Homeowners' Associations – Governing Documents—Solar Energy Panels	7/26/2009, 1979	Solar easement laws that allow parties to enter into solar easement contracts voluntarily for the purpose of ensuring adequate exposure of a solar-energy system. In April 2009, Washington enacted SB 5136, restricting homeowner's associations from prohibiting the installation of solar energy panels. Signed into law by the Governor on 4/10/2009.[612]
2009 HB 2289	NA	5/11/2009	Modification of energy freedom program to receive federal funding to implement smart grid technologies.[613] It also expands the state's Energy Freedom Program to include innovative energy technology for smart grid and/or smart metering. Signed into law by the Governor on 5/11/2009.[614]
2009 HB Amendment to SB 5735	NA	2009	Allowance for qualifying utilities to count investments in smart grid technologies at three times base value. The Senate ruled the bill as "failed" on January 26, 2010.[615]
Washington Administrative Code, Chapter 480-108	Electric companies — interconnection with electric generators	4/6/06	The Washington Utilities and Transportation Commission (WUTC) has adopted interconnection standards for DG systems, including CHP, up to 20 MW in size. Two separate tiers for interconnection exist; the first tier applies to systems smaller than 300 kW. The second tier applies to systems between 300 kW and 20 MW, and generally follows the interconnection standards promulgated by FERC.[616]
Washington State Initiative 937	An act relating to requirements for new energy resources; adding a 2 new chapter to Title 19 RCW; and prescribing penalties.	2006	Initiative that set new requirements for electricity resources, including use of renewable energy and energy conservation: The new REPS of 15 percent by 2020 excludes hydropower. The energy conservation section requires each qualifying utility (those with more than 25,000 customers in Washington) to pursue all available conservation that is cost-effective, reliable and feasible. High efficiency cogeneration is included as part of conservation and the term is defined in the law. Utilities are directed to determine their achievable cost-effective conservation potential through 2019, and a set of biennial acquisition targets for acquiring these resources.[617]

[611] Washington State Legislature, HB 1639. Accessed 9/26/11. http://apps.leg.wa.gov/billinfo/summary.aspx?bill=1639
[612] DSIRE, Washington Solar Easements & Access Law. Accessed 2/9/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=WA02R&re=1&ee=1
Washington State Legislature. Accessed 9/21/11. http://apps.leg.wa.gov/billinfo/summary.aspx?bill=5136&year=2009
[613] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
[614] States Providing for Smart Metering. Accessed 2/11/11. http://www.ncsl.org/?tabid=20672
Washington State Legislature. Accessed 9/21/11. http://apps.leg.wa.gov/billinfo/summary.aspx?bill=2289&year=2009
[615] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
Washington State Legislature. Accessed 9/21/11. http://apps.leg.wa.gov/billinfo/summary.aspx?bill=5735&year=2009
[616] Washington Clean Distributed Generation. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Washington/218/all/195
[617] Washington Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/Washington/218/all/191

Item	Title	Dates	Description
Legislative			
Rev. Code WA § 80.60	Net metering of electricity	1998	Applies to systems up to 100 kW in capacity that generates electricity using solar, wind, hydro, biogas from animal waste, or CHP technologies (including fuel cells). All customer classes are eligible, and all utilities, including municipal utilities and electric cooperatives, must offer net metering. The utility must provide a single, bi-directional meter and the customer must provide the current transformer enclosure. The production incentive law states that customer-generators retain ownership of RECs.[618]
Regulatory			
RCW 80.01.040 and 80.04.160. 10-08-001 (Docket U-090222, General Order R-559), § 480-100-505	Smart grid technology report	4/24/10	Establishes requirements for each electric utility to submit periodic reports to the WUTC with the utility's evaluation of smart grid technologies that are, or will be, available and any plans for implementing smart grid technologies affecting ratepayers. Each utility was directed to file a report in September 2010. Subsequent reports must be filed no later than September 1st of each even-numbered year thereafter through 2016.[619]
Docket No. U-090222, WAC 480-100-505	Washington Commission Staff proposal	3/24/2010, 7/30/09	The WUTC Staff rules that further work to consider a rule requiring electric utilities to report on their activity and evaluations regarding smart grid technology. WUTC current regulations meet some of the standards for the Smart Grid Information Standard, but questions whether additional standards for time-varying pricing make sense. The WUTC provided its ruling on 3/26/2010 regarding smart grid technology report requirements, and closed the docket.[620]
NA	EPAct/PURPA Standard 14	August 2007	The WUTC decided not to adopt PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005. The WUTC determined that it is inappropriate to generally require utilities to deploy smart metering and time-based rates and that its existing policy created in response to the 1980 PURPA standards is sufficient relative to EPAct 1252. The WUTC plans to consider smart metering and time-based rates on a case-by-case basis.[621]

Customers in Washington are served by a wide variety of utilities and energy efficiency programs are provided by many types of utilities. The IOUs carry out DSM programs with regulatory oversight by the WUTC. The NEEA, a regional organization seeking to transform markets for energy efficiency, helps to promote individual utility programs offered across the state, such as services for consumer products and building design, construction and operation. BPA also plays a strong leadership role in supporting individual utilities' efforts. Washington is a non-restructured state and has no public benefits funding to support programs.[622]

[618] DSIRE, Washington – Net Metering. Accessed 2/9/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=WA01R&re=1&ee=1

[619] ADS, Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: May 2010 – June 2011 Accessed 9/16/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2010%20-%2011%20DR%20%20SG%20State%20Policy%20Survey_11%2007%2007_FINAL%20%282%29.pdf

Washington State Legislature, WAC 480-100-505. Accessed 9/16/11. http://apps.leg.wa.gov/wac/default.aspx?cite=480-100-505

[620] Tour of Smart Grid Projects and State Policies by Lisa Schwartz, Presentation to the Oregon PUC, Smart Grid Workshop – September 9, 2009, RAPOnline, Source: Ethnie Groves, Xcel Energy. Accessed 2/7/11. http://www.sgiclearinghouse.org/Legislation?q=node/2303&lb=1

WUTC, Docket No. U-090222. Accessed 9/21/11. http://www.wutc.wa.gov/rms2.nsf/177d98baa5918c7388256a550064a61e/2e5c4853f76fed5c882576f200666075!OpenDocument

[621] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11, http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

[622] Washington Utility Policies. Accessed 2/15/11. http://www.aceee.org/energy-efficiency-sector/state-policy/washington/218/all/191

West Virginia

Item	Title	Dates	Description
Legislative			
HB 2980, HB 2025, HB 3088	Updates to West Virginia Energy Efficiency Act	1/12/2011, 3/6/2009	The PSC shall evaluate whether AMI and digital automation of the components of the entire power supply system are cost-effective in reducing consumption and peak demand of electricity. If found to be cost-effective, the PSC may require each electric utility to implement smart grid technology in its service territory. Bill has remained pending in the House Government Organization Committee since 1/12/2011.[623]
2010 HB 4012	West Virginia Energy Efficiency Act	2010	Requires PSC evaluate cost effectiveness of smart grid technologies in reducing consumption and peak demand of electricity. Bill has been referred to the Committee on Finance. [624]
SB 350	An act to amend and reenact §24-2F-3 of the Code of West Virginia, 1931… alternative and renewable energy portfolio standard	4/2/2010	Categorizes smart metering and smart grid technologies as recycled energy for the purpose of purchasing energy resource credits. Bill has been referred to the Committee on Finance.[625]
HB 103	An Act to Amend the Code of West Virginia…Alternative and REPS	7/1/2009	Addresses awarding of credits for certain energy efficiency and demand-side energy initiative projects. Requires the PSC adopt certain net metering and interconnection rules and standards, and consider extending alternative and renewable resource credits to EDCs or electric generation suppliers other than electric utilities. Authorizes interagency agreements. Signed into law by 2009 Gov. Joe Manchin.[626]
NA	West Virginia Smart Grid Implementation Plan	July 2008	Assessment of current electric grid technologies to evaluate potential of implementing smart grid technologies within the state. [627]
Regulatory			
WV Code § 24-2F-1 et seq., General Order No. 258, General Order No. 258.1	Net metering and interconnection standards	12/27/2010, 8/30/2010, 7/1/2009	Net metering is available to all retail electricity customers. Systems that generate electricity using alternative or renewable energy resources are eligible for net metering, including PV, wind, geothermal, biomass, landfill gas, run of the river hydropower, biofuels, fuel cells, and recycled energy sources.[628]
NA	EPAct/PURPA Standard 14	December 2006	The PSC of West Virginia decided not to adopt PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005, stating that it instead had adopted the collective recommendations of the parties to the proceeding. Electric utilities will explore making smart metering available as an option for all tariff classes in their next rate case, if the utility is not already providing this service. [629]

[623] West Virginia Legislature, H. B. 2980. Accessed 9/20/11. http://www.legis.state.wv.us/Bill_Text_HTML/2009_SESSIONS/RS/Bills/hb2980%20intr.htm
[624] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
West Virginia Legislature. Accessed 9/21/11. http://www.legis.state.wv.us/Bill_Text_HTML/2010_SESSIONS/RS/Bills/hb4012%20intr.htm
[625] States Providing for Smart Metering. Accessed 2/11/11. http://www.ncsl.org/?tabid=20672
West Virginia Legislature. Accessed 9/21/11. http://www.legis.state.wv.us/Bill_Text_HTML/2010_SESSIONS/RS/Bills/SB350%20eng.htm
[626] West Virginia Legislature, H. B. 103. Accessed 9/20/11. http://www.legis.state.wv.us/Bill_Text_HTML/2009_SESSIONS/1X/Bills/hb103%20ENR.htm
[627] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
[628] DSIRE, West Virginia – Net Metering. Accessed 2/9/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=WV03R&re=1&ee=1
[629] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11, http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

There are currently no EERS in place for West Virginia. A DSM/Energy Efficiency Task Force was associated with a case relating to the construction of an Integrated Gasification Combined Cycle electric generating unit proposed by AEP in Case Number 06-0033-E-CS. The PSC allowed the task force to craft energy efficiency programs for utility customers in multiple sectors in Case Number 06-0033-E-CN. [630]

West Virginia enacted REPS in 2009 that requires IOUs with more than 30,000 residential customers to supply 25% of retail electric sales from eligible alternative and renewable energy resources by 2025. [631]

[630] West Virginia Utility Policies. Accessed 2/18/11. http://www.aceee.org/energy-efficiency-sector/state-policy/west%20virginia/219/all/191
[631] DSIRE, West Virginia - Alternative and Renewable Energy Portfolio Standard. Accessed 9/28/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=WV05R&re=1&ee=1

Wisconsin

Item	Title	Dates	Description
Legislative			
WI Stat. § 66.0401 et seq., WI Stat. § 700.41, WI Stat. § 236.292, WI Stat. § 844.22, SB 185	Regulation relating to solar and wind energy systems, solar and wind access, obstruction of solar or wind energy system	10/1/2009, 1993, 1982	Protects a resident's right to install and operate a solar or wind energy system. Local governments, counties, towns, cities and villages may not place any restriction on the installation or use of solar or wind energy systems unless certain conditions are met. It voids all restrictions on platted land that prevent or unduly restrict the construction or operation of solar and wind energy systems.[632]
81.122 CFDA	Wisconsin Energy Assurance and Smart Grid Resiliency Plan	2008	Plan to acquire federal funding to better coordinate and communicate smart grid reliability and security. [633]
Act 141	Energy Efficiency, Renewable Resources, and Energy Policy	2005	Requires the program, Focus on Energy, be transferred to the PSC. Requires IOUs spend 1.2 percent of their annual gross operating revenues on energy efficiency and renewable resource programs. Requires municipal and retail electric cooperative utilities collect an average of $8 per meter to fund energy efficiency programs.[634]
Regulatory			
PSC Docket 5-GF-191 Order	Quadrennial Planning Process	11/9/2010	Sets annual targets for electricity reductions for the period 2011 to 2014. The utilities' statewide energy efficiency program, Focus on Energy, receives funding from ratepayers to achieve goals. Funding levels will increase each year.[635]
PSC Docket 5-UI -116	Alternative Electric and Natural Gas Rate Design and Load Management Options	10/9/2009	In response to FERC orders 719 and 719-A, prohibits the operation of aggregators of retail customers to prevent potential discrimination and to allow the PSC more time to gather more information regarding aggregators, their compensation and the tariff provisions of the MISO. Comments are currently being collected.[636]
WI Stat. § 196.496 enacted 08/30/2001 and Chapter PSC 119 effective 02/01/2004	Distributed generation facilities and rules for interconnection distributed generation facilities	02/01/2004	Interconnection standards for DG systems up to 15 MW in capacity. All IOUs and municipal utilities are required to abide by the standard provisions. Electric cooperatives are encouraged, but not required, to adopt the state standards. The rules categorize DG systems by capacity and provide for several levels of interconnection review.[637]
PSC Order, Docket No. 05-EP-6	Wisconsin Net Metering	9/18/1992	Requires all investor-owned utilities and municipal utilities to file tariffs allowing net metering to customers that generate electricity with systems up to 20 kW in capacity, with no limit on total enrollment. [638]

[632] DSIRE, Wisconsin Solar and Wind Access Laws. Accessed 2/9/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=WI04R&re=1&ee=1
[633] Smart Grid Deployment in Colorado: Challenges and Opportunities, University of Colorado at Boulder, Kevin Doran, Frank Barnes, Puneet Pasrich, eds. Accessed 2/9/11. http://cees.colorado.edu/sgreport.pdf
[634] Wisconsin Utility Policies. Accessed 3/2/11. http://www.aceee.org/energy-efficiency-sector/state-policy/wisconsin/220/all/191
[635] Wisconsin PSC, Quadrennial Planning Process. Accessed 9/14/11. http://www.dsireusa.org/documents/Incentives/PSC_Ref_141173.pdf
DSIRE, Wisconsin - Energy Efficiency Resource Standard . Accessed 9/14/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=WI17R&currentpageid=3&EE=1&RE=1
[636] ADS, Demand Response & Smart Grid—State Legislative and Regulatory Policy Action Review: May 2010 – June 2011 Accessed 9/15/11. http://www.demandresponsesmartgrid.org/Resources/Documents/State%20Policy%20Survey/2010%20-%2011%20DR%20%20SG%20State%20Policy%20Survey_11%2007%2007_FINAL%20%282%29.pdf
Wisconsin PSC, Docket ID: 5-UI -116. Accessed 9/19/11. http://psc.wi.gov/initiatives/globalWarming/index-loadManagement.htm
[637] DSIRE, Wisconsin Interconnection Standards. Accessed 2/9/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=WI11R&re=1&ee=1
[638] DSIRE, Net Metering. Accessed 3/2/11. http://dsireusa.org/incentives/incentive.cfm?Incentive_Code=WI03R&re=1&ee=1

A group known as Focus on Energy (Wisconsin) works with eligible Wisconsin residents and businesses to install cost effective energy efficiency and renewable energy projects with the goal of implementing projects that otherwise would not be completed, or to complete projects sooner than scheduled.[639] The Wisconsin Division of Energy Services administers statewide low income household energy assistance programs involving electric and heating bill payment assistance, as well as benefits and services to assist with energy crisis situations.[640]

In February 2007, the PSC of Wisconsin released its biennial strategic energy assessment titled "Strategic Energy Assessment—Energy 2012." The assessment describes demand response as a tool to provide rate stability to energy customers. In its latest biennial report, the PSC indicates the overall trend in peak demand growth (as estimated by the state's utilities) is approximately 2.1 percent per year through 2014, though increased use of energy efficiency and conservation will likely decrease this rate. [641]

[639] Focus on Energy, About Us Overview. Accessed 2/18/11. http://www.focusonenergy.com/About-Us/
[640] State of Wisconsin, Division of Energy Services. Accessed 2/18/11. http://www.doa.state.wi.us/index.asp?locid=5
[641] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
PSC of Wisconsin, Biennial report, 2007-2009. Accessed 9/28/11. http://www.doa.state.wi.us/docview.asp?docid=7891&locid=0

Wyoming

Item	Title	Dates	Description
Legislative			
HB 0179	Energy Improvement Program	7/1/2011, 3/3/2011	Permits a local government (municipality, county or joint powers board) to designate an energy improvements area and establish an energy improvements program to make loans to property owners within the area for cost-effective energy improvements to existing residential, commercial or industrial buildings on the property. Signed by the Governor on 3/3/2011, effective on 7/1/2011.[642]
HB 0072	Regulation Of Wind Energy Facilities	7/1/2010	Establishes the minimum standards that counties must apply when issuing the required permits for facilities generating electricity from wind power. Signed by the Governor on 3/10/2010, effective on 7/1/2010.[643]
HB 0156	Energy Performance Contracting	7/1/2009	Establishes the Wyoming energy conservation improvement program for the support, development and implementation of energy performance contract projects. Provides for energy efficient audits and measures for local governmental entities. Energy services companies must provide facility owners with an annual reconciliation of guaranteed energy savings. Approved by the Governor.[644]
WY Stat. § 37-16-101 et seq.	Net Metering	2003, 07/01/2001	Establishes statewide net metering. The law applies to IOUs, electric cooperatives and irrigation districts. Eligible technologies include solar, wind, biomass and hydropower systems up to 25 kW in capacity.[645]
Regulatory			
Docket No. 90000-106-XO-8	Wyoming PSC response for EISA 2007 order	7/10/2009	Wyoming PSC declined to adopt smart grid standards.[646]
Docket No. 90000-95-XR-06 (Record No. 10719)	EPAct/PURPA Standard 14	January 2007	The Wyoming PSC decided not to adopt PURPA Standard 14 (Time-Based Metering and Communications) as enacted in EPAct 2005.[647]

In January 2007, the Wyoming PSC decided not to adopt PURPA Standard 14 as enacted in EPAct 2005. The PSC concluded there was no support for this section since there is no real opportunity for Wyoming ratepayers to take advantage of smart metering due to the economic and social makeup of the state. The PSC planned to hold a technical conference on the subject of smart metering. Further, the PSC found adoption of Section 328(D), regarding third-party marketers' ability to sell electric energy to retail customers, illegal in Wyoming. The PSC noted that 16 U.S.C. § 2623(a)(1)requires the PURPA standards, if adopted, to be consistent with state law.[648] In Docket No. 90000-106-XO-8, the PSC ordered the utilities to file an annual report regarding developments in smart grid technologies starting in January 2010.

[642] Wyoming Legislative Service Office, HB 0179. Accessed 9/26/11. http://legisweb.state.wy.us/2011/Digest/HB0179.htm
[643] Wyoming Legislative Service Office, HB 0072. Accessed 9/26/11. http://legisweb.state.wy.us/2010/Digest/HB0072.htm
[644] Wyoming Legislative Service Office, HB 0156. Accessed 10/3/11. http://legisweb.state.wy.us/2009/Summaries/HB0156.htm
[645] DSIRE, Wyoming – Net Metering. Accessed 2/9/11. http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=WY01R&re=1&ee=1
[646] Tour of Smart Grid Projects and State Policies by Lisa Schwartz, Presentation to the Oregon PUC, Smart Grid Workshop – September 9, 2009, RAPOnline, Source: Ethnie Groves, Xcel Energy. Accessed 2/7/11. http://www.sgiclearinghouse.org/Legislation?q=node/2303&lb=1
[647] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf
[648] Demand Response and Smart Metering Policy Actions Since the EPAct of 2005: A Summary for State Officials, Prepared by the U.S. DRCC for the NCEP, Fall 2008. Accessed 2/6/11. http://www.demandresponsesmartgrid.org/Resources/Documents/Final_NCEP_Report_on_DR_and_SM_Policy_Actiona_08.12.pdf

Wyoming PSC approved six DSM programs for RMP that began January 1, 2009. These programs represent the state's first significant energy efficiency activity. The current programs offered to residential customers include rebates for energy efficient appliances and products, low-Income weatherization for qualifying customers, and inverted rates. The inverted rates reward customers with a rate reduction for keeping their electricity usage at or below a 500 kWh per month threshold, and charge customers more than the standard rate for each kWh they use above the threshold. [649]

[649] Wyoming Utility Policies. Accessed 2/18/11. http://www.aceee.org/energy-efficiency-sector/state-policy/wyoming/221/all/191
RMP, Efficiency Programs & Incentives. Accessed 9/28/11. http://www.rockymountainpower.net/res/sem/epi.html

Attachment B

U.S. Smart Grid Case Studies

September 28, 2011

Prepared by SAIC

Prepared for the
Energy Information Administration

Table of Contents

Tables

Figures

Table of Acronyms

General Acronyms

AMI	Advanced Metering Infrastructure
AMR	Automated Meter Reading
ARRA	American Recovery and Reinvestment Act
BPL	Broadband Over Power Lines
CFL	Compact Fluorescent
CPP	Critical Peak Pricing
CPR	Critical Peak Rebate
DG	Distributed Generation
DLR	Dynamic line rating
DOE	Department of Energy
DR	Demand Response
DSM	Demand Side Management
EIA	Energy Information Administration
FAQ	Frequently Asked Questions
FCC	Federal Communications Commission
FERC	Federal Energy Regulatory Commission
GW	Gigawatt
GWh	Gigawatt-hours
HP	Hourly pricing
IM	Instant Messaging
IOU	Investor Owned (Electric) Utility
IP	Internet Protocol
ISO	Independent System Operator
IT	Information Technology
kW	Kilowatt
kWh	Kilowatt-hours
MW	Megawatt
MWh	Megawatt-hours
PEM	Personal Energy Management
PSC	Public Service Commission
PTR	Peak Time Rebates
PUC	Public Utility Commission
PUD	Public Utility District
REC	Renewable Energy Credit(s)
RF	Radio Frequency
RFP	Request For Proposal(s)
RTP	Real Time Pricing
SCADA	Supervisory Control and Data Acquisition
SGIC	Smart Grid Information Clearinghouse
SGIG	Smart Grid Investment Grant
TGB	Tower Gateway Base station
TOU	Time of Use
VOIP	Voice Over Internet Protocol

Utility Specific Acronyms

BGE	Baltimore Gas & Electric
BPA	Bonneville Power Administration
CL&P	Connecticut Light & Power
CPUC	California Public Utility Commission
CVPS	Central Vermont Public Service
DP&L	Dayton Power & Light
HECO	Hawaiian Electric Company
ISO-NE	Independent Service Operator – New England
LIPA	Long Island Power Authority
PEPCO	Potomac Electric Power Company
PGE	Portland General Electric
PG&E	Pacific Gas & Electric
PSE	Puget Sound Energy
SDG&E	San Diego Gas & Electric
SRP	Salt River Project
WUTC	Washington Utilities and Transportation Commission

Introduction

Smart grid pilot projects have been rapidly increasing in number in the United States over the last several years. A recent report by IDC Energy Insights predicts that U.S. smart meter installations will exceed 80 million by 2015, up from about 2 million in 2007.[1] Distribution automation and demand response (DR) projects are also on the rise. A large part of this increase is due to the disbursement of almost $4.5 billion of ARRA funding targeted specifically to smart grid initiatives since 2009. However, even without federal funding, utilities and partner entities are proceeding with smart grid projects. One reason for this phenomenon is that utilities are finding a business case for replacing costly mechanical meters and updating the reliability and efficiency of their systems. Another reason is that Federal mandates are promoting smart grid projects, specifically EISA Title XIII, which establishes a national policy for grid modernization and provides incentives for stakeholders to invest in smart grid initiatives.[2]

The smart grid is growing rapidly and several companies are expanding their initial programs and/or adapting their strategies. This document provides an update to 23 case studies of smart grid pilots and programs that were originally researched and documented in March 2011 under subtasks #2.1.1.1 and 2.1.1.3. Six of the case studies were specifically requested by EIA in the Performance Work Statement under subtask 2.1.1.1; they include the Gridwise Initiative in Washington, PowerCents DC in the District of Columbia, and pilot projects sponsored by San Diego Gas & Electric, Pacific Gas & Electric, Xcel Energy, and Oncor. The remaining case studies were identified through several channels, including work on smart grid under the prior contract as well as targeted research. Each case study begins with a table that outlines important elements of the project and presents quantitative results and metrics when available. The tables are followed by more detailed descriptions of the projects, along with further supporting information. The information in the tables that accompany each case study has been updated if the data has changed since the original research was conducted. An additional section in the text portion of each case study, titled UPDATES AS OF SEPTEMBER 2011, contains an overview of the updates and any new information if available. Note that no calls were made to any utilities.

The case studies are divided into two distinct sections: the first, “Successful or Progressing Projects,” comprises 13 case studies, and the second, “Cancelled or Postponed Projects,” comprises ten case studies. The first section provides examples of projects that have been completed successfully or are in progress with no significant delays or difficulties having been encountered. The second section covers examples of projects that have been completely cancelled or significantly postponed, or that have suffered serious setbacks, due to any number of factors, including technological difficulties, customer complaints, funding problems, etc. In most cases, the public utility commissions (PUCs) or other bodies overseeing the projects have stipulated that these programs may continue as long as certain criteria are met, such as modifying a dynamic pricing structure or solving technical difficulties. The project case studies in the second grouping contain additional information, including a discussion of the key drivers associated with the cancellation or postponement of the project. Of the six case studies specifically requested by EIA, two are included in the “Cancelled or Postponed Case Studies” group. They are the PG&E Smart Meter program in California and the Xcel Energy SmartGridCity project in Boulder, CO.

This collection of case studies is not meant to be a comprehensive list of smart grid projects in the United States. Instead, it provides a sample of projects ranging across a variety of smart grid applications

[1] IDC Energy Insights, http://www.idc-ei.com/getdoc.jsp?containerId=IDC_P21522, accessed September 21, 2011
[2] Energy Independence and Security Act of 2007, Title XIII, http://www.oe.energy.gov/DocumentsandMedia/EISA_Title_XIII_Smart_Grid.pdf, accessed September 21, 2011

and approaches that comprise various technology types, pricing programs, and funding mechanisms. Standard acronyms are used throughout the document. A list of acronyms and definitions is included for reference at the start of the document.

Table 1 provides a list of included case studies; it identifies the State or region where the project takes place, the main utility or entity overseeing the project, and the type of activity occurring between march and September 2011.

- Additional Meters: Additional meters have been installed as part of the project under review.
- Non-Meter Progress: Not including smart meter deployment, other aspects of the project under review have moved forward or been altered.
- New Partnerships: The utility/entity has entered into new smart grid partnerships with other entities, either for the project under review or for other smart grid projects.
- Delays or Setbacks: The project under review has experienced new delays or significant setbacks.
- Other SG Projects: The utility/entity has moved forward with planning or implementing additional smart grid projects other than the project under review.
- No major updates: There have been no significant updates related to smart grid projects undertaken by the utility/entity.

Tables 2 and 3 provide summary views of the main elements of the successful or progressing projects and the cancelled or postponed projects, respectively. Table 4 provides a summary of the cancelled and postponed projects and identifies the main drivers leading to postponement or cancellation.

Table 1. Updates to Smart Grid Case Studies Included in this Document as of September 2011

Utility/Entity	State/Region	Project Name	Additional Meters	Non-Meter Progress	New Partners	Delays or Setbacks	Other SG Projects	No Major Updates
Successful or Progressing Projects								
Austin Energy	Texas	Pecan Street Project		X	X			
BPA	Washington	Pacific Northwest GridWise						X
Duke Energy	North & South Carolina	Grid Modernization Project		X				
Duke Energy	Ohio	Grid Modernization Project	X	X				
FirstEnergy	Ohio	Smart Grid Modernization Initiative						X
Georgia Power	Georgia	PoweRewards					X	
ISO-NE	New England	Demand Response Reserve Pilot						X
Oncor	Texas	Smart Texas Program	X					
PEPCO	DC	PowerCentsDC	X					
PGE	Oregon	Critical Peak Pricing Pilot						X
PG&E	California	Smart Meter Program		X	X		X	
SRP	Arizona	Smart Grid Project	X					
Xcel Energy	Minnesota	Saver's Switch						X
Cancelled or Postponed Projects								
BGE	Maryland	Smart Grid Initiative		X				
CL&P	Connecticut	Plan-It Wise Energy Program				X		
Consumers Energy	Michigan	SmartStreet Pilot and Full Scale Smart Meter Project		X		X		
DP&L	Ohio	Customer Conservation and Energy Management (CCEM) Plan						X
HECO	Hawaii	Smart Meter Pilot Program			X		X	
LIPA	New York	BPL and Wireless Communications Demonstration					X	
PG&E	California	Smart Meter Program	X	X		X	X	
PSE	Washington	Personal Energy Management (PEM) Program						X
Snohomish County	Washington	Smart Grid Project		X				
Xcel Energy	Colorado	SmartGridCity		X		X		

Additional Meters: Additional meters have been installed as part of the project under review.
Non-Meter Progress: Not including smart meter deployment, other aspects of the project under review have moved forward or been altered.
New Partnerships: The utility/entity has entered into new smart grid partnerships with other entities, either for the project under review or for other smart grid projects.
Delays or Setbacks: The project under review has experienced new delays or significant setbacks.
Other SG Projects: The utility/entity has moved forward with planning or implementing additional smart grid projects other than the project under review.
No major updates: There have been no significant updates related to smart grid projects undertaken by the utility/entity.

Table 2. Successful Project Case Study Highlights

Project Name	Dates	Budget	# of Customers	Technology						Status		ARRA Funds
				AMI	AMR	Dist Gen	Energy Storage	Smart Appliance	Dynamic Pricing	In Progress	Complete	
Austin Energy Pecan Street Project	2009-15	$24 million	1,000 Res 75 Com	X		X	X	X		X		X
BPA Gridwise Initiative	2006-07	N/A	150					X	X		X	
Duke Energy Carolinas Grid Modernization Project	2009 - present	$7.5 million	17,000	X	X	X		X	X	X		X
Duke Energy Ohio Grid Modernization Project	2008 - present	$100 million[A]	700,000	X	X	X		X	X	X		X
First EnergySmart Grid Modernization Initiative	2010 - present	$72.2 million	44,000	X	X			X	X	X		X
Georgia Power PoweRewards	2008-09	N/A	1,000	X					X		X	
ISO-NE Demand Response Reserve Pilot	2006-10	N/A	109 assets	X	X				X		X	
Oncor Smart Texas Program	2009-12	$7.3 million (pilot only)	3.4 million	X					X	X		X
PEPCO PowerCentsDC	2008-09; 2010-13	$44.6 million[A]	280,000	X				X	X		X	X
PGE Critical Peak Pricing Pilot	2011 -13	$2 million	1,000 Res	X				X	X	X		
SDG&E Smart Meter Program	2009-11	$572 million	1.4 million	X		X		X	X	X		X
SRP Smart Grid Project	2003-13	$114 million	935,000	X	X				X	X		X
Xcel Saver's Switch	1990 - present	$8.5 million	314,000 Res 13,000 Com		X			X		X		

Notes: [A] = ARRA funding; Res = residential; Com = commercial; Dist Gen = distributed generation

Table 3. Cancelled or Postponed Project Case Study Highlights

				Technology						Status			ARRA Funds
Project Name	**Dates**	**Budget**	**# of Customers**	**AMI**	**AMR**	**Dist Gen**	**Energy Storage**	**Smart Appliance**	**Dynamic Pricing**	**In Progress**	**Delayed/ Postponed**	**Cancelled**	
BGE Smart Meter Pilot Program	2009 - present	$835 million	1.2 million	X	X			X	X	X			X
CL&P Plan-it Wise Energy Program	2009 - present	$863 million	1.2 million	X	X			X	X		X		
Consumers Energy SmartStreet Pilot, Full Scale Smart Meter Project	2008 - present	$200 million (pilot)	7,000 (pilot)	X	X				X		X		
DP&L Customer Conservation and Energy Management Plan	2009-11	$482.9 million	500,000	X	X	X		X	X			X	
HECO Smart Meter Pilot Program	2006-10	$115 million	430,000	X	X				X		X		
LIPA BPL and Wireless Communications Demonstration	2006-07	~ $1 million	100 Res 5 Com		X							X	
PG&E SmartMeter Program	2006 - present	$2 million	5.3 million	X	X			X	X	X			
PSE PEM Program	2000-03	~ $9 million	300,000	X	X				X			X	
Snohomish County PUD Smart Grid Project	2010-13	$31.6 million	320,000	X		X		X	X		X		X
Xcel Energy SmartGridCity	2009 - present	$44.8 million	23,000	X	X			X	X		X		

Notes: Res = residential; Com = commercial; Dist Gen = distributed generation

Table 4. Drivers for Smart Grid Project Postponement or Cancellation

Project Name	Lack of Funding or Cost Issues	Customer Issues					Technological Issues		State/Local Regulatory Orders Causing Delays	Observing Other Pilot Projects before Proceeding
		Health Concerns	Privacy Concerns	Negative Response to Rate Increases	Inadequate Customer Education for Effective System Use	Customer Service Issues	Equipment or Construction Related Problems	Waiting for Technological Advancements		
BGE Smart Meter Pilot Program	●			◒	●			◒	◒	
CL&P Plan-it Wise Energy Program	●		◒	◒					◒	
Consumers Energy SmartStreet Pilot and Full Scale Smart Meter	●							◒	◒	◒
DP&L Customer Conservation and Energy Management Plan	◒		◒	◒				●		◒
HECO Smart Meter Pilot Program	◒						●		◒	
LIPA BPL and Wireless Communications Demonstration	●	◒					●			
PG&E SmartMeter Program		●	◒		◒	◒	●		◒	
PSE PEM Program	◒	◒		●	◒				◒	
Snohomish County PUD Smart Grid Project				◒				●		
Xcel Energy SmartGridCity	●		◒		◒		◒		◒	

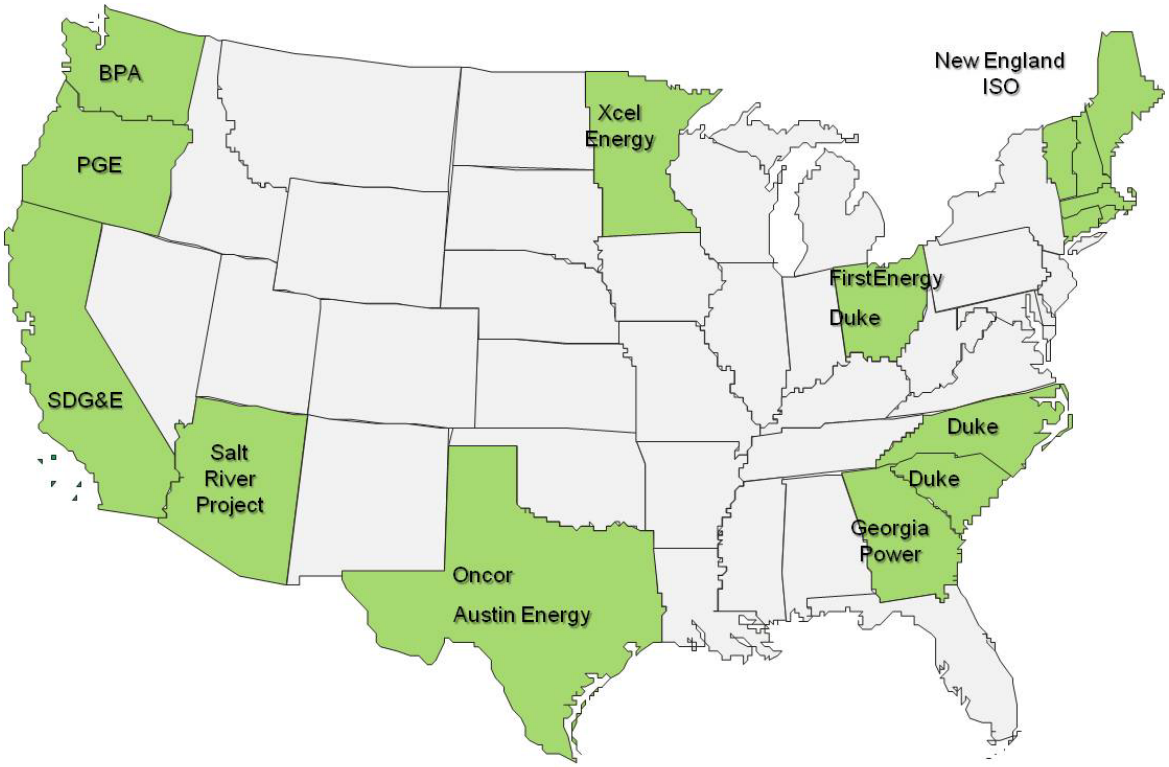
Notes:

● Key Driver for Postponement or Cancellation

◒ Other Driver for Postponement or Cancellation

Case Studies of Successful or Progressing Smart Grid Projects

Figure 1. Locations of Successful/Progressing Smart Grid Project Case Studies



Source: SAIC

Austin Energy Pecan Street Project			
Location:	Austin, TX	**Dates:**	2009-2015
Primary Utility/Entity:	Austin Energy	**ARRA Funding:**	$10.4 million

PROGRAM INFORMATION	
Key Objectives	• To define, test, and implement strategies to keep Austin at the forefront of clean technology innovation and job creation. • To investigate the technical, economic, and policy implications of an energy system that relies on better energy efficiency, locally generated renewable energy, and a new economic model for electricity utilities. • To integrate multiple smart grid technologies over the next five years.
Status	In progress
Number of Participants	• 1,000 residents in the Mueller community • 75 businesses in the Mueller community
Participating Entities	• Representatives of the City of Austin • Austin Energy • The University of Texas • The Austin Technology Incubator • The Greater Austin Chamber of Commerce • Environmental Defense Fund
Program Budget	• $10.4 million smart grid demonstration grant from DOE • More than $14 million in matching funds from project partners
Consumer Sector	• Residential • Commercial
Hardware/Software Technologies	• Distributed clean energy • Energy storage technologies • Smart grid water and smart grid irrigation systems • Smart appliances • Plug-in electric vehicles • Advanced meters and home energy management systems • Green building • New electricity pricing models
Consumer Education Measures	• Austin Energy website • Customer calls • Postcards • Door hangers • Local news coverage (television and newspaper) • Special newspaper insert spread • Notification of all Austin Energy personnel • Work with community coordinators to make special arrangements for life support customers • Notification of partnering social-service agencies that assist low-income clients and provided a presentation with the details

PROGRAM RESULTS	
Key Findings	N/A (Pilot study commenced February 2011.)
Other Outcomes	N/A
Customer Feedback	N/A
Current Deployment Status	First phase of pilot (100 homes) commenced February 2011
Future Implications	N/A
IMPACTS/BENEFITS	
Consumers	N/A (first phase commenced February 2011)
Utilities	N/A (first phase commenced February 2011)
Metrics Used	First phase achieved an installed cost per home of $341 ($241 for equipment plus $100 for installation)
RESOURCES	
Program Website	http://www.pecanstreetproject.org/
Full Program Report	N/A
Presentations	N/A
News Articles	• Pecan Street Project, News Feed, http://www.pecanstreetproject.org/news/, accessed September 21, 2011 • Cichon, Meg, "Can the Utility and Consumer Collaborate To Solve the Peak Problem?", RenewableEnergyWorld.com, http://www.renewableenergyworld.com/rea/news/article/2011/06/can-the-utility-and-consumer-collaborate-to-solve-the-peak-problem, accessed September 21, 2011
Other Resources	Pecan Street Project, Working Group Recommendations, March 2010, http://www.sgiclearinghouse.org/node/3197, accessed September 21, 2011

PROGRAM DESCRIPTION

The Pecan Street Project is a new smart grid project that went live February 1, 2011. It began in 2008 as a community collaboration to reinvent the energy system. The founding members enlisted several private companies to investigate the technical, economic, and policy implications of an energy system that relies on better energy efficiency, locally generated renewable energy, and a new economic model for electricity utilities. In August 2009, the founding partners joined together to create a separate non-profit corporation called Pecan Street Project, Inc. In March 2010 a report that included a narrative of the deliberations, assumptions, conclusions and recommendations of the Pecan Street Project team was shared with the Central Texas community. The Pecan Street Project will help define, test, and implement strategies to keep Austin at the forefront of clean technology innovation and job creation.

The first phase of the project went live at Austin's Mueller community in February 2011 and will integrate multiple smart grid technologies over the next five years. The home smart grid systems being used in this phase capture minute-to-minute energy usage for the whole home and six major appliances or systems. The first phase achieved an installed cost per home of $341 ($241 for equipment plus $100 for installation).[3] The first phase included 100 homes at Mueller, all of which are green built and 11 of which have rooftop solar PV systems. During the spring of 2011, Pecan Street Project deployed the same systems in a second group of 100 homes outside Mueller that are at least 10 years old. Eventually, the

[3] Pecan Street Project, Best Buy, Freescale, Intel, Landis+Gyr, LG Electronics, Sony and Texas Gas Service Join Pecan Street Project Industry Advisory Council, http://www.pecanstreetproject.org/2011/02/pecan-street-project-goes-live-with-first-phase-of-smart-grid-deployment/, accessed September 21, 2011

installation and testing of smart meter technology will take place in a larger group of up to 1,000 residential and 75 commercial customers.

Austin Energy is focusing on customer education and service throughout the meter exchange, which is resulting in a low percentage of customers calling with questions and requesting accuracy tests. Customer services have included: (1) a call center with top performing employees who completed program-specific training, and (2) customer notification including postcards, customer calls, door hangers, local news coverage, special newspaper insert spreads, notification of partnering social-service agencies that assist low-income clients, along with other notification methods, all of which address the installation process and meter accuracy.

UPDATES AS OF SEPTEMBER 2011

Pecan Street Project has undertaken a variety of initiatives to promote collaborative research with other organizations. On June 28, 2011, Pecan Street Project announced the formation of its Industry Advisory Council, composed of a collection of member companies that will collaborate with Pecan Street Project and University of Texas researchers. Its founding member companies are Best Buy, Freescale, Intel, Landis+Gyr, LG Electronics USA, Sony and Texas Gas Service.[4]

Pecan Street Project announced on April 26, 2011 that it had acquired a site for a smart grid interoperability research facility in Austin's Mueller community. Known as the Home Research Lab, it will serve as a neutral, third-party research facility where researchers from Pecan Street Project, the University of Texas, the National Renewable Energy Laboratory, multiple utilities, and other private sector companies will be able to perform smart grid testing. Construction was set to begin September 2011, with operations commencing in March 2012.[5]

Pecan Street Project researchers are also planning to work with Austin Energy in 2012 to investigate consumer responses to various pricing scenarios, possibly including time of use (YOU) rates, flat rates, and a "cell phone" rate under which consumers first purchase a bundle of energy, then pay for additional use.[6]

[4] Pecan Street Project, http://www.pecanstreet.org/2011/06/best-buy-freescale-intel-landisgyr-lg-electronics-sony-and-texas-gas-service-join-pecan-street-project-industry-advisory-council/, accessed September 21, 2011

[5] Pecan Street Project, Pecan Street Project, NREL and UT begin design of Home Research Lab, http://www.pecanstreet.org/2011/04/pecan-street-project-nrel-and-ut-begin-design-of-home-research-lab/, accessed September 21, 2011

[6] Cichon, Meg, Can the Utility and Consumer Collaborate To Solve the Peak Problem?, RenewableEnergyWorld.com, http://www.renewableenergyworld.com/rea/news/article/2011/06/can-the-utility-and-consumer-collaborate-to-solve-the-peak-problem, accessed September 21, 2011

BPA Pacific Northwest GridWise™ Demonstration Project			
Location:	Washington	**Dates:**	2006 – 2007
Primary Utility/Entity:	Bonneville Power Administration (BPA), PacifiCorp, Portland General Electric (PGE), City of Port Angeles, Clallam County PUD #1	**ARRA Funding:**	No

PROGRAM INFORMATION	
Key Objectives	• Project consisted of two separate demand-response studies, the Grid Friendly Appliance Project and the Olympic Peninsula Project, conducted concurrently • To test whether smart grid technologies and consumers could have a significant impact on the electricity grid • To search for potential hurdles and to measure the potential effect of nationwide adoption of smart grid technologies and processes
Status	Completed, successful
Number of Participants	• 150 - Grid Friendly Appliance Project (GFAP)_ • 112 - Olympic Peninsula Project
Participating Entities	• BPA • PacifiCorp • PGE • City of Port Angeles • Clallam County PUD #1 (municipal utility) • Pacific Northwest National Laboratory (PNNL), managed programs • IBM Research • Whirlpool Corp. (in-kind software/appliance contributions) • DOE • Gridwise Alliance (MOU allowed for development of Gridwise Initiative)
Program Budget	N/A
Consumer Sector	• Residential (both programs) • Commercial • Industrial • Municipal water pumps (Olympic Peninsula Project only)
Hardware/Software Technologies	• Grid-friendly appliances/Smart Appliances: dryers, water heaters, thermostats • Internet-based event-driven software established, allowing “shadow” two-way clearing market with 5-minute intervals
Consumer Education Measures	Provided materials to help with automated responses and voluntary actions to obtain greater benefits and contract information on three pricing plans
PROGRAM RESULTS	
Key Findings	Olympic Peninsula Project: savings were realized and participants were satisfied; however, much of the energy savings were a result of the automation technologies used, with relatively few savings resulting from active behavior on the part of participants. For GFAP, short-term load reduction was successful, but a larger-scale experiment may be desired in order to measure potential savings.

Other Outcomes	Automatic settings rarely changed by participants unless settings fail, after which some resistance occurs to control actions.
Customer Feedback	General satisfaction with programs. Most participants would sign up for a TOU pricing plan in the future. GFAP load reduction was barely noticed.
Current Deployment Status	Project has been completed
Future Implications	Additional TOU pricing pilots and programs have been developed and implemented since the Gridwise Initiative data collection period. Use of GFAP technologies has been less widespread.
IMPACTS/BENEFITS	
Consumers	Substantial dollar savings on electricity bill possible without active behavior; even more savings possible by actively managing demand. Future utility bills could be lower as a result of lower aggregate peak demand.
Utilities	Possible savings from decreased need for new capital investments in generation, transmission, and distribution as result of lower peak demand.
Metrics Used	Olympic Peninsula Project: • Peak Demand Savings: Mean peak reduction measured by feeder constraint period: 29.7 percent for 500-kW (fall), 19.0 percent for 750-kW (winter). No measurement provided for 1500-kW (summer) period, which did not need peak management. • Energy Savings: Measured as mean daily energy consumption per home, versus control group. Only TOU customers had less mean overall energy use than control group (37 vs. 47 kWh/day). • Customer Savings: Customers saved an average of 10 percent from previous year's electricity bill. For the control group, monthly savings averaged between 2-30 percent, with median monthly dollar savings ranging from $1.98 to $40.64. GFAP: • Load Reduction: 3-30 kW of load reduction for clothes dryers and 5-35 kW of load reduction for water heaters
RESOURCES	
Program Website	N/A
Full Program Report	• Pacific Northwest GridWise™ Testbed Demonstration Projects, Part I: Olympic Peninsula Project, http://www.pnl.gov/main/publications/external/technical_reports/PNNL-17167.pdf, accessed September 21, 2011 • Pacific Northwest GridWise™ Testbed Demonstration Projects, Part II: Grid Friendly Appliance Project, http://www.pnl.gov/main/publications/external/technical_reports/PNNL-17079.pdf, accessed September 21, 2011
RESOURCES	
Presentations	PNNL, GridWise Demonstration Project Fast Facts, http://www.sgiclearinghouse.org/Resources?q=node/1346&lb=1, accessed September 21, 2011
News Articles	N/A
Other Resources	GridWise Alliance and DOE, GridWise Action Plan, http://www.smartgridnews.com/pdf/GridWiseAction.pdf, accessed September 21, 2011

PROGRAM DESCRIPTION

The Pacific Northwest GridWise Demonstration Project, known as the Gridwise Initiative, was a test of DR concepts and technologies. The project consisted of two separate demand-response studies, the Grid Friendly Appliance Project (GFAP) and Olympic Peninsula Project. The studies were conducted concurrently by PNNL in conjunction with local utilities and industry partners. The data collection period was April 2006 through March 2007. Financial support came from DOE, resulting from a 2004 MOU between DOE and the Gridwise Alliance, an organization made up of utilities and other stakeholders to promote smart grid initiatives.

The GFAP installed controllers on 150 clothes dryers and 50 water heaters in various locations in Washington and Oregon. When the controller recorded an AC signal frequency below 59.95 Hz, this was considered a high-demand "event" and, in response, the controller shut off some of the appliance functionality. Roughly one event per day occurred in the year of the program, ranging in length from 16 seconds to 10 minutes. Overall curtailment ranged from 3-30 kW of load reduction for the clothes dryers and 5-35 kW of load reduction for the water heaters, and customers were hardly inconvenienced. However, the study was conducted at such a small scale that PNNL recommended a larger study to gauge the potential energy savings of the technology tested.

With the Olympic Peninsula Project, 112 participants from the Port Angeles area in Washington State were provided with a choice of pricing plans for the one-year duration of the program. The three pricing plans, as shown in Table 5, were: fixed price, real time price (RTP), and TOU with critical peak price (CPP). A virtual "shadow" energy market was created, allowing for electricity prices to change every five minutes. Participants were assigned to one of the three pricing plans along with a fourth control group in roughly equal numbers. Users were given an average of $150 (which could be more or less depending on energy savings) for participation.

Table 5. BPA Olympic Peninsula Project Price Reduction by Price Group

Price Group	Mean Monthly Consumer Savings	Median Monthly Consumer Savings ($/month)
Fixed	2%	$1.98
TOU/CPP	30%	$28.62
RTP	27%	$40.64

Source: Pacific Northwest GridWise Testbed Demonstration Projects. Part I. Olympic Peninsula Project, http://www.pnl.gov/main/publications/external/technical_reports/PNNL-17167.pdf, September 21, 2011

Although there were a few hiccups (electricity use exceeded the agreed threshold once, water heater technology did not work as expected), the program was deemed successful. Participants were satisfied, peak usage declined, and bills were lower, particularly for the RTP and TOU groups. Interestingly, much of the decline in peak demand can be attributed to automated responses from the smart appliances installed. Default settings, which would shut off appliance usage at critical high-price times, were rarely overridden. The greatest median price reduction, relative to the control group, was seen in the RTP group, but the mean reduction was higher among the TOU/CPP group.

UPDATES AS OF SEPTEMBER 2011

There are no significant updates to this case study as of September 2011.

Duke Energy Carolinas Grid Modernization Project			
Location:	North and South Carolina	**Dates:**	2009-Present
Primary Utility/Entity:	Duke Energy	**ARRA Funding:**	$4 million

PROGRAM INFORMATION	
Key Objectives	• To implement distribution automation to help prevent and shorten outages. • To enable AMR and reduce the need for estimated bills. • To enable remote service connections and disconnections for faster customer service. • To capture and post daily energy usage data online so customers can make wiser energy decisions. • To incorporate more renewable, distributed generation into the grid.
Status	In progress
Number of Participants	• Approximately 17,000 digital smart meters and other automated equipment in parts of North Carolina and South Carolina. • 100 residents included in in-home energy management system pilot in North Carolina. Will be expanded to 8,300 customers.
Participating Entities	• Duke Energy • Echelon Corporation • General Electric • Ambient Corporation • Cisco (home energy management system)
Program Budget	• Cost of pilot projects: up to $7.5 million. • Parent company has allocated $1 billion through 2015 for smart grid technology in North Carolina, South Carolina, and other service territories. • $204 million in smart grid stimulus funds received: o $4 million will support the installation of digital transmission system upgrades in the Carolinas. o $200 million to support the modernization of power distribution system throughout Ohio, Indiana and Kentucky. • Also received $3.5 million for workforce development and training from DOE
Consumer Sector	• Residential • Commercial • Industrial
Hardware/Software Technologies	• Echelon smart meters capable of two-way communication; PLC technology. • New distribution automation equipment including electronic breakers, digital sensors, 45 new phasor measurement units, and automated switching devices. Some equipment will operate automatically to restore power. • New distribution system communications nodes. • Cisco Home Energy Management Solution on an IP-based, open system network platform. • Development of dynamic pricing programs. • Support for the deployment of plug-in electric vehicles.
Consumer Education Measures	FAQ page on company website devoted to smart grid questions.

PROGRAM RESULTS	
Key Findings	Home energy management system pilot conducted in North Carolina needs significant investments in customer education for effective use.
Other Outcomes	N/A
Customer Feedback	• Customers found the usability of the home energy management system in the North Carolina pilot less than optimal, as showcased by the many customer calls to the utility's call center. • North Carolina and South Carolina pilots in progress; customer feedback not found in the identified sources.
Current Deployment Status	• Installed approximately 17,000 digital smart meters and other automated equipment in northern Greenville County in South Carolina and in Charlotte in North Carolina. • Over 150 residential customers received in-home energy management systems installed in North Carolina in 2009 and 2010. In 2011, 50 residential customers are receiving next-generation systems. • Working through regulatory process with PUC in North Carolina and South Carolina to finalize full-scale deployments in service areas.
Future Implications	N/A
IMPACTS/BENEFITS	
Consumers	150 residential customers in home energy management system pilot in North Carolina. Large number of customers needed assistance with system after deployment.
Utilities	Duke Energy received feedback that more customer education measures were needed prior to deployment.
Metrics Used	Customer calls received by call center: five to eight calls received each month which totals to an average of 78 calls during the year of testing.
RESOURCES	
Program Website	Duke Energy, Smart Grid FAQ, http://www.duke-energy.com/about-us/smart-grid-faq.asp, accessed September 21, 2011.
Full Program Report	Residential Energy Management System Pilot Program in North Carolina: http://www.duke-energy.com/pdfs/NCREMS.pdf, accessed September 21, 2011
Presentations	KEMA Consulting and Duke Energy, Duke Energy's Utility of the Future Project, http://www.sessionview.com/data/postevent/GI-07/Will-McNamara-25558886.pdf, accessed September 21, 2011.
News Articles	• Business Courier, Duke Energy Wins $200 million smart grid grant, October 28, 2009, http://www.bizjournals.com/cincinnati/stories/2009/10/26/daily21.html#, accessed September 21, 2011. • World Economic Forum, Accelerating Successful Smart Grid Pilots, http://www.smartgridnews.com/artman/uploads/1/WEF_EN_SmartGrids_Pilots_Report_2010_1_.pdf, accessed September 21, 2011 • St. John, Jeff, Integral Analytics: Orchestrating Duke's 'Virtual Power Plant,' Green Media Quarterly, June 18, 2009, http://www.greentechmedia.com/articles/read/integral-analytics-orchestrating-dukes-virtual-power-plant/, accessed September 21, 2011.

	• Duke Energy, Duke Energy Reaches Agreement with DOE to Accept $204 Million in Stimulus Funds to Support Grid Modernization, May 13, 2010, http://www.duke-energy.com/news/releases/2010051301.asp, accessed September 21, 2011. • Downey, John, Duke energy to team with wireless carriers on smart grid, Charlotte Business Journal, http://www.bizjournals.com/charlotte/print-edition/2011/08/19/Duke-to-team-with-wireless-carriers-on.html?page=all, accessed September 21, 2011
Other Resources	Smartgrid.gov, Duke Energy (PMU Deployment in the Carolinas with Communication System Modernization), http://www.smartgrid.gov/project/duke_energy_pmu_deployment_carolinas_communication_system_modernization, accessed September 21, 2011.

PROGRAM DESCRIPTION

In 2009, DOE awarded Duke Energy $200 million in ARRA funding for smart grid projects in the Midwest and another $4 million for projects in the Carolinas. The projects in each State include the development of an open, interoperable, two-way communications network, deployment of smart meters, distribution system automation, dynamic pricing programs, and deployment of supporting technologies for plug-in electric vehicles.[7] In North Carolina and South Carolina, the company is implementing pilot programs.

Through the company website, Duke Energy reiterates that the smart meters are mandatory for all customers and the company reassures customers that all meters have been thoroughly tested through an enhanced testing procedure. The procedure includes, at a minimum, testing a percentage of all meters received from the vendor before installation, and in some cases, all meters in a shipment are tested. The company also conducts meter testing after installation. Duke Energy indicates that the meters will not have the capability of immediately alerting the utility when there is a power outage; customers still must call to report outages. [8]

In a 2009 pilot program conducted in Charlotte, North Carolina, Duke Energy tested the capabilities of its home energy management system with 100 residential customers, though up to 200 volunteers could participate. The home energy management system allows the customer to manage consumption according to pre-set energy usage settings and preferences, alterable at any time through a web portal.[9] Duke Energy account executives had assisted industrial customers individually with energy management in the past, including capital investment decisions, and the company was ready to increase the scale of these services to residential customers. This would scale the number of one-on-one customer relationships up from the thousands to millions.[10] The call center established by Duke Energy to provide support for the system received roughly five to eight calls each month from customers with questions about using the system. It was discovered that customers needed more robust training to use the system effectively.

In the summer of 2010, Duke Energy expanded its home energy management pilot to include more customers with smart meters in North Carolina, implementing the first-generation Cisco Home Energy

[7] DOE, Recovery Act Selections For Smart Grid Investment Grant Awards – By State, http://energy.gov/oe/downloads/recovery-act-selections-smart-grid-investment-grant-awards-state, accessed September 21, 2011

[8] Duke Energy, Smart Grid FAQ, http://www.duke-energy.com/about-us/smart-grid-faq.asp, accessed September 21, 2011

[9] Duke Energy, Residential Energy Management System Pilot Program (NC), March 10, 2009, http://www.duke-energy.com/pdfs/NCREMS.pdf, accessed September 21, 2011

[10] Geschickter, Chet, Wanted: Chief Customer Officer for Utility Rolling Out Smart Grid, Greentech Media, Inc., http://www.greentechmedia.com/articles/read/wanted-chief-customer-officer-for-utility-rolling-out-smart-grid/, accessed September 21, 2011

Management Solution. The system consists of a countertop, touch screen device, supported on an IP-based, open system network. Duke Energy further planned to include manufacturers of household products like appliances, electrical outlets, air conditioners, water heaters and plug-in electric vehicles to create a suite of products compatible with the Cisco Home Energy Management Solution.[11] Altogether, more than 150 residential customers tested Duke Energy's first-generation home energy management system in 2009 and 2010.

In updating the grid infrastructure in its service territory, a key component of the system is the transmission system communications node. These nodes are located at the ground level beneath electric power transformers. Communication nodes are a crucial part of the billing and power grid management systems because they collect information from numerous digital devices in the area, and transmit the information over a telecommunications network to the utility.[12] Additionally, the project includes installation of 45 phasor measurement units in substations and upgrades to communications infrastructure at the corporate control center.

UPDATES AS OF SEPTEMBER 2011

Following up on its 2009 and 2010 pilot program, Duke Energy reported that 50 residential customers are receiving next-generation home energy management systems in 2011. These next-generation systems feature handheld, touch-screen devices.[13]

Duke Energy is planning to present its proposed smart grid architecture at conferences in Washington and Raleigh in September and November 2011 respectively. The company plans to rely on wireless carriers and other existing infrastructure, rather than building its own proprietary network.[14]

[11] Duke Energy, Duke Energy Signs Agreement with Cisco to Deliver Smart Grid-Enabled Home Energy Management Solution, June 29, 2010, http://www.duke-energy.com/news/releases/2010062901.asp, accessed September 21, 2011

[12] Duke Energy, Duke Energy Takes Steps to Further Advance Its Smart Grid Communications Architecture, Sept. 2, 2010, http://www.duke-energy.com/news/releases/2010090201.asp, accessed September 21, 2011

[13] Duke Energy, Charlotteans Testing Advanced Energy Technologies, http://sustainabilityreport.duke-energy.com/innovative-products-and-services/charlotteans-testing-advanced-energy-technologies/, accessed September 21, 2011

[14] Downey, John, Duke Energy to team with wireless carriers on smart grid, Charlotte Business Journal, http://www.bizjournals.com/charlotte/print-edition/2011/08/19/Duke-to-team-with-wireless-carriers-on.html?page=all, accessed September 21, 2011

Duke Energy Ohio Grid Modernization Project			
Location:	Ohio	**Dates:**	2008-Present
Primary Utility/Entity:	Duke Energy	**ARRA Funding:**	$100 million (estimated allocation for Ohio project)

PROGRAM INFORMATION	
Key Objectives	• To implement distribution automation to help prevent and shorten outages. • To enable AMR and reduce the need for estimated bills. • To enable remote service connections and disconnections for faster customer service. • To capture and post daily energy usage data online so customers can make wiser energy decisions. • To incorporate more renewable, distributed generation into the grid.
Status	In progress
Number of Participants	• 700,000 customers in Ohio. • ~ 140,000 new smart grid meters have been installed since 2008 in Ohio.
Participating Entities	• Duke Energy • Echelon Corporation • Ambient Corporation • Cisco (home energy management system)

Program Budget	• Parent company has allocated $1 billion through 2015 for smart grid technology in Ohio and other service territories.
	• $204 million in smart grid stimulus funds received (total):
	  o Duke Energy Ohio estimates around $100 million of the grant will be used in Ohio to support the modernization of the power distribution system.
	  o Estimated $100 million to support power distribution system upgrades throughout Indiana and Kentucky.
	  o $4 million will support the installation of digital transmission system upgrades in the Carolinas.

Consumer Sector	• Residential • Commercial • Industrial
Hardware/Software Technologies	• Echelon smart meters capable of two-way communication; PLC technology. • New distribution automation equipment including electronic breakers, digital sensors and automated switching devices. Some equipment will operate automatically to restore power. • New distribution system communications nodes. • Cisco Home Energy Management Solution on an IP-based, open system network platform. • Development of dynamic pricing programs. • Support for the deployment of plug-in electric vehicles. • Communications nodes to transmit, locally aggregate and manage data.

Consumer Education Measures	• Customers are notified via mail and door hangers when the new meter is installed. Additional letters to customers confirm that Duke Energy can read the meter remotely. • FAQ page on company website devoted to smart grid questions.
PROGRAM RESULTS	
Key Findings	• Success of in-home energy management system deployment has led to an expansion of the program into Ohio. • Duke Energy chose the Echelon NES System due to its open framework, to maximize compatibility with future technologies.
Other Outcomes	N/A
Customer Feedback	N/A
Current Deployment Status	As of February 2011, Duke Energy Ohio has installed 139,000 smart meters in its service area (Cincinnati and Warren County).
Future Implications	• Ohio PUC opened a case in February 2011 to discuss data privacy issues. Duke Energy supports the initiation of workshops to bring all stakeholders together to work through issues. • Proceeding with full-scale smart meter installations in Ohio.
IMPACTS/BENEFITS	
Consumers	• Improved accuracy of billing. • Energy use information available in near real time.
Utilities	• Decreased billing calls due to reduced bill estimates. • Reduced outage time. • Reduction of system losses due to improved modeling. • Improved data for investment planning.
Metrics Used	• Outage duration • Customer calls • Number of estimated bills
RESOURCES	
Program Website	Duke Energy, Smart Grid FAQ, http://www.duke-energy.com/about-us/smart-grid-faq.asp, accessed September 21, 2011.
Full Program Report	Duke Energy, Echelon E2L, April 23, 2008, http://www.puco.ohio.gov/emplibrary/files/util/RFPs%5C10-2326-GE-RDR%5CAttachments%201-5.pdf, accessed September 21, 2011.
Presentations	N/A
News Articles	• Business Courier, Duke Energy Wins $200 million smart grid grant, October 28, 2009, http://www.bizjournals.com/cincinnati/stories/2009/10/26/daily21.html#, accessed September 21, 2011. • World Economic Forum, Accelerating Successful Smart Grid Pilots, http://www.smartgridnews.com/artman/uploads/1/WEF_EN_SmartGrids_Pilots_Report_2010_1_.pdf, accessed September 21, 2011. • St. John, Jeff, Integral Analytics: Orchestrating Duke's 'Virtual Power Plant,' Green Media Quarterly, June 18, 2009, http://www.greentechmedia.com/articles/read/integral-analytics-orchestrating-dukes-virtual-power-plant/, accessed September 21, 2011. • Duke Energy, Duke Energy Reaches Agreement with DOE to Accept $204 Million in Stimulus Funds to Support Grid Modernization, May 13, 2010,

	http://www.duke-energy.com/news/releases/2010051301.asp, accessed September 21, 2011. • Duke Energy, Echelon E2L, http://www.puco.ohio.gov/emplibrary/files/util/RFPs%5C10-2326-GE-RDR%5CAttachments%201-5.pdf, accessed September 21, 2011.
Other Resources	• SGIC, Smart Grid Projects, http://www.sgiclearinghouse.org/ProjectList?voc_18=802&voc_36=All&submit=Apply, accessed September 21, 2011. • Duke Energy, 2010 | 2011 Sustainability Report, Delivering Today. Investing for our Future, http://www.duke-energy.com/pdfs/10-11-sustainability-report.pdf, accessed September 21, 2011 • Masters, David, Duke Energy: Developing the communications platform to enable a more intelligent electric grid, http://www.duke-energy.com/pdfs/OP-David-Masters-SmartGrid-Comm-Platform-02-01-11.pdf, accessed September 21, 2011

PROGRAM DESCRIPTION

In late 2008, Duke Energy received approval from the Ohio PUC to implement smart electric meters, smart gas meters and new transmission system communication nodes in the State. In 2009, DOE awarded Duke Energy $200 million of ARRA funding for smart grid projects in the Midwest and another $4 million for projects in the Carolinas. The projects in each State include the development of an open, interoperable, two-way communications network, deployment of smart meters, distribution system automation, dynamic pricing programs, and deployment of supporting technologies for plug-in electric vehicles.[15]

Through the company website, Duke Energy reiterates that the smart meters are mandatory for all customers and the company reassures customers that all meters have been thoroughly tested through an enhanced testing procedure. The procedure includes, at a minimum, testing a percentage of all meters received from the vendor before installation, and in some cases, all meters in a shipment are tested. The company also conducts meter testing after installation. Duke Energy indicates that the meters will not have the capability if immediately alerting the utility when there is a power outage; customers still must call to report outages. [16]

By 2009, Duke Energy Ohio installed 60,000 smart electric meters, 40,000 smart gas meters, and 4,000 communication nodes in Ohio. By 2014, a total of 700,000 smart electric and 450,000 smart gas meters will be installed. [17] The PUC approved a rate increase of 49¢ more per month for residential customers to pay for these projects.[18]

In the summer of 2010, Duke Energy expanded its home energy management pilot to include customers with smart meters in Ohio, using the first-generation Cisco Home Energy Management Solution. The home energy management system allows the customer to manage consumption according to pre-set

[15] DOE, Recovery Act Selections For Smart Grid Investment Grant Awards – By State, http://energy.gov/oe/downloads/recovery-act-selections-smart-grid-investment-grant-awards-state, accessed September 21, 2011.
[16] Duke Energy, Smart Grid FAQ, http://www.duke-energy.com/about-us/smart-grid-faq.asp, accessed September 21, 2011.
[17] Ibid.
[18] Nolan, John, Duke Energy customers paying for smart meter deployment, Middletown Journal, May 19, 2010, http://www.middletownjournal.com/news/middletown-business-news/duke-energy-customers-paying-for-smart-meter-deployment-716340.html, accessed September 21, 2011

energy usage settings and preferences, alterable at any time through a web portal.[19] Duke Energy account executives had assisted industrial customers individually with energy management in the past, including capital investment decisions, and the company was ready to increase the scale of these services to residential customers. The system consists of a countertop, touch screen device, supported on an IP-based, open system network. Duke Energy further plans to include manufacturers of household products like appliances, electrical outlets, air conditioners, water heaters and plug-in electric vehicles to create a suite of products compatible with the Cisco Home Energy Management Solution.[20]

In updating the grid infrastructure in its service territory, a key component of the system is the transmission system communications node. These nodes are located at the ground level beneath electric power transformers. Communication nodes are a crucial part of the billing and power grid management systems because they collect information from numerous digital devices in the area, and transmit the information over a telecommunications network to the utility. [21] Additionally, the project includes installation of 45 phasor measurement units in substations and upgrades to communications infrastructure at the corporate control center.

In Ohio, Duke Energy chose the Echelon NES System as the backbone for its automated distribution network communication nodes. This equipment is installed at the "edge of the grid," also known as the "last mile" of the distribution grid where the electricity distribution network connects to customers. With this platform developers can quickly create new software-enabled services via an open application framework tailored to the utility's needs, in a system classified as self healing. The ability for the system to adapt to new technology through its open design is an attractive attribute for utilities, particularly since smart grid standards have only recently been put in place.[22]

In February 2011, the Ohio PUC opened case number 11-0277-GE-UNC, to begin a discussion of customer privacy protection and customer data access issues associated with the smart grid. Duke Energy Ohio submitted comments on March 4, 2011 recommending the launch of workshops to help inform and encourage discussion among utilities, customers, and other stakeholders regarding customer energy usage data privacy standards including storage, formatting, and third party access. In addition, Duke Energy requested such workshops to address the option of eliminating the ability for consumers to opt out of sharing customer energy usage data with their electric utility. [23]

UPDATES AS OF SEPTEMBER 2011

Duke Energy reported in its 2010 | 2011 Sustainability Report that the company has installed approximately 140,000 smart meters in its Ohio service territory since 2008. The company is currently installing distribution automation equipment, such as relays, circuit breakers and sensors. This equipment is designed to shorten and prevent power outages, while improving the electric system's efficiency. Duke Energy is set to install over 1 million smart electric and gas meters and other components over the course of the next five years.[24]

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[19] Duke Energy, Residential Energy Management System Pilot Program (NC), March 10, 2009, http://www.duke-energy.com/pdfs/NCREMS.pdf, accessed September 21, 2011

[20] Duke Energy, Duke Energy Signs Agreement with Cisco to Deliver Smart Grid-Enabled Home Energy Management Solution, June 29, 2010, http://www.duke-energy.com/news/releases/2010062901.asp, accessed September 21, 2011

[21] Duke Energy, Duke Energy Takes Steps to Further Advance Its Smart Grid Communications Architecture, Sept. 2, 2010, http://www.duke-energy.com/news/releases/2010090201.asp, accessed September 21, 2011

[22] Echelon, An Energy Control Network for Distribution Automation, http://www.echelon.com/metering/, accessed September 21, 2011.

[23] Ohio PUC, Case No. 11-277-EL-UNC, Comments of Duke Energy Ohio, Inc., March 3, 2011, http://dis.puc.state.oh.us/TiffToPDf/A1001001A11C04B43259A90260.pdf, accessed September 21, 2011

[24] Duke Energy, 2010 | 2011 Sustainability Report, Delivering Today. Investing for our Future, http://www.duke-energy.com/pdfs/10-11-sustainability-report.pdf, accessed September 21, 2011

On August 8, 2011, Duke Energy publicly released a February 1, 2011 white paper outlining the company's smart grid vision for the future. According to the white paper, Duke Energy will use communications nodes to locally aggregate and manage data from various applications including distribution automation, plug-in electric vehicles, smart metering and customer energy management. The communications nodes will be designed to work with a variety of wireless and wired communications technologies, and will support wide area networking, local area networking and node-to-node communications.[25]

[25] Masters, David, Duke Energy: Developing the communications platform to enable a more intelligent electric grid, http://www.duke-energy.com/pdfs/OP-David-Masters-SmartGrid-Comm-Platform-02-01-11.pdf, accessed September 21, 2011

FirstEnergy Smart Grid Modernization Initiative			
Location:	Cleveland, Ohio	**Dates:**	2010 - Present
Primary Utility/Entity:	FirstEnergy Corporation	**ARRA Funding:**	$36.1 million

PROGRAM INFORMATION	
Key Objectives	• To test and validate the integration of smart grid technology with existing distribution infrastructure. • To analyze system life-cycle costs for cost recovery investments. • To examine how aging infrastructure will perform alongside smart grid technology. • To evaluate benefits to customers and the environment.
Status	Pending regulatory approval; AMI tariff (cost recovery tariff) not yet approved by PUC.
Number of Participants	44,000 customers in Cleveland pilot project
Participating Entities	• FirstEnergy Corporation • Ohio Edison Company • Cleveland Electric Illuminating Company • Toledo Edison Company • Technical Support: EPRI, IBM, SAIC, BPL Global • Vendors: Verizon, Itron, SEL, Current, Zigbee
Program Budget	• $72.2 million total for Cleveland area pilot: o $36.1 million in SGIG funding o $36.1 million recovered through an AMI rider
Consumer Sector	• Residential • Commercial
Hardware/Software Technologies	• Wireless smart meters • Bellweather meters for voltage detection • IP-enabled communications network for all systems. Wide area network with public and private fiber optic cable/Ethernet, and wireless radio components • Meter data management system • Peak time rebate (PTR) pricing/CPP for select customers (voluntary) • Distribution automation technology, including SCADA, across 34 feeders • Advanced voltage controls on 21 feeders • Communications network (backhaul and wide area network) • Cyber security components • Load control options (e.g. programmable thermostats).
Consumer Education Measures	• FirstEnergy Corporation will formulate a comprehensive communications program to educate customers about program responsibilities and benefits. • Customers will be notified on critical peak events via an electronic message sent to the customer owned phone, email, facsimile, or pager.

PROGRAM RESULTS	
Key Findings	The PUC has been slow to approve cost recovery for the project.
Other Outcomes	N/A
Customer Feedback	N/A (pilot not yet initiated)
Current Deployment Status	In spring 2011, the company will begin installing 5,000 smart meters in the Cleveland area, with another 39,000 possible between 2012 and 2013.
Future Implications	If the initial 5,000 smart meter installations are successful, the company will proceed in installing the other 39,000 meters.
IMPACTS/BENEFITS	
Consumers	FirstEnergy expects: • Reduced frequency and duration of outages • Increased level of control over energy use • Reduced energy consumption during peak periods for cost savings • Improved electricity reliability
Utilities	FirstEnergy expects: • Better asset utilization • Increased customer satisfaction • Minimized transmission losses • Increased data availability • Increased workforce productivity
Metrics Used	Planned Impact Metrics: • 3% reduction in peak load (up to 120 MW of peak load reduction) • Improved average power factor of 0.05 • Reduction in peak demand of greater than or equal to 5 percent • Time for line crew to detect faults in system
RESOURCES	
Program Website	http://www.firstenergycorp.com.
Full Program Report	Smart Grid Modernization Initiative: Ohio PUC, Case No. 09-1820-EL-ATA, http://dis.puc.state.oh.us/TiffToPDf/A1001001A09K18B31543G06404.pdf, accessed September 21, 2011
Presentations	Nortech, Advanced Energy Speaker Series – Smart Grid Technology, March 10, 2010, http://www.nortechenergy.org/resources/Smart_Grid_Technology_-_FirstEnergy.pdf, accessed September 21, 2011
News Articles	• Funk, John, FirstEnergy Pulls Plug – For Now – on 'Smart Grid' Pilot Project, The Plain Dealer, 07-01-2010, http://www.cleveland.com/business/index.ssf/2010/06/firstenergy_pulls_plug_on_smart_grid_pilot_project.html, September 21, 2011 • Beyerlein, Tom, Smart grid technology promises more efficient electricity usage, http://www.daytondailynews.com/news/dayton-news/smart-grid-technology-promises-more-efficient-electricity-usage-1073996.html, accessed September 21, 2011

Other Resources	• PUC approval of plan: http://dis.puc.state.oh.us/TiffToPDf/A1001001A10F30B35930J74282.pdf, September 21, 2011 • Ohio PUC, PUCO approves FirstEnergy's Smart Grid Program, http://www.puco.ohio.gov/puco/index.cfm/media-room/media-releases/puco-approves-firstenergye28099s-smart-grid-program/, accessed September 21, 2011

PROGRAM DESCRIPTION

In October 2009, DOE awarded FirstEnergy $57.4 million in ARRA funding for smart grid improvements. FirstEnergy Corporation plans to use $36.1 million of the award amount towards a grid modernization project in Cleveland, Ohio. The company plans to recover the other $36.1 million through a PUC approved AMI rider. In November 2009, FirstEnergy Corporation subsidiaries Ohio Edison Company, Cleveland Electric Illuminating Company, and Toledo Edison Company submitted an application to the Ohio PUC for the Cleveland project. In June 2010, the PUC approved FirstEnergy's Smart Grid Modernization Initiative in case number 09-1820-EL-ATA. However, the approval was subject to the condition that the utility take the following measures:

- Create a database of customer-specific momentary interruption data.
- Keep all accounting records for the pilot program separate.
- Set target values for service reliability performance indices in the project area and report those to the PUC at the completion of the pilot project.
- Set the cost recovery rider as a fixed monthly charge rather than a usage sensitive charge.
- Share pilot project metrics with the PUC.
- Report to the PUC assessment results of the information and lessons learned from the initial 5,000 meter deployment.

In the ruling, the PUC further ordered that FirstEnergy request PUC permission before initiating any additional smart grid projects outside of the Cleveland pilot.

The ruling did not specify how the company could recover the $36.1 million cost not funded by the ARRA. The PUC stated that it would defer ruling on the cost recovery issue until FirstEnergy's second Electricity Security Plan was approved.[26] Fearing this could put the DOE funded grant money in jeopardy, FirstEnergy filed a re-hearing on the case in July 2010, but was denied.[27] FirstEnergy's Electricity Security Plan was later approved in August 2010, allowing the company to proceed in filing any associated tariffs related to the AMI project.[28] Since August 2010, FirstEnergy has been pursuing PUC approval of its AMI/Modern Grid Rider under case number 09-1820-EL-ATA.

Of the $72.2 million cost for the total project, $21 million will support AMI, $5 million will be spent on distribution automation technology, $2 million for advanced voltage controls, $6 million for the communications network, and $2 million for cyber security and project management.

[26] Ohio PUC, Case No. 09-1820-EL-ATA, Entry on Rehearing, http://dis.puc.state.oh.us/TiffToPDf/A1001001A10H25B42331B53184.pdf, accessed September 21, 2011

[27] Ohio PUC, Case No. 09-1820-EL-ATA, RHF Application for Rehearing, http://dis.puc.state.oh.us/DocumentRecord.aspx?DocID=b3de1156-7c1d-43fa-9b8d-92a6c6b68021, accessed September 21, 2011

[28] Ohio PUC, Case No. 09-1820-EL-ATA, OO-Opinion & Order, http://dis.puc.state.oh.us/DocumentRecord.aspx?DocID=06922852-fbd0-478a-b18b-af058aea4691, accessed September 21, 2011

The Cleveland area was chosen for the pilot program due to the limited amount of new infrastructure investment needed. The city's long circuit lengths (creating uneven voltage profiles across the lines) and concentrated population make it an ideal test-bed location for distribution automation. FirstEnergy plans to first deploy 5,000 meters for a random sample of customers and enter a program evaluation period before the other 39,000 meters are deployed.

Customers will be provided with programmable thermostats, electronic switches, and other in-home display devices to participate in CPP and load control portions of the pilot program. Customers will have access to "edge of the network" devices with dynamic pricing data, allowing them to participate in curtailment programs and maximize savings. In a study to evaluate customer responsiveness to the PTR pricing program, some customers will be credited 40¢ for every kWh they do not use compared with their home's average demand, while others will be credited 80¢ per kWh. The Zigbee Smart Energy Profile is one such product being considered as part of the AMI installations.

In another portion of the project, substation relay-based protection strategies will be implemented at nine substations. The distribution automation algorithm will have the capability to react to various loss-of-voltage scenarios.

For its communications network and interface architectures, FirstEnergy requires an open design and open protocols to ensure interoperability standards can be met in the future.

UPDATES AS OF SEPTEMBER 2011

There are no significant updates to this case study as of September 2011.

Georgia Power PoweRewards			
Location:	Georgia	**Dates:**	2008-2009
Primary Utility/Entity:	Georgia Power	**ARRA Funding:**	No

PROGRAM INFORMATION	
Key Objectives	• Critical Peak Pricing (CPP) Pilot for residential customers already with AMI • Customers receive credits for peak demand reduction
Status	Completed, successful
Number of Participants	1,000 residential customers
Participating Entities	Georgia Power
Program Budget	N/A
Consumer Sector	Residential
Hardware/Software Technologies	Pilot available to residents who already have AMI installed
Consumer Education Measures	Information on pilot program availability, applicability, and description was provided on Georgia Power's website
PROGRAM RESULTS	
Key Findings	• Energy reductions achieved from participants with notification of CPP events were greater than energy reduction of the control group during CPP events • Effective payout was 88¢/kWh, compared to the highest 2008 RTP price of 29¢/kWh • Program required approximately 30 hours of administrative time per event • Biggest issue was the "Normal Electric Demand" algorithm, it was difficult to predict erratic residential customer behavior
Other Outcomes	Residential AMI metering required additional time and research to support the interval data requirements of CPP
Customer Feedback	N/A
Current Deployment Status	N/A
Future Implications	N/A
IMPACTS/BENEFITS	
Consumers	Energy reductions achieved from participants with notification of CPP events were greater than energy reductions from the control group during CPP events. Program has the potential to reduce peak energy consumption from customers and save customers money
Utilities	• Peak Load Reductions: Program reduced peak energy demand, easing the demand on the utility • Higher than expected costs: Effective payout was 88¢ per kWh, compared to the highest 2008 RTP price of 29¢ per kWh

Metrics Used	• Peak energy demand reduction: 0.9 kW/CPP participant and 0.5 kW/Control Group customer • Customer Dollar Savings: 35¢/kWh of energy reduced with a maximum CPP period of 50 hours each year • Average Payout: Average total payout was about $6 per customer
RESOURCES	
Program Website	http://www.georgiapower.com/pricing/gpc_resrates.asp
Full Program Report	N/A
Presentations	Southern Company presentation to DOE/EIA Staff, Southern Company Update: Demand Response and Energy Efficiency, February 8, 2011
News Articles	N/A
Other Resources	• CPP-R-1 Electric Service Tariff - Rider Schedule, http://www.georgiapower.com/pricing/files/rates-and-schedules/CPP-R-1.pdf, accessed September 21, 2011 • General study, where Georgia Power was mentioned, http://www.naruc.org/Publications/SERCAT_Washington_2010.pdf, accessed September 21, 2011 • Georgia Power, Your Meter is About to Get Smarter, http://www.georgiapower.com/residential/smartmeter.asp, accessed September 21, 2011 • Southern Company Services, Constructing Baseline of Customer's Hourly Electric Usage in SAS, http://analytics.ncsu.edu/sesug/2009/PO015.Xiao.pdf, accessed September 21, 2011

PROGRAM DESCRIPTION

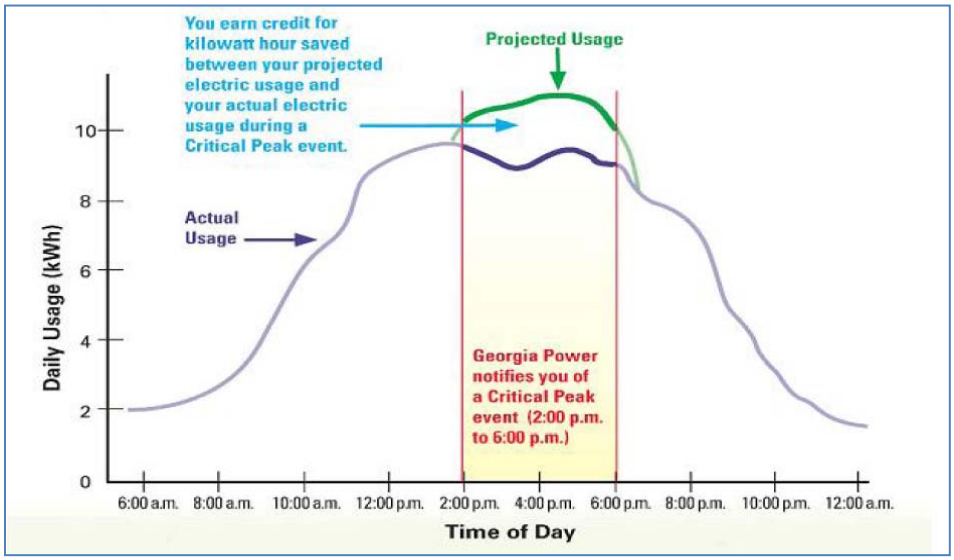
Georgia Power has one of the longest running and largest dynamic pricing programs in the nation. They began pilot-testing commercial and industrial RTP programs in 1992, and in 1994 offered the program to customers with power loads greater than 250 kW. Starting in 2008, Georgia Power began a critical peak pricing (CPP) pilot for its residential customers who already have AMI. The pilot, known as PoweRewards, allowed participating customers to receive credit when they reduce their electric usages during critical peak events called by the company (35¢/kWh of energy saved, with a maximum CPP period of 50 hours each year). In order to determine the rewards, baselines of each customer's hourly electric usage were constructed and rewards were calculated based on the differences between the customer's actual usage and the projected usage, called the baseline, as shown in Figure 2. Customers were notified at least one day before a CPP period was called, either by telephone or e-mail.

Results of the study showed that energy reductions achieved from participants with notification of CPP events (0.9 kW/customer on average) were greater than energy reduction of the control group (0.5 kW/customer on average). However, there were a number of concerns that arose following the end of the pilot. Financial concerns were noted since the effective payout to participating customers was 88¢/kWh, compared to the highest 2008 RTP price of 29¢/kWh.[29] Georgia Power also found issue with the amount of time required for each event; the CPP pilot required approximately 30 hours of administrative time per event. The biggest issue involved determining the baseline or Normal Electric Demand algorithm as it was difficult to predict the sometimes irregular power consumption behavior of residential customers.

[29] Southern Company presentation to DOE/EIA Staff, Southern Company Update: Demand Response and Energy Efficiency, February 8, 2011

Georgia Power's parent company, Southern Company, recently reviewed several CPP programs that were piloted by its retail operating company and noted the overall experience resulting from these programs. In particular, Southern Company found that reliable, measurable residential demand-side resources require enabling technology, such advanced energy management systems and customer gateways. Enabling technology can also further improve customer acceptance and satisfaction with CPP programs and increase the reliability of customer reductions. Southern Company also found that CPP/TOU programs need thorough customer education and energy management advice to be successful.

Figure 2. Georgia PoweReward Concept



Source: Southern Company Services, http://analytics.ncsu.edu/sesug/2009/PO015.Xiao.pdf, accessed September 21, 2011

UPDATES AS OF SEPTEMBER 2011

Georgia Power is in the process of installing smart meters for all of its customers. The company has installed about one million smart meters since 2008, and plans to complete installations by the end of 2012. Georgia Power plans to offer new rate options as a future smart grid benefit.[30]

[30] Georgia Power, Your Meter is About to Get Smarter, http://www.georgiapower.com/residential/smartmeter.asp, accessed September 21, 2011

ISO-NE Demand Response Reserve Pilot			
Location:	New England	**Dates:**	October 2006 – May 2010
Primary Utility/Entity	ISO-New England (ISO-NE)	**ARRA Funding:**	No

PROGRAM INFORMATION	
Key Objectives	• To test the ability of smaller DR resources to respond to ISO dispatch instructions in a manner similar to resources providing Operating Reserve. • To enable system operators to more accurately predict the likely performance of DR resources in varying system conditions, which would contribute to the analysis of contingencies and produce more confidence in the use of DR resources for enhancing system reliability at lower cost.
Status	Completed; successful
Number of Participants	• 109 assets participated in at least one of the sessions of the Demand Response Reserve Program (DRRP) • Of the 109 participants, 35 assets enrolled in all sessions of the program.
Participating Entities	ISO New England
Program Budget	N/A
Consumer Sector	Commercial
Hardware/Software Technologies	N/A
Consumer Education Measures	N/A
PROGRAM RESULTS	
Key Findings	• During all sessions, the performance of load reduction assets was always less than the demand response reserve contract amount. • Generation asset performance usually exceeded the demand response reserve contract amount, except for one season (summer of 2009). • Direct load control, which is combined with generators, had an average performance that was less than the demand response reserve contract amount. • While certain sessions had higher performance than the preceding session, total performance decreased over the six sessions of the DRRP.
Other Outcomes	• Generation resources, which provide reserve services in wholesale electricity markets, showed a moderate increase in reliability since the DRRP started. • DRRP assets showed a decrease in reliability during the same time frame.
Customer Feedback	N/A
Current Deployment Status	N/A

Future Implications	Recommendations to: • Conduct research regarding performance erosion over time • Conduct research regarding audit day behavior • Implement weather-based performance metrics and incentives for weather-sensitive assets • Introduce penalties for over-performance of assets • Continue the utilization of the symmetric baseline adjustment methodology • Provide tools that assist in setting realistic performance goals • Require justification for data changes over a given threshold • Investigate the need for special metering requirements for generation assets
IMPACTS/BENEFITS	
Consumers	N/A
Utilities	ISO-NE could expect decreases in assets' loads; however, reliability of load reductions decreased throughout the pilot project.
Metrics Used	• Average Enrolled Amount: 30.9 MW per session • Average Contract Amount: 15.8 MW • Average Performance: The average performance (total load relief) over all sessions was 42 percent (12.3 MW)
RESOURCES	
Program Website	N/A
Full Program Report	http://www.iso-ne.com/committees/comm_wkgrps/mrkts_comm/dr_wkgrp/mtrls/2010/dec12010/a16_dr_reserve_pilot_final_report_11_30_10.pdf
Presentations	N/A
News Articles	Rowland, Kate, ISOs and RTOs: The Demand Response Equation, Intelligent Utility, http://www.intelligentutility.com/article/10/12/isos-and-rtos-demand-response-equation, accessed September 21, 2011
Other Resources	N/A

PROGRAM DESCRIPTION

The DRRP was developed to acquire performance data for the types of DR resources that exist in New England in response to more frequent, short-duration activations like that of operating reserve resources. The DRRP also was intended to enable system operators to more accurately predict the likely performance of DR resources in varying system conditions, which would contribute to the analysis of contingencies and engender more confidence in the use of DR resources for enhancing system reliability at lower cost. The ISO-NE conducted six sessions of the DRRP between October of 2006 and May of 2010. There are three types of assets that participated in the DRRP:

- Load reduction assets, which reduced the amount of energy their facilities used during the event time. The most common strategies were reductions in lighting and HVAC usage. Asset performance was assessed by comparing their actual metered load during the event to a calculated baseline.
- Generation assets, which started after the meter generator. Their load impact is based solely on the metered generation at the time of the event.
- Direct load control assets, which applied control to a large number of small customers and consisted of residential air conditioner curtailment.

A total of 107 events were conducted over the pilot period, and at least 109 assets participated in at least one session of the DRRP. Thirty-five of the 109 total assets enrolled in all sessions. The average enrolled amount was 30.9 MW per session, and generally reflected each asset's maximum interruptible capacity (see Table 67). On average, the total load relief for each session was 12.3 MW. However, while certain sessions had higher performance than the preceding sessions, total performance decreased over the six DRRP sessions. The performance of the load reduction assets remained fairly constant through each session, achieving an average of 35 percent of DRRP contract amount. Generation and direct load control assets experienced a visible downward trend over the sessions, in which they participated and experienced substantial fluctuation. Compared to generation resources, which provide reserve services in wholesale electricity markets, DRRP assets exhibited less reliability.

Table 6. ISO-NE DRRP Performance Summary: Enrolled Amount vs. Average Performance

DRRP Session	Load Reduction			Generation and Direct Load Control			Total Amount		
	Enrolled MW	Actual MW	Achieved Percent	Enrolled MW	Actual MW	Achieved Percent	Enrolled MW	Actual MW	Achieved Percent
Winter 06/07	14.9	4.9	33%	5.0	4.6	92%	19.9	9.5	48%
Summer 07	20.2	8.4	42%	19.0	10.7	56%	39.2	19.2	49%
Winter 07/08	13.7	3.9	29%	5.0	4	80%	18.7	7.9	43%
Summer 08	18.6	6.8	37%	15.0	7.6	51%	33.6	14.4	43%
Winter 08/09	0	0	N/A	0	0	N/A	0	0	N/A
Summer 09	37.3	13.5	36%	10.0	2.3	23%	47.3	13.5	33%
Winter 09/10	26.5	9	34%	N/A	N/A	N/A	26.5	9.0	34%
Average	**21.9**	**7.8**	**35%**	**10.8**	**5.8**	**60%**	**30.9**	**12.3**	**42%**

Note: Due to a lack of enrollment in Winter 08/09, the average calculations are derived over six sessions only.
Source: KEMA, Demand Response Reserve Pilot Evaluation, Final Report, Prepared for ISO New England, November 30, 2010, http://www.iso-ne.com/committees/comm_wkgrps/mrkts_comm/dr_wkgrp/mtrls/2010/dec12010/a16_dr_reserve_pilot_final_report_11_30_10.pdf, accessed September 21, 2011

Through completing this pilot, several recommendations can be made in an attempt to improve asset performance moving forward, including: conduct research regarding performance erosion over time; conduct research regarding audit day behavior; implement weather-based performance metrics and incentives for weather-sensitive assets; introduce penalties for over-performance of assets; continue the utilization of the symmetric baseline adjustment methodology; provide tools that assist in setting realistic performance goals; require justification for data changes over a given threshold; investigate the need for special metering requirements for generation assets.

UPDATES AS OF SEPTEMBER 2011
There are no significant updates to this case study as of September 2011.

Oncor Smart Texas Program			
Location:	Texas	**Dates:**	2009-2012
Primary Utility/Entity:	Oncor	**ARRA Funding:**	$3.5 million for DLR pilot

PROGRAM INFORMATION	
Key Objectives	• Smart meter installation designed to upgrade the utility's infrastructure to allow for better electricity reliability, peak-load reduction, and other benefits. • Installation throughout Oncor's customer service area in the Dallas/Fort Worth metropolitan area and nearby communities • Related dynamic line rating (DLR) project to mitigate varying conditions along transmission lines and improve reliability
Status	In progress; some customer opposition
Number of Participants	• 3.4 million customers to receive smart meters • 2,086,150 smart meters installed as of September 21, 2011
Participating Entities	• Oncor • Gateway • CenterPoint (pilots in concert with Oncor) • Landis+Gyr (smart meter manufacturer) • IBM (systems integrator) • The Valley Group (DLR equipment provider) • Siemens Energy (DLR systems integrator)
Program Budget	• $686 million (Total capital costs for installation, or about $200 per meter) • $7.3 million (DLR pilot)
Consumer Sector	All
Hardware/Software Technologies	• Smart meters • In-home display monitors • Integrated dynamic line rating systems (DLR pilot)
Consumer Education Measures	• Website devoted to informing consumers about saving energy. Includes links to compliance reports and side-by-side demonstration tests • Smart Texas education campaign hosted eight Mobile Experience Center events • Door hangers • Advertisements • Local and national media coverage
PROGRAM RESULTS	
Key Findings	• Oncor's smart meter rollout has been on time and the technology has worked effectively • Customer complaints about electricity bills have dominated news coverage • The Texas PUC commissioned a report that found that Oncor's smart meters were working, with few exceptions, as expected
Other Outcomes	No significant delays in rollout as of September 2010. Number of smart meters installed is less than initially projected because population growth in service area did not meet estimates

Customer Feedback	• Most customer inquiries are of a general nature • Opposition has come from some customers; a lawsuit was filed • Anti-smart meter groups, including Smart UR Citizen, have been formed
Current Deployment Status	• More than 1.3 million smart meters were installed as of September 2010; expected completion in 2012. • DLR pilot expected to be completed 2nd Quarter 2013
Future Implications	• Electricity producers will be able to implement TOU pricing on a wider scale once installation is completed; for now, these programs are in pilot stages • DLR pilot will measure congestion relief and extrapolate potential economic effects in the overall Oncor service area
IMPACTS/BENEFITS	
Consumers	• Monthly surcharge for smart meter installation ($2.19/month) • Realization of fuller benefits will come when TOU pricing is more widespread.
Utilities	• Oncor's reputation has been mildly damaged by negative AMS feedback from customers • More comprehensive infrastructure improvements, including DLR
Metrics Used	• 2,086,150 smart meters installed as of September 21, 2011 • 770 meters required replacement as of September 2010
RESOURCES	
Program Website	http://www.oncor.com/tech_reliable/smarttexas/
Full Program Report	• Compliance Report of Oncor Electric Delivery Company LLC Pursuant to the Commission's Order Issued Docket No. 35718, September 2010, http://www.oncor.com/tech_reliable/smarttexas/AMS_PUC_Report_September2010.pdf, accessed September 21, 2011 • Oncor Press Release, April 2010, http://www.oncor.com/news/newsrel/detail.aspx?prid=1254, accessed September 21, 2011 • Navigant Consulting, Evaluation of Advanced Metering System (AMS) Deployment in Texas, Report of Investigation, July 30, 2010, http://www.sdge.com/documents/smartmeter/PUCTFinalReport7-30.pdf, accessed September 21, 2011
Presentations	Smart Grid Demonstration Project – Dynamic Line Rating (DLR), June 25, 2010, PowerPoint Presentation, http://www.ercot.com/content/meetings/ros/keydocs/2010/0625/05._OncorDynamicLineRatingProject06252010_.ppt, accessed September 21, 2011
News Articles	• PR Newswire, Oncor, Landis+Gyr Reach National Leadership Milestone in Advanced Meters, 2009, http://www.prnewswire.com/news-releases/oncor-landisgyr-reach-national-leadership-milestone-in-advanced-meters-63680562.html, accessed September 21, 2011 • SustainableBusiness.com, Gateway Launches Smart Grid Pilot in Oncor Service Area, July 2010, http://www.sustainablebusiness.com/index.cfm/go/news.display/id/20678, accessed September 21, 2011 • DallasNews.com, Oncor wins federal funding for smart grid project, November 2009, http://energyandenvironmentblog.dallasnews.com/archives/2009/11/oncor-wins-federal-funding-for.html, accessed September 21, 2011

	• GigaOM, Finally Some Good News for Smart Meters: Texas Lawsuit Tossed, August 2010, http://gigaom.com/cleantech/finally-some-good-news-for-smart-meters-texas-lawsuit-tossed/, accessed September 21, 2011 • Greentech Grid, Oncor Reacts to Smart Meter Anger, March 2010, http://www.greentechmedia.com/articles/read/oncor-reacts-to-smart-meter-anger/, accessed September 21, 2011 • Greentech Grid, Oncor Sued for Fraud Over Smart Meters, March 2010, http://www.greentechmedia.com/articles/read/oncor-sued-for-fraud-over-smart-meters/, accessed September 21, 2011
Other Resources	• SmartGrid.gov, Oncor Electric Delivery Company, Dynamic Line Rating, http://www.smartgrid.gov/project/oncor_electric_delivery_company_dynamic_line_rating, accessed September 21, 2011 • Components of AMS Surcharge, http://www.oncor.com/tech_reliable/pdf/Oncor-AMS-Surcharge-Analysis.pdf, accessed September 21, 2011

PROGRAM DESCRIPTION

Oncor's Smart Texas program arose out of the State's legislative efforts in 2007 to encourage smart meter deployment. The distribution utility's Automated Metering System (AMS, akin to AMI) includes the installation of Landis+Gyr smart meters to all 3.4 million customers in Oncor's service area in Dallas/Fort Worth and nearby communities. In July 2009, Oncor filed an application for a Smart Grid Investment Grant to cover a portion of the costs of the meter rollout. In October 2009, Oncor was informed by the DOE that it had not been selected to receive an award. Oncor is recovering the costs of deployment through a monthly service charge of $2.19 per account, assessed on residential customers by their REP.

From a public-relations standpoint, Oncor's smart grid rollout has not been a total success. Complaints about the accuracy of the meters, though low in overall number, have been widely publicized. In addition, a lawsuit was filed in 2010 alleging that smart meters incorrectly inflate measured electricity use, although the lawsuit was dismissed on technical grounds, as the Texas PUC was deemed to have jurisdiction. The Texas PUC commissioned a study in July 2010 that found that smart meters have been mostly accurate. The study, carried out by Navigant Consulting, conducted independent accuracy tests on 5,627 advanced meters in use by Oncor, CenterPoint, and AEP Texas. The study found that 5,625 of the 5,627 meters (99.96 percent) were determined to be accurate. According to filings with the Texas PUC, as of September 2010, over 1.3 million meters had been installed with a documented failure rate of 0.06 percent, as shown in Table 7. However, the utility still faces a challenge to convince customers that the meters will benefit them.

Table 7. Oncor Replacement Rate of Smart Meters (through September 30, 2010)

Number of Meters Installed	Number of Meters Requiring Replacement	Meter Failure Rate
1,343,358	770	0.06%

Source: Compliance Report of Oncor Electric Delivery Company LLC Pursuant to the Commission's Order Issued Docket No. 35718, September 2010, http://www.oncor.com/tech_reliable/smarttexas/AMS_PUC_Report_September2010.pdf, accessed September 21, 2011

A related DLR pilot, partially funded by an ARRA grant, is currently being implemented. The project will demonstrate the use of DLR monitoring technology to reduce transmission-line congestion and increase

the carrying capacity of the transmission lines. The pilot will help Oncor quantify the economic value of released transmission capacity to the market, determine how to use smart grid technologies to manage the amount of electricity moving on its lines, and quantify the total costs of implementing this type of DLR program on a wider scale. The pilot uses integrated dynamic line rating systems for overhead transmission lines along with a communications system that reads conductor tension, net radiation temperature, and ambient temperature and communicates this information to the substation through a spread spectrum radio.

UPDATES AS OF SEPTEMBER 2011

Oncor has installed about 2.1 million smart meters as of September 21, 2011, up from 1,343,356 on September 30, 2010. The company is approximately two-thirds complete with its planned smart meter installation program.[31]

[31] Oncor, Smart Texas – Rethinking Energy, http://www.oncor.com/tech_reliable/smarttexas/, accessed September 21, 2011

PEPCO PowerCentsDC			
Location:	Washington, DC	**Dates:**	2008-2009; 2010-2011
Primary Utility/Entity:	Potomac Electric Power Company (PEPCO)	**ARRA Funding:**	None for 2008-09; $44.6 million for 2010-13

PROGRAM INFORMATION	
Key Objectives	• To test the impacts of smart grid infrastructure on consumer behavior, specifically in response to three different dynamic electricity pricing plans (or groups): CPP, Critical Peak Rebate (CPR), and Hourly Pricing (HP). • To measure five primary impacts: peak demand reduction, overall consumption changes, customer satisfaction, usefulness of technologies used, and value of pricing information to customers. • To provide statistically valid results that could be extrapolated to the entirety of PEPCO's residential market in the District of Columbia.
Status	Complete, successful
Number of Participants	• About 900 (plus a 400-person control group) • PEPCO has approximately 778,000 customers in Washington, DC and its Maryland suburbs.
Participating Entities	• Smart Meter Pilot Program, Inc. (ran pilot program) • eMeter Strategic Consulting (wrote final report) • Pepco (utility) • DC Public Service Commission (PSC) • Smart Meter Pilot Program, Inc. (SMPPI), a nonprofit company comprised of Pepco, the D.C. Office of the People's Counsel, the D.C. Consumer Utility Board, the International Brotherhood of Electrical Workers Local 1900 and the PSC
Program Budget	N/A
Consumer Sector	Residential
Hardware/Software Technologies	• Smart Meters installed for all households • Smart Thermostats used for households with electric heating (about a third of total participants)
Consumer Education Measures	• Time-based pricing explained in program brochure • Consumer bills included a chart of consumer time use
PROGRAM RESULTS	
Key Findings	• All groups had electricity and dollar savings. • CPP had highest average electricity savings. • HP had highest average dollar savings, but exogenous factors likely contributed to this.
Other Outcomes	Feedback survey given to participants and control group showed general satisfaction with program.
Customer Feedback	• General satisfaction with program • Primary motivation for participation was to save money • Reducing use of air-conditioning and avoided use of appliances were common

Current Deployment Status	Pepco has begun installing smart meters in all DC households; expects to complete the process by the end of 2011.
Future Implications	Further research needed to determine whether all three TOU pricing programs will be offered to all of Pepco's customers.
IMPACTS/BENEFITS	
Consumers	• Increased access to information and smart meter/thermostat technology helped consumers make better decisions about their electricity use. • Most participants saved money from load shifting. • Additional savings, from overall demand reduction, may be realized.
Utilities	• Pepco could expect significant peak demand reduction, particularly in summer, from city-wide AMI implementation.
Metrics Used	• Peak Demand Savings: Electricity savings reported as percentage; ranged from 2 to 34 percent, depending on pricing plan and season (winter/summer) • Customer Dollar Savings: Average monthly savings of between $1.56 and $43.02 (2 to 39 percent), depending on price plan.
RESOURCES	
Program Website	• http://www.powercentsdc.org • http://www.pepco.com/energy/blueprint/
Full Program Report	PEPCO, PowerCents DC Program Final Report, September, 2010, http://www.powercentsdc.org/ESC%2010-09-08%20PCDC%20Final%20Report%20-%20FINAL.pdf, accessed September 21, 2011
Presentations	Morgan, Rick, PowerCents DC: Smart Pricing for the Smart Grid, Pepco, http://www.powercentsdc.org/SMPPI%2010-01-07%20Federal%20Briefing%20Slides%20FINAL-rev.pdf, accessed September 21, 2011
News Articles	• eMeter, PowerCentsDC ™ Selects eMeter's Energy Engage for Online Consumer Engagement, http://www.emeter.com/customers/powercentsdc/, accessed September 21, 2011 • Tweed, Katherine, PowerCentsDC Could Provide Best Practices for Other Utilities, Greentech Media, September 10, 2010 http://www.greentechmedia.com/articles/read/powercentsdc-could-provide-best-practices-for-other-utilities/, accessed September 21, 2011
Other Resources	N/A

PROGRAM DESCRIPTION

PowerCentsDC, an SMPPI DSM pilot program, was approved by the PSC in 2007 and launched the next year. The intent of PowerCentsDC was to measure and analyze residential customers' responses to the following three different dynamic electricity pricing plans (or groups): CPP, CPR, and HP. As the group names suggest, in CPP the electricity prices are about seven times the normal (slightly discounted) price for about 60 peak-consumption hours of the year; for CPR, rebates are earned for lower consumption in the peak pricing hours; and in HP, electricity prices change on an hourly basis based on wholesale prices.

Participants were given smart meters and, in some cases, smart thermostats for their air-conditioning units, and prices were designed to be revenue-neutral, so a participant would expect to pay the same as a non-participant with Standard Offer Service pricing. Additionally, participants received information about the pricing programs in the form of brochures. At the end of the pilot, in October 2009, a

customer survey was sent both to the 900 participants in PowerCentsDC as well as a control group of 400 non-participants. Low-income customers were included as a subset in CPR.

Questions the program tried to answer ranged from the very basic (would people even be willing to participate in the program?) to the very specific (how much money would consumers with central air-conditioning save, and how would this compare to consumers without central air-conditioning?). Thus, the pilot program generally tried to measure the relative effectiveness of the three pricing programs, as well as their absolute effectiveness when compared to business as usual. PowerCentsDC used a nonparametric conditional mean estimation framework for its analytical model.

Three major items were affirmed by PowerCentsDC in its full program report, released in September 2010 (summarized in Table 8):

- Peak demand was reduced in absolute terms (and, as a result, program participants saved money).
- Peak demand was reduced much more in summer than in winter.
- CPP resulted in the most peak energy savings, but had the smallest price savings.

Table 8. PEPCO PowerCentsDC Demand and Price Reductions

Price Group	Summer Peak Reduction	Winter Peak Reduction	Dollar Savings	Percent Savings
CPP	34%	13%	$1.56	2%
CPR	13%	5%	$4.59	5%
HP	4%	2%	$43.02	39%

Source: PEPCO, PowerCents DC Program Final Report, September, 2010, http://www.powercentsdc.org/ESC%2010-09-08%20PCDC%20Final%20Report%20-%20FINAL.pdf, accessed September 21, 2011

How was there an inverse relationship between peak demand reduction and price savings? It was probably just luck. Hourly Pricing program participants benefited from having prices tied to wholesale electricity prices, and it just so happened that over the course of PowerCentsDC, wholesale prices had a dramatic decrease, likely a result of economic downturn.

Other interesting conclusions include the following: use of smart thermostats increased demand reduction; low-income participants' demand reduction was smaller than others' in percentage terms; and the program was very popular with participants.

PEPCO was awarded a $44.6 million ARRA grant to install to install about 280,000 smart meters equipped with the network interface, institute dynamic pricing programs, and deploy distribution automation and communication infrastructure technology to reduce peak load demand and improve grid efficiency.

UPDATES AS OF SEPTEMBER 2011

The installation of smart meters is continuing across the District of Columbia until December 2011, at which point all District customers will have a smart meter.[32] Pepco conducts a sample test on each

[32] Pepco, Smart Meters in D.C., http://www.pepco.com/energy/blueprint/smetersdc/, accessed September 21, 2011

production run of smart meters before installation to ensure accuracy; to-date, no sample tests have failed.[33]

[33] Pepco, Pepco Tests Smart Meters for Accuracy, http://www.pepco.com/energy/blueprint/smetersdc/meteraccuracty.aspx, accessed September 21, 2011

PGE Critical Peak Pricing Pilot			
Location:	Portland, Oregon	**Dates:**	4th quarter 2011-2013
Primary Utility/Entity:	Portland General Electric (PGE)	**ARRA Funding:**	No

PROGRAM INFORMATION	
Key Objectives	To test a variable pricing program through which baseline data would be collected for one year, followed by the launching of a pilot program with 1,000 customers. A subset of those households eventually would get programmable thermostats that allow them to set default preferences for economy or comfort.
Status	Pending; scaled back
Number of Participants	1,000 residents (scaled back from 2,000 residents)
Participating Entities	• PGE • Third-party contractor for billing services
Program Budget	$1.6-2.0 million for third-party contractor
Consumer Sector	Residential
Hardware/Software Technologies	Smart meters
Consumer Education Measures	N/A
PROGRAM RESULTS	
Key Findings	Pilot study could commence during the 4th quarter of 2011
Other Outcomes	N/A
Customer Feedback	To be solicited throughout pilot
Current Deployment Status	N/A
Future Implications	N/A
IMPACTS/BENEFITS	
Consumers	N/A
Utilities	N/A
Metrics Used	N/A
RESOURCES	
Program Website	http://www.portlandgeneral.com/default.aspx
Full Program Report	N/A
Presentations	N/A
News Articles	Sickinger, Ted, PGE to test peak-pricing for electricity, The Oregonian, September 2, 2009, (initial pilot program) http://www.oregonlive.com/business/index.ssf/2009/09/pge_to_test_peak-pricing_for_e.html, accessed September 21, 2011

Other Resources	• PUC- Alternative Pilot submission: http://www.puc.state.or.us/PUC/meetings/pmemos/2010/092110/reg2.pdf?ga=t, accessed September 21, 2011 • PGE, Schedule 12, Residential Critical Peak Pricing Pilot, http://www.portlandgeneral.com/our_company/corporate_info/regulatory_documents/pdfs/schedules/Sched_012.pdf, accessed September 21, 2011 • PGE, Tariff update Announcement, June 8, 2011, http://www.portlandgeneral.com/our_company/corporate_info/regulatory_documents/pdfs/tariff_updates/Update_06_08_11.pdf, accessed September 21, 2011

PROGRAM DESCRIPTION

In order for PGE to be able to initiate their CPP Pilot, the PUC of Oregon required PGE to provide a formal voluntary enrollment period by September 1, 2010. However, PGE acknowledged it would be unable to meet the PUC's deadlines and requested to withdraw the initial pilot program in June 2010. In September 2010, PGE offered a substitute course of action, which would have an alternative CPP pilot running by sometime during the fourth quarter of 2011.

According to the PUC's Staff Report from a public meeting held on September 21, 2010, PGE's alternative CPP Pilot will include:

- A two-year CPP pilot investigation will be conducted as previously contemplated, except that the maximum number of residential customer participants will be scaled down to 1,000 from 2,000.
- Rather than PGE performing the CPP-participant billing services (including answering customers' CPP billing questions) "in-house," a third-party contractor will be retained to perform these functions. The contractor will utilize individual customer load data obtained by PGE from its smart meters. Third-party billing removes PGE's dependency upon its own IT staff for this aspect of the pilot study.
- The range of estimated costs—largely for funding the third-party contract—were forecast in Advice No. 09-05 to be $1.6 to $2 million.
- The CPP pilot will be up and running, i.e., with customers being enrolled and incurring bills based upon tariff CPP prices, by sometime during the fourth quarter of 2011.

After hearing about PGE's alternative plan, PUC staff had several comments and concerns. PGE's incremental costs for the CPP pilot should to be tracked and charged to ratepayers, as with any realized benefits so that ratepayers will be able to recognize the full CPP-related net benefits as described by PGE. Another big concern with PGE's new CPP pilot plan relates to the costs and received value by relying upon a third-party contractor for customer/billing services. Staff mentioned that issues could arise when PGE would transition from the pilot program to a full roll-out of CPP to customers if the contractor used proprietary software or software that is incompatible with PGE's current system. Given these concerns, PUC staff would like PGE to work with other parties to gain a more thorough understanding of all the feasible alternatives that may exist.

UPDATES AS OF SEPTEMBER 2011

According to a tariff update announcement on June 8, 2011, PGE elevated the Critical Peak price and increased the On-Peak/Off-Peak price spread from 1.5 cents to 2.5 cents.[34] The CPP pilot is expected to be conducted from November 1, 2011 through October 31, 2013.

[34] PGE, Tariff update Announcement, June 8, 2011, http://www.portlandgeneral.com/our_company/corporate_info/regulatory_documents/pdfs/tariff_updates/Update_06_08_11.pdf, accessed September 21, 2011

SDG&E Smart Meter Program			
Location:	SDG&E Service Territory, California	**Dates:**	2009-2011
Primary Utility/Entity:	San Diego Gas & Electric (SDG&E)	**ARRA Funding:**	~$28 million

PROGRAM INFORMATION	
Key Objectives	• Establishing the security of its smart grid network in preparation for advanced smart grid technologies. • Smart meter installation is first step, with other infrastructure technologies still in pilot stages.
Status	In progress
Number of Participants	• 1.4 million customers • 1,093,312 electric meters installed through 12/2010 • 725,353 gas meters installed through 12/2010
Participating Entities	SDG&E
Program Budget	• $572 million, as approved by the California PUC (CPUC) in 2007 • $60 million ($28 million ARRA grant and $31 million cost-share) for wireless communications system
Consumer Sector	All
Hardware/Software Technologies	• Two-way-communication smart meters (electricity and gas) • Smart thermostats • Integration with renewable generation (solar/wind) • Sensors, communications and control equipment for Micro Grid Demonstration Project
Consumer Education Measures	Website devoted to informing consumers about saving energy
PROGRAM RESULTS	
Key Findings	• Deployment has been on time and on budget, with little of the organized opposition experienced by fellow California utility PG&E. • Held up as example of good management. • Utility's focus has been on security/integrity first, with the belief that innovations in technology can be implemented later.
Other Outcomes	SDG&E named "smartest utility" two years in a row by *UtiliQ* magazine.
Customer Feedback	• Number of unique visits declined substantially in Q4 2010 even as number of installations was relatively stable. • Negative publicity has been limited.
Current Deployment Status	• Smart meter installation scheduled to be completed in June 2011 • Micro Grid Demonstration Project scheduled to run through 2011, after which implementation of successful technologies may take place over the entire SDG&E coverage area.
Future Implications	Findings of Micro Grid Demonstration Project and other initiatives will help SDG&E improve other aspects of smart grid infrastructure relating to sensors, communications, control equipment, and intermittent/distributed generation.

IMPACTS/BENEFITS	
Consumers	• Ability to monitor energy use • Businesses have ability to join commercial CPP program • Forthcoming integration with renewable energy to allow customers to sell energy back to grid
Utilities	• Effectiveness of smart meters has been increasing, relative to old meters • Utility able to remotely read nearly all meters • Publicity helped by perceived success of rollout
Metrics Used	• Percentage of Smart Meters Requiring Estimated Reading: 0.11 percent (gas), 0.11 percent (electric) versus 2.49 percent for manually read meters (4Q 2010) • Smart Meter website visits: 10,449 unique visits (4Q 2010) • Smart Grid Deployment Plan Metrics: o Nine customer/smart meter metrics o One plug-in electric vehicle metric o One energy storage metric o Eight grid operations metrics
RESOURCES	
Program Website	• http://www.sdge.com/smartmeter • http://www.sdge.com/smartgrid/smartGriddemo.shtml
Full Program Report	• http://www.sdge.com/smartgrid/deployment/index.shtml
Presentations	N/A
News Articles	• Rowland, Kate, UtilitiQ's most intelligent utility forges ahead, Intelligent Utility, http://www.intelligentutility.com/magazine/article/203205/san-diego-gas-electric, accessed September 21, 2011 • Bigelow, Bruce, SDG&E Gets $28.1M Federal Grant for Smart Grid Innovations, Xconomy San Diego, http://www.xconomy.com/san-diego/2009/10/27/sdge-gets-28-1m-federal-grant-for-smart-grid-innovations/, accessed September 21, 2011 • KFMB-TV CBS 8, SDG&E smart meters could help you cut power usage, http://www.cbs8.com/Global/story.asp?S=11772875, accessed September 21, 2011 • Perdue, Christopher, San Diego Gas & Electric weighs in on the costs of smart grid investments, Intelligent Utility, http://www.intelligentutility.com/article/11/06/san-diego-gas-electric-weighs-costs-smart-grid-investments, accessed September 21, 2011 • Renew Grid, SDG&E Outlines Smart Grid Plan, http://www.renewgridmag.com/e107_plugins/content/content.php?content.6864, accessed September 21, 2011

Other Resources	• http://www.sdge.com/smartgrid/smartGriddemo.shtml • http://www.sdge.com/smartgrid/index.shtml • http://www.sdge.com/smartmeter/faq.shtml • http://www.sdge.com/smartgrid/deployment/metrics.shtml • Smartgrid.gov, San Diego Gas and Electric Company: SDG&E Grid Communication System, http://www.smartgrid.gov/project/san_diego_gas_and_electric_company_sdge_grid_communication_system, accessed September 21, 2011 • CPUC, Decision 10-06-047 June 25, 2010, http://docs.cpuc.ca.gov/WORD_PDF/FINAL_DECISION/119902.PDF, accessed September 21, 2011 • Memorandum of Understanding on the Smart Grid Partnership Program, http://www.state.gov/documents/organization/164558.pdf, accessed September 21, 2011

PROGRAM DESCRIPTION

SDG&E first began planning its smart meter rollout in 2005. The first installations began in 2009 and were nearly complete by year-end 2010, with about 1,820,000 electric and gas smart meters deployed; full deployment was expected to be complete in June 2011. A budget of $572 million was approved by the CPUC in 2007. Since that time, SDG&E has won additional funding, including $28.1 million in ARRA funds for a $60-million communication improvement initiative, the centerpiece of which is a 700-mHz takeout point for data transmission. Additionally, $7.5 million in Federal funding and $3 million in State funding are going towards the utility's Micro Grid Demonstration Project, which is incubating sensors, communications and control equipment technologies for a potential future utility-wide rollout. The Micro Grid Demonstration Project also includes a focus on linking intermittent generation to a smart grid infrastructure; SDG&E hopes to allow residents with rooftop solar panels, for example, to sell generation to the grid at peak hours. The Micro Grid Demonstration Project is scheduled to run through 2011.

The smart meter rollout has been regarded as successful, with SDG&E's reputation further enhanced by being named the smartest utility for the second straight year by *UtiliQ* magazine in 2010. The prioritization of one aspect of smart grid, smart meter installation, has been mentioned as a possible factor in the success. This approach has allowed for a small pilot such as the Micro Grid Demonstration Project to study the effectiveness of other infrastructure technologies that could be installed at a later date, rather than rushing to implement unproven (and potentially soon-to-be-obsolete) technologies. Additionally, SDG&E's customer outreach has been deemed effective, as evidenced by the lack of organized opposition to smart meters that other rollouts have experienced. Variable-pricing programs employing smart meters have not been utilized, except for business customers, but this may change in the future.

UPDATES AS OF SEPTEMBER 2011

SDG&E has met with more than 25 stakeholder groups in academia, business, customer advocacy, and government since late 2010 in order to understand their smart grid preferences.[35] On June 6, 2011, SDG&E filed its "Smart Grid Deployment Plan 2011-2020" with CPUC. This plan serves as an overview of the company's current smart grid status and as a policy guide for future deployment of smart grid

[35] Renew Grid, SDG&E Outlines Smart Grid Plan, http://www.renewgridmag.com/e107_plugins/content/content.php?content.6864, accessed September 21, 2011

technology. The deployment plan was filed in response to CPUC decision D.10-06-047, which adopted requirements for smart grid deployment plans pursuant to Senate Bill (SB) 17.[36] SDG&E estimates that the cost of smart grid deployments from 2006 to 2020 will total approximately $3.5 to $3.6 billion, including previously authorized programs (equivalent to about $2,500 per customer).[37] SDG&E estimates that total benefits associated with smart grid deployments will total between $3.8 billion and $7.1 billion, including estimated societal and environmental benefits of between $760 million to $1.9 billion.

SDG&E currently quantifies the success of its current smart grid deployment through a variety of metrics posted on its smart grid homepage, including nine customer/smart meter metrics, one plug-in electric vehicle metric, one energy storage metric, and eight grid operations metrics. As of December 31, 2010, SDG&E has received 2,123 escalated customers complaints related to the accuracy, functioning, or installation of advanced meters, though there were only 37 instances when an advanced meter malfunction caused service to be disrupted. SDG&E reports that it replaced 27,472 advanced meters annually before the end of their expected useful life. As of the same date, 26,088 commercial and residential customers were enrolled in a time-variant or dynamic pricing tariff.[38]

SDG&E has also reached out to international partners. On May 24, 2011, SDG&E entered into an MOU with Russia's Interregional Distribution Grid Company of Centre to cooperate on the development of smart grid. Areas of cooperation will include AMI smart meters and distribution automation, among others.[39]

[36] CPUC, Decision 10-06-047 June 25, 2010, http://docs.cpuc.ca.gov/WORD_PDF/FINAL_DECISION/119902.PDF, accessed September 21, 2011
[37] Perdue, Christopher, San Diego Gas & Electric weighs in on the costs of smart grid investments, Intelligent Utility, http://www.intelligentutility.com/article/11/06/san-diego-gas-electric-weighs-costs-smart-grid-investments, accessed September 21, 2011
[38] SDG&E, Smart Grid Deployment Plan Metrics, http://www.sdge.com/smartgrid/deployment/metrics.shtml, accessed September 21, 2011
[39] Memorandum of Understanding on the Smart Grid Partnership Program, http://www.state.gov/documents/organization/164558.pdf, accessed September 21, 2011

SRP Smart Grid Project			
Location:	Central Arizona	**Dates:**	2003 - 2013
Primary Utility/Entity:	Salt River Project (SRP)	**ARRA Funding:**	$56.9 million

PROGRAM INFORMATION	
Key Objectives	• To enable SRP to remotely address customer orders. • To provide more timely and detailed information to customers and help them to better monitor and manage their energy consumption. • To reduce labor costs and conserve fuel.
Status	Successful to-date
Number of Participants	935,000 customers
Participating Entities	• SRP (utility) • Elster Group (Energy Axis AMI data management, REX meters) • ALPHA • Landis+Gyr (AMI meters)
Program Budget	• Total project cost is $114 million. • $56.9 million in ARRA funding received.
Consumer Sector	• Residential • Commercial • Industrial
Hardware/Software Technologies	• Wireless smart meters with two-way radio communications. Elster REX residential smart meters, ALPHA commercial and industrial smart meters. The meters communicate to the utility via radio signals. 300,000 of the meters are AMPY Pay-Smart Meters with in-home displays, wireless prepayment, or CPP-DR technologies. • Voluntary dynamic pricing options offered. • Elster's EnergyICT meter data management system is used to process meter data. • SRP is the first utility in the U.S. to roll-out remotely controlled 200A service switches to customers.
Consumer Education Measures	• Website includes meter reading tutorial, FAQ, and a guide for what to expect during installation. • Customer access to TOU data through a web portal and/or email notifications. • During the smart meter installation process customers receive: o Postcard (one week prior to installation) o Door hanger (after installation) o Additional page with first bill explaining smart meter the benefits
PROGRAM RESULTS	
Key Findings	• SRP planning to provide customers with a meter that gives hourly and/or real-time energy usage. • M-Power prepaid plan remains a popular option for a variety of residents.
Other Outcomes	N/A

Customer Feedback	• Few complaints about smart meter installations (mainly health concerns). • Customers have high satisfaction rate for pre-paid M-Power plan.
Current Deployment Status	• Smart meter deployment continues through 2012 or 2013 • Up to 709,932 smart meters deployed as of August 31, 2011
Future Implications	• Prepaid metering options may become more prevalent due to the success of the SRP plan. SRP is looking into merging smart meter technology with the M-Power plan. • All customers will have the smart meter option by 2013.
IMPACTS/BENEFITS	
Consumers	• 20 percent increase in voluntary TOU rate program participation with new smart meters. • SRP data shows 88 percent of M-Power customers prefer the prepaid plan to monthly bills; 93 percent say they use energy more wisely. • According to SRP, the average M-Power customer reduces energy usage by 12 percent annually. • M-Power customers could pay at most $74.50 more per year than customers on basic plan (roughly 5 percent rate hike), as a trade-off for more control over bills.
Utilities	• New meters contributed to SRP receiving several J.D. Power and Associates honors; highest in customer satisfaction for business and residential electric service among large electricity providers in the western U.S. • Voluntary pre-paid service is saving SRP money: o Less debt carried from customers who cannot pay bills. o Reduced labor costs due to call center staff relieved from handling reconnect and billing inquiries from accounts that have been shut off or are delinquent. • The utility now avoids tens of thousands of service calls a month. • On the company website, SRP claims the new smart meters are consistently proven to be highly accurate and reliable.
Metrics Used	• Reduced number of customer calls to the utility. • Smart meters currently installed: ~ 14,000 smart meters each month. • By the end of 2010, more than 280,000 customers enrolled in My Account online portal.
RESOURCES	
Program Website	http://www.srpnet.com/electric/home/smartmeter.aspx
Full Program Report	SRP, SRP 2010 Annual Report, http://www.srpnet.com/about/financial/2010AnnualReport/siteassets/pdfx/2010_AR_PDF.pdf, accessed September 22, 2011
Presentations	http://www.srpnet.com/about/financial/2010annualreport/default.aspx
News Articles	• Randazzo, Ryan, SRP gets boost from feds for customer 'smart meters,' The Arizona Republic, http://www.azcentral.com/business/news/articles/1969/12/31/19691231biz-srp1028.html, accessed September 21, 2011 • MeterPedia, Implementation in Arizona by Salt River Project, http://meterpedia.com/mwp/category/topics/prepayment/, accessed September 22, 2011

	• Elster, SRP To Double Elster EnergyAxis AMI Smart Grid Solution Deployment, http://investors.elster.com/phoenix.zhtml?c=227678&p=irol-newsArticle&ID=1444588&highlight=, accessed September 22, 2011 • EP Overviews Publishing Inc., SRP seeks $80,000,000 US for Smart Grid, Energy Efficiency projects (Funding, Leg. & Reg.), http://epoverviews.com/articles/visitor.php?keyword=Smart%20Meter%20Rollout, accessed September 22, 2011 • http://www.greentechmedia.com/articles/read/shocker-a-utility-that-ranks-high-in-customer-satisfaction/ • Randazzo, Ryan, SRP's prepaid electricity plan found to have higher rates, The Arizona Republic, July 11, 2010, http://www.azcentral.com/business/articles/2010/07/11/20100711biz-prepaid-power-srp-rates0711.html, accessed September 21, 2011 • Randazzo, Ryan, Arizona utilities try to ease 'smart meter' fears, The Arizona Republic, September 8, 2011, http://www.azcentral.com/business/articles/2011/09/08/20110908arizona-utilities-try-ease-smart-meter-fears.html, accessed September 21, 2011
Other Resources	• The Edison Foundation, Utility-Scale Smart Meter Deployments, Plans & Proposals - September 2009, http://www.electric-efficiency.com/issueBriefs/Smart%20Meter%20Rollouts_0909_web.pdf, accessed September 22, 2011 • Smartgird.gov, Salt River Project Agricultural Improvement and Power District, Advanced Data Acquisition and Management Program, http://www.smartgrid.gov/project/salt_river_project_agricultural_improvement_and_power_district_advanced_data_acquisition_and, accessed September 21, 2011

PROGRAM DESCRIPTION

In October 2009, SRP was awarded a matching grant of $56.9 million under ARRA Smart Grid Investment Grant initiative. SRP plans to install up to 1 million smart meters, along with the current implementation of the following four pricing plans:[40]

- TOU Plan: Higher prices during on-peak hours; all other off-peak hours are lower-priced.
- EZ3 Plan: Charges premium energy prices during the on-peak hours of 3-6 pm Monday to Friday. All other off-peak hours are lower-priced.
- Basic Plan: Energy prices are the same regardless of TOU. Prices go up slightly when energy usage in a month exceeds certain levels, which vary in winter and summer.
- M-Power Plan: Using an SRP M-Power smart card, customers can buy power when needed, in the quantity desired, at roughly 100 SRP PayCenter machines (similar to ATMs) in grocery stores, convenience stores, and SRP offices throughout Phoenix. An in-home display unit can be used to monitor energy costs. No monthly bills or late charges are assessed; the customer pays only an $87.50 equipment deposit and $11.50 plus tax refurbishment fee.

The Customer Metering Services department at SRP supports the metering operations for residential and commercial customers. The five department subdivisions (the Field Metering Operations, Metering

[40] SRP, Choose the right price plan, http://www.srpnet.com/prices/home/ChooseYourPricePlan.aspx, accessed September 22, 2011

Back-office Operations, Meter Shop Operations, Meter Reading, and Technical Support Services) achieve the following basic functions: [41]

- Install, test, maintain, and repair generation, substation, commercial/industrial, and residential metering
- Upgrade, program, and exchange meters
- Administer maintenance programs to ensure acceptable accuracy performance of population
- Test and evaluate new metering equipment and technologies
- Investigate customer complaints for billing and high/low usage

The wireless, RF smart meter deployments for residential, commercial, and industrial customers began in August 2003. Elster REX meters have an internal service control switch, enabling SRP to remotely connect and disconnect meters without sending personnel to the meter location.[42]

SRP is taking steps to ensure that customer education measures are in place and security risks are mitigated. Two weeks prior to installation, customers are sent smart meter information along with the contact information for staff that can respond to any follow-up questions. SRP chose to specifically design the customer education program to minimize the amount of effort needed for customers to obtain accurate information and resolve any issues or questions. Not only can customers check their energy use online, but SRP also offers estimated monthly or weekly bills via email or text messages based on current power usage. These capabilities were established and tested far ahead of the smart meter rollout, in anticipation of a sharp increase in customer questions. SRP plans to provide more detailed information, such as hourly and real-time data, in the coming years. Over a quarter of SRP customers have accessed the "My Account" online feature associated with their energy pricing plan.[43]

To address data security risks, SRP has implemented proprietary meter protocols to defend against unauthorized access to customer data. Encryption is used at each step of the data transmission process between the customer and SRP. The meters are password protected, meet the ANSI 12.21 and 12.22 security standards, and the network is equipped with a firewall to ensure complete isolation from the broad internet.[44]

SRP has received a great deal of attention for its successful M-Power plan, a prepaid metering program introduced to customers in 2000. By mid 2010, around 100,000 customers had enrolled in the plan, which was originally designed to assist low income residents with payment management.[45] The program has one of the highest customer satisfaction ratings of any customer program offered by SRP. Landis+Gyr will be working together with SRP to merge the latest smart meter technology into the plan to enable both credit and prepay modes. Currently, customers can only load their smart cards at SRP's PayCenter locations, but this will soon change once the customer can wirelessly load a credit amount onto their smart meter.

[41] Metering.com, Sustaining growth at Salt River Project, http://www.metering.com/node/15542, accessed September 21, 2011
[42] Ibid.
[43] Tweed, Katherine, Shocker! A Utility That Ranks High in Customer Satisfaction, Greentech Media, Inc., http://www.greentechmedia.com/articles/read/shocker-a-utility-that-ranks-high-in-customer-satisfaction/, accessed September 21, 2011
[44] SRP, FAQ about smart meters, http://www.srpnet.com/electric/home/smartmeterfaqs.aspx#1, accessed September 21, 2011
[45] Randazzo, Ryan, SRP's prepaid electricity plan found to have higher rates, The Arizona Republic, http://www.azcentral.com/business/articles/2010/07/11/20100711biz-prepaid-power-srp-rates0711.html, accessed September 21, 2011

According to local news reports, some public outcry against the wireless smart meters has occurred in the Phoenix area, mainly for health reasons. However, SRP offers the M-Power plan which does not require a wireless, RF smart meter.

There have also been reports of radio interference caused by the new smart meters. Reports have surfaced of shorted out appliances catching fire, and interference with garage door openers or security systems. Currently the meter roll-out continues with no major problems reported. On the company website, SRP claims "the new meters will not interfere with any of your home electronics."

Consumer advocacy groups have raised concerns about some facets of the M-Power program. If M-Power customers don't reduce their electricity consumption, they could pay up to $74.50 more a year on the M-Power plan than on the basic rate plan, according to an Arizona Republic analysis of the rate structure. This is equivalent to a five percent rate increase. Though most customers express satisfaction with the program, advocacy groups object to the fact that low income residents, particularly those with smaller homes, are being charged more than customers on the basic plan. M-Power customers currently cannot take advantage of dynamic rates like TOU, CPP, or RTP pricing unless additional steps are taken to configure these rate plans on the meter.[46] The ease with which the electricity can be shut off is also a concern, particularly in the Arizona desert. SRP responds that it is expected that customers will reduce energy usage on these plans, and will receive savings as a result. In at least one "friendly credit" feature of the plan, if a customer runs out of purchased power after 6 p.m. on weekdays, weekends, or on a holiday, the power will not be shut off.[47] Prepaid metering does require significant capital investment for utilities due to extra equipment, which may explain why it remains a rare program in the United States.

UPDATES AS OF SEPTEMBER 2011

SRP's smart grid homepage gives differing numbers regarding the progress of its smart meter deployment program. According to one set of figures, 709,932 smart meters have been installed as of August 31, 2011, about 14,000 new smart meters are being installed each month, and virtually all customers will have advanced meters by April 2013. However, SRP also indicates on its program's frequently asked questions (FAQ) page that 560,000 smart meters have been installed, over 10,000 new smart meters are being installed each month, and deployment is set to be complete as soon as summer 2012. Recent news reports indicate that the larger number of installed meters is likely more accurate.[48]

SRP indicates on its program homepage that smart meter deployment is allowing it to save 249,000 labor hours, avoid 1.3 million driving miles, and conserve 135,000 gallons of fuel.

[46] Kumar P. B, Satheesh, Are We Ready for Era of Smart Prepaid Services?, Wipro Council for Industry Research, http://www.wipro.com/datadocs/EnergyUtilities/UtilitiesWP/smart-prepaid-services.pdf, accessed September 21, 2011

[47] Consumer Reports, Prepaid and "smart" meters let you see how much electricity you use—and how much you might save, http://news.consumerreports.org/home/2007/11/smart-meters-prepaid-meters-electricity-use-save-energy-salt-river-project-mpower-plan.html, accessed September 21, 2011

[48] Randazzo, Ryan, Arizona utilities try to ease 'smart meter' fears, The Arizona Republic, September 8, 2011, http://www.azcentral.com/business/articles/2011/09/08/20110908arizona-utilities-try-ease-smart-meter-fears.html, accessed September 21, 2011

Xcel Saver's Switch			
Location:	Minnesota	**Dates:**	1990-Present
Primary Utility/Entity:	Xcel Energy	**ARRA Funding:**	No

PROGRAM INFORMATION	
Key Objectives	To reduce peak demand through direct load control, and in turn, allow Xcel Energy to manage its energy resources and avoid paying higher fuel prices during peak periods.
Status	In progress, successful
Number of Participants	• 314,000 residential customers (this equates to about half of Minnesota's eligible residential population) as of June 1, 2009 • 13,000 business customers as of the end of 2008
Participating Entities	• Xcel Energy (utility, runs program) • Hunt Electric (provides majority of switch technology installation) • The Cadmus Group (wrote 2010 status report)
Program Budget	$8.5 million (from 2010 cost benefit study)
Consumer Sector	• Residential • Commercial
Hardware/Software Technologies	• Standard 900 MHz paging switch (initially) • Automated meter reading system to send a remote signal to meters (2001) • Smart switches, a 900 MHz adaptive algorithm switch (2003)
Consumer Education Measures	• Marketing channels, including bill inserts, direct mail, their standard utility website • Dedicated website just for DSM and DR programs • Telemarketing
PROGRAM RESULTS	
Key Findings	• Both residential and business program participants reported high satisfaction with their program experiences. • Program marketing analysis concludes that traditional marketing approaches, augmented by a segmentation and target marketing approach, effectively promote the program. • To resolve issues surrounding participants' understanding of how the program works, Xcel Energy should communicate more frequently with participants.
Other Outcomes	In a 2010 net present cost-benefit analysis, customer cost-savings were greater than the utility's costs, with high societal net benefits.
Customer Feedback	Saver's Switch participants report high levels of satisfaction with their participation experience.
Current Deployment Status	Xcel (and its predecessors) have been offering Saver's Switch in Minnesota since 1990. Xcel now offers Saver's Switch as an across its service territory, including in Colorado, New Mexico, Texas, North Dakota, South Dakota, and Wisconsin.
Future Implications	N/A

IMPACTS/BENEFITS	
Consumers	• Participants receive 15 percent off their electric energy charges from June through September. • If a water heater is also enrolled in the program an additional 2 percent discount on monthly bills is given throughout the year. • Businesses receive a discount of $5 per air conditioning ton on their June, July, August, and September electric bills. • 2010 bill reduction savings for business customers in this program was estimated to be $3.9 million, while bill reduction savings for residential participants was estimated to be $11.7 million.
Utilities	• Switch hardware and installation work are the significant costs. • Xcel Energy incurs labor costs for managing the program and promotional expenses for program expansion. • 2010 utility project costs for business customers were estimated to be $1.98 million. • Costs for residential customers were estimated to be $6.5 million.
Metrics Used	• Peak Demand Savings: Total residential peak load reduction at end of 2005 was 445 MW. • Energy Savings: 49,598 kWh is proposed to be saved (generator) from business participants between 2010 and 2012. 171,406 kWh is proposed to be saved annually from 2010-2012 from residential participants. • Customer Dollar Savings: calculated from 15 percent discount on residential electric bills June-September; additional 2 percent discount every month from adding on electric water heaters, and $5 credit per air conditioning ton for business participants June-September.
RESOURCES	
Program Website	• Residential Site: http://www.xcelenergy.com/Save_Money_&_Energy/For_Your_Home/Heating_&_Cooling/Saver%27s_Switch_-_MN, accessed September 21, 2011 • Commercial Site: http://www.xcelenergy.com/Save_Money_&_Energy/Find_a_Rebate/Saver%27s_Switch_-_MN, accessed September 21, 2011
Full Program Report	Xcel Energy, 2010/2011/2012 Triennial Plan, Minnesota Electric and Natural Gas Conservation Improvement Program, http://www.xcelenergy.com/staticfiles/xe/Regulatory/Regulatory%20PDFs/2010-11-12Triennial_FINAL_FILED.pdf, accessed September 21, 2011
Presentations	N/A
News Articles	• http://www.xcelenergy.com/About_Us/Energy_News/News_Archive/Xcel_Energy_offers_Saver%27s_Switch_discounts_to_four_New_Mexico_communities, accessed September 21, 2011 • http://www.xcelenergy.com/About_Us/Energy_News/News_Archive/Xcel_Energy_customers_help_reduce_peak_electricity_demand , accessed September 21, 2011 • http://www.xcelenergy.com/About_Us/Energy_News/News_Archive/Xcel_Energy_encourages_customers_to_help_reduce_peak_electricity_demand_by_using_Saver%27s_Switch, accessed September 21, 2011

Other Resources	Public Service Company of Colorado, 2012/2013 Demand-Side Management Plan, Electric and Natural Gas, http://www.xcelenergy.com/staticfiles/xe/Regulatory/2012-2013%20Biennial%20DSM%20Plan.pdf, accessed September 21, 2011

PROGRAM DESCRIPTION

The Saver's Switch Program is a direct load control program that offers residential and business customers credit on their electric bills by allowing Xcel Energy to cycle their air conditioners during peak demand periods. Xcel Energy has offered the Saver's Switch Program in Minnesota since 1990; in 2008, Xcel Energy offered residential participants in Minnesota the option of adding their water heater into the program for an additional incentive. Minnesota residents participating in the program receive 15 percent off their electric energy charges from June through September; if a water heater is also enrolled in the program an additional 2 percent discount on monthly bills is given throughout the year. Businesses in Minnesota receive a discount of $5 per air conditioning ton on their June, July, August, and September electric bills.

Xcel Energy now offers Saver's Switch across much of its service territory, including in Colorado, New Mexico, North Dakota, Texas, South Dakota, and Wisconsin. The program has proven popular in service territories outside of Minnesota. Saver's Switch was launched in Colorado in 2000, and as of December 31, 2010 Xcel Energy reports that there are 137,000 switches in the field. Compensation for participation in the program varies by state; for example, Colorado residents receive a $40 annual bill credit, rather than a fixed percentage off their summer bills as in Minnesota.[49]

A 2010 net present cost-benefit analysis shows that for business customers in this program, bill reduction savings was estimated to be $3.9 million, while bill reduction savings for residential participants was estimated to be $11.7 million. This analysis also showed that utility costs for business customers were estimated to be $1.98 million, whereas utility costs for residential customers were estimated to be $6.5 million. Societal net benefits from the business sector in 2010 were calculated to be $9.1 million, whereas societal net benefits from the residential sector in 2010 were calculated to be $20.45 million

A recent study shows that Saver's Switch participants report high levels of satisfaction with their participation experience. HVAC contractors do not present a significant barrier to program implementation and focus group discussions with HVAC contractors indicated those that understood how the switch worked and had more accurate information about the program were less likely to negatively influence customers. Additionally, traditional marketing approaches, augmented by a segmentation and target marketing approach, are effective methods for promoting the program. The marketing methods implemented in 2009, including bill inserts, direct mail, telemarketing, target marketing, and advertising, were successful for meeting increased participation goals in Minnesota and doubling the number of new program participants in Colorado from those in 2008. Recommendations going forward include the increased use of promotions that drive more sign-ups to the web; this is a cost-efficient but underutilized channel for enrollment.

However, marketing materials, such as program brochures and direct mail pieces, have some missing information and ambiguous messaging. Marketing materials minimize the effect of cycling on

[49] Public Service Company of Colorado, 2012/2013 Demand-Side Management Plan, Electric and Natural Gas, http://www.xcelenergy.com/staticfiles/xe/Regulatory/2012-2013%20Biennial%20DSM%20Plan.pdf, accessed September 21, 2011

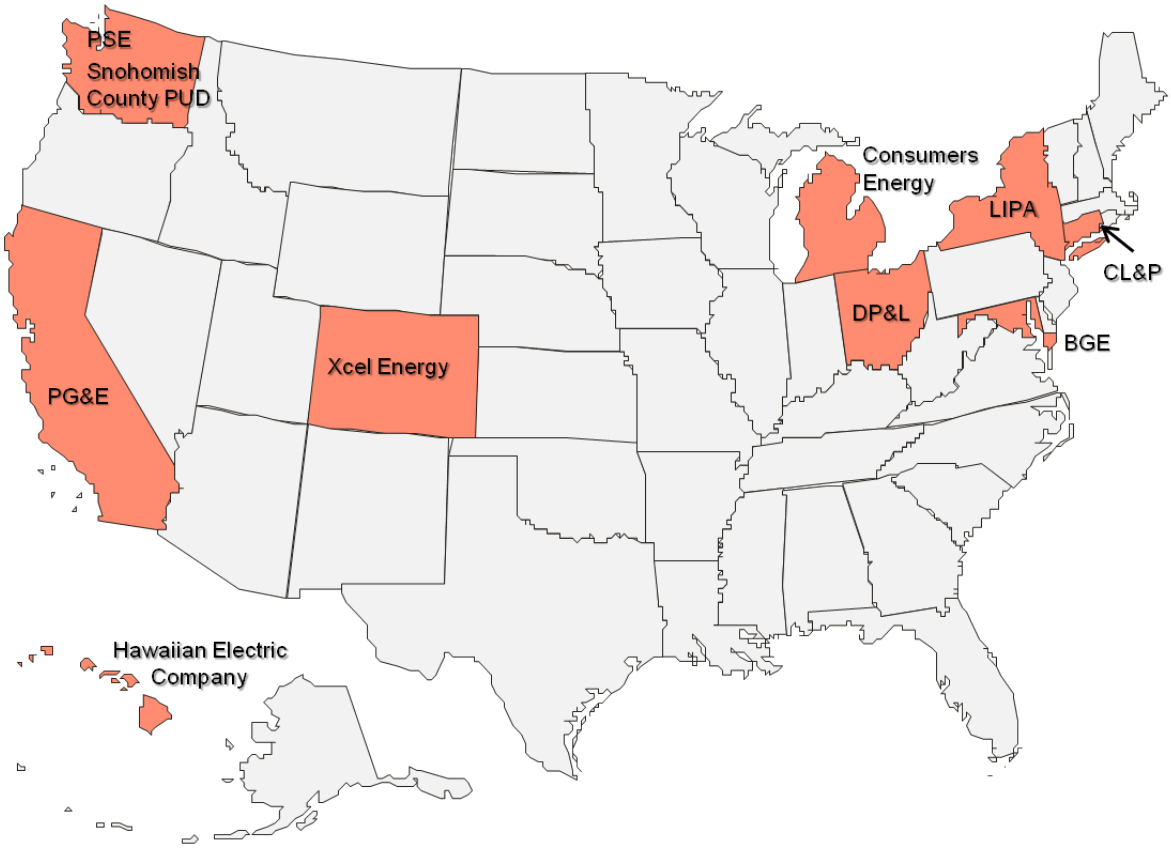
participants and information specific to renters. Additionally, participants could benefit from more frequent communication from the program. With most if not all the marketing efforts focused on recruitment, participants are only reminded about their involvement in the program when cycling is in effect and by a single line in their October electric bills. Although the program is designed to be low-engagement, participants recognize a need for more information about the program.

UPDATES AS OF SEPTEMBER 2011

There are no significant updates to this case study as of September 2011.

Case Studies of Cancelled or Postponed Smart Grid Projects

Figure 3. Locations of Cancelled/Postponed Smart Grid Project Case Studies



Source: SAIC

BGE Smart Grid Initiative			
Location:	Central Maryland	**Dates:**	2009 - Present
Primary Utility/Entity	Baltimore Gas & Electric (BGE)	**ARRA Funding:**	$200 million

PROGRAM INFORMATION	
Key Objectives	• To achieve $2.5 billion worth of savings for BGE customers. • To enhance customer service and electric reliability. • To encourage customers to better manage, conserve and save money on energy.
Status	Initially stalled by a Maryland PSC decision; later approved by PSC after BGE re-filed a new plan.
Number of Participants	• 1.2 million digital electric meters covering all residential and small business customers
Participating Entities	• BGE • ZigBee • Elster American (for gas diaphragm meters)
Program Budget	• BGE estimates that the cost of the proposed program would total $835 million. • BGE received $200 million in support from DOE.
Consumer Sector	• Residential • Commercial
Hardware/Software Technologies	• Smart meters with two-way communication through a wide area network and a local area network, equipped with a ZigBee chip, with the following: o Hourly meter readings (at minimum) o Voltage monitoring o Ability to accept remote programming instructions o Remote disconnect/reconnect capabilities o Ability to communicate outage restoration events o Net metering support • Peak Rewards Program: Initially included as a mandatory TOU rate schedule in the first application to the PSC. • Meter Data Management system • Transmission/Distribution Upgrades: o Embedded sensors o Automated substations o “Smart” transformers o Analytical computer modeling tools o High-speed integrated communications o Reconfigured distribution circuits
Consumer Education Measures	• New filing includes a comprehensive customer-focused education and outreach plan. • Customer web portal for viewing hourly electricity usage, including previous day comparisons. • BGE indicates the company “will begin communication with customers prior to technology installation” and will foster customer understanding of the

	rebate program and the tangible benefits of the Smart Energy Pricing program. • BGE is researching education methods including benchmarking, focus group testing, online/phone/contact center and awareness surveys, and social landscape monitors. • Education outlets will include traditional mass media such as TV, radio, and print , along with social media – all directing customers and stakeholders to the new smart grid micro site for more information. • Opt-in email campaign, online newsroom, webinars, customer tool kit, and FAQs on BGE's Smart Grid website serve as education outlets.
PROGRAM RESULTS	
Key Findings	• Regulators objected to BGE's mandatory TOU rates and the proposal to recover funds from customers via a surcharge, before the cost benefits of smart grid improvements could be seen. • In order to proceed, BGE was ordered to recoup its costs through base-rate increases (not through surcharges) once installations are completed.
Other Outcomes	N/A
Customer Feedback	• BGE reports that over 90 percent of customers expressed satisfaction during the two years of the pilot program; the average savings was more than $100 a year. • In mid-March 2011, BGE reports that "customers continue to strongly support BGE's Smart Energy Savers program" with more than 300,000 customers enrolled in BGE's PeakRewards.
Current Deployment Status	BGE is reported to be starting a full scale roll-out of smart meter technology, though no specifics were found in the identified sources.
Future Implications	• BGE must install smart meter systems before recovering any portion of the costs from customers. • Mandatory TOU programs remain a sticking point for State regulators.
IMPACTS/BENEFITS	
Consumers	N/A
Utilities	N/A
Metrics Used	N/A
CAUSES FOR CANCELLATION/POSTPONEMENT	
Primary	• Lack of funding or cost issues • Inadequate customer education for effective system use
Secondary	• Negative response to rate increases • Waiting for technological advancements • State/local regulatory orders causing delays
RESOURCES	
Program Website	http://www.bge.com/learnshare/smartgrid/smartmeters/Pages/default.aspx, accessed September 21, 2011
Full Program Report	N/A
Presentations	Carmody, Paula, Dumb Policies and Smart Grids: A Consumer Perspective, University of Florida – Public Utility Research Center, February 3, 2011, http://warrington.ufl.edu/purc/docs/AnnualConference/38_Carmody.pdf, accessed September 21, 2011

News Articles	• Sustainable Business.com, Maryland Regulators Approve BGE's Revised Smart Grid Proposal, http://www.sustainablebusiness.com/index.cfm/go/news.display/id/20873 , accessed September 22, 2011 • SustainableBusiness.com, Baltimore Gas and Electric Revises Rejected Smart Grid Proposal, http://www.sustainablebusiness.com/index.cfm/go/news.display/id/20675 , accessed September 22, 2011 • BGE, News Release, BGE Customers Continue to Strongly Support BGE's Smart Energy Savers Program, http://files.shareholder.com/downloads/CEG/1198083822x0x449890/fc67fb45-bfe2-4759-a858-a41e69353f69/BGE_Milestone_Release_Final_3.14.11.pdf, accessed September 22, 2011 • BGE, News Release, BGE to Proceed with Smart Grid Implementation, http://files.shareholder.com/downloads/CEG/1198083822x0x395710/cf4f0b8f-a675-44ea-991a-cf2328d9575b/Implementation_Final_Release_v2_8-16-10.pdf, accessed September 22, 2011 • Sustainablebusiness.com News, Maryland Regulators Approve BGE's Revised Smart Grid Proposal, http://www.sustainablebusiness.com/index.cfm/go/news.display/id/20873, accessed September 21, 2011 • Behr, Peter, MD.'s Veto of Advanced Meter Deployment Stuns Smart Grid Advocates, http://www.nytimes.com/cwire/2010/06/23/23climatewire-mds-veto-of-advanced-meter-deployment-stuns-95998.html, accessed September 21, 2011 • Greater Baltimore Committee News, BGE updates GBC committee on next-generation 'Smart Grid' technology, http://www.gbc.org/news/2045/, accessed September 21, 2011
Other Resources	• Public Service Commission of Maryland, Order No. 83410, Case No. 9208, http://webapp.psc.state.md.us/Intranet/Casenum/NewIndex3_VOpenFile.cfm?filepath=C:\Casenum\9200-9299\9208\Item_59\\59.pdf, accessed September 21, 2011 • Public Service Commission of Maryland Case No. 9208, http://webapp.psc.state.md.us/intranet/maillog/content.cfm?filepath=C:%5CCasenum%5CAdmin%20Filings%5C110000-159999%5C121153%5COPCINITIALBRIEFFINAL.pdf, accessed September 21, 2011 • Public Service Commission of Maryland, Order No. 83531, Case No. 9208, http://webapp.psc.state.md.us/Intranet/Casenum/NewIndex3_VOpenFile.cfm?ServerFilePath=C:\Casenum\9200-9299\9208\\82.pdf, accessed September 21, 2011 • SGIC, Baltimore Gas and Electric Smart Grid Project, http://www.sgiclearinghouse.org/ProjectList?q=node/168&lb=1, accessed September 21, 2011 • Smartgrid.gov, Baltimore Gas and Electric Company, Smart Grid Project, http://www.smartgrid.gov/project/baltimore_gas_and_electric_company_smart_grid_project, accessed September 21, 2011

PROGRAM DESCRIPTION

In July 2009, BGE announced its Smart Grid Initiative, to allow deployment of smart meters throughout the entire service territory of BGE. Smart meters would allow for two-way communication and the implementation of a mandatory TOU rate schedule for all residential customers. BGE estimated that the cost of the proposed program would total $835 million with $482 million expended during the initial deployment phase and the additional $353 million required over the expected life of the program. The $200 million in DOE stimulus funds would help to offset a substantial portion of the proposed customer surcharges. BGE urged the PSC to quickly review their initial filing, requesting a final decision by the end of September 2010.

CAUSES FOR CANCELLATION OR POSTPONEMENT

On July 22, 2010, the PSC denied the Smart Grid Initiative filing. The PSC found the proposal untenable, citing financial risks for the ratepayers, concerns about the proposed tariff structure, technological uncertainties, and underlying assumptions and cost-effectiveness of the business plan.

The PSC questioned the underlying assumptions regarding cost recovery. BGE made the point in its testimony to the PSC that "traditional rate recovery would place an undue strain on the company's balance sheet." The PSC admitted that surcharges were frequently approved to support energy efficiency and DR programs, but smart grid projects could not be grouped in the same category due to the infrastructure involved, specifically the cost of meters, which were never previously funded through surcharges. The PSC also noted that customers who contribute to the funding of the program that later relocate outside BGE's territory might never receive a return on the investment if meters are not installed in their area by that time. Additionally, the plan did not address the $100 million in functional traditional meters that would have to be retired.

In citing concerns about the proposed tariff structure, some groups pointed out during the proceedings that certain groups would be at a great disadvantage in the mandatory TOU program. The Office of the People's Counsel viewed the mandatory TOU program as detrimental to older adults, children and others that are at home during the afternoon peak demand period. [50] It was also argued that up to 40 percent of low-income customers would see a rise in summer energy bills and up to 15 percent would see a rise in annual energy bills overall. The lack of in-home displays to alert customers of rising prices was also criticized. The PSC commented that the surcharge would raise the average electricity customer's monthly rate by 38¢ beginning in 2010, rising to $3.78 in 2013.[51] Some see the decision to reject mandatory RTP as a general trend in State commissions throughout the United States.

The PSC argues that technological innovations and standards for interoperability in the coming years would result in current ratepayers funding outdated technology and could result in additional costs. The PSC stated in its decision, "If it turns out that appliance manufacturers decide to adopt some alternative to ZigBee technology, the expectation that the proposed 'smart meters' will one day be capable of communicating with a customer's 'smart' appliances evaporates." Others also argued that since standards are actively being developed, there is a high level of risk if BGE's proposed technology is deployed and later found to be incompatible with the new standards.

[50] SmartGridNews.com, BG&E Takes Its Smart Grid Case to Regulators, http://www.smartgridnews.com/artman/publish/Business_Policy_Regulation_News/BG-E-Takes-Its-Smart-Grid-Case-to-Regulators-1418.html, accessed September 21, 2011

[51] Behr, Peter, Md.'s Veto of Advanced Meter Deployment Stuns Smart Grid Advocates, The New York Times, http://www.nytimes.com/cwire/2010/06/23/23climatewire-mds-veto-of-advanced-meter-deployment-stuns-95998.html, accessed September 21, 2011

The PSC cited a lack of a strong customer education program as another reason for denying the proposal. The PSC did not feel that customers were provided with the amount of information needed to trigger the desired behavior to shift their energy usage. The PSC brought forth suggestions such as print, radio and television media, live in-person question and answer sessions, town hall meetings and hands-on demonstrations for customers as possible education measures. The PSC further requested that a timeline for education measures be provided as well.

The PSC clearly stated its support for the smart grid concept and urged the company to submit a revised plan. In the order, the PSC stressed that a revised plan should address 1) a cost recovery mechanism that spreads some of the risk to BGE shareholders; 2) elimination of the mandatory TOU rates and 3) the development of a concrete, detailed customer education plan.

FUTURE CHANGES

BGE re-submitted its smart grid metering proposal on July 12, 2010, addressing the three principal concerns of the PSC. BGE dropped the mandatory TOU rates, and developed a more detailed customer education program. Although BGE did not drop its request for an upfront cost recovery surcharge, it did reduce the amount requested to 25 percent of its costs.

On August 12, 2010 the PSC conditionally approved the revised plan, approving the revised customer education plan and the elimination of the mandatory TOU provision, but rejected the up-front surcharge assigned to ratepayers for the roll-out. On August 14, 2010, BGE accepted the conditions and announced the program would be implemented. As a result, the program did qualify for the $200 million in stimulus money from the DOE grant program.

According to the 2010 Securities and Exchange Commission 10-K filing, dated Dec. 31, 2010, BGE was authorized to establish a separate regulatory asset for incremental costs the company will incur to implement the Smart Grid Initiative, net depreciation, and amortization associated with the meters. The PSC order requires that BGE prove the cost effectiveness of the entire smart grid initiative prior to seeking recovery associated with these regulatory assets. BGE indicates in the filing "the commencement and timing of the amortization of these deferred costs is currently unknown."[52] BGE is proceeding with its plan to deploy smart meter technology, but the company cannot recover its costs until after the system is in place.

ALTERNATIVE PROGRAMS

Though it is unclear what program BGE may put in place if the Smart Grid Initiative fails, BGE currently offers energy efficiency programs and a voluntary DR program for customers. In the BGE Smart Energy Savers Program, businesses have access to financial incentives and engineering services for projects such as: [53]

- Retrofits of inefficient equipment
- New construction
- Major renovation and remodeling
- New equipment purchases
- End-of-life equipment replacements

[52] BGE, Securities and Exchange Commission Form 10-K, http://files.shareholder.com/downloads/CEG/1198083822x0x451977/923C10D6-7064-4CD2-A2D2-4AEF9A3F9FDB/10-K_2010.pdf, accessed September 21, 2011

[53] BGE, Smart Energy Savers Program, http://www.bgesmartenergy.com/business, accessed September 21, 2011

For residential customers, the BGE Smart Energy Savers Program provides a variety of discounts and rebates to help customers cut energy costs, save money, and improve home quality. The PeakRewards program is designed to help residential electric customers reduce "peak" demand for electricity, regardless of their electricity supplier. Customers' homes are equipped with smart thermostats or water heater switches controlled by a radio signal, and BGE is permitted to "cycle" the participant's air conditioning (or water heater) on and off, typically during the summer months at peak electricity demand. Participants can also log onto an online portal to access thermostat or equipment settings.

BGE also offers the Energy Choice program, which allows customers to choose their energy supplier. Some suppliers specialize in green options of wind and solar generated electricity.

UPDATES AS OF SEPTEMBER 2011

BGE is planning to begin deployment of 1.2 million digital electric meters and 1,200 radios between 2012 and 2014, thereby covering every home and small business in its service territory.[54] Benefits will not begin immediately after installation, though some smart meter features will be available by 2012. BGE plans to roll out peak event reports and savings summaries, peak event web notifications, and smart energy pricing programs in 2013. BGE plans to notify customers well in advance of their meter installation.

[54] Greater Baltimore Committee News, BGE updates GBC committee on next-generation 'Smart Grid' technology, http://www.gbc.org/news/2045/, accessed September 21, 2011

CL&P Plan-it Wise Energy Program			
Location:	Connecticut	**Dates:**	2009 - Present
Primary Utility/Entity:	Connecticut Light & Power (CL&P)	**ARRA Funding:**	No

PROGRAM INFORMATION	
Key Objectives	• To provide CL&P customers the tools to better control their energy usage. • To improve outage detection and restoration accuracy. • To improve electricity theft detection. • To reduce meter reading costs.
Status	• Delayed due to suspension of PUC review; State Attorney General requesting PUC reject CL&P request due to costs. • Could begin an AMI deployment by December 31, 2012. • Cyber security and interoperability standards in progress and should be complete in mid-2011.
Number of Participants	1.2 million customers, representing all CL&P customers
Participating Entities	• CL&P • Bridge Strategy Group (assisted with cost effectiveness analysis)
Program Budget	• $863 million over 20 years ($493 million on a present value basis)
Consumer Sector	• Residential • Commercial • Industrial

Hardware/Software Technologies	• Smart meters (two-way wireless network)
	• Three new pricing options, including one with rebates for limited-income customers. Includes peak time pricing, a PTR, and an eight-hour TOU year-round rate.
	• Meter Data Management system, to be implemented in 2011, will:
	  o Enable the ability to read, store and process hourly energy data
	  o Aggregate hourly energy usage into pre-defined peak times to enable dynamic pricing
	• Smart thermostat
	• A/C switch
	• Energy orb
	• In-home display

Consumer Education Measures	• Budgeted $44 million in “customer engagement costs” for marketing, education and peak day notification. This includes:
	  o $26 million for general marketing of voluntary dynamic pricing
	  o $15 million to provide an additional page on every customer’s monthly bill regarding the program
	  o $3 million to enable peak day notifications to customers via radio and television
	• Direct mail, bill inserts and outbound calling for disseminating program information
	• Enhanced energy analytics provided through the company web site

PROGRAM RESULTS	
Key Findings	• Concerns about upfront costs of full scale deployment • Data privacy concerns • Proposed ten-to-one pricing differential at peak times expected, translating to high rates at peak times.
Other Outcomes	N/A
Customer Feedback	CL&P expects that customers will further embrace emerging energy products and services, including distributed generation, electric vehicle smart charging, and smart appliances through the program.
Current Deployment Status	Public Utilities Regulatory Authority review temporarily suspended due to passage of Public Act Number 11-80
Future Implications	• CL&P expects that by 2017, 25 percent of residential customers and 50 percent of commercial and industrial customers will be enrolled in program. • CL&P will build additional IT capabilities to provide dynamic pricing, on-bill hourly energy usage analytics, outage detection during AMI deployment. • Dynamic pricing will be available to all customers by 2016.
IMPACTS/BENEFITS	
Consumers	CL&P estimates: • The average residential customer will save $11 over the twenty-year life of the program. • The average commercial and industrial customer will save $96 over the twenty-year life of the program. • The base case indicates that the average customer bill will increase until 2019 and then decrease.
Utilities	CL&P estimates: • Peak load reduction of 125 MW annually. • Total energy reduction of 190 million kWh per year; enough energy to power 20 homes. • Carbon emission reduction of 100,000 tons per year; equivalent to 13,000 fewer cars on the road. • Two percent reduction in storm outage duration.
Metrics Used	• Operation and maintenance metrics include improved theft detection, reduced meter reading costs, elimination of off-cycle meter reads, reduction in manual connect and disconnects. • Amount of avoided or delayed capital investments by: 1) reducing peak-load needs and allowing for reduction in system growth capital and 2) reduced capital costs associated with the replacement of the current AMR meters and other manual meter-reading equipment. • Shifting of megawatts from peak to off-peak hours. • Reduction of peak load through various tested pilot rates. • Reduction in overall energy consumption through AMI. • Will reduce CL&P's storm "System Average Interruption Duration Index" by six minutes. • Net reduction, on the scale tons, in carbon emissions.

CAUSES FOR CANCELLATION/POSTPONEMENT	
Primary	Lack of funding or cost issues
Secondary	• Privacy concerns • Negative response to rate increases • State/local regulatory orders causing delays
RESOURCES	
Program Website	http://www.cl-p.com/home/saveenergy/goinggreen/planitwise.aspx
Full Program Report	• http://nuwnotes1.nu.com/apps/clp/clpwebcontent.nsf/AR/recommendations/$File/recommendations.pdf, accessed September 21, 2011 • CL&P, Results of CL&P Plan-it Wise Energy Pilot, Docket No. 05-10-03RE01 Compliance Order No. 4, http://www.cl-p.com/Home/SaveEnergy/Plan-it_Wise_Pilot_Results/, accessed September 21, 2011
Presentations	• Faruqui, Ahmad, and Sanem Sergici, Appendix A: Impact Evaluation of CL&P's Plan-it Wise Energy Program, The Brattle Group, http://www.cl-p.com/Home/SaveEnergy/Plan-it_Wise_Pilot_Results_Appendix/, accessed September 21, 2011
News Articles	• Kane, Brad, Smart grid's fate hinges on DPUC, consumer embrace, Hartford Business Journal Online, http://www.hartfordbusiness.com/news17308.html, accessed September 21, 2011 • Tweed, Katherine, Connecticut Light & Power Proposes 10:1 Ratio for Peak Power, greentechmedia, http://www.greentechmedia.com/articles/read/connecticut-power-light-proposes-10-1-ratio-for-peak-power/, accessed September 21, 2011
Other Resources	• CL&P, AMI and Dynamic Pricing Deployment Cost Benefit Analysis, http://nuwnotes1.nu.com/apps/clp/clpwebcontent.nsf/AR/recommendations/$File/recommendations.pdf, accessed September 21, 2011 • Connecticut Public Utilities Regulatory Authority, Docket 05-10-03RE04, http://www.dpuc.state.ct.us/SearchDB.nsf/MenuForm?Openform, accessed September 21, 2011 • Summary of Public Act Number 11-80: An Act Concerning the Establishment of the Department of Energy and Environmental Planning for Connecticut's Energy Future, Murtha Cullina, http://www.murthalaw.com/publications/918-summary-public-act-number-11-80-act-concerning-establishment-of, accessed September 21, 2011 • SGIC, Smart Grid Projects, http://www.sgiclearinghouse.org/ProjectList?voc_18=776&voc_36=1151&submit=Apply, accessed September 21, 2011

PROGRAM DESCRIPTION

CL&P first began designing a meter data management system in late 2008. In summer 2009, approximately 3,000 customers (1,500 commercial and industrial customers and 1,500 residential customers) from Hartford and Stamford participated in a pilot program known as the as the Plan-it Wise Energy Program, which included smart meters and dynamic pricing options.[55] The pilot program achieved its objective, which was to gain insight into customer interest and response patterns for

[55] CL&P, Plan-it Wise Energy Program, http://www.cl-p.com/home/saveenergy/goinggreen/planitwise.aspx, accessed September 21, 2011

dynamic pricing rates and four enabling technologies, including smart thermostats, smart switches, Energy Orb, and a Power Cost Monitor. CL&P also gathered additional insight into the maturity of certain AMI technologies.

Peak time pricing, PTRs, and TOU pricing were the three rate designs used, each tested with a high and low price differential of off-peak to on-peak. The CPP and PTR rates were in effect for a total of 40 hours on 10 days from 2 p.m. to 6 p.m. The CPP program increased prices up to $1.60 per kWh during peak hours, while providing a discount of up to $0.05 per kWh during off-peak hours. The PTR program retained normal tariff pricing during all hours of the pilot, but provided rebates of up to $1.60 per kWh during the peak hours if customers reduced their energy usage during that time. The TOU pilot rate tested response from noon to 8 p.m. weekdays as the on-peak period, and all other hours as the off-peak period. The pilot price differential for on-peak versus off-peak was substantially wider than the TOU pricing CL&P currently implements in its TOU rates. The pilot program proved that customer adoption of dynamic pricing achieves significant peak load reduction. Some of the findings indicated that:

- Peak time pricing is the most cost effective dynamic pricing rate (most cost effective/most satisfying to customers).
- PTRs are also cost effective and the utility recommended that all low income customers should be placed on the PTR rate to encourage participation.
- The four-hour TOU rate for residential and business customers is not cost effective unless coupled with other rates.
- The eight-hour TOU rate for residential and business customers is not cost effective unless coupled with other rates. For both TOU options, the utility recommended using an on and off-peak period price differential similar to the high TOU differential tested, to encourage greater customer response).

CL&P used these results to analyze and determine the cost effectiveness of different AMI and dynamic pricing deployment scenarios.

As of March 2011, cyber security and interoperability standards were still being developed for the program, and were anticipated to be completed by mid-2011. At that time, CL&P was to move forward with an RFP for AMI technology selection. Assuming all other approvals are received, CL&P could begin deploying AMI by December 31, 2012 with a four-year AMI implementation. The project would progress through IT development for dynamic pricing and on-bill hourly energy usage analytics, with dynamic pricing available to all customers by 2016. Underlying technology for outage detection, theft detection, and remote service activation operational efficiencies would be developed through 2017. After a public comment period, the PUC was expected to issue its final ruling approving or rejecting the plans by April 6, 2011.[56]

CAUSES FOR CANCELLATION OR POSTPONEMENT

Businesses and State officials have expressed concerns about the upfront costs of CL&P's smart meters. In addition, the industry continues to resolve issues such as security and privacy while ratepayers remain less than enthusiastic about new meter technology. Connecticut Attorney General George Jepsen has indicated that the $492 million cost of the project is too high considering the project benefits are still

[56] Connecticut Public Utilities Regulatory Authority, Application of CL&P to Implement TOU, Interruptible Load Response, and Seasonal Rates, Docket 05-10-03, http://www.dpuc.state.ct.us/dockhist.nsf/(Web%20Main%20View%5CAll%20Dockets)?OpenView&Start=13441.1, accessed September 21, 2011

unknown. The $600 million in savings proposed by CL&P depends heavily on customer response to the programs. Further, Jepsen asked the PUC to deny the full scale smart meter proposal, arguing that the upgrade should be postponed until the existing mechanical meters require replacement.[57]

Privacy issues surrounding customer electricity consumption data are also emerging as a concern. Some critics argue that a utility should make it clear in the project plans that the data will only be used for better cost controls and efficiencies in the system. Security measures should also be integrated into the design to protect meter data from unauthorized access.

In analyzing the rate structure for the dynamic pricing programs, some reports indicate the differential between on-peak and off-peak prices will be too wide. CL&P plans to implement a ten-to-one ratio in critical to off-peak pricing, resulting in electricity prices as high as $1.60 per kWh in the summer months. CL&P argues that steep price signals will further encourage conservation among customers, and allow the company to expand DR services. Connecticut has had successful DR activities, with around 12 percent of peak MW under DR management.[58] With the average U.S. residential electricity price in the second quarter of 2010 of 11.90¢ per kWh according to the EIA, a price increase to $1.60 per kWh could be difficult for customers to accept. [59]

FUTURE IMPLICATIONS

In order for the project to be cost effective, CL&P must have a significant, positive, long-term response to the AMI programs. In the company's program analysis, it is mentioned that "uncertainty in assumptions extending twenty years out" has required the company develop a best, worst and reasonable base case scenario with benefits that are highly dependent on external variables. If CL&P can present a major return on the $492 million AMI investment, the PUC will be more likely to approve the proposal. If the project is given permission to proceed, CL&P will have the opportunity to provide the PUC with additional details regarding its proposal prior to full scale deployment. As of March 2011, CL&P was due to provide an informational update on key AMI standards, technology, deployments and Smart Controlling Technologies in the industry around the end of October 2011.

ALTERNATIVE PROGRAMS

Though it is not yet known what other smart grid projects the utility might pursue if the Plan-it Wise program is not approved, CL&P offers green pricing through a CT Clean Energy Option. This program supports clean, renewable energy produced from wind, water and other renewable sources.

CL&P also has a pilot program, known as "Home Energy Reports," where customers receive detailed bills with the following features:

- Comparison reports: Customers can view how their electricity consumption compares to similar homes in their neighborhood. Only the customer can see their personal information.
- Progress tracker: Customers can view their energy use over time, so they can set targets to save money and electricity.
- Energy efficiency tips: CL&P provides tips designed for the customer based on their energy use patterns and home characteristics.

[57] Kane, Brad, Smart grid's fate hinges on DPUC, consumer embrace, Hartford Business Journal Online, http://www.hartfordbusiness.com/news17308.html, accessed September 21, 2011

[58] Tweed, Katherine, CL&P Proposes 10:1 Ratio For Peak Power, Greentech Media, Inc., http://www.greentechmedia.com/articles/read/connecticut-power-light-proposes-10-1-ratio-for-peak-power/, accessed September 21, 2011

[59] Energy Information Administration, Table 2. U.S. Energy Prices Short-Term Energy Outlook - March 2011, http://www.eia.doe.gov/steo/steo_full.pdf, accessed September 21, 2011

UPDATES AS OF SEPTEMBER 2011

Connecticut's PUC has been considering CL&P's smart meter deployment proposal under Docket No. 05-10-03RE04, "Application of The Connecticut Light and Power Company to Implement Time-of-use, Interruptible Load Response, and Seasonal Rates – Review of Meter Study, Deployment Plan and Rate Pilot." Though no final decision has been made whether to approve the project or not, a draft decision issued on August 29, 2011 would deny CL&P permission to deploy smart meters across the state. The draft decision cites a number of reasons for denying the project, including the following: uncertainties regarding AMI technology and standards, minor savings for customers, a lack of confidence in the cost/benefit analysis provided by CL&P and a concern that customers do not desire to participate in dynamic rate plans. Though a full deployment would not be permitted, the draft decision does call for CL&P to provide the PUC with four reports throughout 2012 and 2013 describing the latest advancements in AMI technology. Should the AMI industry develop to the point where CL&P believes that a smart meter deployment would be cost effective, the utility may request a meeting with the PUC to develop a plan of action to evaluate an updated deployment plan.[60]

Public Act No. 11-80, an act concerning the establishment of the Department of Energy and Environmental Protection and planning for Connecticut's energy future, came into effect July 1, 2011. This new law consolidates development of Connecticut's energy policy within the new Department of Energy and Environmental Protection, and requires the department to implement a variety of new clean energy and energy efficiency programs. The commissioner of the Public Utilities Regulatory Authority decided to suspend all further action on Docket No. 05-10-03RE04 while the new department establishes Connecticut's smart meter policy. By delaying review of CL&P's smart meter deployment plan, the Public Utilities Regulatory Authority will ensure that CP&L's proposals align with the Connecticut legislature's directives.[61]

Despite the draft decision and the suspension of review, CL&P's Plan-it Wise homepage still states that the company recommends smart meter installations begin in the latter part of 2012, once a series of industry standards are in place.

[60] Connecticut Public Utilities Regulatory Authority, Draft Decision for Docket No. 05-10-03RE04, http://www.dpuc.state.ct.us/dockcurr.nsf/8e6fc37a54110e3e852576190052b64d/225548e74546efe585257905005603e3?OpenDocument, accessed September 21, 2011

[61] Connecticut Public Utilities Regulatory Authority, Motion Ruling for Docket No. 05-10-03RE04, http://www.dpuc.state.ct.us/dockcurr.nsf/8e6fc37a54110e3e852576190052b64d/225548e74546efe585257905005603e3?OpenDocument, accessed September 21, 2011

Consumers Energy SmartStreet Pilot and Full Scale Smart Meter Project			
Location:	Michigan's Lower Peninsula	**Dates:**	2008 - Present
Primary Utility/Entity	Consumers Energy	**ARRA Funding:**	No

PROGRAM INFORMATION	
Key Objectives	• To quickly respond to outages and decrease repair time • To provide real-time information to customers allowing them to better manage energy consumption • To increase operation efficiency and implement DR programs
Status	Full scale deployment postponed until Michigan PSC approval is received.
Number of Participants	• Anticipated conversion of 3.5 million electric and gas meters (1.8 million electricity meters) to smart technology • An initial 7,000 smart meters were installed in Jackson County in 2010 • About 60 homes and businesses in Grand Rapids received smart meters as part of the SmartStreet program in 2011
Participating Entities	• Consumers Energy • IBM • SAP • OSIsoft • General Electric • Elster
Program Budget	• $2.57 billion (nominal dollars, over lifecycle) for full scale deployment • $200 million for the Smart Grid/AMI pilot
Consumer Sector	• Residential • Commercial
Hardware/Software Technologies	• Elster's EnergyAxis system used in pilot program • General Electric's high-speed wireless system with WiMAX (the first of its kind in a U.S. deployment) • Planned smart meters, wireless mesh networks, backhaul networks
Consumer Education Measures	• Company website has smart meter information. • Consumers Energy's Smart Services Learning Center analyzes smart grid technology effects on service quality and monitors customer satisfaction.
PROGRAM RESULTS	
Key Findings	Pilot costs, and proposed full scale costs not deemed reasonable by the PSC at this time.
Other Outcomes	N/A
Customer Feedback	No feedback found in identified sources.
Current Deployment Status	• In 2010, Consumers Energy installed smart meters at about 6,000 customer homes in Jackson County. • Full scale deployment is currently pending PSC approval.
Future Implications	Consumers Energy will have to significantly lower costs before receiving approval from the PSC for full scale deployment.
IMPACTS/BENEFITS	
Consumers	N/A

Utilities	N/A
Metrics Used	N/A
CAUSES FOR CANCELLATION/POSTPONEMENT	
Primary	Lack of funding or cost issues
Secondary	• Waiting for technological advancements • State/local regulatory orders causing delays • Observing other pilot projects before proceeding
RESOURCES	
Program Website	• http://www.consumersenergy.com/content.aspx?ID=3776 • http://www.consumersenergy.com/content.aspx?id=1503
Full Program Report	http://efile.mpsc.state.mi.us/efile/docs/16191/0293.pdf
Presentations	N/A
News Articles	• SmartGridNews Online, Consumers Energy Profile, http://www.smartgridnews.com/artman/publish/Key_Players_Utilities_Profiles/Consumers_Energy_Profile-1083.html, accessed September 22, 2011 • SGIC, Consumer Energy Smart Meter Pilot Project, http://www.sgiclearinghouse.org/node/1565, accessed September 21, 2011 • Dickinson, Boonsri, In Michigan, a Smart Meter Plan Gets Scaled Back, Greentech Media, Inc., http://www.greentechmedia.com/articles/read/in-michigan-a-smart-meter-plan-gets-whacked-back/, accessed September 21, 2011 • Puchala, Jessica, Consumers Energy's SmartStreet program underway, WZZM 13 ABC, http://www.wzzm13.com/news/article/172746/48/Keeping-track-of-energy-usage?odyssey=mod|newswell|text|FRONTPAGE|t, accessed September 21, 2011
Other Resources	• Carson, Phil, Consumers Energy's measured steps, Intelligent Utility, http://www.intelligentutility.com/magazine/article/203203/consumers-energys-measured-steps, September 22, 2011 • Consumers Energy, SmartStreet Frequently Asked Questions, http://www.consumersenergy.com/content.aspx?id=3807, accessed September 21, 2011 • Michigan PSC, Order, March 17, 2011, Case No. U-16191, http://efile.mpsc.state.mi.us/efile/docs/16191/0315.pdf, accessed September 21, 2011

PROGRAM DESCRIPTION

In 2010, Consumers Energy installed smart meters at about 7,000 customer homes in Jackson County. Due to the success of the pilot program, Consumers Energy has progressed with the new demonstration project "SmartStreet," deployed in 2011 in the Grand Rapids neighborhood of East Hills. Full scale deployment of smart meter devices in the rest of Consumers Energy's service area would then follow upon PSC approval.

CAUSES FOR CANCELLATION OR POSTPONEMENT

The full scale budget of the project has been problematic for Consumers Energy. It was reported that a full scale deployment of AMI for the service area could cost as much as $2.57 billion over the project lifecycle. In August of 2010 it was determined that the budget and scope of the project had to be cut.

The company decided to cut out smart gas meters entirely, and reduce its smart meter budget from $900 million to about $500 million over the next five years.

In a November 2010 order, case U-16191, the PSC authorized Consumers Energy to increase its electric rates by $145.7 million, but it refused to transform the pilot into a permanent program, finding that cost-benefit data from the initial pilot did not support permanent deployment.[62]

While the PSC expressed general support for AMI, it feared that AMI vendors would benefit more from the programs than customers. The PSC indicated that Consumers Energy ignored collaboration opportunities with other companies in customizing AMI software, which would have reduced costs.

The PSC pointed to "the level of expenditures for intangible IT labor and expenses" and other expenditures "being vetted by Consumers" as additional areas of concern.

The Attorney General pointed out that the current spending has been heavily weighted toward the beginning of the project. Consumers Energy proposes to spend 80 percent of the total IT costs in the pilot phase, putting ratepayers at great financial risk if full deployment is cancelled. According to the Attorney General, the company's benefit-cost analysis shows that the program is only "a financial break-even for customers."

The PSC recommended a 20 percent adjustment to the AMI software configuration costs, though Consumers Energy argues that this level of cost-cutting may not be possible. The PSC also encouraged Consumer's Energy to observe the outcome of smart grid deployment plans funded through the Federal stimulus dollars, anticipating that more viable systems would become commercially available at reduced cost at that time, to further aid in vendor selection. Consumers Energy was ordered to provide documentation of the reasonableness of its pilot program costs.

FUTURE CHANGES

According to the PSC, Consumers Energy must prove that its costs will directly fulfill the goal of the pilot, before further progress can be made on a full scale deployment. Since the programs would be funded by ratepayer dollars, the PSC requires the project pilot costs be kept as low as possible. The PSC has also reiterated that if full deployment is not approved, "any full deployment costs incurred during the pilot phase of the project are not recoverable from ratepayers."

The approval of full deployment cost recovery hinges on the company achieving all major pilot milestones and demonstrating that a detailed cost-benefit analysis of the entire project supports full deployment. The company must also file a comprehensive plan with program details that prove customer savings will offset any smart grid infrastructure cost recovery request presented to the PSC.

Sue Swan, vice president for smart grid development at Consumers Energy indicated that many consumers have very little knowledge of how the smart grid would function.[63] Increased customer education could potentially increase support for a full scale deployment in Michigan.

[62] Public Utilities Blog, Michigan Extends Consumers Energy AMI Pilot, http://blog.fortnightly.com/category/smart-grid/, accessed September 21, 2011
[63] Carson, Phil, Consumers Energy's measured steps, Intelligent Utility, http://www.intelligentutility.com/magazine/article/203203/consumers-energys-measured-steps, accessed September 21, 2011

ALTERNATIVE PROGRAMS

Though it is unclear what new programs Consumers Energy might implement if the full scale program is not approved, the company has several energy efficiency programs in place that help residential, commercial, and industrial customers reduce their energy use. The company offers rebates for residential customers who buy products such as CFL bulbs, energy efficient furnaces, air conditioners and appliances. Customers who weatherize their homes by installing additional insulation or those who participate in appliance recycling are also offered rebates. Qualified low-income customers are offered weatherization options as well. Business customers who make energy efficient upgrades to their heating and cooling systems, water heaters, lighting, and food service equipment can also receive rebates. Rebates are also offered to some industrial customers to help pay for energy efficiency improvements in their facilities.[64]

UPDATES AS OF SEPTEMBER 2011

In a March 17, 2011 order, the Michigan PSC denied Consumers Energy's request to deploy 400,000 smart meters as part of a proposed $217 million expanded pilot program. The PSC left open the possibility that Consumers Energy could file an application in a new docket requesting approval of the 400,000 meter pilot.[65] No other relevant orders have been made by the PSC in the same docket since March 17.

Consumers Energy currently plans to continue its SmartStreet demonstration program in Grand Rapids through December 2011. In 2012, the company will begin deployment of smart electric meters in the greater Grand Rapids area, with Muskegon slated to be the first community to receive wide use. Smart meter deployment across the state is expected to continue over several years.

[64] Consumers Energy, Energy Efficiency, http://www.consumersenergy.com/content.aspx?id=1499, accessed September 21, 2011
[65] Michigan PSC, Order, March 17, 2011, Case No. U-16191, http://efile.mpsc.state.mi.us/efile/docs/16191/0315.pdf, accessed September 21, 2011

DP&L Customer Conservation and Energy Management Plan			
Location:	Western and Central Ohio	**Dates:**	2009-2011
Primary Utility/Entity	Dayton Power and Light (DP&L)	**ARRA Funding:**	No

PROGRAM INFORMATION	
Key Objectives	• To develop an advanced, modern distribution system to integrate renewable energy into the grid. • To implement AMI, enabling customers to manage their electricity consumption through direct load control, TOU and PTR pricing.
Status	Postponed
Number of Participants	All 500,000 customers in service area
Participating Entities	• DP&L • Energy efficiency vendors and channel partners • Bridge Strategy Group and Accenture involved in planning phase
Program Budget	• Would require investment of $297.1 million in capital and $185.8 million in operation and maintenance (O&M) costs over seven years. o $255 million to support AMI, $41.6 million for smart grid development, and $0.5 million for energy efficiency programs o O&M includes $118.4 million for energy efficiency programs, $63.1 million for AMI, and $4.3 million for smart grid development
Consumer Sector	• Residential • Commercial • Industrial
Hardware/Software Technologies	• AMI and home energy management systems communicating through broadband, two-way voice/data and microwave IP networks • New electricity pricing models • Home area network gateway to communicate with smart appliances • Distribution system upgrades to include automation controls such as SCADA voltage telemetry
Consumer Education Measures	• Educational information on DP&L website • Energy efficiency showcase • Educational facility for customer outreach activities
PROGRAM RESULTS	
Key Findings	N/A (Plan postponed)
Other Outcomes	N/A
Customer Feedback	Some customers have expressed concerns regarding privacy and costs.
Current Deployment Status	Plans withdrawn by DP&L due to lack of stimulus funding; no solidified plans for smart meter installation at this time.
Future Implications	DP&L looking into new technology with microwave communications and two-way radio systems and evaluating the deployments currently underway by other utilities.

IMPACTS/BENEFITS	
Consumers	N/A
Utilities	N/A
Metrics Used	N/A
CAUSES FOR CANCELLATION/POSTPONEMENT	
Primary	Waiting for technological advancements
Secondary	• Lack of funding or cost issues • Privacy concerns • Negative response to rate increases • Observing other pilot projects before proceeding
RESOURCES	
Program Website	• http://www.dpandl.com/education/electricity-information/smart-grid-the-facts/ • DP&L, Customer Conservation and Energy Management Programs, Direct Testimony of Kevin L. Hall, http://www.dpandl.com/documents/Testimony2.pdf, accessed September 21, 2011
Full Program Report	• http://www.dpandl.com/documents/CustomerConservationandEnergyManagementPrograms.pdf • DP&L, Energy Efficiency and Demand Response Plan 2009-2015, http://www.dpandl.com/documents/EnergyEfficiencyandDemandResponsePlan.pdf, accessed September 21, 2011
Presentations	N/A
News Articles	Beyerlein, Tom, DP&L only Ohio power company to delay 'smart meter' upgrades, http://www.daytondailynews.com/news/dayton-news/dpl-only-ohio-power-company-to-delay-smart-meter-upgrades-1073958.html, accessed September 21, 2011
Other Resources	• Metering.com, DP&L files smart metering and smart grid plan, http://www.metering.com/node/13727, accessed September 21, 2011 • DP&L, AMI Plan, http://intelligrid.epri.com/AMI_Business_Cases/DPL_09_02_25_AMI_Business_Case_for_PUCO.pdf, accessed September 21, 2011 • http://dis.puc.state.oh.us/TiffToPDf/A1001001A11A05B35417E65734.pdf

PROGRAM DESCRIPTION

In 2008 DP&L filed its proposal for AMI and smart grid developments with the PUC of Ohio. The plan, titled Customer Conservation and Energy Management (CCEM), was approved by the PUC in June 2009. The plan included the development of an upgraded distribution system with real-time, automated controls. AMI installations for all customers, substation automation, energy efficiency programs, and DR programs were also included. Under the plan, TOU and PTR pricing would become available once the underlying AMI was installed. The plan was designed to allow easier integration of intermittent, renewable energy sources into the grid.

CAUSES FOR CANCELLATION OR POSTPONEMENT

DOE rejected DP&L's application for a $145 million stimulus grant to fund the program; a reason for the rejection was not disclosed in the identified sources.[66] Initially, DP&L requested permission from the PUC to recover the program costs through ratepayers, but the company later retracted the request. In January 2011 the PUC approved DP&L's withdrawal of the $370 million, 10-year CCEM plan for smart grid developments. Given current economic conditions, the plan no longer seemed to be in the company's best interest. DP&L reported that some customers objected to the meters due to cost and privacy concerns. From the outset, customers made it clear that they didn't want to pay for the plan's implementation through rate increases.[67] Additionally, DP&L indicated in the withdrawal request to the PUC, that the company preferred to observe how AMI and smart grid programs being implemented by other Ohio utilities fare before making significant investments in their own plan.

FUTURE CHANGES

As economic conditions change, DP&L could revisit AMI and smart grid deployment in the future. DP&L will be evaluating the deployments currently underway by American Electric Power, Duke Energy, and FirstEnergy, and will develop their own plans from the lessons learned.

The DP&L website states that the company continues to work on a smart grid plan, along with investments in upgrades of their systems and distribution technology. Old technologies will be retired and new technology installed in the system will be designed with smart meter and smart grid compatibility in mind. The company is looking into microwave communications and two-way radio system technology and specifically observing how other companies' test pilots progress with these and other technologies.

ALTERNATIVE PROGRAMS

Though it is unclear what new programs DP&L might implement in place of CCEM, the company currently has programs that encourage reductions in electricity consumption and promote overall energy efficiency. For residential customers, DP&L has proceeded in offering: 1) appliance recycling and cooling system tune-ups; 2) rebates on qualified, new energy-efficient air conditioning and heat pump systems; 3) discounts on CFL bulbs; and 4) the Smart Energy Community Program where customers qualifying for bill assistance receive a free audit of their home energy usage along with energy improvements. Business customers can receive rebates on new equipment that reduces energy consumption and demand as well as rebates for new construction surpassing standard building codes. DP&L government customers can receive a comprehensive energy analysis of their facility from a qualified auditor who evaluates energy usage and can recommend cost-effective, improvement projects.[68]

DP&L also offers an energy efficiency education program in the Miami Valley. The program is offered to teachers, students, and families, and includes 9,000 take-home energy efficiency kits with accompanying classroom curriculum.[69]

[66] Dayton Daily News, DP&L only Ohio power company to delay "smart meter" upgrades, http://www.daytondailynews.com/news/dayton-news/dpl-only-ohio-power-company-to-delay-smart-meter-upgrades-1073958.html, accessed September 21, 2011
[67] Dayton Daily News, DP&L only Ohio power company to delay "smart meter" upgrades, http://www.daytondailynews.com/news/dayton-news/dpl-only-ohio-power-company-to-delay-smart-meter-upgrades-1073958.html, accessed September 21, 2011
[68] DP&L, Business & Government Rebates, http://www.dpandl.com/save-money/, accessed September 21, 2011
[69] DP&L, Energy Efficiency Program (E-3), http://www.dpandl.com/education/educational-programs/energy-efficiency-program-e-3/, accessed September 21, 2011

All DP&L customers can take advantage of net metering for renewable energy systems and customers can apply to sell their RECs to DP&L. Green pricing is also provided through the "Green Connect program." [70]

In Dayton, DP&L currently utilizes AMR technology, in a drive-by mode, through an RF network.[71]

UPDATES AS OF SEPTEMBER 2011

There are no significant updates to this case study as of September 2011. DP&L reports on its smart grid homepage that it continues to work on its smart grid plan, but no details are provided.[72] When old technologies are retired, new digital options are incorporated into the system, thereby supporting the foundation for the implementation of smart meters and a smart grid in the future.

[70] DP&L, Renewable Energy, http://www.dpandl.com/environment/renewable-energy/, September 21, 2011
[71] DP&L, AMI Plan, http://intelligrid.epri.com/AMI_Business_Cases/DPL_09_02_25_AMI_Business_Case_for_PUCO.pdf, accessed September 21, 2011
[72] http://www.dpandl.com/education/electricity-information/smart-grid-the-facts/, accessed September 21, 2011

HECO Smart Meter Pilot Program			
Location:	Hawaii	**Dates:**	2006-2010
Primary Utility/Entity	Hawaiian Electric Company (HECO)	**ARRA Funding:**	No

PROGRAM INFORMATION	
Key Objectives	• To test the ability to provide RF coverage in urban and rural applications. • To evaluate third party contractor installation of the meters. • To demonstrate the capability to reliably and accurately deliver timely monthly billing readings and interval data via two-way commands.
Status	Cancelled
Number of Participants	• 430,000 residential and commercial electric customers. • Approximately 9,400 meters installed by mid-2010.
Participating Entities	• HECO • Sensus
Program Budget	$115 million for full scale smart meter deployment. Ratepayers would have to absorb $1.35 million.
Consumer Sector	• Residential • Commercial
Hardware/Software Technologies	• Sensus FlexNet AMI system • Sensus iCon smart meters
Consumer Education Measures	N/A
PROGRAM RESULTS	
Key Findings	• Technical problems associated with the performance of the AMI system were identified, including apparent data anomalies. • Other issues identified were associated with business processes. • AMI software was criticized for being proprietary, rather than open-source.
Other Outcomes	N/A
Customer Feedback	N/A
Current Deployment Status	July 2010 extension request for pilot project denied by the Hawaii PUC, but in October 2010, the PUC approved the company's new smart grid roadmap.
Future Implications	• East Oahu Transmission Project will include smart grid elements. • The current smart grid roadmap focuses on transmission upgrade projects rather than customer smart meter installations. • PUC has noted that any new AMI or preferably AMI/smart grid application for any utility should include or be preceded by an overall smart grid plan or proposal filed with the commission.
IMPACTS/BENEFITS	
Consumers	N/A
Utilities	N/A
Metrics Used	N/A

CAUSES FOR CANCELLATION/POSTPONEMENT	
Primary	Equipment or construction related problems
Secondary	• Lack of funding or cost issues • State/local regulatory orders causing delays
RESOURCES	
Program Website	http://www.hawaiisenergyfuture.com/articles/Smart_Grid.html
Full Program Report	N/A
Presentations	N/A
News Articles	• Tweed, Katherine, HECO Requests Second Pilot of Sensus Meters, Greentech Media, Inc., http://www.greentechmedia.com/articles/read/heco-requests-second-pilot-of-sensus-meters/, accessed September 21, 2011 • Smartmeters.com, Hawaiian utility to install AMI, http://www.smartmeters.com/the-news/403-hawaiian-utility-to-install-ami.pdf, accessed September 21, 2011 • Cocke, Sophie, Grid stability critical to state's energy future, Pacific Business News, http://www.bizjournals.com/pacific/stories/2010/08/09/story11.html, accessed September 21, 2011 • SmartGridNews.com, Smart Meter Setback: Hawaii PUC Kicks Back Project, Tells Utility to Try It Again, http://www.smartgridnews.com/artman/publish/Business_Policy_Regulation_News/Hawaii-PUC-Kicks-Back-Smart-Meter-Project-Tells-Utility-to-Try-It-Again-2795.html, accessed September 21, 2011
Other Resources	• PUC Letter of Denial, http://www.mmidl.com/sgt/2010-Jul-29/20100726%20Order%20Closing%20Docket.pdf, accessed September 21, 2011 • PUC documentation for East Oahu Transmission Project, http://dms.puc.hawaii.gov/dms/DocumentViewer?pid=A1001001A10F14B10939I51169 and http://dms.puc.hawaii.gov/dms/DocumentViewer?pid=A1001001A10H30B03334C50131, accessed September 21, 2011 • Metering.com, Hawaiian Electric selects AMI solution, http://www.metering.com/Hawaiian/Electric/selects/AMI/solution, accessed September 21, 2011 • HECO, Japan-U.S. Smart Grid project on Maui to demonstrate new technologies, http://www.heco.com/portal/site/heco/menuitem.508576f78baa14340b4c0610c510b1ca/?vgnextoid=6d9a7368ae500310VgnVCM1000005c011bacRCRD&vgnextfmt=default&cpsextcurrchannel=1, accessed September 21, 2011 • Smartgrid.gov, Hawaiian Electric Company, East Oahu Switching Project, http://www.smartgrid.gov/project/hawaiian_electric_company_east_oahu_switching_project, accessed September 21, 2011 • Maui Electric Company, Maui Smart Grid Project Now Recruiting Volunteers, http://www.hawaiisenergyfuture.com/articles/MauiSmartGridProject.pdf, accessed September 21, 2011

PROGRAM DESCRIPTION

HECO initiated three AMI pilot projects prior to 2008, which comprised an investigation into the functionality and reliability of Sensus AMI technology for RF coverage, ease of installation by contractors, and monthly meter reading/billing needs. This included 500 AMI meters on Oahu and two tower gateway base radio base station sites; 3,000 residential and commercial meters in the Ocean Pointe area, along with a third tower gateway base tower; and 400 residential meters at two more TGB sites in Koko Head and Pu'u Papa'a to support a Dynamic Pricing Pilot program. [73]

In December 2008, HECO sought approval from the Hawaii PUC to install smart meters at approximately 451,000 locations. The cost for the project was estimated at approximately $115 million.

By July 2010, HECO had installed approximately 9,400 meters under three pilot programs. During performance testing, a number of issues were identified, and in order to address these issues, HECO applied for an extension of the pilot program. HECO submitted a request to the PUC for an additional $1.35 million to expand the pilot by installing 5,000 additional meters on Oahu to test the equipment with a new customer information system (CIS), to address issues that were uncovered during the pilot programs, and to gather information on cyber security matters.

CAUSES FOR CANCELLATION OR POSTPONEMENT

Technical issues associated with the performance of the AMI system included:

- Apparent data anomalies
- AMR and bill processing problems
- Interval data collection problems
- Two-way communication performance (including demand reset and firmware upgrade functionality) issues
- TOU data delivery problems
- Availability and maturity of key network equipment and installation tools

HECO identified issues associated with business processes and other areas critical to ensuring that a full scale deployment could proceed securely, efficiently and economically. These issues included new developments regarding cyber security measures, hardware/software quality processes, mitigation of RF interference, efficient and automated management of the AMI network, supply chains and the robustness of the backhaul communications links.

In July, 2010, the Hawaii PUC denied the pilot extension request and dismissed the pilot program, though it reiterated its support for an AMI and the smart grid concept to reduce the State's dependence on fossil fuels. The PUC pointed to timing and cost concerns and indicated extended pilot testing was needed before any additional deployments could take place. The PUC noted concerns about allowing "a pilot program to occur during what is ostensibly a capital improvement project. Generally, any pilot programs should occur prior to the application, rather than during the application." The PUC also noted concerns about the cost effectiveness of the project and "significant unanswered questions" that the extended pilot testing may not answer, such as the communication issues between AMI and the CIS. The PUC dismissed the application and closed the docket, requiring that HECO re-file a new application if desired, rather than a project extension request. HECO was advised to develop a comprehensive

[73] Kema Consulting, New trends emerging for AMI cost recovery, http://www.kema.com/services/consulting/utility-future/smart-grid/ami-cost-recovery.aspx, accessed September 21, 2011

approach, detailing the costs and benefits associated with the project before requesting use of additional ratepayer funds. [74]

Critics argued for more public discussion to evaluate costs of alternative systems. Some groups recommended more decentralized power, such as rooftop solar panels. Some also questioned the high cost of installing AMI, since it is exacerbated by Hawaii's isolation from other utilities, requiring much higher levels of in-system backups. Unlike the mainland, utilities in Hawaii cannot rely on adjacent utilities to supply vital, ancillary services as operational reserves or spinning reserves for backup. Instead, backups must be built into the grid of each island, which contributes to the high cost of electricity in the State.

FUTURE CHANGES

Since cost was a driving factor in the PUC decision, technological breakthroughs that reduce smart grid equipment costs could help AMI projects significantly.

The significant increase in fuel costs (oil over $100 per barrel) could push smart grid development forward as well. Other than solar and wind, fuel oil is the primary source for the generation of electricity, making the cost of electricity in Hawaii the highest in the nation. Hawaii accounted for more than 30 percent of the fuel oil used in the generation of electricity in the United States in 2010.[75]

ALTERNATIVE PROGRAMS

In observing the HECO pilot example, it becomes clear that focused, detailed plans with cost/benefit analysis are more likely to win approval from the Hawaii PUC. In October 2010, the Hawaii PUC approved a request from HECO for $10.1 million for the installation of computer controlled sensors and switches to automatically isolate outages and re-route power to affected customers. This project, known as the East Oahu Transmission Project, would improve the reliability of the transmission system through smart grid upgrades and by adding additional transmission routes. The project could save customers as much as $18 million, and will avoid the underground construction that could severely impact traffic. The project will also improve outage troubleshooting and reduce outage duration.

Originally, HECO planned to spend $28 million on the project, but was able to scale back the cost in the approved plan as well as avoid the traffic congestion that would have resulted had the original plan been implemented. [76] HECO was awarded $5.3 million in stimulus money for the project. The project is planned to be completed by 2012. Other smart grid pilot projects and testing can continue as funding allows, including a joint project with Sacramento Municipal Utility District using California PUC funds.[77]

In a GE Smart Grid pilot on Maui, GE and HECO are testing wall-mounted meters that will monitor power consumption of household appliances and alert customers when peak demand periods occur. This

[74] Hawaii PUC, Docket No. 2008-0303, http://www.mmidl.com/sgt/2010-Jul-29/20100726%20Order%20Closing%20Docket.pdf, accessed September 21, 2011

[75] Energy Information Administration, Electric Power Monthly September 2011, Average Retail Price of Electricity to Ultimate Customers by End-Use Sector, by State, June 2011 and 2010, Table 5.6.A; Receipts of Petroleum Liquids Delivered for Electricity Generation by State, Year-to-Date through June 2011 and 2010, Table 4.7.B, http://www.eia.doe.gov/cneaf/electricity/epm/epm_sum.html, accessed September 21, 2011.

[76] HECO, Hawaii PUC approves Hawaiian Electric smart grid project using $5.3 million federal stimulus grant, http://www.heco.com/portal/site/heco/menuitem.508576f78baa14340b4c0610c510b1ca/?vgnextoid=c14d1c9e623fb210VgnVCM1000005c011bacRCRD&vgnextfmt=default&cpsextcurrchannel=1, accessed September 21, 2011

[77] HECO, Hawaii Clean Energy Initiative - Hawaiian Electric Companies' Energy Agreement Update - Year Two, http://www.heco.com/vcmcontent/StaticFiles/pdf/HCEI_2YearUpdate.pdf, accessed September 21, 2011

project is funded by a $14 million Smart Grid Investment Grant from DOE, with the goal of reducing peak electricity consumption by 15 percent by 2012.[78]

HECO is deploying utility applications from SAP to manage customer service, billing, metering data, and energy information with the goal of allowing customers to better understand their electricity use. It is also hoped that the project will allow for flexible rate options in the future. The system will establish a centralized source of customer information for advancing customer service and infrastructure management capabilities of the utility.[79]

HECO also has net metering programs available for customers. All residential and commercial utility customers enrolled in net metering, who own and operate an eligible renewable energy generation system up to 100 kW and intend to connect to the grid, must register their systems with the utility. The net metering law specifies that solar, wind, biomass, hydroelectric generation facilities, or a hybrid system of two or more of these technologies are eligible.[80]

UDPATES AS OF SEPTEMBER 2011

Though HECO's large-scale AMI pilot program remains permanently canceled, two of the utility's alternative smart grid programs, the East Oahu Transmission Project and the Maui Smart Grid Project, are both proceeding. Various partners in the U.S. and Japan agreed on May 18, 2011 to collaborate on the smart grid demonstration in Maui. The organizations partnering on the project include DOE; HECO; Maui Electric Company; the Hawaii Department of Business, Economic Development and Tourism; the Hawaii Natural Energy Institute at the University of Hawaii; and Japan-based New Energy and Industrial Technology Development Organization, an entity under the government of Japan's Ministry of Economy, Trade and Industry. The New Energy and Industrial Technology Development Organization agreed to provide about $37 million in funding for the project, and selected six Japanese companies to work with their U.S. project partners to develop and install smart grid technologies on Maui. The U.S.-Japanese partnership will focus on demonstrating new technologies focused on the integration of clean energy and electric vehicles.[81]

On September 21, 2011, the Maui Smart Grid Project began actively recruiting volunteers from the Maui Meadows neighborhood in South Kihei to participate in a smart grid pilot program. Organizers are seeking 200 volunteers to have a smart meter installed in their home and receive access to a personalized website displaying energy usage information. Volunteers will also have the opportunity to use other smart grid technologies, such as in-home energy displays and smart thermostats.[82]

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[78] SmartGridNews.com, Beyond Metering: 10 Pretty Darn Interesting Stimulus-Funded Smart Grid Projects, http://www.smartgridnews.com/artman/publish/Stimulus_Awards_Projects_News/Beyond-Metering-10-Pretty-Darn-Interesting-Stimulus-Funded-Smart-Grid-Projects-2254.html, accessed September 21, 2011

[79] Renew Grid, Hawaiian Electric Using SAP Technology To Streamline Operations, http://www.renewgridmag.com/e107_plugins/content/content.php?content.5770, accessed September 21, 2011

[80] HECO, Net Energy Metering in Hawaii, http://www.heco.com/portal/site/heco/menuitem.508576f78baa14340b4c0610c510b1ca/?vgnextoid=12a290a2decab110VgnVCM1000005c011bacRCRD&vgnextchannel=a48df2b154da9010VgnVCM10000053011bacRCRD&vgnextfmt=default&vgnextrefresh=1&level=0&ct=article, accessed September 21, 2011

[81] HECO, Japan-U.S. Smart Grid project on Maui to demonstrate new technologies, http://www.heco.com/portal/site/heco/menuitem.508576f78baa14340b4c0610c510b1ca/?vgnextoid=6d9a7368ae500310VgnVCM1000005c011bacRCRD&vgnextfmt=default&cpsextcurrchannel=1, accessed September 21, 2011

[82] Maui Electric Company, Maui Smart Grid Project Now Recruiting Volunteers, http://www.hawaiisenergyfuture.com/articles/MauiSmartGridProject.pdf, accessed September 21, 2011

LIPA BPL and Wireless Communications Demonstration			
Location:	Hauppauge and Commack, New York	**Dates:**	2006-2007
Primary Utility/Entity	Long Island Power Authority (LIPA)	**ARRA Funding:**	No

PROGRAM INFORMATION	
Key Objectives	• To assess the potential for large-scale application of Broadband over Power Lines (BPL) technology on the grid. • To enhance service reliability for LIPA customers and enable quick fault detection in the T&D system. • To facilitate AMR and reduce costs.
Status	Cancelled
Number of Participants	100 residential customers; five commercial customers.
Participating Entities	• LIPA • Main.net Power Line Communications • Partnership with Stony Brook University, Brookhaven National Laboratory, and Maritime
Program Budget	• LIPA would pay Main.net $887,762, plus an estimated $90,000 in third-party internet carrier costs. • LIPA's customers were not charged for their participation.
Consumer Sector	• Residential • Commercial
Hardware/Software Technologies	• Real-time AMR technology • Consumer internet, VoIP, IM and other broadband services over power lines
Consumer Education Measures	N/A (project cancelled)
PROGRAM RESULTS	
Key Findings	N/A (Cancelled sometime around first test period in mid-2007.)
Other Outcomes	N/A
Customer Feedback	Project met with some resistance due to RF interference issues.
Current Deployment Status	Cancelled; abandoned due to cost issues.
Future Implications	FCC regulations and concerns over interference continue to overshadow BPL technology benefits. If implemented, the utility would compete directly with broadband service providers for customers.
IMPACTS/BENEFITS	
Consumers	N/A
Utilities	N/A
Metrics Used	N/A
CAUSES FOR CANCELLATION/POSTPONEMENT	
Primary	• Lack of funding or cost issues • Equipment or construction related problems
Secondary	Health concerns

RESOURCES	
Program Website	N/A
Full Program Report	LIPA, "Minutes of the 177th Meeting Held on June 22, 2006," http://www.lipower.org/pdfs/company/papers/minutes/062206.pdf, accessed September 23, 2011
Presentations	N/A
News Articles	• Belson, Ken, Plug-In Internet Connection to Get Test on Long Island, New York Times, February 17, 2006, http://www.nytimes.com/2006/02/17/nyregion/17lipa.html?_r=2&oref=slogin, accessed September 21, 2011 • Long Island Press, LIPA Applies For $119 Million In Smart Grid Funding, August 10, 2009, http://www.longislandpress.com/2009/08/10/lipa-applies-for-119-million-in-stimulus-funding-for-smart-grid-projects/, accessed September 21, 2011
Other Resources	• National Association for Amateur Radio, Electric Utility Communications, Applications and Smart Grid Technologies, http://www.arrl.org/electric-utility-communications-applications-and-smart-grid-technologies, accessed September 21, 2011 • Smartgrid.gov, Long Island Power Authority: Long Island Smart Energy Corridor, http://www.smartgrid.gov/project/long_island_power_authority_long_island_smart_energy_corridor, accessed September 21, 2011 • Efracec ACS, Efracec ACS to Deliver Advanced Distribution Management System to Long Island Power Authority, http://www.efacec-acs.com/index.php?option=com_content&view=article&Itemid=134&id=173%3A2011-efacec-acs-to-deliver-advanced-distribution-management-system-to-long-island-power-authority, accessed September 21, 2011

PROGRAM DESCRIPTION

LIPA issued an RFP on February 21, 2006 seeking firms experienced in BPL and wireless communication technologies for a pilot project.[83] Around Sept. 2006 Main.net was chosen for the project and LIPA's "BPL and Wireless Communications Demonstration Project" began. The project area covered approximately 2.8 square miles, with 1,500 households and 50 industrial properties on the affected circuits.[84] LIPA was interested in a large-scale application of the BPL technology, which would enable AMR in the area.

CAUSES FOR CANCELLATION OR POSTPONEMENT

The demonstration projects had several barriers to overcome from the start. In general, BPL equipment is very expensive, and tends to interfere with other radio communications, such as ham radio service. Some local community groups assembled teams to test the interference and noise level measurements in the area, just prior to the project testing period.

LIPA also had the additional challenge of ensuring the deployment of a BPL system would not affect its tax-exempt status. LIPA's chairman confirmed that the project could not progress on a commercial basis without firm assurance LIPA's non-profit, tax exempt status would remain intact. LIPA's tax exempt

[83] LIPA, Minutes of the 177th Meeting Held on June 22, 2006, http://www.lipower.org/pdfs/company/papers/minutes/062206.pdf, accessed September 21, 2011

[84] LIPA, BPL Fact Sheet - LIPA Test Areas, Schedule for Testing, http://rr13.net/Ham/BPL/LIPA%20Fact%20Sheet.pdf, accessed September 21, 2011

bonds could have been affected by the use of LIPA's lines financed with tax exempt debt. Private use of the lines and facilities owned by LIPA could have resulted in the bonds being recalled and reissued as taxable debt, an additional cost LIPA was not willing to bear.[85]

By April 2007, the State had not yet approved the project and with a new governor taking office, some doubted the project would move forward. In July 2007, LIPA made special design changes to ensure that the amateur radio bands in the area would not be affected by interference. However, a few months later the project appeared to be abandoned due to cost.[86]

Due to the high cost of BPL technology, most U.S. utilities have not been able to affordably use the technology for advanced metering alone, without the assistance of government subsidies or private sector partners.[87] Additionally, BPL signals are limited by distance in the overhead U.S. electrical distribution topology without additional equipment such as couplers and repeaters to boost the signal. This additional equipment tends to eliminate cost savings associated with using the existing wires. Not only do BPL signals traveling on overhead lines have the potential to interfere with shortwave radio signals, but local RF on an unlicensed spectrum also can interfere with the BPL network signal itself, requiring costly mitigation. Additional drawbacks include noisy lines and poor interoperability due to the lack of IEEE-P1901 Standard.[88] All of these factors contribute to the challenges BPL projects face in the U.S.

FUTURE CHANGES

Technological improvements to reduce noise and improve interoperability may help. Tailored design considerations to minimize local radio interference, such as the steps LIPA took to exclude frequencies used by local operators, could help as well.

Cost issues may have resolution at some point, but utilities would have to be adequately prepared to address the new broadband services market they are entering. This becomes a problem for BPL integration in lines owned by non-profit entities like LIPA.

ALTERNATIVE PROGRAMS

While the BPL demonstration project has been cancelled, LIPA continues to invest in other smart grid technologies through the assistance of ARRA funding. In 2009, LIPA applied for $119 million in stimulus funding to add an advanced computer system and digital technology to its existing grid system. Under the plan, the funding would support the Dynamic Reactive Support System Project ($49.6 million), consisting of a voltage management system to reduce blackouts and integrate renewable energy sources. Another $69.5 million of the funding would support the Smart Grid Communications Backbone Project, a fiber optic and radio network that would improve communications between all LIPA substations.

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[85] National Association for Amateur Radio, Electric Utility Communications, Applications and Smart Grid Technologies, http://www.arrl.org/electric-utility-communications-applications-and-smart-grid-technologies, accessed September 21, 2011
Belson, Ken, Plug-In Internet Connection to Get Test on Long Island, New York Times, February 17, 2006, http://www.nytimes.com/2006/02/17/nyregion/17lipa.html, accessed September 21, 2011

[86] National Association for Amateur Radio, April 2007 Hudson Division Beacon - # 73, http://www.hudson.arrl.org/beacon/2007/200704hudsonbeacon.htm, accessed September 21, 2011
National Association for Amateur Radio, Electric Utility Communications, Applications and Smart Grid Technologies, http://www.arrl.org/electric-utility-communications-applications-and-smart-grid-technologies, accessed September 21, 2011

[87] Global Smart Energy, Advanced Metering Opportunities, http://store.globalsmartenergy.com/media/summarypdf/AMO_Summary_Report.pdf, accessed September 21, 2011

[88] National Association for Amateur Radio, Electric Utility Communications, Applications and Smart Grid Technologies, http://www.arrl.org/electric-utility-communications-applications-and-smart-grid-technologies, accessed September 21, 2011

In a third project, totaling $25.3 million (of which $12.5 million comes from ARRA funding), LIPA is partnering with Stony Brook University and Farmingdale State College for the Smart Grid Corridor Project along Route 110, where 500 residential, commercial and industrial customers could test smart technologies for reducing electricity usage. The technologies include smart meters, distribution automation, distributed energy resources, electric vehicle charging stations, and the testing of cyber security systems. New York State's first Smart Campus would be developed to tie smart grid systems with energy conservation and renewable technologies.[89]

In 2009, LIPA deployed its pilot Smart Metering Program in the cities of Hauppauge and Bethpage. In the pilot, LIPA is testing the new meters, dynamic pricing signals, remote control capabilities and load measurement capabilities of new distribution system equipment. LIPA allocated $3 million for smart meters in the 2009 capital budget and $5 million in 2010.[90] Another $1.7 million will be spent in 2011 with a congressional grant of $158,000.[91]

LIPA also has a program known as LIPAedge in which residential and small commercial customers allow LIPA to control their central air conditioning unit, between the hours of 2 pm and 6 pm in the summer months, through the use of a smart thermostat. The project helps customers save on energy bills, and helps LIPA avoid new construction of transmission and generation facilities.[92]

LIPA has recently contracted with Efacec ACS to implement an integrated real-time distribution and outage management system, which will include smart grid applications for power optimization and self-healing feeders. The system will support the goals of LIPA's Smart Grid Corridor Project, though it will be internally funded and deployed independently. The project will be deployed in five phases over the next year.[93]

UDPATES AS OF SEPTEMBER 2011

There are no significant updates to this case study as of September 2011. All developments have occurred in alternative programs.

[89] Long Island Press, LIPA Applies For $119 Million In Smart Grid Funding, http://www.longislandpress.com/2009/08/10/lipa-applies-for-119-million-in-stimulus-funding-for-smart-grid-projects/, accessed September 21, 2011
SmartGrid.gov, Regional Demonstration Projects, http://www.smartgrid.gov/taxonomy/term/2?page=13, accessed September 21, 2011
[90] SGIC, LIPA Smart Metering Program, http://www.sgiclearinghouse.org/node/1777, accessed September 21, 2011
[91] LIPA, Approved Operating Budget – 2011, http://www.lipower.org/pdfs/company/investor/2011budget.pdf, accessed September 21, 2011.
[92] LIPA, LIPAedge FAQs, http://www.lipaedge.com/faq.asp, accessed September 21, 2011
[93] Efracec ACS, Efracec ACS to Deliver Advanced Distribution Management System to Long Island Power Authority, http://www.efacec-acs.com/index.php?option=com_content&view=article&Itemid=134&id=173%3A2011-efacec-acs-to-deliver-advanced-distribution-management-system-to-long-island-power-authority, accessed September 21, 2011

PG&E SmartMeter Program			
Location:	Northern and Central California	**Dates:**	2006 - Present
Primary Utility/Entity	Pacific Gas and Electric (PG&E)	**ARRA Funding:**	No

PROGRAM INFORMATION	
Key Objectives	• To enable new programs that help customers track energy usage and control costs. • To enable PG&E to quickly pinpoint power outages and restore power. • To upgrade California's electrical grid infrastructure. • To reduce costs of manual inspections, approximated readings, and meter failures.
Status	Installations delayed due to customer complaints/refusals.
Number of Participants	• 4,418,901 smart electric meters installed as of July 29, 2011 • 5.3 million electric customer accounts in service area
Participating Entities	• PG&E • Wellington Energy (smart meter installation) • General Electric and Landys+Gyr (meter manufacturers)
Program Budget	$1,956,438,000 spent through December 2010
Consumer Sector	• Residential • Agricultural • Commercial • Industrial
Hardware/Software Technologies	• Approved for 5.1 million electric meters. • RF wireless smart meter consisting of a small one watt radio that allows two-way communication between the customer and PG&E, enabling the customer to review their daily energy use. The SmartMeter transmits information via radio signals. • A CPP option is offered along with the meter that records usage every hour, in 15 minute increments. • Customers can also enroll in a separate program for TOU rates.
Consumer Education Measures	• PG&E website provides: o FAQ page o Energy usage tools o Tutorials for reading smart meters o Information for a side by side comparison with traditional meters o Guide of "what to expect" during the installation process
PROGRAM RESULTS	
Key Findings	• Meters record data accurately in most cases. PG&E is working to resolve any concerns regarding meter calibration problems. • Customer concerns regarding privacy and health remain large factors, even prompting some jurisdictions to ban meter installations. • PG&E has submitted a plan (pending PUC approval) to allow customers to decline wireless meter installations.

Other Outcomes	N/A
Customer Feedback	• In May 2010 PG&E issued a public apology to customers for poor customer service. • Angry customers in Bakersfield sued the utility over what they perceived were billing inaccuracies. • Cities and counties in California continue to impose their own moratoriums on the meter installations.
Current Deployment Status	• 4,418,901 smart electric meters installed as of 7/29/11. • PG&E reports that an increasing number of installations are delayed due to refusals. • Portions of the projects are behind schedule due to testing and delays during the design phase, causing additional costs. • The company is working on deploying in-home devices to residential customers connected through the AMI network.
Future Implications	• PG&E is working on a plan to address refusals with an alternative metering device, as directed by the CPUC. • Passage of Assembly Bill 37 could require all other utilities provide an alternative metering option for those rejecting installation.
IMPACTS/BENEFITS	
Consumers	• Ability for consumers to track hourly usage online, providing some PG&E customers with a tool to minimize energy usage. • Bill savings unlikely to be realized from smart meter use alone, but from participation in the SmartRate and Energy Alert programs, which had approximately 25,000 participants each as of 12/2010.
Utilities	• Failure rate of smart meters lower than previous generation of meters. • Dollar savings occur from not needing a manual reading.
Metrics Used	• Percentage of smart meters requiring estimated reading: electric meters: 0.09 percent (versus 1.83 percent for non-smart meters); gas meters: 0.05 percent (versus 0.96 percent for non-smart meters), as of June 30, 2011 • Percentage of total intervals received from smart meters: 99.85 percent from electric meters, 99.66 percent from gas meters • 1,586,979 pge.com My Account customers (as of 12/2010); 293,285 online usage inquiries (as of 12/2010); failure rate of meter tests by meter type (as of 12/2010)
CAUSES FOR CANCELLATION/POSTPONEMENT	
Primary	• Health concerns • Equipment or construction related problems
Secondary	• Privacy concerns • Inadequate customer education for effective system use • Customer service issues • State/local regulatory orders causing delays
RESOURCES	
Program Website	• PG&E, SmartMeter – See Your Power, http://www.pge.com/myhome/customerservice/smartmeter/, accessed September 21, 2011

Full Program Report	• PG&E, SmartMeter Program Data, http://www.pge.com/myhome/customerservice/smartmeter/programdata/, accessed September 21, 2011 • Structure Consulting Group, LLC, PG&E Advanced Metering Assessment Report Commissioned by the California Public Utilities Commission, September 2, 2010, http://www.pge.com/includes/docs/pdfs/myhome/customerservice/meter/smartmeter/StructureExecutiveSummary.pdf, accessed September 21, 2011 • PG&E, Smart Grid Deployment Plan 2011-2020, http://www.pge.com/includes/docs/pdfs/shared/edusafety/electric/SmartGridDeploymentPlan2011_06-30-11.pdf, accessed September 21, 2011
Presentations	N/A
News Articles	SmartGridNews, Smart Meters: An Apology from PG&E – and a New Paper on Meter Accuracy and Customer Perceptions from EPRI, May 11, 2010, http://www.smartgridnews.com/artman/publish/Technologies_Metering_News/Smart-Meters-An-Apology-from-PG-E-and-a-New-Paper-on-Meter-Accuracy-and-Customer-Perceptions-from-EPRI-2322.html, accessed September 21, 2011
Other Resources	• PG&E, Company Profile, http://www.pge.com/about/company/profile/, accessed September 21, 2011 • PG&E, SmartMeter Steering Committee Update, December 2010, http://www.pge.com/includes/docs/pdfs/myhome/customerservice/meter/smartmeter/smartmeter_steeringcomm_1210.pdf, accessed September 21, 2011 • PG&E, SmartMeter Steering Committee Update, July 2011, http://www.pge.com/includes/docs/pdfs/myhome/customerservice/meter/smartmeter/smartmeter_steeringcomm_0711.pdf, accessed September 21, 2011 • PG&E, Understanding RF, http://www.pge.com/myhome/edusafety/systemworks/rf/, accessed September 21, 2011 • CPUC, Ruling, September 21, 2011, http://docs.cpuc.ca.gov/efile/RULINGS/143742.pdf, accessed September 21, 2011 • CPUC, Proceeding A1103014, http://docs.cpuc.ca.gov/published/proceedings/A1103014.htm, accessed September 21, 2011 • CPUC, CPUC Adopts Rules to Protect the Privacy and Security of Customer Electricity Usage Data, http://docs.cpuc.ca.gov/PUBLISHED/NEWS_RELEASE/140316.htm, accessed September 21, 2011

PROGRAM DESCRIPTION

In July 2006, PG&E was given approval to begin full deployment of an AMI project pursuant to PUC decisions D.06-07-027 and D.09-03-026. That year, PG&E began installing gas and electric meters with SmartMeter technology, manufactured by General Electric and Landys+Gyr. The program includes the upgrade of metering and communications networks as well as related systems and software for 5.1 million electric meters and 4.2 million gas meters within the PG&E service territory. As of January 2011, 3,878,492 smart meters have been installed in northern and central California. The program is not currently funded by stimulus dollars.

CAUSES FOR CANCELLATION OR POSTPONEMENT

Throughout 2009 and into early 2010, PG&E received approximately 1,378 customer complaints regarding electrical bills and meter accuracy.[94] As a result, the PUC ordered a third party, the Structure Group of Houston, to investigate the root cause of the complaints and evaluate the accuracy of the meters.

Some of the first issues arising from the SmartMeter installations were related to the functionality of the meters themselves. These included installation and calibration problems, network connection problems, and meter data storage issues. One-tenth of one percent (0.1 percent) of the 5.5 million electric and gas meters installed had trouble connecting with the network. Bills were issued using an estimate based on the customer's routine energy usage, until the actual usage could be retrieved. Two-tenths of one percent (0.2 percent) of the meters accurately captured data, but did not retain the data correctly, thus software upgrades or meter replacements were required. In this case, PG&E billed the customer for less energy than was used and no retroactive corrections were made. In the case of installation complications, less than 0.5 percent of the 5.5 million meters consisted of perfectly functioning meters that hadn't been connected properly and calibrated as they should. In these cases PG&E issued an apology to the customer and corrected the billing information. PG&E has indicated that the company is working to improve training for installation technicians.[95]

It was discovered that interference can occur between the meter and nearby devices, such as security lights and hot tub pumps. As with any RF device, the SmartMeters can cause electrical surges or interruptions in timed electrical services. Motion sensors, garage door openers, baby monitors, wireless telephones, and wireless speakers may also be affected. In addition, PG&E has determined that certain models of Ground Fault Interrupter (GFI) breakers (such as those used on hot tubs) may be impacted if they are in close proximity to the meter. PG&E is working with meter manufacturers to address the GFI interference issue, and has trained the installation contractors to listen for GFI tripping at the point of installation.[96]

Health concerns regarding the RF emissions from the meters are also a major issue for some customers. The meters send information over a wireless network which is required to meet FCC guidelines, specifically the guidelines regarding levels at which body tissues heat up from RF waves. This is known as the "thermal effect." There have been claims of sensitivity to electromagnetic frequencies with symptoms including headaches and restlessness. Neither the FCC nor the World Health Organization has been convinced that the current health standards surrounding RF devices need to be revised, though some customers remain concerned.[97]

Customer communication issues have also been a recurring source of frustration regarding the SmartMeter program. Some expressed concern that the SmartMeter installations were treated as the replacement of another piece of infrastructure by PG&E, without the customer being presented the full amount of information about the new installed device. PG&E indicates that they now provide as much

[94] Structure Consulting Group, LLC, PG&E Advanced Metering Assessment Report Commissioned by the California Public Utilities Commission, September 2, 2010, http://www.pge.com/includes/docs/pdfs/myhome/customerservice/meter/smartmeter/StructureExecutiveSummary.pdf, accessed September 21, 2011

[95] Metering.com, PG&E reports on smart meter technology to California Senate panel, May 3, 2010, http://www.metering.com/node/17517, accessed September 21, 2011

[96] Structure Consulting Group, LLC, PG&E Advanced Metering Assessment Report Commissioned by the California Public Utilities Commission, September 2, 2010, http://pge.com/includes/docs/pdfs/myhome/customerservice/meter/smartmeter/StructureExecutiveSummary.pdf, accessed September 21, 2011

[97] Hoppin, Jason, Santa Cruz County ground zero for SmartMeter opposition, San Jose Mercury News, February 28, 2011, http://www.mercurynews.com/breaking-news/ci_17505532?nclick_check=1, accessed September 21, 2011

information as possible to customers at the installation point, and when customers refuse the meters, PG&E makes every effort to help the customer understand the program.

The PUC does not have plans to impose a moratorium on SmartMeter installations and has confirmed it wouldn't honor a local moratorium. This has not stopped the individual cities and counties from imposing their own moratoriums on the meter installations. The Lake County Board of Supervisors may be headed for legal action to stop SmartMeter installations in the county until legislation addressing smart meters is passed. The city and county of San Francisco also has petitioned for expedited treatment of a petition against the meters, which was denied last September by an administrative law judge who said, "the information available at this time indicates that the costs associated with a suspension of PG&E's Smart Meter installation program, in both monetary and human terms, appear to be substantial and exceed the doubtful benefits of an immediate suspension." The Big Valley Tribal Business Committee has also banned SmartMeters within tribal boundaries.[98] The Monterey City Council recently passed a resolution demanding that PG&E halt the installation and activation of the controversial meters for customers who don't want the devices. Health hazards and privacy concerns are driving the resolution. Passing an ordinance against smart meters was out of the question due to legal expenses. The city resolution urges PG&E to respect the wishes of people who want to "opt out" of the program.[99] A resolution from a city, town or county banning the meters, however, is not legally binding.

In mid-March 2011, the PUC further ruled that PG&E had two weeks to develop a plan to allow customers to decline the wireless smart meters. The ruling was directed to PG&E specifically and does not include other California utilities installing smart meters.[100] On March 24, 2011, PG&E submitted its plan to the PUC to charge customers upfront fees, monthly charges, or an increase in electric rates to cover the utility's costs to disable the wireless meters and reinstitute traditional meter reading. The plan is pending approval.[101] In total, approximately ten counties and 36 cities are protesting against the smart meter installations. Many of these cities and counties are located in coastal areas.[102]

FUTURE CHANGES

PG&E may find that customers would be more inclined to accept the new meters if: 1) better education exists for consumers; 2) better training exists for smart meter installation technicians; 3) an improved PG&E customer service and complaint resolution process exists; 4) a choice to "opt out" or use wired/power-line based meters is presented; and 5) PG&E addresses the technical problems, like the Ground Fault Interrupter interference issue, to improve the reliability of the meters.

The PG&E website offers a "frequently asked questions" page, energy usage tools, tutorials for reading smart meters, side by side comparison with traditional meters, and a guide for what to expect during the installation process. To further educate customers, pending legislation in Assembly Bill 37 would

[98] Larson, Elizabeth, SmartMeter fight grows locally; supervisors prepare to look at legal options, Lake County News, March 7, 2011, http://lakeconews.com/content/view/18576/919/, accessed September 21, 2011

[99] Monterey County Herald, Monterey says PG&E smart meters should be optional, http://www.allvoices.com/news/8357921-monterey-says-pgampe-smart-meters-should-be-optional, accessed September 21, 2011

[100] Larson, Elizabeth, CPUC chair directs PG&E to create SmartMeter opt-out proposal for customers, Lake County News, March 10, 2011, http://lakeconews.com/content/view/18630/919/, accessed September 21, 2011

[101] Norberg, Bob, PG&E proposes SmartMeter opt-out plan, but it will cost you more money, The Press Democrat, March 24, 2011, http://www.pressdemocrat.com/article/20110324/ARTICLES/110329726/1350?Title=SmartMeter-opt-out-will-cost-you-, accessed September 21, 2011

[102] Stop Smart Meters!, CA Local Governments On Board, http://stopsmartmeters.org/how-you-can-stop-smart-meters/sample-letter-to-local-government/ca-local-governments-on-board/, accessed September 21, 2011

allow customers to have access to more detailed information regarding the RF emissions of the meters, which would assist them in making more informed decisions regarding meter installation.[103]

PG&E is working on improved training for smart meter installation technicians. A sizeable portion of the bill complaints filed by PG&E customers in 2010 were due to calibration errors that occurred when the meter was installed. The meter functioned properly at the incorrectly calibrated level, but these errors have contributed to the general assumption that the meters record electricity consumption incorrectly.[104]

Through an independent evaluation of the SmartMeter program in September 2010, the Structure Group indicated that the PG&E customer service and complaint resolution process needed significant improvements. While customer service representatives made corrections to correct billing inaccuracies, customers were not always given the background information surrounding the mistake, thereby reducing customer confidence in the program. In addition, some customer service representatives were categorized as "unprofessional" in dealing with customer complaints.[105] Improvements within PG&E's customer service area to address these issues could improve public opinion of the program.

To address customers' refusal to allow meter installations on their property, PG&E is waiting for its latest plans to be approved by the PUC. The company hopes to "engage customers across multiple communication channels to enhance customer understanding." [106]

To address health concerns surrounding wireless meters, allowing customers to "opt out," or use a wired meter may also improve public opinion of the program in some cities. PG&E was authorized by the PUC to implement power line communications for its metering technology, but PG&E opted for a wireless transmission system instead.[107] The passage of Assembly Bill 37 may also force PG&E, as well as the other California utilities, to provide an alternative to the current technology by Jan. 1, 2012. The bill also requires PG&E disclose additional information about the meters, including timing, magnitude, frequency and duration of RF emissions. On January 24, 2011, this bill was referred to the Assembly Committee on Utilities and Commerce.[108] In addition, PG&E claims that in light of consumer concerns the company is looking at other options including a wired device. [109]

ALTERNATIVE PROGRAMS

Though it is unclear what new programs PG&E might implement in place of the SmartMeter program, PG&E currently provides other DR programs for all business sizes. However, DR programs require an electric interval meter that can be read remotely by PG&E. These programs include the Peak Day Pricing Plan for large businesses where consumers receive credits for accepting additional charges during peak

[103] California Legislature—2011–12 Regular Session, Assembly Bill No. 37, http://www.leginfo.ca.gov/pub/11-12/bill/asm/ab_0001-0050/ab_37_bill_20101206_introduced.pdf, accessed September 21, 2011

[104] Metering.com, PG&E reports on smart meter technology to California Senate panel, May 3, 2010, http://www.metering.com/node/17517, accessed September 21, 2011

[105] Structure Consulting Group, LLC, PG&E Advanced Metering Assessment Report Commissioned by the California Public Utilities Commission, September 2, 2010, http://www.pge.com/includes/docs/pdfs/myhome/customerservice/meter/smartmeter/StructureExecutiveSummary.pdf, accessed September 21, 2011

[106] PG&E, SmartMeter Steering Committee Update, December 2010, http://www.pge.com/includes/docs/pdfs/myhome/customerservice/meter/smartmeter/smartmeter_steeringcomm_1210.pdf, accessed September 21, 2011

[107] Public Utilities Commission of the State of California, Final Opinion Authorizing PG&E To Deploy AMI, http://docs.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/58362.htm, accessed September 21, 2011

[108] California Legislature—2011–12 Regular Session, Assembly Bill No. 37, http://www.leginfo.ca.gov/pub/11-12/bill/asm/ab_0001-0050/ab_37_bill_20101206_introduced.pdf, accessed September 21, 2011

[109] Larson, Elizabeth, SmartMeter fight grows locally; supervisors prepare to look at legal options, Lake County News, March 7, 2011, http://lakeconews.com/content/view/18576/919/, accessed September 21, 2011

hours on certain "event" days. The credits then can be used during the summer months. In the PeakChoice program large business consumers receive an incentive to reduce their facility's load to or below a level that is pre-selected by the consumer. In the Optional Binding Mandatory Curtailment Plan, customers can avoid rotating outages in tight demand periods by reducing the entire electric circuit load of their facility on any given day or time that PG&E specifies via email or text message. In some cases, standard interval metering could be sufficient for this plan. [110]

PG&E has been awarded $25 million in ARRA funding for a smart grid demonstration project. The company plans to build and test an advanced, underground 300 MW compressed air energy storage plant using a saline porous rock formation near Bakersfield, California as the storage reservoir. [111].

In September 2010, PG&E joined with the WECC to work on the Western Interconnection Synchrophasor stimulus grant project. PG&E is creating a prototype facility in the first phase of the project. Synchrophasors and phasor measurement unit technology is quickly advancing with the devices now taking in data measurements 20 to 40 times per second. The telecommunications system design, data storage, and user interfaces will be developed during the project, and could be implemented in the existing system by early 2013.

PG&E has also requested approval from the CPUC to develop a large pumped hydro storage project in the Sierras using new technology. The company is also exploring battery storage on its distribution system, including a 2 MW battery at one of its substations and a 4 MW battery on the distribution system to provide ancillary services. PG&E anticipates that the technology will result in a reduction of sustained outages. [112]

UDPATES AS OF SEPTEMBER 2011

PG&E has taken a number of steps to continue its deployment of smart grid technology. In response to a 2010 CPUC order, PG&E issued a smart grid deployment plan in June 2011. The plan identifies 21 potential smart grid projects and initiatives which would achieve approximately $900 million to $2 billion in benefits, plus a 10 to 20 percent improvement in system reliability over 20 years.[113] PG&E has also opened a Smart Grid Test Center in San Ramon to analyze new technology to reduce the number of customers affected by outages.[114] The company continues to deploy smart meters across its service territory: as of the week ending July 29, 2011, PG&E had installed 4,418,901 smart meters out of 5,271,508 total electric customers. PG&E plans to roll out its smart meter system to all customers by mid-2012.

Public opposition to PG&E's smart meter program remains significant. One anti-smart meter organization reports that ten counties and 36 cities or towns are opposed to mandatory wireless smart meters. Four counties and seven cities or towns have gone as far as passing ordinances making smart meter installations illegal within their jurisdictions. In response, PG&E proposed a plan to CPUC on March 24, 2011 to give residential customers the option to have the radios in their smart meters turned

[110] PG&E, Demand Response Incentives, http://www.pge.com/mybusiness/energysavingsrebates/demandresponse/, accessed September 21, 2011
[111] Smartgrid.gov, Pacific Gas & Electric Company Advanced Underground Compressed Air Energy Storage, http://www.smartgrid.gov/project/pacific_gas_electric_company_advanced_underground_compressed_air_energy_storage, accessed September 21, 2011
[112] Rowland, Kate, PG&E Testing technologies off-the-grid proves valuable, Intelligent Utility Magazine, January/February 2011, http://www.intelligentutility.com/magazine/article/203211/pge-corp, accessed September 21, 2011
[113] PG&E, Smart Grid Deployment Plan 2011-2020, http://www.pge.com/includes/docs/pdfs/shared/edusafety/electric/SmartGridDeploymentPlan2011_06-30-11.pdf, accessed September 21, 2011
[114] Marshall, Jonathan, PG&E Tests the Future of Smart Grid, Next 100, April 18, 2011, http://www.next100.com/2011/04/pge-tests-the-future-of-smart.php, accessed September 21, 2011

off in exchange for both an up-front and a monthly fee. CPUC is still considering the request.[115] Separately, on July 28, 2011, CPUC approved a series of rules designed to protect the privacy and security of customer electricity usage data gathered by smart meters.[116]

A July 2011 report from PG&E provides analysis of numerous smart meter program metrics. The report identifies two issues in particular that have impacted smart meter deployment. One issue, which is classified as ongoing, is the increasing number of customers refusing to grant PG&E access to install smart meters. In response, PG&E is planning to use multiple communication channels to educate customers about the benefits of smart meters. PG&E is also offering customers the option to temporarily delay their smart meter upgrades. CPUC ordered a set of protocols on September 21, 2011 for how PG&E (and other IOUs in California) should honor the requests of customers who wish to delay the installation of smart meters on their property.[117]

The second issue identified in the report is that approximately 1,600 residential customers were impacted by a meter defect which occasionally ran fast in a narrow band of high temperatures. PG&E attempted to contact all impacted customers by telephone and replaced affected meters for free. Impacted customers received full refunds of over-billed amounts, plus interest and a $25 inconvenience payment; they were also given the offer of a free in-home energy audit. PG&E now classifies this issue as resolved.[118]

[115] CPUC, Proceeding A1103014, http://docs.cpuc.ca.gov/published/proceedings/A1103014.htm, accessed September 21, 2011
[116] CPUC, CPUC Adopts Rules to Protect the Privacy and Security of Customer Electricity Usage Data, http://docs.cpuc.ca.gov/PUBLISHED/NEWS_RELEASE/140316.htm, accessed September 21, 2011
[117] CPUC, Ruling, September 21, 2011, http://docs.cpuc.ca.gov/efile/RULINGS/143742.pdf, accessed September 21, 2011
[118] PG&E, SmartMeter Steering Committee Update, July 2011, http://www.pge.com/includes/docs/pdfs/myhome/customerservice/meter/smartmeter/smartmeter_steeringcomm_0711.pdf, accessed September 21, 2011

PSE Personal Energy Management Program			
Location:	Washington State	**Dates:**	2000 - 2003
Primary Utility/Entity	Puget Sound Energy (PSE)	**ARRA Funding:**	No

PROGRAM INFORMATION	
Key Objectives	• To implement a network metering system with TOU information and customer communications to enable customers to manage their own energy use (i.e., Personal Energy Management, PEM) • To shift usage to off-peak hours in a period of volatile energy prices due to the 2000 energy crisis that affected the western United States
Status	Cancelled
Number of Participants	300,000 residential customers
Participating Entities	• PSE • Landis+Gyr • Alliance Data Systems • SchlumbergerSema
Program Budget	Incremental cost to provide customized energy usage information was approximately $1.26 per customer per month; translating to $378,000 per month for the pilot participants.
Consumer Sector	Residential
Hardware/Software Technologies	• Itron smart meters enabling AMR were installed on 900,000 homes and businesses six months before program began (300,000 of these customers later involved in pilot). • Wireless, near real-time data transfer via network meter reading system supported AMR and the customer web portal with price/consumption data. • ConneXt's ConsumerLinX™ consumer care and billing system. • Landis+Gyr advanced information services and website applications. • PSE call center applications.
Consumer Education Measures	• PEM clients could log on to the company's website and learn: o What their energy consumption was the previous day o How much they paid for energy at different times during the day o How to modify their consumption habits and take advantage of lower electricity costs
PROGRAM RESULTS	
Key Findings	Customers shifted their demand to off-peak periods, and reduced overall demand, but did not see savings reflected on bills during 2002.
Other Outcomes	N/A
Customer Feedback	Initial satisfaction, then sharp decline in support in 2002.
Current Deployment Status	Cancelled
Future Implications	The widespread adoption of metering technology that allows customers to respond to TOU pricing could make the pricing strategy more common, but the savings must outweigh the costs of deploying meters.

IMPACTS/BENEFITS	
Consumers	N/A
Utilities	N/A
Metrics Used	N/A
CAUSES FOR CANCELLATION/POSTPONEMENT	
Primary	Negative response to rate increases
Secondary	• Lack of funding or cost issues • Health concerns • Inadequate customer education for effective system use • Equipment or construction related problems • State/local regulatory orders causing delays
RESOURCES	
Program Website	N/A
Full Program Report	http://www.wutc.wa.gov/rms2.nsf/6d24f40d9ee81e4a882570900002a478/dd401dcacf211ca908256b7300044682!OpenDocument
Presentations	N/A
News Articles	Richter, Roxane, Time-of-Use Plan Benefiting PSE and its Customers, Electric Light & Power, http://www.elp.com/index/display/article-display/145966/articles/utility-automation-engineering-td/volume-7/issue-3/features/time-of-use-plan-benefiting-pse-and-its-customers.html, accessed September 21, 2011
Other Resources	• California Public Utilities Commission, Summary Report on the Experiential Workshops, Day-1: September 9, 2002, http://sites.energetics.com/MADRI/toolbox/pdfs/pricing/workshop_summary.pdf, accessed September 21, 2011 • Energy Priorities, TOU Electricity Billing: How PSE Reduced Peak Power Demands (Case Study), http://energypriorities.com/entries/2006/02/pse_tou_amr_case.php, accessed September 21, 2011 • Brockway, Nancy, AMI: What Regulators Need to Know About Its Value to Residential Customers, National Regulatory Research Institute, http://nrri.org/pubs/multiutility/advanced_metering_08-03.pdf, accessed September 21, 2011

PROGRAM DESCRIPTION

PSE introduced a mandatory TOU pricing plan, called Personal Energy Management (PEM), in 2000. The Washington Utility and Transportation Commission (WUTC) approved a limited trial of the TOU tariff starting May 1, 2001.[119] Three hundred thousand residential customers were placed on the plan on an "opt-out" basis. Customers were charged an on-peak summer rate of 6.25¢ per kWh and an off-peak rate of 4.7¢ per kWh, plus a $1 incremental monthly charge to be a participant in the program. The program was put in place in response to the crisis in the Western markets that was occurring at the time, including droughts resulting in low hydropower water problems.[120]

[119] Northwest Energy Efficiency Taskforce, Workgroup #6: Rethinking Governance and Energy Efficiency Policies, http://www.nwcouncil.org/energy/neet/workgroups/6/Load%20Management%20and%201B3F47.doc., accessed September 21, 2011

[120] Brockway, Nancy, AMI: What Regulators Need to Know About Its Value to Residential Customers, National Regulatory Research Institute, http://nrri.org/pubs/multiutility/advanced_metering_08-03.pdf, accessed September 21, 2011

CAUSES FOR CANCELLATION OR POSTPONEMENT

Customers began receiving comparison bills in late 2002, and found that their electricity bills either remained the same, or rose from their previous amount on the flat rate, even though customers had shifted their electricity use to off-peak hours. As a result, customers began to opt-out of the program in large numbers; there simply wasn't an incentive to stay in the program if their bills were not reduced.

Though peak demand was reduced by 5 to 6 percent, it was also discovered that the reduction was due to a small number of customers with large loads. Many customers made no actual reduction to their peak use. This further indicated that peak load reductions may not be repeatable each year, depending on the needs of the few customers with large loads. PSE claimed that a lack of financial rewards on the lower cost for peak power at the time, contributed to the poor results in bill savings.[121]

Since most PSE customers' bills had actually increased by an average of $0.80 per month on the program, the current energy crisis in the West had subsided, and power prices migrated down to normal levels, PSE could not find justification to continue the program. The WUTC was also concerned that in the current rate structure, customer bills might increase even more. In August 2003, PSE and the WUTC ended the PEM program officially.[122] The company indicated it planned to restructure the rates for the program, and would refund the $1 per month fee to the participants.

It was further discussed that the program results showed much lower elasticity of demand for low income groups, in that groups such as the elderly and disabled could not shift their usage to off-peak times. Multi-family homes and mobile homes were among the groups with the largest bill impacts.

FUTURE CHANGES

Some have suggested that the TOU rates employed by the PEM program would be appropriate in a future energy crisis situation, as long as the technology exists to support it. If customers have the technology needed to respond to the price changes, such a program could be implemented in the future.

Some also argue that the regulatory environment surrounding the PEM program may not be sufficient in responding to quick price fluctuations in the wholesale market. If the regulatory and technological barriers were removed, a program like PEM might be effective in the long term.[123]

ALTERNATIVE PROGRAMS

In 2009, PSE deployed its Bainbridge Island residential DR pilot program. By the end of the pilot project in 2011, PSE will evaluate how electric space, water heating and central air conditioning customers can voluntarily manage their electric demand during peak use periods. Load control devices, including ZigBee-enabled programmable two-way communicating thermostats, Comverge ZigBee-enabled digital control units and internet-enabled Comverge ZigBee gateways have been installed on several hundred participating PSE residential electric customers' electric space and water heating systems, and central air-conditioners. Participants will have access to their energy data via a web interface.[124]

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[121] U.S. Dept. of Energy, Office of Energy Efficiency and Renewable Energy, PSE to Restructure TOU Pilot, http://apps1.eere.energy.gov/news/news_detail.cfm/news_id=6156, accessed September 21, 2011

[122] Energy Priorities, TOU Electricity Billing: How PSE Reduced Peak Power Demands (Case Study), http://energypriorities.com/entries/2006/02/pse_tou_amr_case.php, accessed September 21, 2011

[123] International Energy Agency, The Power to Choose: Demand Response in Liberalised Electricity Markets, http://www.schneider-electric.us/documents/solutions1/demand-response-solutions/powertochoose_2003.pdf, accessed September 21, 2011

[124] Metering.com, PSE to undertake smart grid-enabled demand response pilot program, http://www.metering.com/node/16458, accessed September 21, 2011

Today, PSE uses an automatic meter reading system to gather data from 900,000 smart meters within the company's service area, as a method of controlling costs and improving customer service.[125]

Through PSE's green pricing program, titled "Green Power Program," customers can support renewable energy in the Northwest. For residential customers and businesses, PSE offers a collection of efficiency programs, tips and rebates.[126]

UPDATES AS OF SEPTEMBER 2011

There are no significant updates to this case study as of September 2011.

[125] Energy Priorities, TOU Electricity Billing: How PSE Reduced Peak Power Demands (Case Study), http://energypriorities.com/entries/2006/02/pse_tou_amr_case.php, accessed September 21, 2011

[126] PSE, Green Power Program, http://www.pse.com/energyEnvironment/renewableenergy4/Pages/GreenPowerProgram.aspx, accessed September 21, 2011

PSE, Home & Business Solutions, http://www.pse.com/solutions/Pages/Default.aspx, accessed September 21, 2011

Snohomish Smart Grid Project			
Location:	Snohomish County, Washington	**Dates:**	2010 - 2013
Primary Utility/Entity	Snohomish County PUD	**ARRA Funding:**	$15.8 million

PROGRAM INFORMATION	
Key Objectives	• To isolate and minimize power disruptions and reduce restoration time. • To enable efficient management of a growing number of distributed energy sources. • To achieve a reduction in line losses. • To achieve reduced greenhouse gas emissions. • To enable better integration of electric vehicles in the PUD service area. • To lower operating and maintenance costs and improve grid security.
Status	Partially postponed (smart meter installations, smart devices, and dynamic pricing options only)
Number of Participants	320,000 residential customers
Participating Entities	• Snohomish County PUD • RFP issued for software providers, three finalists identified: o Areva T&D, Inc. o Telvent o Ventyx, an ABB Company
Program Budget	$31.6 million for entire project (47 percent funded by ARRA).
Consumer Sector	Residential
Hardware/Software Technologies	• Fiber optic installations to enable power control and monitoring via two-way power communications • Substation automation, communications equipment/SCADA, using wireless telecommunications • Distribution management system development • Cyber security development • Feeder monitors/indicators • Automated reclosers, capacitor banks, and line switches
Consumer Education Measures	N/A (utility side upgrades only)
PROGRAM RESULTS	
Key Findings	The PUD has moved forward with substation automation and fiber optic cable installation and is on target to achieve the major milestones for the project.
Other Outcomes	N/A
Customer Feedback	N/A (utility side upgrades only)
Current Deployment Status	• 18 substations automated (out of 84) at this time • 163 miles of fiber optic cable installed; connects a set of 62 substations, two radio sites, and utility buildings (completed on time and under budget) • Currently installing wireless field area network and automation hardware on poles/substations in a demonstration area in Tulalip, Warm Beach and Lake Goodwin.

Future Implications	With extensive utility side grid management technology in place, the utility may have a smooth integration of new smart meters, in home devices, and DG in the future.
IMPACTS/BENEFITS	
Consumers	N/A
Utilities	N/A
Metrics Used	N/A
CAUSES FOR CANCELLATION/POSTPONEMENT	
Primary	Waiting for technological advancements
Secondary	Negative response to rate increases
RESOURCES	
Program Website	http://www.snopud.com/PowerSupply/smartgrid.ashx?p=1869
Full Program Report	http://www.snopud.com/Site/Content/Documents/custpubs/sgridprojdes.pdf
Presentations	http://www.electricleague.net/files/luncheons/2010_jan_luncheon_snopud_presentation.pdf, accessed September 21, 2011
News Articles	• Beniwal, Angela, Kicking Off Upgrades With Back-End Automation, Renew Grid, http://issuu.com/zackinpublications/docs/reg1103_online?mode=embed&layout=http%3A%2F%2Fskin.issuu.com%2Fv%2Flight%2Flayout.xml&showFlipBtn=true&pageNumber=1, accessed September 21, 2011 • Snohomish County PUD No. 1, Power News, September 15, 2011, http://snopud.com/Site/Content/Documents/ci/pn911_web.pdf, accessed September 21, 2011
Other Resources	SmartGrid.gov, Snohomish County PUD Smart Grid Project, http://www.smartgrid.gov/project/public_utility_district_no_1_snohomish_county_smart_grid_infrastructure_modernization_electr, accessed September 21, 2011

PROGRAM DESCRIPTION

The PUD received $15.8 million in ARRA funding for a distribution automation project, which has a total cost of $31.7 million. The project includes fiber optic installations, substation automation, distribution management system development, and cyber security development. The PUD recently installed 163 miles of fiber optic cable as part of an overall project to automate their distribution system. Once the automated distribution system is in place for a select region of the system by early 2012, the full-scale roll-out of the technology will begin across the entire system. The project must be completed by 2013. The PUD decided against smart meter deployment, smart appliances, smart water heaters, and dynamic pricing options for customers until a dependable, optimized distribution system is in place.

The PUD anticipates that savings achieved through the fiber optic system installation will help pay for other smart grid components in the future.[127]

CAUSES FOR CANCELLATION OR POSTPONEMENT

The Snohomish County PUD has indicated that back-end optimization will be necessary to ensure proper price signals are sent to customers in the future when smart meters are in place. The PUD insists that they be prepared with the software and infrastructure in place on their end in order to manage the enormous amount of data received from customer meters, other various smart devices, and DG

[127] Snohomish County PUD No. 1, What is Smart Grid? http://www.snopud.com/PowerSupply/smartgrid.ashx?p=1869, accessed September 21, 2011

systems. The PUD is hesitant to impact ratepayers by spending large sums of money on smart meters at this early stage of the grid modernization process.

Additionally, the PUD sees an attempt to change a customer's energy consumption behavior through smart meters as more challenging than the projects they can complete to optimize their transmission system. It is planned that the back-end automation will provide better information and benefits to the customer in the long run, and will allow for an easier transition away from traditional meters. The PUD indicates that it wants to avoid a time gap between the point the new piece of equipment is installed at the customer's residence, and the point at which the associated pricing program can begin. The PUD also hopes that smart meter technology will have advanced by the time installations are needed.

Integrating renewable energy sources into the grid is a high priority for the PUD, and focusing efforts to upgrade and automate their distribution system is the district's preferred method to achieve this goal.

FUTURE CHANGES

Once the automated distribution system is thoroughly tested and programs are developed to encourage energy conservation through metering methods, the PUD will consider installing smart meters. The PUD prefers to first automate its way out to the customer to ensure it can monitor and store the information that will be retrieved through smart devices.

The PUD is not certain that TOU rates will be offered in the future. The PUD Board of Commissioners will be evaluating the need for a policy adoption, in light of current system improvements, maintenance costs, and other factors, in order to implement TOU rates.

ALTERNATIVE PROGRAMS

If the PUD decides not to deploy smart meters and smart devices, or to offer dynamic pricing options, other programs are currently in place to encourage DG and energy efficiency. The PUD offers the Solar Express program which provides incentives for distributed solar electric systems for customers. [128]

The PUD is also implementing its Community Energy Efficiency Pilot for residential and small business customers in select neighborhoods. An estimated 3,000 homes and 100 small businesses will be included in the pilot, with a projected annual savings of approximately 10 million kWh. The project is supported by a $2.17 million ARRA grant, and will include new installations of CFL bulbs, showerheads, smart power strips, programmable thermostats and ENERGY STAR CFL light fixtures as well as incentives to upgrade common area lighting, install attic insulation, retrofit windows and install energy efficient appliances.[129]

UPDATES AS OF SEPTEMBER 2011

The PUD continues to concentrate its efforts on internal operations to lay the groundwork for a modernized grid, rather than rushing to deploy residential smart meters. In 2012, the PUD plans to complete installation of a distribution automation demonstration project in the Tulalip/Warm Beach community. The PUD also recently began operations at a smart grid test lab at its Operations Center.

[128] Snohomish County PUD No. 1, For Your Home - Solar Express, http://www.snopud.com/?p=1207, accessed September 21, 2011
[129] The Electric League, Snohomish County PUD & ARRA Grants, http://www.electricleague.net/files/luncheons/2010_jan_luncheon_snopud_presentation.pdf, accessed September 21, 2011

According to the PUD, future upgrades will allow the utility to plan for features including advanced metering, smart appliances, and dynamic pricing.[130]

[130] Snohomish County PUD No. 1, Power News, September 15, 2011, http://snopud.com/Site/Content/Documents/ci/pn911_web.pdf, accessed September 21, 2011

Xcel Energy SmartGridCity			
Location:	Boulder, Colorado	**Dates:**	2008 - Present
Primary Utility/Entity	Xcel Energy	**ARRA Funding:**	No

PROGRAM INFORMATION	
Key Objectives	• To utilize emerging smart grid technologies to improve reliability and reduce the number (and impact) of power outages. • To evaluate which energy-management and conservation tools customers prefer. • To reduce carbon emissions.
Status	Full-scale deployment beyond the pilot program is on hold due to funding issues.
Number of Participants	• Approximately 23,000 smart meters installed • 4,685 customers initially enrolled in SmartGridCity Pricing Pilot
Participating Entities	• Xcel Energy • Accenture • Current Group • Schweitzer Engineering Laboratories • Ventyx, GridPoint Inc. • OSIsoft • Landis+Gyr • SmartSynch, Inc.
Program Budget	As of February 2011, the pilot program cost is $44.5 to $44.8 million.
Consumer Sector	• Residential • Commercial • Industrial

Hardware/Software Technologies	• Automated, two-way high-speed broadband, smart electric meters with measurements in 15-minute increments.
	• Three pricing plans:
	  o Shift & Save Plan: Encourages customers to shift usage to hours with lower cost electricity.
	  o Peak Plus Plan: Customers are notified in advance to shift usage on Peak Energy Events (days with higher electricity pricing).
	  o Reduce-Your-Use Rebate: Encourages customers to cut back usage on Peak Energy Event days to earn rebates.
	• Smart plugs that enable hybrid/electric vehicles to supply energy.
	• Fiber optic cable, transformers, and network elements along with power-line sensors.
	• Wireless in-home devices (e.g. smart thermostats).

Consumer Education Measures	• Xcel Energy website allows participants to view and control energy consumption. • Promotional materials and workshops encourage enrollment in pricing plans.

PROGRAM RESULTS	
Key Findings	Xcel Energy underestimated construction costs, as well as costs associated with software and permitting.
Other Outcomes	City of Boulder replaced 20-year franchising of Xcel Energy with voter-approved occupational tax that began 1/2011; some residents see option for replacing Xcel's services with a municipal utility.
Customer Feedback	Little feedback found from identified sources. Some of the 5,000 randomly selected customers were angered by letters sent from Xcel Energy requiring them to respond to new pricing plans; customers claim mailing verbiage is in conflict with Colorado PUC agreement.
Current Deployment Status	• Infrastructure for pilot program completed in 2009. • Pilot meter installation complete and rate programs initiated in 2010; planned to progress through 2013. • Full scale deployment beyond the pilot program appears to be on hold due to funding issues.
Future Implications	The future full scale deployment hinges on Xcel Energy proving to the PUC that the pilot is cost-effective.
IMPACTS/BENEFITS	
Consumers	• Potential exists for customers save on energy bills through the choice to join a TOU pricing plan. • Because a portion of the program is being paid by customers, most residents have paid more as a result of SmartGridCity.
Utilities	• Savings for Xcel from reduced need for meter readers and from strengthened system integrity • Dissatisfied shareholders may put Xcel's future in Boulder in jeopardy.
Metrics Used	• Focus on grid intelligence and utility management (rather than demonstrated peak-load reduction) • Outage Reduction: Xcel Energy indicated that power-line sensors prevented 63 outages in 2009.
CAUSES FOR CANCELLATION/POSTPONEMENT	
Primary	Lack of funding or cost issues
Secondary	• Privacy concerns • Inadequate customer education for effective system use • Equipment or construction related problems • State/local regulatory orders causing delays
RESOURCES	
Program Website	http://smartgridcity.xcelenergy.com/, accessed September 21, 2011
Full Program Report	Xcel Energy, SmartGridCity Information Sheet, http://smartgridcity.xcelenergy.com/media/pdf/Information-Sheet.pdf, accessed September 21, 2011
Presentations	N/A

News Articles	• National Conference of Black Mayors, Are Consumers Ready to Use and Pay For A Smart Grid?, August 2009, http://ncbm.org/2009/08/are-consumers-ready-to-use-and-pay-for-a-smart-grid/, accessed September 21, 2011 • Kanellos, Michael, Boulder Prepares to Wash Its Hands of SmartGridCity, Greentech Media, August 25, 2010, http://www.greentechmedia.com/articles/read/boulder-prepares-to-wash-its-hands-of-smartgridcity/, accessed September 21, 2011 • Jaffe, Mark, PUC must walk the line between Xcel, customers, The Denver Post, February 13, 2011, http://www.denverpost.com/business/ci_17367998, accessed September 21, 2011 • Snider, Laura, Boulder residents outraged by Xcel's mandatory pricing pilot, Boulder Daily Camera, February 17, 2011, http://www.dailycamera.com/boulder-county-news/ci_17418583, accessed September 21, 2011 • Davidson, Michael, Lines Drawn in Boulder utility debate, Boulder County Business Report, September 2, 2011, http://www.bcbr.com/article.asp?id=59526, accessed September 21, 2011 • Enbysk, Liz, Power struggle erupts in SmartGridCity, smartgridnews.com, September 6, 2011, http://www.smartgridnews.com/artman/publish/Projects_Updates/Power-struggle-erupts-in-SmartGridCity-3975.html, accessed September 21, 2011
Other Resources	• Xcel Energy, SmartGridCity Frequently Asked Questions, http://smartgridcity.xcelenergy.com/learn/frequently-asked-questions.asp, accessed September 21, 2011 • Colorado PUC, Decision No. C09-1446, http://www.dora.state.co.us/puc/docketsdecisions/decisions/2009/C09-1446_09AL-299E.doc, accessed September 21, 2011 • Colorado PUC, Decision No. C11-0139, http://www.smartgridlegalnews.com/CPUC%20decision.pdf, accessed September 21, 2011 • Colorado PUC, Decision No. C11-0869, https://www.dora.state.co.us/pls/efi/efi_p2_v2_demo.show_document?p_dms_document_id=125674, accessed September 21, 2011 • Xcel Energy, SmartGridCity Pricing Pilot Informational Report, Docket No. 09A-796E, July 20, 2011, https://www.dora.state.co.us/pls/efi/efi_p2_v2_demo.show_document?p_dms_document_id=120732, accessed September 21, 2011 • City of Boulder, Memorandum to IBM Smarter Cities Challenge Team, May 11, 2011, http://www.bouldercolorado.gov/files/Energy/SGC_IBM/SGC_memo_may11.pdf, accessed September 21, 2011 • IBM, IBM's Smarter Cities Challenge, Boulder: Report, http://www.bouldercolorado.gov/files/Energy/SGC_IBM/IBM_SmrtCity_SGC_Report.pdf, accessed September 21, 2011

PROGRAM DESCRIPTION

The SmartGridCity network began operation in the summer of 2009 in Boulder, Colorado. The smart grid infrastructure allows Xcel Energy to communicate and connect with nearly 47,000 premises throughout Boulder. Participants with smart meters can view their electricity consumption through the company's online portal. Starting in 2010, Xcel Energy began to focus on the deployment of in-home energy management options, pricing pilot programs, and additional plug-in hybrid electric vehicle testing.[131]

CAUSES FOR CANCELLATION OR POSTPONEMENT

In 2008, Xcel Energy chose not to file a Certificate of Public Convenience and Necessity (CPCN) with the PUC prior to the start of the project with the reasoning that the pilot program was a research project. Xcel Energy also decided to forgo an initial cost-benefit analysis for the project. Without a CPCN, the PUC (or other interested parties) could not cap costs to protect ratepayers. The original $15.3 million project cost estimate soared to $27.9 million, and at last report to roughly $44.5 to $44.8 million due to permitting, tree trimming, software, and construction difficulties.[132] Construction crews were required to drill through a larger amount of rock than anticipated to install the fiber optic lines. Additionally, construction crews did not anticipate the cost of drilling through granite with diamond-tipped drill bits and utilizing cranes and dump trucks to move large boulders.

The fiber optic network accounts for a large portion of the ballooning project cost. While many utilities limited fiber optic installations to major transmission lines, ending at substations, Xcel Energy has chosen to install the cables in neighborhood distribution grids. While fiber optic cable is the fastest and most reliable communications network material available to utilities, its high cost has prompted other utilities to use utility-owned wireless or power line-carrier networks, and public cellular networks such as Sprint, AT&T and Verizon to reduce costs. Xcel Energy decided against using wireless mesh technologies, provided by vendors such as Silver Spring Networks and Trilliant, which have usually been the first choice of U.S. utilities deploying smart meters. Though the SmartGridCity network includes some BPL technology, Xcel Energy indicates wireless technology is only used in isolated instances.[133]

The lack of a clear division of shared project costs among Xcel Energy's partners has also contributed to the project's delays. Xcel Energy planned to bring on industry partners that would share the cost of the project. Once operation and maintenance is included, the cost calculations reach above $100 million. Though the seven "consortium" members/partners are in place, the PUC could not determine what their financial contribution would be from Xcel Energy's plans. As a result, the PUC finds the plans difficult to approve when they don't know where (or how much) funding is in place on Xcel Energy's part.[134]

As a result of these challenges, the PUC decided Xcel Energy needed an approved CPCN to prove the project is practical and in the public interest. In its December 2009 order, the PUC confirmed the funds obtained through rate hikes would be refunded to ratepayers if Xcel Energy failed to obtain a CPCN authorizing the project.[135]

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[131] Xcel Energy, SmartGridCity Information Sheet, http://smartgridcity.xcelenergy.com/media/pdf/Information-Sheet.pdf, accessed September 21, 2011

[132] Berst, Jesse, SmartGridCity Meltdown: How Bad Is It?, SmartGridNews Online, August 3, 2010, http://www.smartgridnews.com/artman/publish/Business_Policy_Regulation_News/SmartGridCity-Meltdown-How-Bad-Is-It-2822.html, accessed September 21, 2011

[133] Xcel Energy, SmartGridCity Frequently Asked Questions, http://smartgridcity.xcelenergy.com/learn/frequently-asked-questions.asp, accessed September 21, 2011

[134] Snider, Laura, Xcel smart grid costs blow up, PUC orders more transparency, Boulder Daily Camera, February 6, 2010, http://www.dailycamera.com/news/ci_14346139, accessed September 21, 2011

[135] Colorado PUC, Decision No. C09-1446, http://www.dora.state.co.us/puc/docketsdecisions/decisions/2009/C09-1446_09AL-299E.doc, accessed September 21, 2011

On Oct. 27, 2010, the CPCN was approved by the PUC subject to conditions involving customer usage information, confidentiality, intellectual property rights and patent rights. The PUC further stated, "This Commission believes that the Company needs to 're-boot' the [SmartGridCity] project and restore some of the promise this concept originally held. If the Company demonstrates in a future application that the [SmartGridCity] project has a coherent and valuable future, we may allow the Company to recover the balance of the investment disallowed in this case." [136]

As the project nears completion, only about 23,000 meters in the city are smart meters. Some feel the metering system is not providing as many in-home benefits as anticipated in a smart grid program. Due to the funding issues, some also argue that the SmartGridCity technology will not be fully deployed in Boulder for the foreseeable future.

To further complicate matters, the City of Boulder has petitioned the Colorado PUC to effectively remove itself from the hearings over SmartGridCity. The petition requests to eliminate the city's testimony within the hearings. City representatives pointed to the lack of a clear consensus among the members of the Boulder City Council regarding the value of SmartGridCity. Some city leaders maintain that the project in its present state has stopped short of what Xcel Energy promised. The City of Boulder expected that the project would be entirely paid for by the PUC, and it is dissatisfied that Xcel Energy has sought to recover some of the costs through rate increases. In late 2010, the City of Boulder further decided not to renew Boulder's franchise agreement with Xcel Energy, allowing for the possibility of Boulder forming its own municipal utility. As a result of the decision, Xcel Energy began operating the project under a revocable permit. [137]

In January 2011, the PUC awarded $27.9 million in rate recovery for the project, with the possibility of Xcel Energy receiving the other $16.6 million if it can show a significant benefit to Colorado ratepayers.[138]

Some of those Colorado ratepayers were recently angered by an Xcel Energy mail-out to gather participants for a new pilot pricing program. In February 2011, a flier was sent to 5,000 randomly selected Boulder residents prompting recipients to sign up for one of three pricing plans. The goal of the pricing pilot is to evaluate the ability of Boulder's smart grid to help residents reduce peak demand. Thousands of Xcel customers received the fliers which state, "You have been selected as one of the participants for this mandatory program. Your response is required to select your top two choices by March 1st." A statement that a response is required was also printed on the flier envelope. Although it is not explained on the flier, customers who do not respond to the mailing continue to be charged the standard rate, according to paperwork filed with the Public Utilities Commission in December 2010. The PUC approved the pricing pilot with the requirement that Xcel Energy allow those selected to decline participation, if desired, though the flier verbiage seemed to suggest otherwise.[139]

FUTURE CHANGES

[136] Colorado PUC, Decision No. C11-0139, http://www.smartgridlegalnews.com/CPUC%20decision.pdf, accessed September 21, 2011
[137] Kanellos, Michael, Boulder Prepares to Wash Its Hands of SmartGridCity, Greentech Media, Inc., August 25, 2010, http://www.greentechmedia.com/articles/read/boulder-prepares-to-wash-its-hands-of-smartgridcity/, accessed September 21, 2011
Heath, Urie, Boulder's energy goals summed up in mission statement, Boulder Daily Camera, February 16, 2011, http://www.istockanalyst.com/article/viewiStockNews/articleid/4896086, accessed September 21, 2011
[138] Colorado PUC, Decision No. C11-0139, http://www.smartgridlegalnews.com/CPUC%20decision.pdf, accessed September 21, 2011
[139] Snider, Laura, Boulder residents outraged by Xcel's mandatory pricing pilot, Boulder Daily Camera, February 17, 2011, http://www.dailycamera.com/boulder-county-news/ci_17418583, accessed September 21, 2011

A reduction in costs could change the future of the SmartGridCity project. If Xcel Energy can prove its technology is cost-effective for ratepayers, the company could recover the funds it needs to continue the pilot program. If Xcel Energy "re-boots" SmartGridCity with new plans regarding smart meter communications platforms (e.g. cheaper wireless mesh networks), the result might be reduced costs. Additionally, the PUC might be more inclined to approve Xcel Energy's plans if the company can provide clear financial contributions from the seven "consortium" members.

The arrangements between the City of Boulder and Xcel Energy could also change the path of the project. If Boulder's franchise agreement with Xcel Energy is renewed, this would resolve the issue of the pilot program being operated under revocable conditions. The Boulder City Council would first need to come to a consensus with regard to the value of SmartGridCity, as dissenting opinions among council members exist at this time.

The feedback Xcel Energy receives as a result of its 2011 pricing pilot will also help the company gauge the effectiveness of its SmartGridCity programs. If there is considerable response to the new pricing options, the long term outlook of the project may improve.

Though it has been reported that Xcel Energy will neither expand nor replicate its Boulder project, cost reduction measures and revised technology requirements could increase PUC and customer confidence in a large scale project. In Xcel Energy's 2011 DSM Plan, the company states that SmartGridCity is now in Phase IV, where the focus has shifted to wider technology deployment, systems operation, and evaluation of the systems requirements driving the project. [140]

ALTERNATIVE PROGRAMS

Xcel Energy's companywide Smart Grid implementation involves three phases: 1) Quick-hit projects; 2) SmartGridCity and 3) Xcel-wide deployment of proven technologies. Prior to the initiation of SmartGridCity, Phase 1 (Quick-hit projects) included the following projects focused on vertical aspects of the utility:

- Wind energy storage
- Neural networks to reduce coal slagging and fouling
- Smart substation development of cutting-edge technology for remote monitoring of critical and non-critical operating data to reduce transmission losses
- Smart distribution asset development to detect isolated outages
- Smart outage management diagnostic software that uses statistics on eight factors (including maintenance, weather, and historical data) to predict problems in the power distribution system
- Plug-in hybrid electric vehicle technology, which will allow vehicles to charge from and discharge energy to the grid, among other DG developments
- Consumer web portal development to give customers an opportunity to automatically control their energy[141]

Xcel Energy supported the legislative requirements in both Colorado and Minnesota for increasing the renewable portfolio standard benchmarks to 20 percent of annual retail electricity sales by 2020 in Colorado and 30 percent of annual retail electricity sales (25 percent from wind energy) by 2025 in

[140] Xcel Energy, 2011 Demand-Side Management Plan, July 2010, http://www.swenergy.org/news/news/documents/file/Xcel%202011%20DSM%20Plan.pdf, accessed September 21, 2011

[141] Xcel Energy, Xcel Energy Smart Grid, A White Paper, February 2008, http://smartgridcity.xcelenergy.com/media/pdf/SmartGridWhitePaper.pdf, accessed September 21, 2011

Minnesota.[142] By investing in battery technology, and wind energy storage, Xcel Energy hopes to become a player in the energy storage market.[143]

Other Xcel Energy DSM pilots continuing into 2011 in Colorado include:

- Energy Feedback Pilot: Investigates how various feedback methods affect residential customer energy consumption.
- Central Air- Conditioning Tune-Up Pilot: This pilot seeks to provide customers with an affordable option for improving existing residential air conditioning efficiency and reducing costs. Includes 1,000 "tune up" units where Public Service Company of Colorado can monitor results and determine true cost-benefit savings.
- ENERGY STAR Retailer Incentive Pilot: Designed to increase the sales of energy efficient technologies by providing upstream rebates to retailers that sell ENERGY STAR equipment, particularly large appliances and electronics.
- In-Home Smart Device Pilot: Designed to test how residential customers respond to control strategies and energy consumption information received through tools, such as utility-controllable programmable thermostats or plug-load or hard wired appliance controls, monitoring and tracking their energy usage.[144]

Xcel Energy announced a new energy efficiency program in 2011 in which the company will discount more than 1.3 million ENERGY STAR qualified CFL bulbs for Colorado residential electric customers. Xcel Energy will offer special prices at participating retailers throughout 2011.[145]

UPDATES AS OF SEPTEMBER 2011

The number of smart meters deployed throughout Boulder has not changed substantially since 2010. Using data from 2010, the City of Boulder reported on May 11, 2011 that the SmartGridCity smart meter system includes about 23,000 smart meters out of 44,000 total residential meters, plus 100 smart meters out of 7,600 commercial, institutional, and governmental meters in the SmartGridCity area. Xcel Energy continues to report in various sources that approximately 23,000 smart meters are currently deployed in the city. City officials say that questions remain about the exact numbers of smart meters and home automation systems that have been deployed, as well as how far various Xcel Energy smart grid projects have progressed.[146]

In mid-2011 Xcel Energy has moved forward with its SmartGridCity Pricing Pilot to test customer responses to three different types of rates: TOU, CPP, and PTR. This pilot program has suffered a number of significant setbacks. Initially, the Colorado PUC declined to allow Xcel Energy to classify the Pricing Pilot as a DSM plan, though the company is still moving forward with the pilot, regulated by the PUC under Docket No. 09A-796E. In addition to a "voluntary" first phase, Xcel Energy planned to enroll 5,000 customers in a "random selection" second phase of the pilot. During enrollment for Phase 2, more customers than anticipated opted for PTR rates, leading to over-subscription of this tariff. In addition,

[142] Ibid.
[143] Johnson, Rachel, Energy Storage: enabling a shift away from baseload generation, Industrial Fuels and Power, March 1, 2011, http://www.ifandp.com/article/009866.html, accessed September 21, 2011
[144] Xcel Energy, 2011 Demand-Side Management Plan, July 2010, http://www.swenergy.org/news/news/documents/file/Xcel%202011%20DSM%20Plan.pdf, accessed September 21, 2011
[145] Xcel Energy, Xcel Energy to discount more than 1.3 million CFLs in 2011, March 8, 2011, http://www.xcelenergy.com/Colorado/Company/Newsroom/Pages/2011-03-0813millionCFLsin2011.aspx, accessed September 21, 2011
[146] City of Boulder, Memorandum to IBM Smarter Cities Challenge Team, May 11, 2011, http://www.bouldercolorado.gov/files/Energy/SGC_IBM/SGC_memo_may11.pdf, accessed September 21, 2011

fewer than 5,000 customers enrolled in the pilot program overall, meaning that the company was unable to establish a true random sample. Xcel Energy opted to close enrollment even without a random sample, stating that the company had already contacted selected customers multiple times and feared that they had become fatigued and possibly upset with Xcel Energy's repeated attempts to market the pilot tariffs. Xcel Energy has already reported an attrition of 669 participants due to a variety of factors, negatively impacting statistical precision factors used to test pricing structures. A final setback for the project relates to the state of the In-Home Smart Devices that were planned to be used in conjunction with the pricing pilot. Xcel Energy has had difficulties procuring devices that meet the company's functionality and security requirements. As a result, the company did not install any In-Home Smart Devices for pricing pilot customers during summer 2011.[147] In response, the PUC ordered in August that Xcel Energy finish installation of all In-Home Smart Devices for the pilot by December 31, 2011.[148] The SmartGridCity Pricing Pilot is due to continue through September 30, 2013.

It is unclear what the future holds for Xcel Energy's SmartGridCity project. Negotiations over whether to grant Xcel Energy a new 20-year franchise agreement to supply power to Boulder broke down in July 2011, largely due to the perception that Xcel Energy is not working hard enough to reduce the city's greenhouse gas emissions by providing sources of renewable energy. On November 1, 2011, city residents will vote on two ballot measures which, if passed, could lead to the creation of a municipal utility in Boulder.[149]

[147] Xcel Energy, SmartGridCity Pricing Pilot Informational Report, Docket No. 09A-796E, July 20, 2011, https://www.dora.state.co.us/pls/efi/efi_p2_v2_demo.show_document?p_dms_document_id=120732, accessed September 21, 2011
[148] Colorado PUC, Decision No. C11-0869, https://www.dora.state.co.us/pls/efi/efi_p2_v2_demo.show_document?p_dms_document_id=125674, accessed September 21, 2011
[149] Davidson, Michael, Lines Drawn in Boulder utility debate, Boulder County Business Report, September 2, 2011, http://www.bcbr.com/article.asp?id=59526, accessed September 21, 2011
Enbysk, Liz, Power struggle erupts in SmartGridCity, smartgridnews.com, September 6, 2011, http://www.smartgridnews.com/artman/publish/Projects_Updates/Power-struggle-erupts-in-SmartGridCity-3975.html, accessed September 21, 2011

Attachment C

Smart Grid Around the World

Selected Country Overviews

October 3, 2011

Prepared by SAIC

Prepared for the
Energy Information Administration

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Tables

Figures

Table of Acronyms

General Acronyms

BEMS	Building energy management system	**MDM**	Meter data management
BPL	Broadband power line	**MVA**	Megavolt ampere
CHP	Combined heat and power	**NAS**	Sodium sulfur (battery type)
DSM	Demand side management	**NIST**	National Institute of Standards and Technology
EHMS	Energy hub management	**PLC**	Power line carrier
EV	Electric vehicle	**SCADA**	Systems control and data acquisition
EU	European Union	**T&D**	Transmission and distribution
GSGF	Global Smart Grid Federation	**TOU**	Time of use
HEMS	Home energy management system	**TWh**	Terawatt hours
IP	Internet protocol	**UHV**	Ultra high voltage
ISGAN	International Smart Grid Action Network	**USAID**	U.S. Agency for International Development
IT	Information technology	**USTDA**	U.S. Trade and Development Agency
LTE	Long term evolution	**V2G**	Vehicle to grid

Country Agency Acronyms

Australia	**AEMC**	Australian Energy Market Commission
	AEMO	Australian Energy Market Operator
	DCCEE	Department of Climate Change and Energy Efficiency
	DRET	Department of Resources, Energy and Tourism
	SGA	Smart Grid Australia
Canada	**CED**	Clean Energy Dialogue
	NEB	National Energy Board
	NRCan	Natural Resources Canada
	NSERC	Natural Sciences and Engineering Research Council of Canada
	SCC	Standards Council of Canada
	SGC	Smart Grid Canada
China	**CEC**	China Electricity Council
	NDRC	National Development and Reform Commission
	NEC	National Energy Administration
	SERC	State Electricity Regulatory Commission
	SGCC	State Grid Corporation of China
	SGEPRI	State Grid Electric Power Research Institute
Germany	**BMU**	Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety
	BMWi	Federal Ministry of Economics and Technology
	DKE	The German Commission for Electrical, Electronic, & Information Technologies

India	**CEA**	Central Electric Authority
	CPRI	Central Power Research Institute
	DST	Department of Science and Technology
	MCIT	Ministry of Communications and Information Technology
	Mescom	Mangalore Electricity Supply Company
	MNRE	Ministry of New and Renewable Energy
	MOP	Ministry of Power
	PFC	Power Finance Corporation
	R-APDRP	Re-Structured Accelerated Power Development and Reforms Program
	SGTF	Smart Grid Task Force
Japan	**ARIB**	Association of Radio Industries and Businesses
	METI	Ministry of Economy, Trade and Industry
	NEDO	New Energy and Industrial Technology Development Organization
South Korea	**KSGI**	Korea Smart Grid Institute
Spain	**NOBEL**	Neighborhood Oriented Brokerage Electricity and monitoring system
	REE	Red Electrica de Espana
United Kingdom (UK)	**DECC**	Department of Energy and Climate Change
	DNO	distribution network operators
	LCN	Low Carbon Networks
	Ofgem	Office of the Gas and Electricity Markets

Introduction

Smart grid initiatives are gaining traction, not only in the United States but in many other countries around the world. Utilities around the globe are investing billions of dollars to deploy smart grid technologies. The number of smart meters deployed worldwide is expected to rise from a level of 76 million in 2009 to more than 250 million in 2015, representing approximately 18 percent of all electric meters globally.[1] Just as the $4.5 billion investment under the American Recovery and Reinvestment Act (ARRA) is a significant factor in driving smart grid growth in the United States, other countries are also investing significant resources in the creation of their own financial and policy incentives to spur smart grid development. A report released in January 2010 by ZPryme Research & Consulting ranks the top 10 countries by smart grid federal stimulus investments.[2] The report showed that China exceeded the United States in federal smart grid subsidies for the first time in 2010, with over $7.3 billion invested, compared to $7.1 billion in the United States. Table 1 shows the list of countries ranked by federal smart grid investment in 2010.

Table 1. Top Ten Smart Grid Federal Stimulus Investments by Country, 2010

Country	Invested (U.S. Million Dollars)
China	$7,323
United States	$7,092
Japan	$849
South Korea	$824
Spain	$807
Germany	$397
Australia	$360
United Kingdom	$290
France	$265
Brazil	$204

Source: ZPryme, http://zpryme.com/news-room/smart-grid-china-leads-top-ten-countries-in-smart-grid-federal-stimulus-investments-zpryme-reports.html, accessed September 27, 2011

Although the definition of smart grid varies from country to country, the underlying concept is the same: an electricity system that uses information technology (IT) to connect those who generate and transmit electricity with those who consume it. The approach to establishing such a system varies by country and region. Smart grid activities in the United States and the European Union (EU) illustrate this variation. For example, in Europe smart meter roll-outs and other smart grid initiatives are largely driven by policy mandates to meet environmental and climate goals. This differs from the United States, where the primary drivers for smart grid development are stimulus money for job creation and utility-based efforts to add value and increase system efficiencies. The two regions also show a fundamental difference in the systems used to enable two-way communication for smart meters, a key element of a smart grid. The United States is generally leaning toward wireless mesh technology, while many European countries

[1] KEMA. Smart Grid Development Is Not Limited to the U.S. http://www.kema.com/services/consulting/utility-future/smart-grid/smart-grid-not-limited-to-US.aspx, accessed September 27, 2011

[2] ZPryme, http://zpryme.com/news-room/smart-grid-china-leads-top-ten-countries-in-smart-grid-federal-stimulus-investments-zpryme-reports.html, accessed September 27, 2011

are choosing power line carrier (PLC) technology, a communication system that uses existing power lines to send and receive information. Wireless mesh is the choice in the United States primarily because of the Federal Communications Commission's (FCC) flexible regulations regarding the use of public, unlicensed radio communications bands. Because these bands are more heavily regulated in Europe, PLC is the initial preference in that region. Among EU countries, however, there have been concerns about the reliability of PLC; this has lead to recent pilots in Europe using wireless mesh technology.[3]

In spite of these differences in approach, there are some lessons to be learned from the smart grid approaches and projects under development in other countries. This report provides a brief overview of smart grid activities in select countries, highlighting the key aspects and potential lessons learned from each country's general smart grid approach or from a specific project or program. Countries were selected according to the following criteria:

- Their relative smart grid advancement
- Their noteworthy progress
- Their pilot projects or programs of particular interest to the United States

Among the countries that met those criteria, an attempt was made to represent different regions, utility structures, and transmission and distribution (T&D) configurations. The most important reason for inclusion, however, is whether the smart grid activities in a particular country could offer any lessons learned to the United States.

The information contained in these country-level profiles was obtained through Internet searches of open-source material. No attempt was made to contact the governments or utilities highlighted in these overviews. New developments since the original release on March 31, 2011 are included in the final section of each country profile, "Updates as of September 2011."

Table 2 provides national-level electricity (and renewable energy) statistics for the countries included in this study; Table 3 provides basic economic statistics and smart grid federal investment. Both tables also include statistics for the United States as a point of reference. Table 4 compares the relative maturity of smart grid activities in each country by identifying the primary drivers. Table 5 highlights smart grid projects/programs and the respective partners for each of the countries profiled in this report. Light blue hatched cells highlight the nine new projects/programs added during the September Update.

A description of the efforts to develop international smart grid standards follows the individual country profiles.

[3] Giglioli, Encrio, et al., How Europe is approaching the smart grid, McKinsey & Company, http://www.mckinsey.com/~/media/mckinsey/dotcom/client_service/EPNG/PDFs/McK%20on%20smart%20grids/MoSG_Europe_VF.aspx, accessed September 27, 2011

Table 2. Electricity Statistics and Utility Structure for Selected Countries, 2008

Country	Net Electricity Consumption (GWh)	Total Net Electricity Generation (GWh)	Total Installed Electricity Capacity (GW)	Installed Renewable Electricity Capacity (GW)	Net Renewable Electricity Generation (GWh)	Electricity Capacity Utilization	Renewable Capacity as Share of Total Installed	Renewable Net Generation as Share of Total	Utility Structure		
									National Monopoly	Commercial/ Vertically Integrated	Deregulated/ Partially Deregulated
Australia	225,376	242,224	55.5	10.5	17,780	50%	19%	7%			X
Canada	549,476	632,227	127.6	78.4	390,367	57%	61%	62%		X	
China	3,016,550	3,221,181	797.1	186.8	537,298	46%	23%	17%	X		
Denmark	33,414	34,317	12. 5	4.1	10,333	31%	33%	30%			X
Germany	544,467	594,685	139.3	37.8	91,252	49%	27%	15%			X
India	600,649	785,529	177.4	51.4	128,098	51%	29%	16%	X		
Japan	963,852	1,015,165	280.5	27.8	103,990	41%	10%	10%		X	
South Korea	402,049	418,155	79. 9	2.4	4,358	60%	3%	1%	X		
Spain	267,464	293,503	93.5	33.7	60,434	36%	36%	21%			X
United Kingdom	344,669	361,842	85.6	6.8	22,287	48%	8%	6%			X
United States	3,906,443	4,119,387	1,010. 2	117.4	392,736	47%	12%	10%			X

Notes: All data for 2008. Renewable energy includes hydropower.
Source: EIA, International Energy Statistics, http://www.eia.doe.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=92&pid=46&aid=2, accessed September 27, 2011

Table 3. Economic and Smart Grid Statistics for Selected Countries

Country	Population (Millions, mid-year 2008)	Population (Millions, mid-year 2010)	Gross Domestic Product (GDP) (Billion $ U.S. 2010)[a]	GDP per Capita ($U.S./person, 2010)	Electricity Consumption per Capita (kWh/person, 2008)[b]	Federal Funding for Smart Grid (Million $U.S., 2010)	Year Smart Grid Development was Started	Communication Technologies Deployed	
								BPL/PLC	Wireless
Australia	21.0	21.5	$890	$41,395	10,728	$360	2004		X
Canada	33.2	33.8	$1,335	$39,497	16,544	N/A	2006		X
China	1,317.1	1,330.1	$9,872	$7,422	2,290	$7,323	2007	X	
Denmark	5.5	5.5	$201	$36,545	6,092	N/A	2005	X	X
Germany	82.1	81.6	$2,960	$36,275	6,635	$397	2008	X	X
India	1,140.6	1,173.1	$4,046	$3,449	527	N/A	2008	X	X
Japan	127.3	126.8	$4,338	$34,211	7,572	$849	1990s		X
South Korea	48.4	48.6	$1,467	$30,185	8,310	$824	2009	X	X
Spain	45.9	46.5	$1,376	$29,591	5,826	$807	2007	X	X
United Kingdom	61.6	62.3	$2,189	$35,136	5,591	$290	2009	X	X
United States	304.4	310.2	$14,720	$47,453	12,834	$7,092	2001		X

Notes: [a]Gross domestic product calculated at purchasing power parity.
[b]Calculated from 2008 population since electricity consumption data available for 2008 .

Sources: U.S. Census Bureau, International Data Base, Population, http://www.census.gov/ipc/www/idb/rank.php, accessed September 21, 2011
Central Intelligence Agency, World Fact Book - GDP, https://www.cia.gov/library/publications/the-world-factbook/geos/xx.html, accessed September 21, 2011
Energy Information Administration, International Energy Statistics, http://www.eia.doe.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=92&pid=46&aid=2, accessed September 21, 2011
Zpryme Research and Consulting, Smart Grid Snapshot: China Tops Stimulus Funding, http://www.zpryme.com/SmartGridInsights/2010_Top_Ten_Smart_Grid_Stimulus_Countries_China_Spotlight_Zpryme_Smart_Grid_Insights.pdf, accessed September 21, 2011

Table 4. Drivers for Smart Grid Development

Country	Government Policies/ Mandates	Environmental Goals	Electric Vehicle Integration	Renewable Integration	Reliability Concerns	Financial Incentives	Energy Efficiency Goals	Increasing Demand	Economic Competitiveness	Geographic Grid Constraints	Energy Security Goals	Energy Theft Reduction
Australia	●	●		●	●	●	●					
Canada		●					●	●		●	●	●
China		●		●		●	●	●	●	●		
Denmark	●	●	●	●								
Germany	●	●		●		●		●			●	
India					●		●	●	●	●		●
Japan		●	●	●		●						
South Korea		●		●		●	●					
Spain	●		●	●		●		●				
United Kingdom	●	●				●			●		●	

Notes:

- **Government Policies/Mandates** - The individual country government or region in which the country is a part (e.g., EU) has policies in place or has issued mandates specific to smart grid development.
- **Environmental Goals** – The country has a strong focus on environment and climate goals and the advancement of smart grid initiatives is seen as a key factor in meeting those goals.
- **Electric Vehicle Integration** – The integration of electric vehicles is seen as a major component of smart grid development in the country.
- **Renewable Integration** – The country is focused on rapidly increasing the integration of intermittent renewable energy sources which is driving the need for an advanced grid infrastructure.
- **Reliability Concerns** – The reliability of electric power supply to end use customers is a concern and smart grid development is seen as a main way to mitigate this.
- **Financial Incentives** - The country is supplying a large amount of government subsidies targeted specifically to smart grid development. The country is ranked as one of the top ten in government investment on smart grid.
- **Energy Efficiency Goals** – The country has a focus on the improvement of efficiency in the electric power sector and smart grid initiatives are seen as a way to accomplish this.
- **Increasing Demand** – The country is seeing a rapid increase in energy demand due to increasing population or expanding industry. Smart grid development is seen as a primary means to manage the growing energy demand related to this growth.
- **Economic Competitiveness** – The country views smart grid development as a key way to spur industry growth and improve global economic competitiveness.
- **Geographic Grid Constraints** – Sources of energy supply and centers of energy consumption are separated by long geographic distances or challenging terrain putting strain on the energy delivery system. More effectively managing the energy delivery through smart grid upgrades is seen as a key method of alleviating this issue.
- **Energy Security Goals** – Improving energy security and reducing imports is a key smart grid driver in these countries.
- **Energy Theft Reduction** – Energy theft is widespread and the development of a smart grid, especially smart meters, is viewed as a way to manage these non-technical losses.

Source: SAIC

Table 5. Smart Grid Projects, Programs, and Partners in Selected Countries

Country	Smart Grid Champions	Project/Program	Location	Partners
Australia	Smart Grid Australia	Smart Grid, Smart City	Newcastle, Scone, Ku-ring-gai, Newington and Sydney	EnergyAustralia, Australia Department of Resources, Energy, and Tourism, Intel, Grid Net, IBM, General Electric, and Better Place
		Victoria Smart Meter Project	Victoria	State Government of Victoria, Powercor Australia, Singapore Power Group Ausnet, United Energy Distribution, Citipower, and Jemena
		Solar Cities Program	Adelaide, Alice Springs, Blacktown, Central Victoria, Moreland, Perth, and Townsville	Australia Department of Climate Change and Energy Efficiency, Adelaide, Alice, Blacktown, Central Victoria Solar City Consortiums, Sustainability Victoria, Moreland Energy Foundation, and Western Power
		Advanced Electricity Storage Technologies Program	Australian Capital Territory (ACT), New South Wales (NSW), Queensland (QLD)	Department of Resources, Energy and Tourism, Wizard Power (ACT), Lloyd Energy Systems (NSW), ZBB Technologies (NSW), RedFlow Pty Ltd (QLD), Smart Storage Pty Ltd (NSW)
Canada	SmartGrid Canada	Ontario London Hydro Phase II	London, Ontario	London Hydro Smart Meter Consortium, Ontario Hydro, and London Hydro
		NSERC Smart Microgrid Network	British Columbia	British Columbia Institute of Technology
		British Columbia Green Energy Plan	British Columbia	British Columbia Ministry of Energy, Mines and Petroleum Resources, British Columbia Hydro, British Columbia Transmission Corporation, Fraser Basin Council, and First Nations
		Advanced Metering Infrastructure pilots, full-scale rollout	Boucherville, Montreal, and Memphrémagog, Quebec	Hydro-Québec, Landis+Gyr, and Elster
China	State Grid Corporation of China	Smart Community Demonstration Project	Langfang, Heibei Province	North China Power Grid
		Smart Grid, Demand Side Management Pilot	Nationwide	State Grid Electric Power Research Institute and U.S. Trade and Development Agency
		MW class VRB™ Energy Storage System	Zhangbei, Hebei province	Prudent Energy, National Wind Power Integration Research and Test Center of China (NWIC), State Grid Corporation of China, China Electric Power Research Institute (CEPRI)
		Eco-City	Sino-Singapore Tianjin	State Grid Corporation of China (SGCC), Duke Energy, ENN Group
		Smart Grid Project	Fujian Province	Fujian Electric Power Company, Sanming, Nanping and Longyan
Denmark	European Commission, Global Intelligent Utility	Holsted Smart Grid Test Project	Holsted	Energinet.dk, Syd Energi Net, Spirae Inc., Energynautics GmbH, and Siemens

Country	Smart Grid Champions	Project/Program	Location	Partners
	Network Coalition, EU Smart Grid Task Force	SEAS-NVE Cell Project	Eastern region	SEAS-NVE and Eltel Networks
		Bornholm Test Site	Bornholm	EcoGrid (European Union), Østkraft, Siemens, IBM, Technical University of Denmark, Australian Institute of Technology, Energinet.dk, and Research Group Energy and Communication Technology GmbH
Germany	European Commission, Federal Ministry of Economics and Technology, Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, EU Smart Grid Task Force	Yello Strom/Cisco Smart Meter Pilot	Nationwide	Yello Strom and Cisco
		Smart Meter Project	Hassfurt	Stadtwerk Hassfurt and Echelon
		Model City Mannheim Project	Mannheim and Dresden	MVV Energie
India	India Smart Grid Forum	Bangalore Pilot Project	Electronic City	Bangalore Electricity Supply Company, Center for Study of Science, Technology and Policy, Central Power Research Institute and Public Affairs Committee
		Distribution Reform, Upgrades and Management Projects	North Delhi, Bangalore, Gujarat, and Maharashtra	U.S. Agency for International Development and the India Ministry of Power
		Joint Clean Energy Research and Development Center	India and United States	Indian Ministry of Science and Technology, U.S. Department of Energy
		Smart Meter Installations	New Delhi	Grinpal Energy Management
Japan	Japan Smart Community Alliance	Ministry of Economy, Trade and Industry Smart Grid Trial	Kyoto, Yokohama, Toyota City, and Kitakyushu City	Kansai Research Institute and the Japanese Ministry of Economy, Trade and Industry
		Sodium Sulfur Battery (NaS) System	Tsukuba, Ibaraki Prefecture	National Institute of Advanced Industrial Science and Technology (NAIST)
		V2X, Electric Vehicle Smart Grid Pilot	Nagoya	Mitsubishi Motors Corporation, Mitsubishi Electric Corporation, and Mitsubishi Corporation
		Maui Smart Grid Project	Maui, Hawaii, United States	Japan's New Energy and Industrial Technology Development Organization (NEDO) and Hawaiian Electric Company
South Korea	Korean Smart Grid Association	Jeju Smart Grid Test Bed	Jeju Island	Korea Smart Grid Institute and Korea Electric Power Corporation
		Collaboration with State of Illinois	Gyeonggi-do, Republic of Korea	Illinois' Department of Commerce and Economic Opportunity and Korean Ministry of Knowledge Economy
Spain	European Commission, EU Smart Grid Task Force	Bilbao and Portugalete Smart Grid Pilot	Bilbao and Portugalete	Iberdrola and the Basque regional government

Country	Smart Grid Champions	Project/Program	Location	Partners
		Málaga SmartCity Project, Smart Community System Demonstration Project	Málaga, Andalusia	Endesa, Enel, Japan's New Energy and Industrial Technology Development Organization (NEDO)
		Castellón Smart Grid Project	Castellón	Iberdrola, Itron, and Current Group
United Kingdom	European Commission, United Kingdom Department of Energy and Climate Change, Ofgem, EU Smart Grid Task Force	North East and Yorkshire Smart Grid Project	Yorkshire, Durham, Leeds, Newcastle and Sheffield	CE Electric UK, British Gas, Durham University and EA Technology
		Energy Demand Research Project	Nationwide	EDF Energy, Scottish and Southern Energy, E.ON, and Scottish Power
		Smart Meter Installations	Nationwide	First Utility, OPower, Department of Energy and Climate Change (DECC)
		Switch EV Trial	Newcastle, Gateshead, and North East areas	Technology Strategy Board, Nissan, Simon Bailes Limited, Avid Vehicles, Liberty E Cars, Smith Electric Vehicles, The Transport and Operations Research Group at Newcastle University, One North East, and Future Transport Systems

Note: Light blue hatched cells indicate projects/programs added during September 2011 Update.
Source: SAIC, 2011.

Australia			
Population	21.5 Million	**GDP**	$890 Billion U.S.
Electricity Consumption per Capita	10,728 kWh	**Federal Funding for Smart Grid**	$360 Million U.S.

Smart Grid Drivers

- Energy efficiency goals
- Renewable integration (especially solar)
- Reliability concerns
- Financial Incentives
- Government policies/mandates
- Environmental Goals

Smart Grid Development Status

Both smart grid and energy efficiency programs are in the relatively early stages of development in Australia, with government efforts focused on establishing goals, determining the course of action, defining terms, establishing data needs, developing objectives, developing pilot programs, and seeking to remove barriers to participation. Like most countries developing smart grid infrastructure, Australia has no one agency overseeing smart grid development. As a result, smart grid activities are administered separately from energy efficiency programs. The Australian Energy Market Commission (AEMC) serves as the regulator of the National Electricity Market (NEM). The Australian Energy Regulator (AER) and the Australian Energy Market Operator (AEMO) work in conjunction with AEMC to enforce rules and ensure the smooth operation of the electricity markets. Additionally, the AEMO is responsible for planning the transmission grid. The Department of Climate Change and Energy Efficiency (DCCEE) and the Department of Resources, Energy and Tourism (DRET) set climate change and energy policy nationally. These agencies work together to define policy framework and develop the smart grid.[4] In addition, Smart Grid Australia (SGA) was created as a non-profit, non-partisan alliance dedicated to an enhanced, modernized electric system. The SGA holds meetings, organizes committees, assists with government initiatives, and issues communications to accelerate progress on smart grid development.[5]

Key Projects/Programs

- **Solar Cities program:**[6] Designed by DCCEE to test new sustainable models for electricity supply and use. These models combine solar power, smart metering, energy efficiency, and cost-reflective pricing. The goals of the program include cuts in peak electricity demand, testing of sustainable energy options, the development of better information on environmental and economic costs and benefits of the various energy options, and the reduction of greenhouse gas emissions. The seven cities participating are Adelaide, Alice Springs, Blacktown, Central Victoria, Moreland, Perth, and Townsville. The first cities joined the program in 2006 and the last in 2008.

[4] IEEE, http://smartgrid.ieee.org/public-policy/australia, accessed September 21, 2011
[5] Smart Grid Australia, http://www.smartgridaustralia.com.au/, accessed September 21, 2011
[6] Australia Department of Climate Change and Energy Efficiency, Solar Cities, http://www.climatechange.gov.au/government/programs-and-rebates/solar-cities.aspx, accessed September 21, 2011

- **Smart Grid, Smart City program:**[7] DRET committed up to $100 million to develop and test a commercial scale project that will gather robust information about the costs and benefits of smart grids to inform future decisions by government, electricity providers, technology suppliers and consumers. The Australian Government launched Smart Grid, Smart City in Newcastle in October 2010. The technology introduced through the program will allow residents to see real-time analysis of electricity usage for their households and for individual appliances. The smart grid demonstration will also test real-time, complex information about grid performance in order to improve control over the network for Australian energy transmission and distribution companies. EnergyAustralia is leading the demonstration project and will become the first utility to use long term evolution (LTE) for its 4G communications network.[8]

- **Victoria Smart Meter Project:**[9] Large-scale project to replace all residential and small business meters in the province of Victoria, a total of 2.5 million smart meters. Although the project is currently under review by the new Victorian Government, installation of smart meters is continuing. The Government is commissioning an independent cost-benefit analysis to determine whether, and under what circumstances, the program can deliver value for consumer costs. This analysis, and a review of other parts of the program, will inform the Government's decision on the future of the smart meter program.[10]

- **EnergyAustralia PowerSmart Program:**[11] Time-of-use (TOU) pricing system for small and medium sized business customers that use less the 40 MWh of electricity per year. A large number of businesses have had smart meters installed, allowing them to take advantage of the program.

- **Advanced Electricity Storage Technologies Program:**[12] An Australian Government initiative that has awarded $20.4 million through DRET. This program seeks to increase the use of variable renewable energy sources, such as wind and solar, by promoting the development and demonstration of efficient electricity storage technologies. Such technologies include batteries, electro-mechanical, chemical, and thermal storage technologies, in either on- or off-grid configurations. So far, the program has funded five projects:

    - **Wizard Power:** A solar energy storage project using technology based on ammonia dissociation and re-association into hydrogen and nitrogen.
    - **Lloyd Energy Systems:** A solar thermal energy storage system demonstration involving concentrated solar energy and graphite blocks.
    - **ZBB Technologies**: An integrated zinc-bromine flow battery project at CSIRO's National Solar Energy Centre in Newcastle.

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[7] Australia Department of Resources, Energy and Tourism, Smart Grid, Smart City, http://www.ret.gov.au/energy/energy_programs/smartgrid/pages/default.aspx, accessed September 21, 2011

[8] Energy Source & Distribution, January - February 2010, EnergyAustralia's Smart Grid to Use LTE, http://en.calameo.com/read/00037349524f74e4b1f68 , accessed October 3, 2011.

[9] State Government of Victoria, Smart Meters, http://www.new.dpi.vic.gov.au/energy/projects-research-development/smart-meters, accessed September 21, 2011

[10] Victoria Department of Primary Industries, Smart Meter rollout is continuing while the program is under review, http://www.new.dpi.vic.gov.au/smart-meters, accessed September 21, 2011

[11] EnergyAustralia, PowerSmart time-based pricing, http://www.energyaustralia.com.au/State/NSW/Business/Small-and-medium-business/Business-products-and-services/Electricity/PowerSmart-time-based-pricing.aspx, accessed September 21, 2011

[12] Australian Government, Department of Resources, Energy and Tourism, Advanced Electricity Storage Technologies Program, http://www.ret.gov.au/energy/clean/cei/advanced_electricity_storage_technologies_program/Pages/AdvancedElectricityStorageTechnologies.aspx, accessed September 21, 2011

- **RedFlow Pty Ltd**: A zinc bromine battery demonstration in grid and fringe-of-grid solar photovoltaic systems.
- **Smart Storage Pty Ltd:** An UltraBattery system project located at the end of an 11-kV rural grid attached to a 660-kW wind turbine.

Potential Lessons Learned for the United States

Australia's SmartGrid, SmartCity project will be the first to use a 4G LTE network in a smart grid application.[13] This will be an important project to follow, as 4G networks are expanding in the United States. The 4G network will transmit data between 12,000 smart monitoring devices, 3,000 mobile field computers and 200 zone substations. Trials will begin on an LTE platform at 15 sites, with the plan to move to a full LTE network.

In addition, Australia recently launched one of the largest research efforts on green telecommunications in the world, the Centre for Energy-Efficient Telecommunications, a partnership with Alcatel-Lucent Bell Labs, the University of Melbourne, and the Victorian State Government. The Centre will take advantage of the University of Melbourne's world-class research in telecommunications network infrastructure.

Australia's energy storage technology deployments also warrant watching.

Updates as of September 2011

The government of Australia has recently implemented significant smart technology policies and environmental policies. The government's Department of Broadband, Communications and the Digital Economy launched the National Digital Economy Strategy on May 31, 2011, setting a goal of providing smart technology to a majority of Australian households, businesses, and organizations by 2020 to better manage energy use.[14] In addition, Australia launched a carbon pricing scheme, known as "Clean Energy Future," in July 2011. Under the carbon pricing mechanism, about 500 of the country's largest polluters will be required to pay for each metric ton of pollution released into the atmosphere.[15] Both of these policies are certain to impact the development of smart grid in Australia in coming years.

At least two of Australia's existing smart grid projects have reported significant updates. DCCEE's Solar Cities program reported that it is beginning to achieve some of its goals. As of June 2011, 20,174 smart meters were installed, 10,945 home energy assessments were given, and 5,301 kW of solar photovoltaic capacity were installed. Participants in Townsville were able to reduce peak demand at the busiest time of the year on Magnetic Island by 33 percent compared to business as usual projections. Participants in a dynamic peak pricing trial in Blacktown reduced average daily demand by 24 percent on peak demand days, and an air conditioner remote cycling trial reduced daily energy consumption on hot days by 29 percent. In Perth, 211 participants have undertaken direct load control trials.[16] A mid-term review of the project found that the program is in good shape financially and that Solar Cities are on track to meet their objectives. According to the report, consumers and communities are willing to adopt and pay for new technologies. The report also found that the Solar Cities program was able to drive network

[13] Energy Source & Distribution, January - February 2010, EnergyAustralia's Smart Grid to Use LTE, http://en.calameo.com/read/00037349524f74e4b1f68, accessed October 3, 2011.
[14] Australia Department of Broadband, Communications and the Digital Economy, National Digital Economy Strategy, http://www.nbn.gov.au/the-vision/digitaleconomystrategy/, accessed September 21, 2011
[15] Australian Government, Clean Energy Future, The benefits of a carbon price, http://www.cleanenergyfuture.gov.au/the-benefits-of-a-carbon-price/ and Smart Grid Australia, News, http://www.smartgridaustralia.com.au/SGA/News/September_2011/SGA/3_News/News_-_September_2011.aspx?hkey=73f8da02-71e6-4655-a2f7-0332721f43c1, accessed September 21, 2011
[16] DCCEE, Solar Cities Achievements, http://www.climatechange.gov.au/en/government/programs-and-rebates/solar-cities/achievements.aspx, accessed September 21, 2011

planning responses and immediately provide a beneficial impact for communities that had clear problems facing them related to present or looming network constraints.[17]

The government of Victoria is still reviewing the previous government's smart meter policy, and meters continue to be installed, with every home and small business in the state due to receive a smart meter by the end of 2013.[18] To help inform its program review, the government solicited public submissions on issues associated with the smart meter program and released an issues paper. Based on about 400 submissions, the public expressed concern about a variety of issues, including costs imposed on households by smart meters and TOU tariffs, health issues, smart meter accuracy, and the inability of some disadvantaged groups to change energy consumption patterns if TOU tariffs were implemented.[19]

[17] DCCEE, Mid-Term Review of the Solar Cities Program, http://www.climatechange.gov.au/government/programs-and-rebates/solar-cities/publications-resources/mid-term-review-solar-cities.aspx#t3, accessed September 21, 2011
[18] Victoria Department of Primary Industries, Smart Meters, http://www.new.dpi.vic.gov.au/energy/environment-and-community/smart-meters, accessed September 21, 2011
[19] Victoria Department of Treasury & Finance, Review of the advanced metering infrastructure program, http://www.dtf.vic.gov.au/amireview, accessed September 21, 2011

Canada			
Population	33.8 Million	**GDP**	$1,335 Billion U.S.
Electricity Consumption per Capita	16,544 kWh	**Federal Funding for Smart Grid**	N/A

Smart Grid Drivers

- Increasing demand
- Energy efficiency goals
- Energy security goals
- Geographic grid constraints
- Environmental goals
- Canadian-U.S. cooperation/coordination
- Energy Theft Reduction

Smart Grid Development Status

In Canada smart grid developments are underway at both the national and provincial levels. Although Canada lacks a fully formulated federal policy regarding the development of the smart grid or a set timetable for the rollout of smart meters, it nonetheless aims to reduce its carbon emissions by 17 percent over 2005 levels by 2020.[20] Much of the smart grid activity in Canada takes place at the provincial level, with Ontario the clear leader in efforts to develop and deploy smart grid applications. Ontario enacted the Energy Conservation Responsibility Act in 2006, which mandated the installation of smart meters in all Ontario businesses and residences by 2010. By early 2010, more than 3.4 million meters had been installed, and the program was on track to have 350,000 customers using TOU metering by the summer of 2011.[21] In 2009, the Green Energy Act[22] was adopted with the stated purpose of encouraging development of renewable generation, providing investment opportunities and some measure of cost recovery, and establishing the basis for future developments related to smart grid. These programs mean that Ontario has arguably one of the world's most advanced smart grids, with more than 1 million smart meters installed and reading data.

Government agencies and programs that play a role in the electricity network and smart grid activities in Canada include the National Energy Board (NEB), Natural Resources Canada (NRCan), the Natural Sciences and Engineering Research Council of Canada (NSERC), and the Clean Energy Fund. At the federal level, NRCan is overseeing the coordination of smart grid activities. In addition, CanmetENERGY, Canada's clean and renewable energy research centre and an agency of NRCan, in collaboration with the Standards Council of Canada (SCC) and other partners, have established a national smart grid Technology and Standardization Task Force. The SCC is overseeing the standardization process while the Canadian Standards Association is actively developing standards for the smart grid.

[20] Ernst & Young, Canada: tackling geographical challenges with smart, http://www.ey.com/GL/en/Industries/Power---Utilities/Seeing-energy-differently---Geographical-differences---Canada--tackling-geographical-challenges-with-smart, accessed September 21, 2011

[21] Ontario Ministry of Energy and Infrastructure, The Green Energy Act and the Smart Grid in Ontario, http://energy.mcmaster.ca/CES_presentations/green_energy_act_NORMAN.pdf, accessed September 21, 2011. See also, Independent Electricity System Operator, Smart Meters and Time-of-Use Rates, http://www.ieso.ca/imoweb/siteshared/smart_meters.asp, accessed September 21, 2011

[22] Ontario Ministry of Energy and Infrastructure, Ontario Legislature Passes Green Energy Act, http://news.ontario.ca/mei/en/2009/05/ontario-legislature-passes-green-energy-act.html, accessed September 21, 2011

The electricity grids of Canada and the United States are highly interconnected. There are at least 33 major transmission interconnections between Canada and the United States, with nearly 70 terawatt hours (TWh) of electricity exchanged in 2009.[23] As a result of this integration, Canada and the United States have formed the Electricity Grid Working Group focused on bilateral collaboration to facilitate the transition to a modernized electric grid. The Clean Energy Dialogue (CED) [24] was also formed to enhance joint collaboration on the development of clean energy science and technologies to reduce greenhouse gas emissions. The integrated nature of the electricity grid with the United States is also a main driver for Canada's participation in the international coordination of smart grid standards.

Numerous federally funded, smart grid-related programs are underway or in the planning stages throughout Canada. A large number of programs and pilots fall under the Clean Energy Fund, part of the recovery act under NRCan. In addition, like a number of other countries, Canada has established a public/private group, known as Smart Grid Canada (SGC), to promote smart grid developments. SGC consists of utilities, vendors, technology and service providers, academia and other industry associations.[25]

Key Projects/Programs

- **Ontario London Hydro Phase II project**:[26] Involves installation of 1.8 million meters. All utilities participating in the project were assigned specific weighting factors to their individual technical requirements, supplied meter population data, and provided utility-specific cost and productivity factors. An unbiased scoring procedure then weighted the raw data to derive a life-cycle system cost for each participating vendor. Miscellaneous factors, such as experience and customer satisfaction, were also examined.

- In February 2011, the NSERC announced grants to support research projects. Two of the projects are related to smart grid applications:
    - **University of Ottawa, Intelligent Vehicular Networks and Applications** (DIVA):[27] The School of Information Technology and Engineering will lead research efforts to design network protocols and applications for vehicular ad hoc and sensor networks that allow high-speed communication among vehicles and ground-based infrastructure.
    - **British Columbia Institute of Technology, NSERC Smart Microgrid Network:**[28] The project, the first smart grid research network in Canada, is composed of researchers from a number of government research laboratories and universities. The project will focus on three themes: operation, control and protection of smart microgrids; smart microgrid planning, optimization and regulatory issues; and smart microgrid communication and information technologies. The program also targets energy security, conservation and reduced carbon footprints.

[23] U.S. EIA, Electric Power Industry – U.S. Electricity Imports from and Electricity Exports to Canada and Mexico, 1998-2009, http://www.eia.doe.gov/cneaf/electricity/epa/epat6p3.html, accessed September 21, 2011
[24] Government of Canada, Electricity Grid Working Group, http://www.climatechange.gc.ca/Dialogue/default.asp?lang=En&n=F68970F9-1, and NRCan, Key Energy Legislation, http://nrcan.gc.ca/eneene/polpol/keycle-eng.php, accessed September 21, 2011
[25] SmartGrid Canada, http://sgcanada.org/, accessed September 21, 2011
[26] Sensus Metering Systems, FlexNet Makes Impact in Ontario, http://www.ngpowereu.com/article/FlexNet-makes-impact-in-Ontario/, accessed September 21, 2011
[27] University of Ottawa, University of Ottawa-led smart car technology research awarded $8 million, http://www.research.uottawa.ca/news-details_2235.html, accessed September 21, 2011
[28] NSERC, NSERC Smart Microgrid Network, http://www.nserc-crsng.gc.ca/Partners-Partenaires/Networks-Reseaux/NSMGNet-NSMGNet_eng.asp, accessed September 21, 2011

- **Ontario, City of Windsor, Water Systems:** [29] In August 2010, the City of Windsor announced that it would connect the city water and waste water systems to the Ontario Smart Grid as part of a pilot program to allow entities that operate large electric equipment with a consistent workload and some process flexibility or functional range to be tied into the smart grid. The water and wastewater systems constitute a significant load on the electricity supply system. The city anticipates that participating in the program will result in both cost reduction and increased reliability.

- **British Columbia Green Energy Plan:**[30] The plan targets greater conservation, energy efficiency and clean energy. A major feature is to achieve the goal of electricity self-sufficiency by 2016, and an eventual surplus in years with normal water flows. Another goal is to enable the export of more electricity to neighboring jurisdictions, either in Canada or the western United States than current capabilities allow.

- **Projects funded under the Clean Energy Fund:**[31]
    - **Electricity Storage Demonstration:** The project consists of a utility-scale storage demonstration using both new and re-purposed lithium ion automotive batteries. The project is located in Toronto and Cornwall, Ontario, and in Manitoba.
    - **Wind and Storage Demonstration:** Located in Cowessess First Nation, Saskatchewan.
    - **Energy Storage and Demand Response:** The goal of the project is to demonstrate the feasibility of energy storage as a mechanism for reducing electricity demand at near-peak capacity substations. Located at BC Hydro at Golden and Field, British Columbia.
    - **Interactive Smart Zone Demonstration:** Hydro-Québec will deploy infrastructure for charging electric and hybrid rechargeable vehicles at its Institut de recherché in Boucherville, Québec.
    - **New Brunswick Power Corporation Electricity Load Control Demonstration:** The project will be conducted in four maritime communities in New Brunswick, Nova Scotia and Prince Edward Island, with the focus on the integration between smart grid technologies, customer loads, and intermittent renewable energy sources in a region with potentially significant renewable electricity capacity. It will involve real-time demand balancing in up to 750 buildings.
    - **Prince Edward Island, Wind Technology Research and Development Park**: The Wind Energy Institute of Canada will develop a 9-MW wind park which will be the first wind/storage combination in Prince Edward Island. The project will provide a base for supporting additional wind research.

Potential Lessons Learned for the United States

The highly integrated nature of the electricity grids of the United States and Canada will mean that smart grid development in both countries will be highly cooperative. Canadian companies have been working with U.S. companies for many years to collaborate on power issues. For example, the Canadian company Energent has been working with U.S. utilities to develop smart grid solutions since 2007. The

[29] Enbala, City of Windsor to connect Water Systems to Ontario's Smart Grid, http://enbala.com/media/newsarticles/City%20of%20Windsor%20to%20Connect%20Water%20Systems%20to%20Ontario's%20Smart%20Grid.pdf, accessed September 21, 2011

[30] NEB, Canada's Energy Future: Infrastructure Changes and Challenges to 2020, http://www.neb-one.gc.ca/clf-nsi/rnrgynfmtn/nrgyrprt/nrgyftr/2009/nfrstrctrchngchllng2010/nfrstrctrchngchllng2010-eng.pdf, accessed September 21, 2011

[31] NRCan, Clean Energy Fund Renewable Energy and Clean Energy Systems Demonstration Projects, http://www.nrcan-rncan.gc.ca/media/newcom/2010/201001a-eng.php, accessed September 21, 2011

company is currently developing an Energy Hub Management System (EHMS).[32] The system consists of three elements: a hub (defined as a single, static location, such as a home), a central core module, and a web-based portal. The system will provide an effective way to connect the home to the grid. This will be an important program to watch, given the close physical proximity and integrated nature of the United States and Canadian power sectors. Canada is also a member of ISGAN, and therefore will be working together with the United States to develop international standards for smart grid technologies and interoperability.

Updates as of September 2011

Smart meter deployments are making significant progress in Canada. A majority of meters in Ontario are now smart meters, and a majority of Ontario customers are being phased onto TOU pricing. Full roll outs of smart meters are taking place in British Columbia and Quebec, while pilot programs are taking place in Alberta, Manitoba, and Saskatchewan.

BC Hydro is currently installing smart meters for 1.8 million of its customers in British Columbia by 2012. Costing about $930 million, the program is expected to save $70 million over three years. According to the utility, the smart meter deployment will detect and reduce energy theft, which costs BC Hydro about $100 million each year.[33] BC Hydro emphasizes on its Web page that its smart meters will protect customers' privacy and not impact their health.[34]

Hydro-Québec is planning to install 3.8 million smart meters in Quebec by 2017. Hydro-Québec's roll out will be the largest deployment of smart meters in Canada, and one of the largest in North America. Hydro-Québec entered into a $350 million deal with Landis+Gyr for about three million of its smart meters, with the balance provided by Elster. Hydro-Québec will first implement three pilot programs between June 2011 and 2012 in Boucherville (6,000 meters), Montreal (19,000 meters in the Villeray area), and Memphrémagog (2,000 meters), before installing smart meters across the entire province (starting in the Montreal area) in 2012.[35]

[32] Energent, Energy Hub Research Project, http://www.energent.com/about-energent/research-projects/energy-hub-research-project, accessed September 21, 2011
[33] BC Hydro, Smart Meters Are Here, http://www.bchydro.com/energy_in_bc/projects/smart_metering_infrastructure_program.html, accessed September 21, 2011
[34] BC Hydro, Smart meters: Privacy, security of your information a priority, http://www.bchydro.com/news/articles/conservation/2011/smart_meters_security.html, and Quick facts – smart meters and wireless networks, http://www.el.bchydro.com/mediabulletins/bulletin/community/quick_facts_smart_meters_and_wireless_networks, accessed September 21, 2011
[35] Ernst & Young, Canada: tackling geographical challenges with smart, http://www.ey.com/GL/en/Industries/Power---Utilities/Seeing-energy-differently---Geographical-differences---Canada--tackling-geographical-challenges-with-smart, accessed September 21, 2011, and Hydro-Québec, Installation of next-generation meters: Meter Rollout, Pilot Projects, http://www.hydroquebec.com/residential/nouveau-compteur/cheminement-a-venir.html, accessed September 21, 2011

China			
Population	1,330.1 Million	**GDP**	$9,872 Billion U.S.
Electricity Consumption per Capita	2,290 kWh	**Federal Funding for Smart Grid**	$7,323 Million U.S.

Smart Grid Drivers

- Increasing demand
- Energy efficiency goals
- Renewable integration
- Geographic grid constraints
- Economic competitiveness
- Financial Incentives

Smart Grid Development Status

In 2010, Chinese Premier Wen Jiabao announced that construction of a smart grid was a national priority, with completion planned for 2020. Subsequently, the State Grid Corporation of China (SGCC), which controls electricity distribution, announced that construction will begin on major nationwide grid upgrades in 2011. Cost of the projects is estimated to be $100 billion through 2020.[36] As a result of the increased spending, China surpassed the United States in 2010 in total smart grid expenditures, and is anticipated to spend more than any other country on smart grid developments for several years at least. As China establishes standards, seeks equipment, and develops its own technologies, it will play a central role in setting the tone of smart grid development worldwide, through the sheer size of its smart grid activities.[37]

Despite China's centralized structure, a number of government agencies share responsibilities for smart grid development. The State Electricity Regulatory Commission (SERC) oversees regulatory policies and rate structures. The National Development and Reform Commission (NDRC), is the central planning authority for all significant national initiatives of any description. The National Energy Administration, a superagency of the NDRC, has responsibility for administering energy related programs. China's Energy Conditions and Policies, announced in 2007, established energy policies and targets to be achieved in the 11th Five Year Plan and beyond, as well as a number of measures and targets focused on smart grid measures to achieve policy goals. In addition, like many other countries, China created a hybrid governmental/industrial organization, the China Electricity Council (CEC) to promote research and development of smart grid applications. Operating under the CEC, the SGCC, which controls the T&D network, coordinates and guides smart grid developments in China.[38]

[36] IEEE, China, http://smartgrid.ieee.org/resources/public-policy/china, accessed September 21, 2011. SustainableBusiness.com News, China Smart Grid Market To Hit $61B by 2015, http://www.sustainablebusiness.com/index.cfm/go/news.display/id/21724, accessed September 21, 2011. Siegel, Jeff, Chinese Smart Grid: Will China Control Smart Grid Too?, Green Chip Stocks, http://www.greenchipstocks.com/articles/chinese-smart-grid/991, accessed September 21, 2011

[37] Xu, David, et al., Evolution of the smart grid in China, McKinsey, http://www.mckinsey.com/~/media/mckinsey/dotcom/client_service/EPNG/PDFs/McK%20on%20smart%20grids/MoSG_China_VF.aspx, accessed September 21, 2011

[38] Information Office of the State Council of the People's Republic of China, China's Energy Conditions and Policies, http://www.ccchina.gov.cn/WebSite/CCChina/UpFile/File229.pdf, accessed September 21, 2011

The energy policies established in 2007 underlie China's plans for moving forward on smart grid in seven key areas:[39]

- Rationalization of power grids
- Strengthening of regional power grids and power T&D networks
- Development of an emergency response system for power safety and reliability
- Strengthening of demand-side management (DSM)
- Control of power use to conserve energy and increase energy utilization efficiency
- Strengthening of the Renewable Energy Law and policies for renewable energy electricity
- Renovation of the rural energy grid.

The SGCC, the largest single electric power entity in China, in 2009 announced a multi-stage ten-year plan for the deployment of smart grid. The initial phase of the plan calls for pilot programs and planning initiatives through 2010. The second phase, undertaken concurrently, consists of development of standards through 2014 and construction projects beginning in 2011 and running through 2015. The final phase of the plan focuses on system upgrades that will begin in 2016 and culminate in 2020.[40]

In 2010, China's smart grid investment surpassed that of the United States to make it the world leader in smart grid spending ($7.3 billion compared to $7.1 billion in the United States).[41] The vast potential of the smart grid market in China has resulted in a number of joint ventures with companies from outside China such as Siemens, General Electric, IBM, Nissan, and General Motors.[42] One indication of the scale of China's announced plans is the effort to link remote energy resources to energy markets through construction of major transmission lines that will make China the world's largest consumer of copper.[43]

Key Projects/Programs

- **Smart Community Demonstration Project:**[44] The project, consisting of 655 households and 11 buildings, is the first demonstration community built by North China Power Grid as well as the first project constructed under SGCC's guideline on smart communities. The project is located at the Xin'ao Golf Garden residential complex in Langfang, Heibei province, and was completed in September 2010. The project includes a low-voltage electricity network, power usage information collection, an interactive service platform, smart household installment, electric automobile charging facilities, distributed power generation and energy storage, automatic electricity distribution, integrated network using low-voltage fiber optic cables, and AMI meters for electricity, gas and water.

- **Smart Grid, Demand Side Management Pilot:**[45] The project, to be developed and implemented by Honeywell, will be China's first smart grid pilot project and feasibility study to monitor and manage electricity use in commercial buildings. The project will focus on DSM, and will utilize

[39] IEEE, China, http://smartgrid.ieee.org/resources/public-policy/china, accessed September 21, 2011. Information Office of the State Council of the People's Republic of China, China's Energy Conditions and Policies, http://www.ccchina.gov.cn/WebSite/CCChina/UpFile/File229.pdf, accessed September 21, 2011.
[40] Ibid.
[41] Zpryme, Smart Grid: China Leads Top Ten Countries in Smart Grid Federal Stimulus Investments, Zpryme Reports, http://zpryme.com/news-room/smart-grid-china-leads-top-ten-countries-in-smart-grid-federal-stimulus-investments-zpryme-reports.html, accessed September 21, 2011
[42] Reitenbach, Gail, Smart Grid 2011: More than Meters, Power News, http://www.powermag.com/smart_grid/Smart-Grid-2011-More-than-Meters_3265.html, accessed September 21, 2011
[43] Financial Times, State Grid views Brazil as another smart move, http://www.ft.com/cms/s/0/16cc2100-0d2b-11e0-82ff-00144feabdc0.html#axzz1EzB8cgSS, accessed September 21, 2011
[44] State Grid Corporation of China, First Smart Community Demonstration Project by North China Power Grid Company Completed, http://www.sgcc.com.cn/big5/ywlm/mediacenter/corporatenews/10/236660.shtml, accessed September 21, 2011
[45] Greenbang, Honeywell to bring smart grid to China, http://www.greenbang.com/honeywell-to-bring-smart-grid-to-china_16645.html, accessed September 21, 2011

Honeywell's state-of-the-art smart grid technology, including automated demand response, advanced energy management, and sub-metering. The project is part of an agreement between the U.S. Trade and Development Agency (USTDA) and the State Grid Electric Power Research Institute (SGEPRI), a subsidiary of the SGCC.

- **National Wind Power Integration Research and Test Center of China:**[46] The project centers on the development of renewable energy and clean energy storage. Toward that goal, the SGCC is installing 30 wind turbines with at least 78 MW of generating capacity, 640 kW of solar photovoltaic (PV) capacity, and 2.5 MW of energy storage. Prudent Energy is providing vanadium redox batteries. When it is completed, the testing center will be the largest facility of its kind in the world.

- **Power System Digital Real-Time Simulation Device:**[47] This research project developed the first large-scale power system real-time simulation device. The device can simulate a power system with up to 1,000 generators and 10,000 bus bars. The development of this device will contribute to the safe operation of the power grid by researching the access of new large-scale equipment and enhancing power system incident analysis. The device will also allow equipment tests such as the safe and stable operation and control of a large AC/DC hybrid transmission system.

- **1000-kV Jindongnan Nanyang-Jingmen Ultra High Voltage (UHV) AC Pilot Project:**[48] Construction of a single circuit line of 640 kilometers, with a capacity of 6,000 MVA, and an operational voltage of 1,100 kV.

- **Xiangjiaba-Shanghai +/-800-kV UHV DC Transmission Pilot Project:**[49] Construction of an advanced UHV DC high capacity, long distance, DC transmission line.

- **Ningdong-Shandong +/-660-kV DC Project:**[50] Approved in November 2010 as a key project in the development of the West to East transmission project designed to move both hydro and thermal power from generation sites in the West to demand centers in the East.

- **Qinghai-Tibet 750-kV/+/-400-kV AC/DC Grid Interconnection Project:**[51] Construction of a 750-kV AC project and a +/-400-kV DC power transmission project from Qinghai to Tibet, allowing the integration for the first time of all provinces in SGCC's service area. The project is expected to be put into operation by the end of 2011 or in 2012.

Potential Lessons Learned for the United States

China surpassed the United States in smart grid investments in 2010 and will see further gains in spending over the next five years.[52] This is important for U.S. companies leading the way in smart grid

[46] Electric Light & Power, Prudent Energy installs MW class VRB energy storage system for CEPRI, March 2, 2011, accessed October 3, 2011.
[47] State Grid Corporation of China, Power System Digital Real-time Simulation Device won First Prize of National Science & Technology Awards, http://www.sgcc.com.cn/ywlm/gsyw-e/218927.shtml, accessed September 21, 2011
[48] SGCC, Projects, 1000kV Jindongnan-Nanyang-Jingmen UHV AC Pilot Project, http://www.sgcc.com.cn/big5/ywlm/projects/brief/12/237188.shtml, , accessed, September 21, 2011
[49] SGCC, Projects, Xiangjiaba-Shanghai +/-800kV UHV DC Transmission Pilot Project, http://www.sgcc.com.cn/big5/ywlm/projects/brief/10/237089.shtml, accessed September 21, 2011
[50] SGCC, Projects, Ningdong-Shandong +/-660kV DC Project, http://www.sgcc.com.cn/big5/ywlm/projects/brief/10/237087.shtml, accessed September 21, 2011
[51] SGCC, Projects, Qinghai-Tibet 750-kV/+/-400-kV AC/DC Grid Interconnection Project, http://www.sgcc.com.cn/big5/ywlm/projects/brief/10/237088.shtml, and SGCC, Xinhua: "Heavenly Road of Electricity" to Be Put Into Operation, http://www.sgcc.com.cn/ywlm/mediacenter/inspotlight/03/242178.shtml, accessed September 21, 2011,
[52] Zpryme, Smart Grid Research, http://smartgridresearch.org/, accessed September 21, 2011

development because these companies will also be able to make progress in China, where a large portion of the new infrastructure will be installed. The Honeywell project is an example. The company will develop and implement China's first smart grid pilot project for managing energy use in commercial buildings. The installation of DSM technologies in selected commercial and industrial pilot sites will demonstrate the feasibility of adopting U.S. smart grid solutions to China's grid infrastructure. China is ahead of the curve on smart grid development according to a recent report by ZPryme, and has been "building strategic global relationships, aggressively building electric infrastructure, and more importantly making the smart grid initiative a national policy."[53]

Updates as of September 2011

China's large-scale deployment of smart grid technology is continuing. According to a report by In-Stat, China is currently on track to deploy 280 million smart meters by 2016, making China the largest smart meter consumer in the world.[54]

The development of China's "Strong and Smart Grid" has been in its comprehensive construction phase since March 2, 2011, which, according to Xinhua News Agency, includes demonstration projects, electric vehicle recharging and switching facilities, new energy connections, and residential smart appliances. SGCC plans to implement 11 different types of smart grid projects, including building smart substations, installing 50 million smart meters, accommodating the integration of 20 GW of wind power, increasing electric vehicle recharging facilities by seven-fold, formulating 88 standards on smart grid, and completing construction of the integrated smart grid demonstration project in Sino-Singapore Tianjin Eco-City.[55] The Eco-City, which is being developed in partnership with Singapore as an environmentally friendly city, is located east of Tianjin's city center.[56]

One recent smart grid project highlighted by SGCC is the Fujian Electric Power Company's 15.77 billion Yuan ($2.47 billion) investment in smart grid projects in the inland areas of Fujian province. In addition to 35 110-kV substations, the investment will include nine electric vehicle battery replacement stations, nine battery distribution stations, and 1,070 AC charging poles.[57]

[53] Ibid.
[54] In-Stat, China to Deploy 280 Million Smart Meters by 2016, Competing Technologies vie for Position, http://www.instat.com/press.asp?ID=3257&sku=IN1104731WH, accessed September 21, 2011
[55] Xinhua News Agency, State Grid: China's Smart Grid in Comprehensive Construction, http://www.sgcc.com.cn/ywlm/mediacenter/inspotlight/03/243905.shtml, accessed September 21, 2011
[56] Sino-Singapore Tianjin Eco-City, http://www.tianjinecocity.gov.sg/, accessed September 21, 2011
[57] Xinhuanet, Fujian Invests 15.77 Billion Yuan to Build Smart Grid in Inland Areas During the Twelfth Five-Year-Plan, http://www.sgcc.com.cn/ywlm/mediacenter/inspotlight/06/248443.shtml, accessed September 21, 2011

Denmark			
Population	5.5 Million	**GDP**	$201 Billion U.S.
Electricity Consumption per Capita	6,092 kWh	**Federal Funding for Smart Grid**	N/A

Smart Grid Drivers

- Renewable integration
- Electric vehicle integration
- Environmental goals
- Government policies/mandates

Smart Grid Development Status

Denmark is one of the largest users of renewable energy in the world, with wide integration of co-generation sources. The country has aggressive electric vehicle (EV) goals and a target to be completely free of fossil fuels by 2025. These factors will require a change to the power system structure in Denmark. As host to one of the largest smart grid test projects in the world, Denmark is already ahead of the curve, a leader in smart grid development.

The integration of renewable energy is a key focus of smart grid development. Although wind energy already accounts for 20 percent of Denmark's power needs, there are enough turbines already built to bring that total up to 40 percent. The introduction of smart grid technology and energy storage will help the country take full advantage of the wind resources available.

A unique aspect of Denmark's energy sector is the large-scale use of the combined heat and power (CHP) sources. In the mid 1990s, in order to increase system efficiencies and reduce GHG emissions, Denmark required all non-wind electricity generators to not only produce electricity, but also heat. Denmark has since developed new policies creating a market for thermal energy.

Key Projects/Programs

- **Holsted Smart Grid Test Project:**[58] The project is one of the world's largest smart grid test sites. The initial phase of the project involves a distribution network with 13 substations between the 60-kV and 10-kV networks, four CHP plants and 47 wind turbines. The test area involves a complete prototype of a SCADA system capable of automatically operating an entire distribution network with wind turbines, CHP plants, and substations that communicate with each other. The test area measures around 50 kilometers from north to south, and has approximately 28,000 electric meters.

- **SEAS-NVE Cell Project**:[59] In 2008, SEAS-NVE, Denmark's largest consumer-owned utility, awarded a smart metering contract to Eltel Networks A/S for more than 380,000 homes. As of

[58] EnergyMAP, The world's largest smart grid tested in Denmark, http://energymap.dk/Newsroom/The-world-s-largest-intelligent-grid-tested-in-Den, accessed September 21, 2011

[59] Echelon, Danish Utility SEAS-NVE Achieves Nearly 100% Reliability Using Echelon Based Smart Grid Solution, http://www.businesswire.com/news/home/20110209005679/en/Danish-Utility-SEAS-NVE-Achieves-100-Reliability-Echelon, accessed September 21, 2011

February 2011 over 200,000 meters have been installed. The project focused on customer engagement from the beginning, including educating installers as to how to speak to customers in their homes. In addition, a plan for an advanced meter data management system was designed early on. The multi-purpose energy control network has thus far achieved a 99.5 percent favorable rating and is saving customers 16 percent in energy use.

- **EcoGrid EU**, **Bornholm Test Site:**[60] The island of Bornholm is the location for this smart grid test project. Renewables already account for almost 50 percent of power consumption, making the island a unique test site for a smart grid project. EVs will be a major component of the project. New vehicle-to-grid (V2G) experiments will use batteries within the electric cars to store excess wind power that will be fed back into the power grid when wind production is low.

Potential Lessons Learned for the United States

The SEAS-NVE smart grid project is an important example of a successful smart grid project. The large energy savings achieved (16 percent) are attributed not only to the performance of the advanced technology, but to the thoughtful customer engagement process specifically designed to prevent the types of customer frustration seen from some projects in the United States. In addition, the advanced EV systems being tested as part of certain smart grid projects in Denmark will be valuable test cases as the United States develops its own EV infrastructure.

Updates as of September 2011

Many smart grid-related projects are ongoing in Denmark.[61] For example, the Electric vehicles in a Distributed and Integrated market using Sustainable energy and Open Networks (EDISON) project is an international research project partly funded by Energinet.dk. It is meant to develop systems to integrate electric vehicles into the electric grid.[62] However, the Holsted Smart Grid Test Project and EcoGrid EU project on the island of Bornholm remain the most significant smart grid projects in the country.

As part of the Holsted project, Energinet.dk is undertaking what it calls the Cell Project. The project is designed to increase the extent of system control and monitoring to ensure that power generation and consumption are balanced. As part of the project, Energinet.dk planned to test its "Cell Controller" from June 14 to July 1, 2011. The test was designed to simulate a cut in power in order to determine whether the Cell Controller could maintain the supply of electricity to customers by operating the area as an independent island. Energinet.dk plans to complete evaluations of the test in fall 2011, with project completion expected in November 2011. Lessons learned from the Cell Project will be used at the EcoGrid EU project on Bornholm.[63]

After receiving final approval from the EU Commission, the EcoGrid EU project started up in the middle of 2011. It will run through spring 2015. Among other components of the project, about 2,000 residential customers will participate in a real-time pricing demand response program, making use of

[60] Energinet.dk, EcoGrid EU, http://energinet.dk/en/forskning/EcoGrid-EU/sider/EU-EcoGrid-net.aspx, accessed September 21, 2011
[61] SmartGridNews, Denmark smart grid playbook: The road to happiness?, http://www.smartgridnews.com/artman/publish/Business_Global/Denmark-smart-grid-playbook-The-road-to-happiness-3779.html, accessed September 21, 2011
[62] EDISON, About the EDISON project, http://www.edison-net.dk/About_Edison.aspx, accessed September 21, 2011
[63] Energinet.dk, The world's largest intelligent power system undergoes final testing, http://www.energinet.dk/EN/FORSKNING/Nyheder/Sider/Verdensstoersteintelligenteelsystemsluttestes.aspx, and The Cell Project, http://www.energinet.dk/EN/FORSKNING/Energinet-dks-forskning-og-udvikling/The-Cell-Project/Sider/The-Cell-Project.aspx, accessed September 21, 2011

residential demand response devices/appliances and smart controllers.[64] At its peak, the overall project will include a distributed grid with resources of up to 60 kV, 28,000 customers, 55 MW peak load, and 268 GWh of electricity consumption.[65]

[64] Energinet.dk, EcoGrid EU, http://www.energinet.dk/EN/FORSKNING/EcoGrid-EU/Sider/EU-EcoGrid-net.aspx, 2011, and Way Paved for Unique Energy Project on Bornholm, http://energinet.dk/EN/FORSKNING/Nyheder/Sider/VejenbanetforuniktenergiprojektpaaBornholm.aspx, accessed September 21

[65] EcoGrid, EcoGrid EU: A Prototype for European Smart Grids, Guide to the large-scale project, http://www.e-pages.dk/energinet/229/, accessed September 21, 2011

Germany			
Population	81.6 Million	**GDP**	$2,960 Billion U.S.
Electricity Consumption per Capita	6,635 kWh	**Federal Funding for Smart Grid**	$397 Million U.S.

Smart Grid Drivers

- Renewable integration
- Increasing demand
- Energy security goals
- Environmental goals
- Government policies/mandates
- Financial Incentives

Smart Grid Development Status

Germany is a world leader in both renewable energy and energy efficiency. However, a large surge in energy demand and diminishing natural resources are presenting challenges for the German energy sector. In addition, the EU has set ambitious energy and climate goals for member countries. In order to tackle these challenges, the Federal Ministry of Economics and Technology (BMWi) in cooperation with the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) are working to foster a new field of innovation called E-Energy.[66] E-Energy stands for the comprehensive digital networking and optimization of the energy supply system, encompassing everything from generation and distribution to consumption. The German Commission for Electrical, Electronic & Information Technologies (DKE) is acting as the central contact for standardization for E-Energy in Germany, and has prepared a Smart Grid Standardization Roadmap with numerous recommendations and approaches for implementation.[67] The document serves as a strategic and technically oriented roadmap that represents the standardization requirements for the German vision of the smart grid.

The integration of renewable energy sources is a key driver for smart grid development in Germany. The first Electricity Feed-In Law, passed in 1990 and later modified in the Energy Supply Industry Act of 1998 and the 2000 Renewable Energy Sources Act, requires utilities to connect small renewable energy generators to the grid and buy back the electricity produced at rates differentiated by renewable energy type, size and site.[68] The Renewable Energy Act of 2004 further requires that grid operators give priority to clean forms of energy when feeding electricity into the grid.[69] In January 2007, the EU Commission published a Renewable Energy Roadmap requiring 20 percent of the EU energy sources consist of renewable energies by 2020.[70]

[66] BMU and BMWi, E-Energy – Smart Grids made in Germany, http://www.e-energy.de/en/, accessed September 21, 2011
[67] German Commission for Electrical, Electronic & Information Technologies, The German Roadmap: E-Energy/Smart Grid, http://www.e-energy.de/documents/DKE_Roadmap_SmartGrid_230410_Engllish.pdf, accessed September 21, 2011
[68] BMU, Act on Granting Priority to Renewable Energy Sources, http://www.solarpaces.org/Library/Legislation/docs/EEG%20English.pdf, accessed September 21, 2011
[69] Spiegel, Building the Internet of Energy Supply, http://www.spiegel.de/international/business/0,1518,694287,00.html, accessed September 21, 2011
[70] EurActiv.com, EU renewable energy policy,http://www.euractiv.com/en/energy/eu-renewable-energy-policy/article-117536, accessed September 21, 2011

Several directives currently support the development of smart grid in Germany. As of early 2010, all new and remodeled buildings in Germany are required to be equipped with smart meters connected to a central control station via the Internet. Other legislation requires that utilities offer variable rates to customers starting in 2011.[71] Several EU directives are also shaping the smart grid. Directive 2009/72/EC requires an increase in energy security, reduction of carbon output, and improved competitiveness in the energy sector.[72] Smart meter implementation is recommended as a first step in this directive. The M/441 Mandate on Smart Metering issued March 2009 requires the standardization of utility meters to enable interoperability. The EU Task Force Smart Grids will identify strategic decisions, make regulatory recommendations, and produce a strategic roadmap for the implementation of smart grids by June 2011.[73]

Key Projects/Programs

- **Yello Strom/Cisco Smart Meter Pilot**:[74] Cisco and Yello Strom collaborated on the pilot in 2009 to enable 70 selected homes to use smart metering to communicate with the power company over an Internet Protocol (IP) network. The project also made use of the Google PowerMeter application to enable consumers to monitor energy consumption. A home energy management system and smart plugs allowed customers to set appliances to operate during off-peak periods. Since 2008, Yello Strom GmbH has offered its nationwide customers a smart meter known as the Yello Sparzähler online. Unlike most utilities in the United States that do not charge customers directly for smart meters, Yello Strom sells meters to customers for about $5.60 to $11.24 a month, which has reduced the scale of deployment.[75]

- **Stadtwerk Hassfurt Smart Meter Project:**[76] The project provides all of the utility's customers in Hassfurt (approximately 10,000) with AMI and no rate increase. Electricity meters are accessed via a web-based network operating system over an IP networking infrastructure. The project used Echelon's NES advanced metering infrastructure. Unlike systems with a dedicated radio per metering point, multiple NES meters can share a single IP connection through the use of Echelon's standards-based power line networking technology.

- **MIRABEL Project**:[77] The main goal of SAP's Micro-Request-Based Aggregation, Forecasting and Scheduling of Energy Demand, Supply and Distribution (MIRABEL) Project in Dresden is to develop a system that allows energy distribution companies to balance the available supply of renewable energy sources and the current demand. Household micro-requests with time shifts are aggregated on a regional level for production and consumption to be scheduled more efficiently, which could result in peak-demand reductions of approximately 8-9 percent.

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[71] International Business Times, Smart Grid comes costly for households in Germany, http://www.ibtimes.com/articles/43468/20100815/smart-grid-fail.htm, accessed September 21, 2011
[72] A.T. Kearney, The Smart Meter Mandate, http://www.atkearney.de/content/misc/wrapper.php/id/51252/name/pdf_the_smart_meter_mandate_12888660420e69.pdf, accessed September 21, 2011
[73] European Commission, Legislative proposal for a regulatory framework on smart grids, http://ec.europa.eu/governance/impact/planned_ia/docs/56_ener_smartgrids_legal_proposal_en.pdf, accessed September 21, 2011
[74] Cisco Systems, Cisco and Yello Strom Launch Energy-Saving Smart Grid Pilot in Germany, http://newsroom.cisco.com/dlls/2009/prod_100509e.html, accessed September 21, 2011
[75] Ricketts, Camille, German utility Yellow Strom steals the smart grid spotlight – at least for today, VentureBeat, http://venturebeat.com/2009/07/02/german-utility-yello-strom-steals-the-smart-grid-spotlight-at-least-for-today/#, accessed September 21, 2011
[76] Echelon, Echelon Announces First Advanced Metering Deployment in Germany, http://www.businesswire.com/portal/site/google/?ndmViewId=news_view&newsId=20080903005219&newsLang=en, accessed September 21, 2011.
[77] MIRABEL Project, http://www.mirabel-project.eu/, accessed September 21, 2011

- **SAP's SmartHouse/SmartGrid Project**:[78] Based in Karlsruhe, this project validates and tests how aggregations of Smart Houses, defined as information and communication technology-enabled homes, will achieve higher levels of energy efficiency required by the EU's 20 percent by 2020 objective.

- **Model City Mannheim Project**:[79] Energy supplier MVV Energie is developing a micro-grid communications network using the existing BPL network to manage electricity supply from large numbers of decentralized and centralized generators. Variable pricing is implemented in the project. The network consists of cellular energy grid structures, communicating closely with their surroundings to enhance supply security across the collection of grids. In 2011, the micro-grid pilot will include approximately 1,300 pilot users in Mannheim and Dresden.[80]

- **Energy Storage Initiatives:** Germany has been a leader in energy storage technology for decades, and is home to a variety of storage projects.

    - **Compressed Air Energy Storage System**:[81] The first facility of its kind was built in Hunsdorf, Germany in 1978. It can discharge 290 MW over two hours to meet peak demands. The Hunsdorf facility was the model for the only other one ever built, which was in 1991 in Mcintyre, Alabama.

    - **Berliner Kraftund Licht Battery System**:[82] Built in 1987 and operated until 1995, this was the world's largest stationary battery energy storage system. Located in Berlin, it consisted of over 7,000 lead acid flooded cells with a capacity of 14 MWh. It was the model for Southern California Edison's Chino facility, built in 1988, as well as the Puerto Rico Electric Power Authority's system, which was installed in 1994.

    - **Evonik Industries AG 1-MW/700-kWh Lithium Ion Prototype Battery:**[83] In support of Germany's current focus on producing mega batteries for renewable energy applications, the German Government has funded this project. The system is installed at the Völklingen power plant in Saarland. In addition, Evonik plans to develop a 10-MW unit.

    - **The Fraunhofer Consortium:**[84] The consortium is currently developing large-scale redox flow batteries with a capacity of 20 MWh. In 2010, the technology was still bench-scale, achieving a few kW output.

[78] Seventh Framework Program, About the Project, http://www.smarthouse-smartgrid.eu/index.php?id=43, accessed September 21, 2011
[79] MVV Energie, The "Model City Mannheim" project, http://www.mvv-energie.de/cms/konzernportal/en/mvv_energie_gruppe/mvv_energie_/innovation/modellstadt_mannheim/projektbeschreibung/projekt_moma_1.jsp, accessed September 21, 2011
[80] IBM, The Smart Micro Grid: IT Challenges for Energy Distribution Grid Operators, http://www.ibm.com/smarterplanet/global/files/us__en_us__energy__thesmartmicrogrid_schiller_fassmann.pdf, accessed September 21, 2011
[81] Bine, Projektinfo 05/07, http://www.bine.info/fileadmin/content/Publikationen/Englische_Infos/projekt_0507_engl_internetx.pdf, and Ridge Energy Storage & Grid Services, CAES Technology, http://www.ridgeenergystorage.com/caes_history.htm, accessed September 21, 2011
[82] Doughty, Daniel, et al., Batteries for Large-Scale Stationary Electrical Energy Storage, The Electrochemical Society's Interface, Fall 2010, http://www.electrochem.org/dl/interface/fal/fal10/fal10_p049-053.pdf, accessed September 21, 2011
[83] Factclipper, Germany's Evonik is building a 1-MW lithium-ceramic energy-storage battery, the world's largest, http://factclipper.com/abs/tech/energy-storage/2010-03-03/germanys-evonik-is-building-a-1-mw-lithium-ceramic-energy-storage, accessed September 21, 2011.
[84] Fraunhofer, Hannover Messe: Giant batteries for green power, http://www.fraunhofer.de/en/press/research-news/2010-2011/15/giant-batteries-for-green-power.jsp, accessed September 21, 2011.

Potential Lessons Learned for the United States

Germany has a very active market for both smart grid and energy storage technologies. The continued growth of renewable energy sources in Germany has created a demand for innovative energy storage technologies. Germany's aggressive renewable goals will make the country a prime location for the development of storage technologies. The German Government has set a goal to have renewables as 35 percent of the country's electricity portfolio by 2020 and 80 percent by 2050.[85] U.S. partners have been – and will continue to be – well positioned to leverage the expertise gained from these efforts.

Updates as of September 2011

Germany, Austria and Switzerland have agreed to work together to promote energy grid research and development.[86] However, while a wide range of smart grid and smart meter pilots are currently underway across Germany, Pike Research reports that little progress has been made towards large-scale deployment.[87]

The E-Energy program is continuing, with BMWi and BMU identifying six model regions to carry out research and development activities, including the Model City of Mannheim.[88] In July 2011, the Model City Mannheim Project was due to complete its second practical test, related to flexible electricity tariffs for 200 households with new electricity meters. The project's third and final practical test, known as the Energy Butler SmarTest, will investigate to what extent electricity customers can contribute to increasing their energy efficiency, as well as the integration of renewable energy into the power grid. The Energy Butler SmarTest is set to begin in fall 2011 and run through mid-2012.[89]

In Hassfurt, the Stadtwerk Hassfurt Smart Meter Project is also continuing. The deployment of 10,000 smart meters is due to be complete by 2012.[90]

[85] Rhein, Eberhard, Germany defines sustainable energy policy up to 2050, Blogactiv.eu, http://rhein.blogactiv.eu/2010/09/13/germany-defines-sustainable-energy-policy-up-to-2050/, accessed September 21, 2011
[86] BMU and BMWi, Smart Grids for Germany, Austria and Switzerland, http://www.e-energy.de/en/1247.php, accessed September 21, 2011
[87] Pike Research, 238 Million Smart Meters to Be Deployed in Europe by 2020, http://www.pikeresearch.com/newsroom/238-million-smart-meters-to-be-deployed-in-europe-by-2020, accessed September 21, 2011
[88] BMU and BMWi, E-Energy Model Regions, http://www.e-energy.de/en/32.php, accessed September 21, 2011
[89] Modellstadt Mannheim, SmarTest energy butler, http://www.modellstadt-mannheim.de/moma/web/en/feldtest/praxistest_3/praxistest3.html, and Flexible electricity rates, http://www.modellstadt-mannheim.de/moma/web/en/feldtest/praxistes_2/Praxistest_2.html, accessed September 21, 2011
[90] Echelon, EVB Energy Solutions, http://www.echelon.com/partners/nespartners/partner_highlight/evb.htm, accessed September 21, 2011

India			
Population	1,173.1 Million	**GDP**	$4,046 Billion U.S.
Electricity Consumption per Capita	526 kWh	**Federal Funding for Smart Grid**	N/A

Drivers

- Increasing demand
- Energy efficiency goals
- Reliability concerns
- Energy theft reduction
- Geographic grid constraints
- Economic competitiveness

Smart Grid Development Status

India is developing a smart grid policy as part of a larger nationwide energy policy. Efforts underway encompass both the national and state governments, and include representatives from industry, academia and various organizations. The efforts focus on three principal areas of concern:

- Accommodation of load growth in a fast-growing economy
- A goal of extending electricity to rural areas
- Load management and loss mitigation[91]

Losses from operation and theft are major concerns in India. Overall standards for the type of network are being drafted. In 2010 and 2011, India boosted the level of announced expenditures, placing it among the top 10 countries in the world in terms of smart grid spending.[92]

Primary responsibility for the grid in India lies with the Ministry of Power (MOP). Under MOP jurisdiction are the Central Power Research Institute (CPRI), the Central Electric Authority (CEA), and the Power Finance Corporation (PFC). In addition, the government has also created the Smart Grid Task Force (SGTF), an inter-departmental group that not only includes the MOP and its organizations, but reaches out to the Ministry of New and Renewable Energy (MNRE), the Ministry of Communications and Information Technology (MCIT), and the Department of Science and Technology (DST). Like several other countries, India has set up a public-private partnership, the India Smart Grid Forum, which brings together utilities, industry, academia, and others interested groups.[93] India is also a member of the Global Smart Grid Federation (GSGF) and the International Smart Grid Action Network (ISGAN).

The *IT Task Force for Power Sector* report in 2002 and the 2008 report titled *Technology: Enabling the Transformation of Power Distribution* developed much of the underlying groundwork setting the stage for India to move forward on three key areas of grid development:

[91] IEEE, India, http://smartgrid.ieee.org/public-policy/india, accessed September 21, 2011
[92] Innovation Observatory, Ten countries will account for 80% of global smart grid investment by 2030, http://www.innovationobservatory.com/sgpress2, accessed September 21, 2011
[93] Ibid.

- Advanced metering to reduce unacceptably high level of losses
- Improving system reliability on a near real-time basis
- Developing a smart grid to manage loads, congestion and shortfall

The Electricity Act of 2003 and National Energy Policy of 2005 established the following national objectives:[94]

- To provide access to electricity for all households
- To eliminate shortages and establish adequate spinning reserves
- To develop standards to address reliability and quality
- To increase per capita availability
- To establish minimum lifeline consumption level
- To make the power sector commercially viable
- To protect consumers' interests

Losses from operation and theft are major concerns in India. Overall standards for the type of network are being drafted. In 2010 and 2011, India boosted the level of announced expenditures, placing it among the top 10 countries in the world in terms of smart grid spending.[95]

Key Projects/Programs

- **Mangalore pilot project:**[96] The Mangalore Electricity Supply Company (Mescom) initiated this project in December 2010 with the following objectives – load management and real-time metering for each of 250 installations, including industrial, residential, and street lighting.

- **Bangalore pilot project:**[97] The Bangalore Electricity Supply Company (BESCOM) recently initiated this project in Electronic City, where it will reach 2,000 residential and commercial customers. Among its features are two-way communication nodes, transformers to control power consumption, private-public partnership, increased customer choice, and the flexibility to extend to other parts of the country.

- **Maharashtra Project:**[98] Includes GIS-based indexing and asset mapping and GIS network analysis based on a distribution management system on a web based platform. The project is designed to provide baseline data and IT applications for energy accounting, auditing and IT-based consumer service centers. The project will be carried out in 95 towns under R-APDRP. The objective is to reduce losses from operational issues and theft in project areas.

[94] Ibid.
[95] Innovation Observatory, Ten countries will account for 80% of global smart grid investment by 2030, http://www.innovationobservatory.com/sgpress2, accessed September 21, 2011
[96] The Hindu, state's power grid set to get smart, http://www.hindu.com/2011/02/23/stories/2011022359620100.htm, accessed September 21, 2011
[97] Daily News & Analysis, Smart grid for Electronic City, http://www.dnaindia.com/bangalore/report_smart-grid-for-electronic-city_1331838, accessed September 21, 2011
[98] Telvent, Telvent to Implement Smart Grid Project for Maharashtra India, http://www.telvent.com/en/business_areas/smart_grid/news_center/2010/Telvent-to-Implement-Smart-Grid-Project-for-Maharashtra-India.cfm, accessed September 21, 20p11

- **Kerala:**[99] Kepco Knowledge, Data & Network, an affiliate of state-owned Korea Electric Power Corp, is developing an IT system to prevent energy theft and increase efficiency of energy supply.

- **Distribution Reform, Upgrades and Management (DRUM) Projects:**[100] Was a joint venture between the U.S. Agency for International Development (USAID) and the Ministry of Power (MoP) from 2003 to 2010. Pilot programs were focused on improving the quality of electricity services, especially to India's rural energy sector. Four pilot programs were begun (North Delhi, Bangalore, Gujarat, Maharashtra), focusing on extending electricity to areas currently not served, reducing loss, and improving reliability. Over 25,000 electric utility staff were trained in distribution business and technical skills.

- **Rabirashmi Abasan Housing project:**[101] The first instance of net metering in India (2008), this project involves rooftop solar installations.

- **SA Habitat and Valence Energy:**[102] This distributed generation project is located in Hyderabad (2009) and involves roof-top solar micro-grid.

Potential Lessons Learned for the United States

India's power sector is one of the largest in the world, ranking sixth in terms of electricity consumption.[103] As a member of ISGAN, India coordinates with members, including the United States, to help develop a global Smart Grid Technology Roadmap and to identify opportunities for collaborative technology and policy development efforts. In addition, the potential for India to leapfrog to an advanced electricity system, much as it did in the telecommunications arena, has been speculated.[104] The developments in information and communication technology, an area of unique capability in India, will be important to follow as India develops its smart grid.

Updates as of September 2011

India is progressing with the development of smart grid by developing standards, reaching out to new partners, and assessing which projects are worth pursuing. In May 2011 a number of significant developments took place:

- IEEE Standards Association introduced its "IEEE P2030 Draft Guide for Smart Grid Interoperability of Energy Technology and Information Technology Operation with the Electric Power System (EPS) and End-Use Applications and Loads."[105] Interoperability remains a key concern for smart grid development in India.

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[99] IT Times, Kepco KDN Lands Deal in India, http://www.koreaittimes.com/story/10495/kepco-kdn-lands-deal-india, accessed September 21, 2011

[100] USAID, Activities, Distribution Reform, Upgrades and Management (DRUM), http://www.usaid.gov/in/our_work/health/environment_doc1.htm, CORE International, About the DRUM Project, http://www.coreintl.com/projects/Signature_Projects/DRUM/About_the_DRUM_Project.html, and Narayan, Amit, Smart Grid in India, http://asia.stanford.edu/us-atmc/wordpress/wp-content/uploads/2010/11/SmartGrid_India.pdf, accessed September 21, 2011

[101] Narayan, Amit, Smart Grid in India, http://asia.stanford.edu/us-atmc/wordpress/wp-content/uploads/2010/11/SmartGrid_India.pdf, accessed September 21, 2011

[102] Ibid.

[103] USAID, The Smart Grid Vision for India's Power Sector, http://www.sari-energy.org/PageFiles/What_We_Do/activities/smart_grid_vision_for_india_power_sector_june_2010/White_paper-Th_%20Smart_Grid_Vision_for_India/White_Paper_on_the_Smart_Grid_Vision_for_India_-_final.pdf, accessed September 21, 2011

[104] Gammons, Brad, India Set to Leap-Frog Ahead with 'Smart Grid' Energy Strategy, International Business Times, http://www.ibtimes.com/articles/210618/20110908/india-smart-grid-intelligence-ibm-brad-gammons.htm, accessed September 21, 2011

[105] IT News Online, IEEE Introduces Smart Grid Interoperability Standards Project in India, http://www.itnewsonline.com/news/IEEE-Introduces-Smart-Grid-Interoperability-Standards-Project-in-India/23566/8/1, accessed September 21, 2011

- IBM agreed to work with India's Bureau of Energy Efficiency to conduct a cost-benefit analysis of various smart grid initiatives in India and to explore the country's readiness for smart grid.[106]
- The U.S. Department of Energy committed $25 million over the next five years to support the U.S.-India Joint Clean Energy Research and Development Center.[107]

At least one large smart meter deployment is already underway in India. Grinpal Energy Management began deployment of advanced meters in New Delhi in 2008. The advanced meters include automated meter reading and a prepaid system utilizing PLC technology. According to one company executive, over 500,000 meters have been deployed in the city as of May 2011.[108]

[106] Shyamala, S., IBM, BEE partner for India's first smart grid, http://www.mydigitalfc.com/news/ibm-bee-partner-india%E2%80%99s-first-smart-grid-730, accessed September 21, 2011
[107] U.S. Department of Energy, DOE Announces Funding for U.S.-India Joint Clean Energy Research and Development Center, http://energy.gov/articles/doe-announces-funding-us-india-joint-clean-energy-research-and-development-center, accessed September 21, 2011
[108] SGI Clearinghouse, Grinpal Energy Management, http://www.sgiclearinghouse.org/Asia?q=node/2589&lb=1, and French, Paul, Smart Grids leading to smart cities in Asia, Smart Grid Update, http://analysis.smartgridupdate.com/industry-insight/smart-grids-leading-smart-cities-asia, Energy Metering Project Launched in India, http://www.metering.com/node/12555, accessed October 3, 2011

Japan			
Population	126.8 Million	**GDP**	$4,338 Billion U.S.
Electricity Consumption per Capita	7,572 kWh	**Federal Funding for Smart Grid**	$849 Million U.S.

Smart Grid Drivers

- Renewable integration
- Environmental goals
- Demand management controls
- Electric vehicle integration
- Financial incentives

Smart Grid Development Status

Smart grid activities are centralized and considered to be at the core of Japan's national strategy. This strategy is focused on connectivity, energy efficiency, and the integration of renewable resources into the grid, as well as concerns regarding sustainability and reduction of carbon emissions. Smart grid issues are under the direction of the Ministry of Economy, Trade and Industry (METI). In 2010, METI established the New Energy and Industrial Technology Development Organization (NEDO) as a public management organization to undertake development of new technologies dealing with energy and energy-conservation.[109] METI, in partnership with NEDO, created a working group to coordinate smart grid activities. The group is called the Japan Smart Community Alliance, and its goal is to promote public-private cooperative activities that address issues such as dissemination, deployment, and research on smart grid standardization. [110]

Unlike most other nations, reliability is not considered to be an issue in Japan. The country has already undertaken significant generation and transmission infrastructure improvements as a result of investments of more than $100 billion beginning in the 1990s. A key focus area for Japan is the introduction of advanced integrated controls for DSM and connectivity to the end-use customer, known as the "last mile." The last mile is the final link or leg in connecting the end user to the grid or communications provider. Japan is also focused on integration of intermittent energy sources (particularly solar) and sustainability with the goal of moving toward becoming a low-carbon emission society.[111] Japan has begun establishing standards for smart grid applications. One such standard is the Association of Radio Industries and Businesses ARIB STD-T96 protocol, which is specified for the automatic transmission and measurement of data from remote sources by low-power radio equipment.[112]

[109] Japan Smart Community Alliance, http://www.smart-japan.org/english/tabid/103/Default.aspx, accessed September 21, 2011
[110] Ibid.
[111] McGuire, Kelly, The Smart Grid Movement: Japan vs. U.S., TMCnet, http://smart-grid.tmcnet.com/topics/smart-grid/articles/73301-smart-grid-movement-japan-vs-us.htm, accessed September 21, 2011
[112] Analog Devices, RF Transceiver Enables Secure, Robust and Reliable Transmission of Remote Data for ARIB STD-T96 Systems, http://www.analog.com/en/press-release/3-1-11_RF_Trans_Enables_Secure_Robust_Reliable/press.html, accessed September 21, 2011

Key Projects/Programs

- **METI Smart Grid Trial:**[113] In April 2010, METI announced a large-scale five-year $1.1 billion smart grid trial project. The project will take place in four cities and focus on grid-scale energy storage, plug-in hybrid electric vehicles and vehicle to grid connections, smart homes and networks, and the integration of renewable such as solar power into the grid while maintaining grid reliability. The four project cities are:[114]

    - **Kyoto Keihanna District (Kansai Science City) Project**: PV systems and fuel cells will be installed on 1,000 residential units, grid connected to test load management systems, electric vehicle car sharing programs, and an incentive plan for the use of green energy "Kyoto-eco points" will be tested. The Kansai Research Institute oversees the project, which has a target of reducing CO_2 emissions by 20 percent in the residential sector and by 30 percent in the transportation sector from 2005 levels.

    - **Yokohama Smart City Project**: 4,000 homes will be equipped with smart meters using Home Energy Management Systems (HEMS) and Building Energy Management Systems (BEMS) to automatically adjust the amount of electricity supplied to each home, while monitoring electricity usage throughout the project. In addition, 27 MW of solar generation will be installed, and 2,000 electric vehicles will be deployed. The project has a target of reducing CO_2 emissions by 30 percent from 2004 levels.

    - **Toyota City Project**: The project will introduce 3,100 electric vehicles in the city to test grid-to-vehicle and vehicle-to-grid connectivity. DSM applications focused on using heat and unused energy will be tested at 70 residential locations. The project has a target of reducing CO_2 emissions by 20 percent in the residential sector and by 40 percent in the transportation sector.

    - **Kitakyushu City Project**: Will deploy energy management equipment using HEMS and BEMS capable of real-time management at 70 commercial and 200 residential locations. The energy system will coordinate DSM with the overall power system and reduce CO_2 emissions by 50 percent from the 2005 level.

- **Energy Storage Initiatives:** It is likely that Japan has more stationary energy storage installed than any other country in the world. The development of sodium sulfur (NAS) and lithium ion batteries has enjoyed government and large industrial support, and this has led to deployment at a number of facilities in Japan and other countries, including the United States and Australia.[115]

    - **NGK Insulators Prototype NAS Battery:** This transmission component manufacturer began testing the battery in 1992 in an actual transmission system at Kawasaki

[113] Ibid. See also, Chan, Tony, Japan set for massive smart grid trials, greentelecomlive, http://www.greentelecomlive.com/2010/04/09/japan-set-for-massive-smart-grid-trials/, accessed September 21, 2011

[114] Ichimura, Tomoya, Renewable Energy and Smart Community, presentation at the METI/NEDO Renewable Energy Opening Asia's Future forum, June 29, 2010, https://app3.infoc.nedo.go.jp/informations/koubo/other/FF/nedoothernewsplace.2009-02-09.3960481985/nedoothernews.2010-07-14.7324681214/Ichimura%20Tomoya.pdf, accessed September 21, 2011. See also, "Japan to launch 5-year, Y100 bil smart grid trial project", Japan Today, April 10, 2010, http://smartgrid.testing-blog.com/2010/04/13/japan-to-launch-5-year-y100-bil-smart-grid-trial-project/, accessed September 21, 2011

[115] Ota, Kenichiro, Status of Japanese Electric Energy Storage Technologies with Stationary Battery Systems, The Electrochemical Society of Japan, http://energy.electrochem.jp/NEDO_WS100702.pdf, accessed September 21, 2011

Substation of the Tokyo Electric Power Company. Since then, NGK has installed these batteries at many electric power and renewable energy installations.

- **Wakkanai Mega-Solar Project**: NEDO funded this 5-MW PV and 1.5-MW NAS battery on Hokkaido island. The Japan Electric Power Exchange installed a 34-MW NAS battery for a 51-MW wind farm in 2008.

- **Mitsubishi Heavy Industries:** The company has been testing lithium batteries in the Nagasaki Research & Development Center since 2004.

- **The National Institute of Advanced Industrial Science and Technology**: The project involves testing a 170-kW Redox flow system installed in 2003, along with 2,000-kW NAS system to support a 1-MW solar power system in Tsukuba. NEDO funded a project in 2005-2008 that tested a 4-MW/6-MWh Redox flow battery designed to stabilize a 30-MW wind farm.

- **Kawasaki Heavy Industries**: The company is currently developing a nickel-hydrogen battery known as GIGACELL.

Potential Lessons Learned for the United States

Japan's electricity grid is already considered to be reliable, so Japan's smart grid activities are more focused. While the United States is focusing on businesses and infrastructure, Japan is focusing its efforts on sustainability goals and moving toward becoming a low carbon society. Key objectives of the smart grid in Japan include advanced integrated controls to facilitate demand response and prepare for the integration of large amounts of renewables, such as PV. While the majority of pilot projects in the United States are smart meter rollouts, this is only one portion of an overall smart grid. Japan's focused efforts on advanced integrated controls and demand response will be important to watch as the United States begins to invest more resources into these elements of smart grid development.

Updates as of September 2011

Model homes were completed for the Toyota City Project by July 2011, and trial operations have now begun.[116]

Electric vehicle/vehicle-to-grid smart grid projects remain popular in Japan. In addition to the Toyota City Project and the Yokohama Smart City Project (which both include vehicle-to-grid components), three of Mitsubishi's core companies announced a joint project in August 2011 to develop smart grid technology to use electric vehicles as "moving batteries." The companies plan to install a test facility and begin collecting data at the Mitsubishi Motors's Nagoya Works by March 2012. The facility will consist of a parking lot with a roof covered with photovoltaic solar panels. Several units will draw direct current power from the electric vehicle charging outlets, convert the power into alternating current, and use the energy to supply factories.[117]

[116] Press Release Network, Toyota City Low-Carbon Project Model Homes Completed, http://www.pressreleasenetwork.com/newsroom/news_view.phtml?news_id=3519, accessed September 21, 2011

[117] The Denki Shimbun, Developing a smart grid utilizing EVs, http://www.shimbun.denki.or.jp/en/news/20110819_02.html, and SmartGridNews, Vehicle-to-grid gets Japanese pilot, http://www.smartgridnews.com/artman/publish/Projects_Demo_Pilots/Vehicle-to-grid-gets-Japanese-pilot-3937.html, accessed September 21, 2011

Japanese companies have also looked to develop smart grid projects abroad. By May 2011, NEDO selected six Japanese companies to work with U.S. project partners to develop and install smart grid technologies on Maui, Hawaii as part of the Hawaiian Electric Company's Maui Smart Grid Project. NEDO will provide approximately $37 million to support the project, which will work to improve integration of renewable energy resources and prepare the electric system for widespread electric vehicle use.[118] NEDO has also entered into an agreement with Málaga, Spain to implement the Smart Community System Demonstration Project, which will focus on establishing electric vehicle infrastructure in the city (see Spain country profile below for more details).[119]

[118] Hawaiian Electric Company, Japan-U.S. Smart Grid project on Maui to demonstrate new technologies, http://www.heco.com/portal/site/heco/menuitem.508576f78baa14340b4c0610c510b1ca/?vgnextoid=6d9a7368ae500310VgnVCM1000005c011bacRCRD&vgnextfmt=default&cpsextcurrchannel=1, accessed September 21, 2011

[119] NEDO, Conclusion of a Letter of Intent for Smart Community System Demonstration Project in the City of Council Malaga, Spain, http://www.nedo.go.jp/english/whatsnew_20110401_index.html, accessed September 21, 2011

South Korea			
Population	48.6 Million	**GDP**	$1,467 Billion U.S.
Electricity Consumption per Capita	8,310 kWh	**Federal Funding for Smart Grid**	$824 Million U.S.

Smart Grid Drivers

- Energy efficiency goals
- Environmental goals
- Renewable integration
- Financial incentives

Smart Grid Development Status

In August 2008, the National Vision for Low-Carbon, Green Growth plan was announced by South Korean president Lee Myung-Bak, and the plan was initiated in February 2009.[120] The plan would voluntarily reduce carbon emissions by 30 percent from the expected 2020 levels. In the plan, the Korea Smart Grid Institute (KSGI) is responsible for managing the government's Smart Grid Roadmap, and smart grid test-bed, as well as providing policy support for smart grid issues. The roadmap includes an investment of $6.16 billion in smart grid technology and overall the country may spend as much as $24 billion on smart grid projects by 2030.[121] The smart grid roadmap includes five sectors:[122]

- *Smart Power Grid* - Open power grids will be built to allow various kinds of interconnections between consumption and supply sources.
- *Smart Consumer* - Encourage consumers to save energy by using real-time information and producing smart home appliances that operate in response to electric utility rates.
- *Smart Transportation* - Build a nationwide charging infrastructure that will allow electric vehicles to be charged anywhere. It also establishes a V2G (Vehicle to Grid) system where the batteries of electric vehicles are charged during off-peak times while the resale of surplus electricity takes place during peak times.
- *Smart Renewable* - Build a smart renewable energy power generation complex across the nation by rolling out microgrids.
- *Smart Electricity Service* – Improve customer service through energy-saving rate plans and added electricity services.

In 2009, the government unveiled its Five-Year Plan for Green Growth, planning to spend two percent of its gross domestic product over the next five years in investments in green technologies, resource and material efficiency, renewable energies, sustainable transport, green buildings and ecosystem restoration.[123] Korea was a co-author of the Smart Grids Technology Action Plan released by the Major Economies Forum on Energy and Climate's Global Partnership in December 2009 and is also part of the Global Smart Grid Federation. Korea, through the KSGI, is currently implementing ten Power IT projects

[120] Kim, Jinho. "Policy Directions for the Smart Grid in Korea." Power and Energy Magazine, IEEE, Feb 2011, http://www.sgiclearinghouse.org/Legislation?q=node/3080&lb=1, accessed March 9, 2011.
[121] GigaOM, http://gigaom.com/cleantech/the-billions-of-dollars-behind-koreas-smart-grid/, accessed March 9, 2011.
[122] Korean Smart Grid Institute, http://www.smartgrid.or.kr/10eng6-1.php, accessed March 9, 2011.
[123] UPI.com, http://www.upi.com/Science_News/Resource-Wars/2010/07/13/Boost-for-South-Koreas-green-sector/UPI-28761279040517/, accessed March 9, 2011.

aimed at enhancing the power grid system through transmission monitoring, distribution system enhancements, and integration of distributed generation.[124]

Korea's future smart grid goals include the implementation of real-time pricing nationwide and integration of energy storage devices.[125] KEPCO announced in February 2011 it would invest $7.18 billion in its smart grid business by 2030, with part of the funds allocated to upgrade power transmission and distribution systems, and switch meters.[126]

Key Projects/Programs

- **Jeju Smart Grid Test Bed:**[127] Korea's largest test project, located on Jeju Island south of Seoul, is the Jeju Smart Grid Test-bed. The project is touted as the world's largest Smart Grid community. The test-bed will consist of about 6,000 households and will feature various prototypes of smart meters, in-home displays, electric vehicle charging infrastructure as well as networks and substations monitored and controlled by SCADA systems, all tested under real-life conditions.[128]

- **Superconductor power cables:**[129] KEPCO has forecasted the wide deployment of superconductor power cables in the Korean grid starting in the 2012-2013 timeframe.

- **Collaboration with State of Illinois:**[130] In 2010, the Illinois' Department of Commerce and Economic Opportunity and Korean Ministry of Knowledge Economy agreed to jointly develop and deploy smart grid technologies and business models. During this collaboration, the Korean government will commit more than $20 million to the development of smart grid hardware and software deployments as well as charging infrastructure for electric vehicles in Illinois.

Potential Lessons Learned for the United States

South Korea's state-managed electric utility, KEPCO, is expected to invest heavily in smart grid initiatives over the next decade. Importantly for the United States, the company also plans to market the smart grid technologies it develops overseas. South Korea could be an important source of smart grid technology and components not already developed in the United States. In addition, direct collaboration with Korea on smart grid projects located in the United States, such as the current project with the State of Illinois, will be important technology-sharing opportunities.

Regarding its communications approach, South Korea has one of the fastest and most reliable broadband internet networks in the world. The use of this system within the context of an emerging smart grid will provide important lessons for the United States as it develops its own broadband plan.

Updates as of September 2011

[124] Korea Smart Grid Institute, 10 Projects, http://www.smartgrid.or.kr/10eng5-2.php, accessed September 21, 2011
[125] Korea Smart Grid Institute, http://www.smartgrid.or.kr/eng.htm, accessed September 21, 2011
[126] Reuters,KEPCO to invest $7.2 billion in smart grid by 2030, http://www.reuters.com/article/2011/02/18/us-kepco-korea-idUSTRE71H0K020110218?feedType=RSS&feedName=GCA-GreenBusiness, accessed September 21, 2011
[127] Korea Smart Grid Institute, Korea's Jeju Smart Grid Test-bed Overview, http://www.smartgrid.or.kr/10eng3-1.php, accessed September 21, 2011
[128] Fehrenbacher, Katie, The Billions of Dollars Behind Korea's Smart Grid, GigaOM, http://gigaom.com/cleantech/the-billions-of-dollars-behind-koreas-smart-grid/, accessed September 21, 2011
[129] Harris, Phillip, and Jack McCall, Nationalizing the Grid, Mechanical Engineering, http://memagazine.asme.org/Articles/2010/December/Nationalizing_Grid.cfm, accessed September 21, 2011
[130] Adica, Smart Illinois, http://www.adica.com/smart_illinois.html, and Electric Light & Power, Illinois smart grid leaders sign agreements, http://www.elp.com/index/display/article-display/articles/electric-light-power/smart-grid/2010/07/Illinois_smart_grid_leaders_sign_agreements.html, accessed September 21, 2011

South Korea's Jeju Smart Grid Test Bed project continues to move forward. Reports indicate that over 2,000 houses on the island have now been revamped with solar panels. Smart meters, energy storage batteries, and tablet computers that allow homeowners to monitor and adjust their energy usage have all been distributed. The basic (infrastructure build up) stage of the project ends this year, to be followed in 2012 by the expansion (integration) stage. This stage will in turn run until the project concludes in May 2013.[131] KSGI has been collaborating with the Illinois Department of Commerce to develop the Jeju project, and there are plans to roll out technologies and business models developed on Jeju in Illinois in the future.[132]

After the Jeju project, South Korea's Smart Grid Roadmap calls for expanding smart grid technology into metropolitan areas from around 2012 to 2020, then completing a nationwide intelligent smart grid from around 2021 to 2030.[133]

[131] Kaye, Leon, Pushing the low carbon boundaries: South Korea's smart grid initiative, The Guardian, http://www.guardian.co.uk/sustainable-business/south-korea-smart-grid-low-carbon, and KSGI, Jeju Progress Schedule, http://www.smartgrid.or.kr/10eng3-2a.php, accessed September 21, 2011
[132] KSGI, Major Smart Grid Initiatives by Countries, http://www.smartgrid.or.kr/10eng8-1.php, accessed September 21, 2011
[133] KSGI, Roadmap Implementation in Five Sectors, http://www.smartgrid.or.kr/10eng4-1.php, accessed September 21, 2011

Spain			
Population	46.5 Million	**GDP**	$1,376 Billion U.S.
Electricity Consumption per Capita	5,825 kWh	**Federal Funding for Smart Grid**	$807 Million U.S.

Smart Grid Drivers

- Government policies/mandates
- Renewable integration (particularly solar)
- Increasing demand
- Electric vehicle integration
- Financial incentives

Smart Grid Development Status

Spain ranks fifth worldwide in the amount of government stimulus funding provided to utilities to launch smart grid projects.[134] The Ministry of Industry, Commerce and Tourism regulates and oversees smart grid projects in Spain. The country currently receives around 35 percent of electricity from renewable resources, but will require additional smart grid infrastructure to accommodate more renewable distributed generation in the coming years. [135]

Much of Spain's smart grid activity has been prompted by EU and Spanish regulations. The EU currently has a directive ordering that smart meters be provided to all consumers by 2022.[136] The EU Energy and Climate Package and Third Energy Package further require reduction of GHG emissions, increased renewable energy resources, and modernization of distribution networks.[137] At the national level, regulation has been passed declaring that electric power distributors cannot charge customers a monthly fee for traditional, electromechanical meters. Distributors do have the option to charge a monthly rental fee of $0.90 for new smart meters. Additionally, Spanish Ministerial Order ITC/3860/2007 requires each Spanish power distributor to install smart meters for consumers with power requirements up to 15 kW. Fifty percent of the smart meters must be installed by 2012, with the remaining portion installed by 2018.[138]

Similar to Germany, Spain has laws regarding electricity feed-in tariffs for renewable resources. The rise in solar thermal electric plant projects in Spain is partially attributed to the tariffs that encourage their development along with storage capacity. Although the high price of PV technology creates additional policy costs, regulators believe this is offset by reduced transmission losses due to the close proximity of installations to end users (e.g., rooftop solar panels).

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[134] Zpryme Research and Consulting, Smart Grid Snapshot: China Tops Stimulus Funding, http://www.zpryme.com/SmartGridInsights/2010_Top_Ten_Smart_Grid_Stimulus_Countries_China_Spotlight_Zpryme_Smart_Grid_Insights.pdf, accessed September 21, 2011

[135] Carrasco, Alicia, Spain reaffirms focus on smart energy demand to support renewables, electric vehicles, eMeter Corp., http://www.emeter.com/2011/spain-reaffirms-focus-on-smart-energy-demand-to-support-renewables-electric-vehicles/, accessed September 21, 2011

[136] King, Chris, Smart Meter Europe: Spain Jumping Ahead, Smart Grid Watch, http://smartgridwatch.wordpress.com/2009/10/07/smart-meter-europe-spain-jumping-ahead/, accessed September 21, 2011

[137] The European Electricity Grid Initiative, Roadmap 2010-18 and Detailed Implementation Plan 2010-12, http://www.smartgrids.eu/documents/EEGI/EEGI_Implementation_plan_May%202010.pdf, accessed September 21, 2011

[138] Carrasco, Alicia, Spain starts installing smart meters, despite new economic wrinkle, eMeter Corp., http://www.emeter.com/2010/spain-starts-installing-smart-meters-despite-new-economic-wrinkle/, accessed September 21, 2011

Smart energy demand and renewable distributed generation integration are key points of Spain's power grid operator, Red Electrica de Espana (REE), strategic plan for 2011-2015. REE hopes to achieve its goals to integrate renewable sources through demand management, reduced electricity consumption, and peak demand reduction. In the REE's business plan, energy efficiency measures, TOU tariffs, energy storage technologies, pumping stations, interruptible service tariffs, and automated load management will be implemented. [139]

The Spanish Ministry of Industry, Tourism and Trade has created draft regulation for a nighttime off-peak tariff to encourage electric vehicle charging in off-peak hours (midnight to 6 AM in the winter, and 1-7 AM in the summer). Spain's government has set a goal to have 250,000 electric vehicles on the road by the end of 2014. Electric vehicle charging will play a key role in flattening the peaks and valleys of the electricity demand profiles in the region.[140]

Key Projects/Programs

- **Bilbao and Portugalete Smart Grid Pilot:**[141] Iberdrola SA and the Basque regional government are planning to adapt 1,100 transformers in the cities of Bilbao and Portugalete for the installation 230,000 smart meters. The project will cost around 60 million euros.

- **Málaga Smartcity Project:**[142] Endesa's Smartcity project in the Playa de la Misericordia section of Málaga, Andalusia was initiated in July 2009 at a cost of around 43.2 million U.S. dollars. The goal of the project is to cut electricity consumption by 20% through the deployment of smart meters, TOU rates, advanced telecommunications, energy storage and distributed generation systems. 300 industrial customers, 900 businesses, and 11,000 households will receive smart meters by 2015.

- **Castellón Smart Grid Project:** [143] Iberdrola selected Castellón, Spain as the first location to participate in its Network Remote Management and Automation Systems project (abbreviated STAR in Spanish). In June 2010, the smart grid project in Castellón was launched with plans to upgrade 600 transformer stations and replace 100,000 electromechanical meters with new Itron smart meters over the next several years. The meters and meter data management software are driven by PLC technology. The city's 175,000 residents will have the ability to monitor usage data in real-time and possibly take advantage of flexible electricity rates.[144] The PLC platform will have adaptive capabilities for future smart grid application needs and evolving protocol standards.

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[139] Carrasco, Alicia, Spain reaffirms focus on smart energy demand to support renewables, electric vehicles, eMeter Corp., http://www.emeter.com/2011/spain-reaffirms-focus-on-smart-energy-demand-to-support-renewables-electric-vehicles/, accessed September 21, 2011.

[140] Carrasco, Alicia, Spain: Time-of-use tariff would encourage electric vehicles, eMeter Corp., http://www.emeter.com/2010/spain-time-of-use-tariff-would-encourage-electric-vehicles/, accessed September 21, 2011

[141] White, Todd, Iberdrola, Basque Government Plan Pilot Smart Grid, Cinco Says, Bloomberg, http://www.bloomberg.com/news/2011-02-15/iberdrola-basque-government-plan-pilot-smart-grid-cinco-says.html, accessed September 21, 2011

[142] Smart Grid Today, Spain's Endesa details smart grid projects, plans, future of EVs, http://www.drsgcoalition.org/news/media/2010-02-03-Delurey_Report_on_Hoffman_Confirmation.pdf, accessed September 21, 2011

[143] Iberdrola, First Smart Grid: Castellón, https://www.iberdrola.es/webibd/corporativa/iberdrola?IDPAG=ENWEBREDDISREDINTCST&codCache=13015092117806108, and Iberdrola, Smart Grids, https://www.iberdrola.es/webibd/corporativa/iberdrola?IDPAG=ENWEBREDDISREDINT&codCache=13173300584422003, accessed September 21, 2011

[144] Regulación Eólica con Vehículos Eléctricos, Iberdrola Launches Spain's First Smart Grid in Castellón, http://www.evwind.es/noticias.php?id_not=6222, accessed September 21, 2011

- **NOBEL (Neighborhood Oriented Brokerage Electricity and monitoring system):**[145] Through funding from the EU, the NOBEL project entails the development of an energy brokerage system connecting consumers to large- and small-scale energy producers. A middleware system will be used to communicate consumption data between the customer and the energy producer. IP (version 6) technology will be employed on additional sensors and device energy meters. It is expected that the system will enable more timely predictions of future demand, and improve energy savings.

- **Sarecar Project:** [146]ZIV Metering Solutions is developing electric vehicle charging and car sharing facilities in Ataun, Guipuzcoa. A total of 15 electric vehicles and 10 parking facilities with grid-interconnected PV canopies will be created. The charging system will provide the owner and the utility with real-time information on the state of the infrastructure, the number of users charging vehicles, and the energy consumption associated with each charging session.

Potential Lessons Learned for the United States

Spanish utility Iberdrola has selected smart meter company Itron to develop the first phase of one of Europe's largest smart metering initiatives, an advanced metering management system which will include not only smart meters, but also head-end and meter data management (MDM) software in Castellón. The meters will use the PRIME telecommunications protocol, Iberdrola's open standards PLC standard. Initially, 100,000 Itron meters will be delivered for the initial phase of the project and could later expand to 10 million meters throughout the country. Important to the U.S. will be the demonstration of an open standard communication system and a project that incorporates end-to-end interoperability. The United States is keeping an eye on PLC pilots used widely in Europe, which will prove helpful for those situations where it may be warranted in the United States.

Updates as of September 2011

Various smart grid projects in Spain have continued to move forward. A new control and monitoring center opened in Málaga as part of the Málaga Smartcity Project on March 25, 2011.[147] In late March, Japan's NEDO and the City Council of Málaga agreed to cooperate in the implementation of a Smart Community System Demonstration Project, which will be aligned with the Málaga Smartcity Project. The demonstration project will focus on the establishment of new infrastructure, including electric vehicle management systems and charging facilities.[148] By 2012, Málaga will have 20 charging stations for electric vehicles. A total of 60 million euros will be invested as part of the project by Spanish and Japanese firms.[149]

In Castellón, smart meters are now being installed. Iberdrola plans to add new cities and provinces to the STAR project in 2011.[150]

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[145] European Commission, NOBEL: Neighborhood Oriented Brokerage Electricity and monitoring system, http://cordis.europa.eu/fetch?CALLER=PROJ_ICT&ACTION=D&DOC=10&CAT=PROJ&QUERY=012e33f54585:bee9:58b28151&RCN=94044, accessed September 21, 2011

[146] SGIC, Smart Grid Projects in Europe, http://www.sgiclearinghouse.org/Europe?order=name&sort=asc, accessed September 21, 2011

[147] Endesa, The SmartCity Consortium, Headed by Endesa, Opens its Control and Monitoring Center in Malaga, http://portalsmartcity.sadiel.es/EN/noticias/documentos/110325_Inauguracion_centro_Smartcity%28def%29ENG.pdf, accessed September 21, 2011

[148] NEDO, Conclusion of a Letter of Intent for Smart Community System Demonstration Project in the City of Council Malaga, Spain, http://www.nedo.go.jp/english/whatsnew_20110401_index.html, accessed September 21, 2011

[149] EuroWeekly News, Electric Car charging stations in Malaga, http://www.euroweeklynews.com/2011091289138/news/costa-del-sol/electric-car-charging-stations-in-malaga.html, accessed September 21, 2011

[150] Iberdrola, Deployment Areas of Remote Management Project, https://www.iberdrola.es/03sica/clientesovc/iberdrola?IDPAG=ESOVD_ZONA_DESPL, and Video Smart Grid in Castellón, https://www.iberdrola.es/webibd/corporativa/iberdrola?IDPAG=ENWEBREDDISREDINTCSTLOC, accessed September 21, 2011

United Kingdom			
Population	62.3 Million	**GDP**	$2,189 Billion U.S.
Electricity Consumption per Capita	5,591 kWh	**Federal Funding for Smart Grid**	$290 Million U.S.

Smart Grid Drivers

- Environmental goals
- Energy security goals
- Economic competitiveness
- Government policies/mandates
- Financial incentives

Smart Grid Development

The UK has a strong vision for smart grid development. In 2009 the UK Government announced a plan to install smart meters in every home in Britain by 2020.[151] The plan involves installing 47 million meters in 26 million properties and is expected to cost £8.6 billion. The full-scale meter rollout is expected to begin in mid-2012. The plan is managed by the Department of Energy and Climate Change (DECC) with the Office of the Gas and Electricity Markets (Ofgem) tasked with developing the regulatory framework supporting the rollout.[152] The UK Government visualizes the smart grid as the internet of electricity that will help transform the UK into a low carbon economy and reducing greenhouse gas emissions by at least 80 percent by 2050, relative to 1990 levels.

In March 2011 the DECC announced its strategy and timetable for the national deployment of smart meters.[153] The deployment will occur in two phases. During the foundation stage, currently underway, the government works with industry, consumer groups and other stakeholders to make sure the necessary planning preparations have been completed for the second phase, the roll-out itself. The foundation stage will enable the industry to test all the systems required to begin the mass rollout and ensure positive consumer engagement. During this stage the UK Government will also establish the Data and Communications Company, which will provide data and communications services for the nationwide smart meter system.

Ofgem set up the Low Carbon Networks (LCN) Fund to help support smart grid projects. The Fund will provide up to £500 million to support projects sponsored by the distribution network operators (DNOs) to test new technology, operating and commercial arrangements and investigate the opportunities that the smart meter rollout will provide to network companies. GE's Smart Grid Center was opened in December 2009 and serves as a showcase for smart grid technologies that are used to improve energy efficiency across the UK. Following the publication of the National Infrastructure Plan 2010, the

[151] BBC, UK energy smart meter roll-out is outlined, http://news.bbc.co.uk/2/hi/business/8389880.stm, accessed September 21, 2011
[152] BusinessGreen. DECC takes control of smart meter roll out, http://www.businessgreen.com/bg/news/1931718/decc-takes-control-smart-meter-roll, accessed September 21, 2011
[153] DECC, DECC Lays Foundations for Smart Meters Rollout, http://www.decc.gov.uk/en/content/cms/news/pn11_032/pn11_032.aspx, accessed September 21, 2011

Government created an Engineering and Interdependency Expert Group to look into investment in R&D of grid sensor and metering technology.[154]

The Electricity Networks Strategy Group (ENSG), which includes the T&D companies, developed a vision for smart grids that draws together what has been learned from these partnerships and industries. These developments are taking place in the context of international work on the development of smart grid technologies through entities such as the Major Economies Forum Smart Grids Working Group, and the EU's Strategic Energy Technology Plan and Smart Grids Task Force.[155] These EU initiatives were created to ensure that technology development and the regulatory framework for smart grids are pursued by Member States in a coordinated way.

Key Projects/Programs

- **North East and Yorkshire Smart Grid Project**:[156] Plans for Britain's biggest smart grid project include 14,000 homes and businesses and test the impact of new low carbon technologies such as electric cars and solar panels on the electricity grid. The project is a partnership between CE Electric UK, British Gas, Durham University and EA Technology. The total project is valued at £54 million with CE Electric UK and its partners seeking £28 million from Ofgem's LCN Fund. Around 2,500 customers taking part will also be installing solar PV panels, heat pumps or provision for charging electric vehicles.

- **Energy Demand Research Project (EDRP):**[157] The EDRP is a £20 million trial of smart meters and related measures such as real-time display devices, additional billing information, monthly billing, energy efficiency information, and community engagement. The project is jointly funded by the Government and industry and involves around 50,000 households. The trials began in 2007 and finished at the end of 2010. The data is being collected and analyzed and the final results will be available in spring 2011.

Potential Lessons Learned for the United States

The first stage of UK's two-phase approach to smart meter rollout is heavily customer oriented. Known as the foundation stage, it will enable the industry to test all the systems and ensure positive consumer engagement before the mass rollout begins. This is important to the U.S. effort to develop smart grids since several smart meter pilot programs in the United States have resulted in negative customer feedback.

Updates as of September 2011

DECC has set out a detailed policy design for its nation-wide smart metering implementation program, and is currently seeking the opinions of stakeholders as part of its consultations.[158]

Other programs are ongoing as well. First Utility, which already offers its 50,000 customers free smart meters, began working with OPower and in consultation with DECC in July 2011 on a pilot program to

[154] Global Smart Grid Federation. UK looks at smart electric grids, http://www.globalsmartgridfederation.org/news_20101114_uk.html, accessed September 21, 2011
[155] European Commission, SET-Plan. http://ec.europa.eu/energy/technology/set_plan/set_plan_en.htm and Smart Grids Task Force. http://ec.europa.eu/energy/gas_electricity/smartgrids/taskforce_en.htm, accessed September 21, 2011
[156] Centrica. Plans for Britain's biggest 'smart-grid project' launched, http://www.centrica.co.uk/index.asp?pageid=39&newsid=2089, accessed September 21, 2011, and Network Revolution home page, http://www.networkrevolution.co.uk/, accessed September 21, 2011
[157] Ofgem. Energy Demand Research Project, http://www.ofgem.gov.uk/sustainability/edrp/Pages/EDRP.aspx, accessed September 21, 2011
[158] DECC, Smart Metering Implementation Programme Consultations, http://www.decc.gov.uk/en/content/cms/consultations/cons_smip/cons_smip.aspx, accessed September 21, 2011

gather ideas regarding future smart meter policy. In the program, data collected by smart meters will be put into a software system, allowing customers to proactively alter their domestic energy usage. Communication with customers will occur through mailed reports, a web portal, email, SMS messages and social media.[159]

In another project, the UK's Technology Strategy Board is supporting an electric vehicle trial program known as the Switch EV trial. As of June 2011, the 44 electric vehicles in the program have completed 50,000 miles across the North East of England.[160]

[159] Taylor, Ann Elise, Smart grid news, First Utility to lower energy bils with smart grid software, http://www.greenwisebusiness.co.uk/news/first-utility-to-lower-energy-bills-with-smart-grid-software--2458.aspx, accessed September 21, 2011
[160] CE Electric, Electric vehicle trial reaches milestone, http://www.ce-electricuk.com/news/50000_electric_miles.cfm, and Switch EV, http://www.switchev.co.uk/, accessed September 21, 2011

International Smart Grid Standards

The international community is currently in the early stages of developing standards for smart grid components and interoperability. A set of standards that allows interoperability of individual technology components is essential to realize the full benefits of a smart grid. However, the process of standards development is time consuming. Hundreds of standards will be required, and developing a single standard in a technology area often takes several years to achieve. It was only in March 2011 that the European Commission delivered a mandate for the development of region-wide smart grid standards. In the United States, the National Institute of Standards and Technology (NIST) is setting aggressive goals to develop dozens of smart grid standards in only a few years. In countries around the world, however, smart grid planning and implementation are taking place despite the lack of standards.

The involvement of utilities, vendors, and stakeholders is vital in the development of standards for a smart grid. Recent initiatives related to international cooperation on smart grid development include the creation of ISGAN, launched at the Clean Energy Ministerial in Washington, D.C. in July 2010. ISGAN facilitates the development and deployment of smart grids around the world through knowledge sharing, technical assistance, peer review, and project coordination. ISGAN complements the Global Smart Grid Federation (GSGF), a global stakeholder organization composed of the U.S. GridWise Alliance, the Korean Smart Grid Association, the India Smart Grid Forum, the Japan Smart Community Alliance, Smart Grid Australia, Smart Grid Canada, Smart Grid Ireland, and other leading smart grid organizations. GSGF brings together smart grid stakeholder organizations from around the world to share best practices, identify barriers and solutions, foster innovation, and address key technical and policy issues.

International Smart Grid Standards Development
International standards related to smart grid technology are currently being developed by several different organizations. Global-scale international organizations involved with smart grid standardization include:

- International Electrotechnical Commission (IEC): Consists of 81 national committees (known as members) from around the world. The U.S. member is the American National Standards Institute (ANSI). Founded in 1906.
- Institute of Electrical & Electronics Engineers (IEEE): The world's largest professional organization for advancing technological innovation. More than half of its nearly 400,000 members hail from the United States. Founded in 1884 in the United States as the AIEE.
- Internet Engineering Task Force (IETF): An open community of network designers, operators, vendors, and researchers. Formed in 1986.
- Third Generation Partnership Project (3GPP): A telecommunications collaborative that provides globally applicable third-generation mobile phone system standards. Formed in 1998.
- International Telecommunications Union (ITU): The United Nations agency for information and communications technology. Founded in 1865; the oldest international organization in the UN family.

In addition to the global organizations, several European organizations with parallel and overlapping missions have also been developing smart grid standards since as early as 2005. These organizations are:

- European Commission (M/441 Standardization Mandate and OPEN meter project)
- Smart Grids European Technology Platform (SG ETP)
- European Telecommunications Standards Institute (ETSI)
- European Committee for Standardization (CEN)
- European Committee for Electrotechnical Standardization (CENELEC)

International Timeline

After the United States adopted the Energy Independence and Security Act (EISA) of 2007, IEEE formed a smart grid standards working group, known as P2030. The purpose of P2030 is to draft a guide for smart grid interoperability with the electric grid and end-use applications and loads. Separate supplemental guides for transportation infrastructure and energy storage systems are also being drafted. As of February 2011, a fifth version of the draft, available only internally, has been developed.

ITU has worked with 3GPP and, indirectly, other organizations on a range of mobile communication standards, including those with smart grid applications. HomeGrid Forum, an organization that works within ITU's G.hn home networking standard, formed in 2009 with a smart grid/smart energy working group. Later, at a meeting of ITU's Telecommunication Standardization Advisory Group (TSAG) in January 2010, TSAG agreed to create a new focus group to investigate existing national standards for their appropriateness as potential international standards, as well as to conduct a gap analysis. Afterwards, the smart grid standards themselves will be developed.

In 2009, IEC formed Strategic Group 3 (SG-3) on Smart Grid to develop the framework for all IEC technical committees related to smart grid technologies. Representatives of 15 national committees[161] are participants in SG-3, and SG-3 also is collaborating closely with NIST. To date, more than 100 specific standards have been considered, with a special focus on interoperability, transmission, distribution, metering, consumers, and cyber security. Key concepts taken from IEC standards 61850 (electrical substation automation), 61968 (information exchanges between electrical distribution systems), and 61970 (application program interfaces for energy management systems) are being standardized for smart grid applications.

Billed as an open community of network designers, operators, vendors, and researchers, IETF conducts its technical work through its working groups. One of these groups is the Smart Power Directorate, which deals with Internet protocols in relation to smart grid communications. In January 2011, IETF released a draft standard for the Constrained Application Protocol (CoAP), a web transfer protocol for machine-to-machine (M2M) applications, including smart grid technologies.

European Timeline

Launched in 2005, SG ETP was Europe's first major initiative related to smart grid standardization, with its aim to provide a vision of how Europe could achieve a smart electricity network by 2020. In that vein, SG ETP's Strategic Deployment Document (SDD) was finalized in 2010. The SG ETP Forum, made up of 12 individuals representing smart grid stakeholders, will continue advocacy to make its SDD vision a reality.

[161] United States, Canada, Brazil, China, Japan, South Korea, and nine European countries.

On January 1, 2009, the Open Public Extended Network (OPEN) meter project, supported by the European Commission's Directorate-General for Research and Innovation, officially was launched. OPEN intends to develop a comprehensive set of public AMI standards for electricity, gas, water, and heat metering, with an added focus on addressing knowledge gaps. The draft standards are expected to be released in summer 2011.

On March 12, 2009, the European Commission issued a mandate, known as M/441, to the European standardization organizations (ESOs). M/441 builds upon mandates issued in 2004 and 2005 concerning utility meters, as well as a 2006 directive on energy end-use efficiencies and energy services. M/441 calls upon CEN, CENELEC, and ETSI to develop a European standard open architecture for bidirectional communication among smart meters. To this end, a working group, the Smart Meters Coordination Group (SM-CG), was established; this working group is working closely with OPEN, as they both are under the European Commission aegis. SM-CG first met in May 2010 and will sponsor a two-day workshop about smart grid standards, with a focus on communications systems, to be held in France in April 2011.

ETSI, along with telecommunications organizations in other regions and countries, is a 3GPP organizational partner. The two organizations are teaming up to develop specifications for Universal Mobile Telecommunications System (UMTS) and Long-Term Evolution (LTE) mobile communication standards. Included in 2011's forthcoming specifications (which include items not related to smart grid) will be a set of enablers that could make a wide-scale smart grid monitoring and control infrastructure a reality.

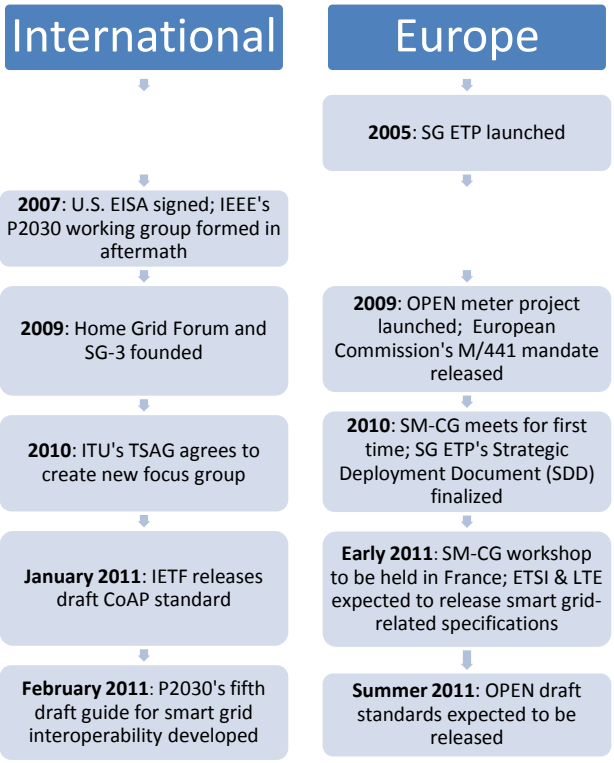
On March 1, 2011, the European Commission presented CEN, CENELEC and ETSI with a mandate to produce a set of consistent standards within a common European framework. The standards are to achieve interoperability and enable or facilitate the implementation of different smart grid services and functionalities. Once accepted, a development prioritization of all the required standards must be presented to the Commission within two months, and a comprehensive work plan must be proposed within six months. The first set of standards must be available by the end of 2012.

Figure 1 illustrates the timing of international and European smart grid standards development. The links for all the international grid standards and organizations follow.

International Smart Grid Standards Resources

- International Electrotechnical Commission (IEC), http://www.iec.ch/
- Institute of Electrical & Electronics Engineers (IEEE), http://www.ieee.org/index.html
- Internet Engineering Task Force (IETF), http://www.ietf.org/
- Third Generation Partnership Project (3GPP), http://www.3gpp.org/
- International Telecommunications Union (ITU), http://www.itu.int/en/pages/default.aspx
- European Technology Platform (ETP), http://www.smartgrids.eu/
- European Telecommunications Standards Institute (ETSI), http://www.etsi.org/WebSite/homepage.aspx
- European Committee for Standardization (CEN), http://www.cen.eu/cen/pages/default.aspx
- European Committee for Electrotechnical Standardization (CENELEC), http://www.cenelec.eu/
- European Commission (M/441 Standardization Mandate and OPEN meter project), http://www.cen.eu/cen/Sectors/Sectors/Measurement/Documents/M441.pdf

Figure 1. International and European Smart Grid Standards Timeline



Source: SAIC

- EU: http://ec.europa.eu/index_en.htm
- Standardization Mandates: http://www.cen.eu/cen/Sectors/Sectors/Measurement/Pages/default.aspx
- OPEN Meter: http://www.openmeter.com/
- IEEE P2030 weblink: http://grouper.ieee.org/groups/scc21/2030/2030_index.html
- European Technology Platform, http://www.smartgrids.eu/