Annotated Bibliography – Grid Modernization

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I. OF GENERAL INTEREST

A. Alvarez, Paul. (January 2012). *Maximizing Customer Benefits - Performance measurement and action steps for smart grid investments.*

Filename: Alvarez-Jan.2012-Maximizing Customer Benefits

This article documents three types of benefits that appear to be the most tangible for customers: economic benefits, reliability improvements, and customer service enhancements. The article then proceeds to discuss the following distinct approaches to smart grid investment cost recovery: special-purpose riders; special-purpose riders with limits based on anticipated economic benefits; and traditional rate case prudency reviews. Lastly, action steps for regulators and IOUs are discussed.

B. Consumer Electronics Association. *Unlocking the Potential of the Smart Grid – A Regulatory Framework for the Consumer Domain of Smart Grid.*

Filename: Consumer Electronics-Unlocking Potential of Smart Grid

The authors of this report believe that smart grid technologies will revolutionize the way Americans understand and manage energy consumption. The most efficient untapped energy resource may be energy efficiency achieved through demand response. However, in order for demand response to succeed, policymakers need to address at least two issues: 1) consumers must be provided the economic incentive to reduce peak demand through dynamic pricing programs, and 2) consumers and their third party smart grid providers must have access to real time consumption and pricing information in a format they can use.

To foster the development of technologies that will enable demand response, CEA encourages policymakers to: 1) work with utilities, smart grid providers and consumers to consider ways to expedite the transition to dynamic pricing, 2) encourage utilities to coordinate with the consumer electronics industry when planning demand response deployments, 3) modify existing weatherization and demand side management incentive programs to include smart grid technologies, and 4) consider the enhancement of existing market-oriented programs and the creation of other programs to encourage the adoption of smart technologies.

C. DNV KEMA Energy & Sustainability. (October 2012). *Global Inventory and Analysis of Smart Grid Demonstration Projects.*

Filename: DNV KEMA Report-Global Inventory of Smart Grid Demo Projects

This report provides a comprehensive overview of the key findings from many smart grid demonstration projects globally. From these projects, different trends based on geographic locations can be identified. In America, there is a strong focus on peak load reduction technology and dynamic pricing tariff pilots, whilst in Europe more emphasis is placed on improving energy efficiency and reducing emissions through the use of more decentralized means of production. In the Asia-Pacific region, drivers vary country to country – from

modernizing and improving grid reliability in China, to techniques for load management in Australia and New Zealand.

The recommendations from this report are to: learn from past implemented projects by carefully examining the findings, speed up the demonstration projects by participating in selective targeted collaborative efforts with other stakeholders, and continuously tracking developments in smart grid projects globally.

D. Ontario Energy Board. (October 2012). *Renewed Regulatory Framework for Electricity Distributors: A Performance-Based Approach (Report of the Board).*

Filename: Ontario Energy Board- Renewed Regulatory Frameworks

This report summarizes the Ontario Energy Board's development of a "renewed regulatory framework" for the 77 electricity distributors in Ontario which the Ontario Energy Board regulates. The renewed regulatory framework is a comprehensive performance-based approach to regulation that is based on the achievement of outcomes that ensure that Ontario's electricity system provides value for money for customers. The Board believes that emphasizing results rather than activities, will better respond to customer preferences, enhance distributor productivity and promote innovation. The following objectives are emphasized in this approach: protect customer interests regarding electricity prices, reliability, and service quality; promote the economic efficiency and cost effectiveness of electric system; facilitate the implementation of a smart grid; promote electricity conservation and demand management; and promote the use and generation of electricity from renewable energy sources.

E. Perfect Power Institute. (2012). *Investing in Grid Modernization: The Business Case for Empowering Consumers, Communities and Utilities.*

Filename: Perfect Power Institute-Investing in Grid Modernization

Consumers could realize benefits that exceed the investment costs for modernization by a factor of three or more if they, along with local governments and innovators, are engaged as partners in grid modernizations. The Perfect Power Institute estimates savings of about $1,200 per year for a household with an estimated cost of about $400 per year, per household. The investment costs are estimated across three main grid categories: power supply, power delivery, and end-use consumption. The benefits for a household include: direct cost savings such as avoided rate increases; indirect savings such as reduced economic losses due to power interruptions; and future revenue potential for providing electricity and ancillary services to the grid.

To maximize these benefits, market reforms must be made that empower consumers enabling them to generate greater savings and earn revenue for grid services. A new electricity market that values customer participation will attract the interest and investment of technology innovators. Local governments should become key partners and investors in local electricity system improvements, enabling them to specify local needs and coordinate with local infrastructure projects and programs to lower grid modernization costs.

Grid modernization depends on a new utility regulatory compact that rewards system operators for tracking and eliminating system waste, such as the economic impact of outages and operational inefficiencies. Indirect costs are substantial and should be quantified and tracked for use in system improvement. Investments in the elimination of system waste can pay for themselves.

F. Schilberg, Gayatri from JBS Energy, Inc. (June 2012). *Memorandum - Overall Evaluation of Perfect Power Institute's "Investing in Grid Modernization."*

Filename: JBS Memo on PPI Grid Mod Study

The study by Perfect Power Institute (PPI) ostensibly shows that Grid Modernization would provide benefits to consumers that exceed the investment cost by a factor of 3 or more. Based on my overview of the benefit calculations, it appears that the benefits are grossly overstated and quite unrealistic, and the conclusion is therefore completely false and misleading. Major reasons are that 1) for half of the alleged benefits, the costs to achieve are not included but rather are assumed, 2) the calculations of some benefits are questionable, and 3) the reliability solutions experienced by a small municipal utility have only limited relevance to larger utilities with diverse service territories. Furthermore the validity of the assumptions made by PPI is likely to vary considerably depending on the type of utility and climate zone. Thus readers should be very cautious in expecting that the benefits claimed in the PPI study could be obtained cost-effectively if at all. I discuss several issues below, although there are many more details that could be addressed in a more comprehensive review.

G. Renewables Grid Initiative. (December 2012). *Grid operators and environmental organisations team up to promote sustainable modernisation of electricity grids* (European Grid Report).

Filename: RGI European Grid Report

This document reports RGI's launch of the European Grid Report "Beyond Public Opposition – Lessons Learned across Europe," which provides over 80 comprehensive overviews of ongoing activities and relevant experiences that have been gathered in seven countries across Europe. This document introduces RGI and SEFEP and lists quotes by many RGI partners.

H. Smith, Allison from New England States Committee on Electricity. (Spring 2012). *Survey of Smart Grid Implementation in New England*.

Filename: NESCOE Smart Grid Survey

Smart grid benefits - including overall system cost reductions that will ultimately flow to customers - are likely to be many. As noted, NESCOE has not examined whether or under what conditions smart grid technology deployment makes economic sense. In most cases, benefits will flow to customers who adapt to new metering devices and shift electricity use,

particularly at peak periods. Because adaptation requires real change in how and when consumers use electricity and requires them to think about energy pricing, customer education will be a central element of smart meter programs and the realization of anticipated benefits. As states begin or modify smart grid programs, they may wish to consider collecting consumer participation data to enable them to track and evaluate benefits, which may illuminate the degree of customer adaptation and further customer education efforts that may be helpful.

I. Potomac Electric Power Company and Baltimore Gas & Electric. (May 18, 2011). *Advanced Metering Infrastructure Performance Metrics Reporting Plan: Phase I.*

Filename: Maryland AMI Performance Metrics-Phase I

This report establishes a comprehensive set of metrics developed by Baltimore Gas & Electric, Potomac Electric Power Company, and the stakeholders from Case Nos. 9207 and 9208, to allow the Public Service Commission of Maryland to assess the progress and performance of the two companies' Smart Grid Initiatives. There are four categories of metrics discussed: costs, project execution and delivery, operational benefits, and consumer education. The metrics are designed to capture data during AMI deployment, known as Phase I. The report also introduces Phase II metrics, which will measure the realization of benefits associated with implementation of AMI functionalities once enabled.

J. Executive Office of The President of the United States. (June 2011). *A Policy Framework for The 21st Century Grid: Enabling Our Secure Energy Future*.

Filename: White House Policy Framework for Grid

This document outlines four essential pillars that will enable the United States to transition to a smarter grid: 1) enable Cost-Effective Smart Grid Investments, 2) unlock the Potential of Innovation in the Electricity Sector, 3) empower Consumers and Enable Informed Decision Making, and 4) secure the grid.

There are significant benefits that will flow from making the grid smarter. This grid modernization effort, however, will require sustained cooperation between the States, local governments, the Federal Government, the private sector, and other stakeholders. The Recovery Act provided support for a number of important steps in this direction, but there is still much to be done. To provide a path forward, the Administration's smart grid policy framework will enable U.S. leadership in clean energy solutions and provide a foundation of energy innovation more generally.

K. Metavu. (October 21, 2011). *SmartGridCity™Demonstration Project Evaluation Summary.*

Filename: Metavu-2011-SmartGridCity-Eval Report

In 2008, Xcel Energy, through its subsidiary Public Service Company of Colorado designed the SmartGridCity demonstration project in Boulder, Colorado. The project was specifically designed to help the utility understand which grid investments best improve electric distribution efficiency and reliability; facilitate expansion of customer energy efficiency and demand response; inform future investments; and help the utility manage reliability challenges from higher penetrations of new technologies.

The document is divided into three sections. The Executive Summary describes value created by the project and themes that transcend any individual smart grid component or capability, the second section describes the value created by individual smart grid components, and a highly detailed Appendix follows and includes evaluations of specific value propositions and a reference list.

L. Greg Young Morris et al. (2011). *A Framework for the Evaluation of the Cost and Benefits of Microgrids*.

Filename: A Framework for the Costs and Benefits of Microgrids

This paper proposes a methodology for systematizing and representing benefits and their interrelationships based on the UML Use Case paradigm, which allows complex systems to be represented in a concise, elegant format. This methodology is demonstrated by determining the economic feasibility of a Microgrid and Distributed Generation installed on a typical Canadian rural distribution system model as a case study. The study attempts to minimize the cost of energy served to the community, considering the fixed costs associated with Microgrids and Distributed Generation, and suggests benefits to a variety of stakeholders.

M. Synapse Energy Economics. (July 2012). *Best Practices in Energy Efficiency Program Screening: How to Ensure that the Value of Energy Efficiency is Properly Accounted For*. National Home Performance Council Web site www.nhpci.org.

Filename: NHPC-Synapse-Best Practices in EE Screening

This report identifies the best practices available for screening energy efficiency resources, in order to capture and assess the full value of those resources. Five standard tests are used to determine the cost-effectiveness of energy efficiency programs. Of these, the Program Administrator Cost (PAC) test, the Total Resource Cost (TRC) test, and the Societal Cost test are predominately used by states as the primary test for screening efficiency programs.

While the choice of test is important, it is even more important to ensure that states are properly applying the cost-effectiveness tests, which include: achieving underlying objectives, being internally consistent, accounting for the full value of energy efficiency resources, and using appropriate planning methodologies and assumptions. Many states are not properly applying the cost-effectiveness tests, and thus are understating the value of energy efficiency resources.

N. Synapse Energy Economics and RAP. (November 2012). *Energy Efficiency Cost-Effectiveness Screening: How to Properly Account for 'Other Program Impacts' and Environmental Compliance Costs.*

Filename: EE Cost-Effectiveness-Other Program Impacts and Env.Compliance

The report starts with the discussion of the cost-effectiveness tests used to evaluate energy efficiency programs. The focus of this report is two elements of energy efficiency program screening that are frequently treated improperly: other program impacts (OPIs) and the costs of complying with environmental regulations.

Even though OPIs are hard to quantify, it is recommended that states: 1) develop quantitative, monetary estimates of OPIs that can be readily monetized, 2) develop a methodology for OPIs that cannot be easily monetized, 3) address the OPIs associated with low-income customers, and 4) identify OPI assumptions, methodologies, and outcomes that can be transferred across utilities and states. All states should also recognize that the costs of compliance with current and anticipated EPA regulations and climate change requirements must be included in the PAC, TRC, and Societal Cost Tests since they will be incurred by utilities and passed on to ratepayers.

II. U.S. DEPARTMENT OF ENERGY

A. U.S. Department of Energy and Electric Power Research Institute. (January 2010). *Methodological Approach for Estimating the Benefits and Costs of Smart Grid Demonstration Projects* (1020342).

Filename: EPRI-Methodological Approach for Benefits and Costs of SGDP

This report presents a comprehensive framework for estimating the benefits and costs of Smart Grid projects and a step-by-step approach for making these estimates. The framework identifies the basic categories of benefits, the beneficiaries of these benefits, and the Smart Grid functionalities that lead to different benefits and proposes ways to estimate these benefits, including their monetization. The report covers cost-effectiveness evaluation, uncertainty, and issues in estimating baseline conditions against which a project would be compared. The report also suggests metrics suitable for describing principal characteristics of a modern Smart Grid to which a project can contribute.

B. U.S. Department of Energy. (December 2009). *Guidebook for ARRA Smart Grid Program Metrics and Benefits.*

Filename: DOE Guidebook-ARRA SG Program Metrics and Benefits

DOE will award about $4 million to utilities, equipment suppliers, regional transmission organizations, states, and research organizations to jump start smart grid deployment and demonstration on a massive scale. DOE is particularly interested in: 1) Job

Creation and Marketplace Innovation, 2) Peak Demand and Electricity Consumption, 3) Operational Efficiency, 4) Grid Reliability and Resilience, 5) Distributed Energy Resources and Renewable Energy, and 6) Carbon Dioxide Emissions. This Guidebook serves as a dialogue between DOE and the recipients of the Smart Grid Investment Grant awards to describe the type of information to be collected from each of the award recipients and how it will be used by DOE to communicate overall conclusions to the public.

C. U.S. Department of Energy. (July 2012). *Smart Grid Investment Grant Program – Progress Report*.

Filename: DOE-SGInvestmentProgressReport

This report provides a summary of the SGIG program's progress, initial accomplishments, and next steps. The SGIG program, a public–private partnership with a total investment of $7.8 billion, wants to accelerate investments in grid modernization. The program is designed to: 1) accelerate electric industry plans to deploy smart grid technologies by several years, 2) develop and transfer know-how on designing and integrating complex systems, 3) measure realized benefits in areas such as asset utilization, system efficiency, reliability, and operations management, and 4) advance development and deployment of effective cybersecurity protections for smart grid technologies and systems. SGIG projects are organized in four areas: Electric Transmission Systems (ETS), Electric Distribution Systems (EDS), Advanced Metering Infrastructure (AMI), and Customer Systems (CS).

The SGIG projects were launched in early 2010, and all projects are expected to complete equipment installation in the 2013–2014 time frame. Data analysis and reporting is expected to be completed by 2015. During the next 18 months, the SGIG projects will continue deploying technologies and systems, and will provide quarterly reports on installations and costs. As the projects gather more information on their experiences in operating the technologies and systems, emphasis will shift to the analysis of results, lessons learned, impacts, and benefits and will result in five analysis reports.

D. U.S. Department of Energy. (December 2012). *Application of Automated Controls for Voltage and Reactive Power Management – Initial Results*.

Filename: DOE-VVO Report-smartgrid.gov Dec2012

E. U.S. Department of Energy. (December 2012). *Demand Reductions from the Application of Advanced Metering Infrastructure, Pricing Programs, and Customer-Based Systems – Initial Results.*

Filename: USDOE 12-2012 Demand Reductions

F. U.S. Department of Energy. (December 2012). *Operations and Maintenance Savings from Advanced Metering Infrastructure – Initial Results.*

Filename: AMI-Operations Management Report Dec2012

G. U.S. Department of Energy. (December 2012*). Reliability Improvements from the Application of Distribution Automation Technologies – Initial Results.*

Filename: DOE-Distribution Reliability Report-Dec 2012

H. Navigant Consulting. (August 2011). *User Guide For the U.S. Department of Energy Smart Grid Computational Tool (SGCT).*

Filename: Navigant-User GuideDOE SG Computational Tool

This document provides an introduction to the DOE Smart Grid programs, a description of the DOE smart grid cost benefit analysis methodology, an overview of the Smart Grid Computational Tool (SGCT) architecture, and step-by-step instructions for using the SGCT. The appendix provides further detail about the methodology, calculations, and assumptions used in the SGCT.

The monetary value of the benefits calculated by the Smart Grid Investment Grant could be attributed to ratepayers, utilities, society, or a combination of these parties depending on the nature of the benefit. The SGCT was not designed to yield results that will be used in regulatory hearings, but rather for educational purposes, and are meant to provide insight that can be used in conjunction with other analyses to more clearly understand the impact and benefits of a smart grid project.

I. Litos Strategic Communication. *The Smart Grid Introduction* (No. DE-AC26-04NT41817, Subtask 560.01.04).

Filename: Litos-DOE-The Smart Grid Introduction

The Smart Grid Introduction is intended primarily to acquaint non-technical yet interested readers about: 1) the existence of, and benefits accruing from, a smarter electrical grid, 2) what the application of such intelligence means for our country, and 3) how DOE is involved in helping to accelerate its implementation. The document also includes a list of additional resources and a glossary.

III. EPRI

A. EPRI. (2011). *Guidebook for Cost/Benefit Analysis of Smart Grid Demonstration Projects* (Volume 1).

Filename: EPRI 2011 Cost Benefits Analysis SG

This guidebook builds on the Methodological Approach for Estimating the Benefits and Costs of Smart Grid Demonstration Projects (1020342).and provides a framework for estimating benefits and costs associated with smart grid projects. The guidebook presents a 24-step framework for performing a CBA and works through the process by providing an example application in Appendix A and a collection of templates in workbook format in Appendix B. The different sections also include: the background and purpose of the guidebook and how it should be used, defining the research problem or opportunity, project documentation schematic, the development of measurement and verification protocols, and remaining steps for estimating the project benefits and costs based on monetizing project impact metrics.

B. EPRI. (December 2010). *A Framework for Assessing the Net Benefits of Home Area Networks to Enable Demand Response.*

Filename: EPRI-Assessing Net Benefits of HAN to Enable DR

EPRI conducted an analysis to provide insight into the value of a Home Area Network (HAN) to a household. A HAN accommodates the flow of information to and from network nodes each associated with a device or element of the household's electric system and devices. This collectivization of household devices facilitates managing the whole house load under demand response program protocols, and provides opportunities for additional payments to the household. EPRI conducted an analysis to see if the added stream of benefits attributed to a HAN justified its costs.

The findings are mixed. Under conditions where demand response produces high payments for curtailments, the HAN investment can be recouped from the marginal payments it produces in a year or so. However, at demand response curtailment payments typical of what is offered today, the investment has a long payback time. The payback would be faster if HAN costs come down, which might be the case when the technology matures and is produced in large scale. Moreover a HAN may provide the household with other services that improve the value of electricity or reduce the electric bill, which would contribute to the benefits and hasten payback.

A daily (summer peak) load profile was established for 28 household end uses typical of the South Atlantic region of the U.S. The loads were then sorted into groups according to the degree of technology required to manage them under representative demand response program protocols. The increased cost of control was compared to the addition revenues attributed to the additional load under control.

C. EPRI. (March 2011). *Estimating the Costs and Benefits of the Smart Grid A Preliminary Estimate of the Investment Requirements and the Resultant Benefits of a Fully Functioning Smart Grid (1022519).*

Filename: EPRI-March2011-Cost Benefit Preliminary Estimate

The primary goal of this report, which is a partial update to an earlier report (EPRI 1011001), is to initiate a stakeholder discussion regarding the investment needed to create a viable Smart Grid. To meet this goal, the report documents the methodology, key assumptions, and results of a preliminary quantitative estimate of the required investment. At first glance, it may appear the most obvious change from the 2004 report is the significant increase in projected costs associated with building the smart grid. In actuality, the increased costs are a reflection of a newer, more advanced vision for the smart grid. The concept of the base requirements for the smart grid is significantly more expansive today than it was seven years ago, and those changes are reflected in this report.

D. EPRI. *EPRI Smart Grid Demonstration Initiative – 4 year update.*

Filename: EPRI-SG Demo Initiative-4 Year Update

The EPRI Smart Grid Demonstration Initiative is a seven year international collaborative research initiative demonstrating the integration of Distributed Energy Resources (DER) in large scale demonstration projects. This four-year update picks up where the three-year update (EPRI Report 1023411). This year as the initiative moved past the half-way mark, the research has progressed into a stage where solid results are becoming available and can be shared among the collaborative.

This document contains a full range of activities (community energy storage, remote dispatch of customer owned resources, smart green circuits, distribution volt-VAR control integrated with wind turbine inverter control, etc.) from 10 of the collaborative members. Each case study completed to date provides an overview and background information followed by the approach/methodology and continues through the results, lessons learned, and concludes with key recommendations. Some case studies may also list some unresolved questions that were uncovered in the demonstration, thus providing a guideline for continued study.

IV. EUROPE

A. Council of the European Union. (June 2009). *Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/54/EC concerning common rules for the internal market in electricity* (10814/09 ADD 1 REV 3, CODEC 813 ENER 217, Interinstitutional File: 2007/0195 (COD)).

Filename: EU Council June 2009 Proposal Amending Directive 2003/54/EC

This declaration of the Republic of Austria states that Austria welcomes the adoption of the Directive which will, enhance both security of supply as well as market integration and which will, as a result thereof, contribute to the competitiveness of the electricity industry in Europe. In order to not burden small transmission systems, at least 80% of those consumers which have been assessed have to be equipped with intelligent metering systems by 2020.

B. Ofgem. (April 2010). *RIIO – a new way to regulate energy networks* (Factsheet 93).

Filename: Ofgem April 2010 RIIO-Factsheet 93

Ofgem's new performance-based RIIO model seeks to ensure consumers get the necessary investment in Britain's energy networks at a fair price. RIIO will ensure that network costs do not rise any more than they need to by financially punishing inefficient companies that fail to deliver for consumers. Companies will have to meet performance targets, set in consultation with consumers and network users.

The need to invest will increase consumers' bills, with network charges accounting for around 18% of gas and electricity bills. Ofgem estimates that the cost of delivering the £200 billion would put up energy bills by 14-25%. However, the Government is planning an ambitious program of energy efficiency measures to help reduce the cost of this investment for consumers.

Additional key features of RIIO are: 1) meeting the needs of a sustainable future, 2) potential early completion of price control reviews for companies which innovate, 3) higher returns for companies that deliver at a lower cost, 4) having the option to give new entrants responsibility for delivery of some large infrastructure projects, 5) providing clarity to investors to ensure that network companies can raise finance needed in a timely manner and at a reasonable cost to consumers, and 6) ensuring that the cost of investment is spread fairly between today's and tomorrow's consumers.

V. CALIFORNIA

A. State of California Public Utilities Commission. (March 2012). *Decision Adopting Metrics to Measure the Smart Grid Deployments of Pacific Gas and Electric Company, Southern California Edison Company and San Diego Gas & Electric Company* (R.08-12-009 COM/MP1/lil, Agenda ID #11186).

Filename: CA PUC March 2012 Order on Smart Grid Metrics

This decision adopts consensus metrics to measure the extent and effectiveness of Smart Grid investments made by Pacific Gas and Electric Company, Southern California Edison Company and San Diego Gas & Electric Company. This decision also sets a schedule for the future review and revision of Smart Grid metrics. Specifically, this decision directs parties and Commission Staff to create four Technical Working Groups to address the following topics: 1) updates or revisions to the metrics adopted herein, if needed; 2) the creation of metrics related to cyber-security; 3) the creation of metrics related to environmental benefits; and, 4) the creation of broad goals to focus all stakeholders toward a common vision.

VI. HEALTH EFFECTS

A. Public Utility Commission of Texas. (December 2012). *Report on Health and Radiofrequency Electromagnetic Fields from Advanced Meters* (Project No. 40190, Project Relating to Advanced Metering Issues.

Filename: TX PUC 12-2012 Advanced Meter Effects

VII. ILLINOIS

A. *An Act Concerning Public Utilities* (Public Act 097-0616) SB1652 Enrolled.

Filename: IL SB1652-As Enacted in Public Act 097-0616

B. *Illinois* Statewide Smart Grid Collaborative (ISSGC) (September 30, 2010). *Collaborative Report*.

Filename: Illinois Statewide SG Collaborative Report Sept 2008

The ISSGC was established by the Illinois Commerce Commission (ICC) in September 2008, to develop a strategic plan to guide deployment of smart grid in Illinois and to recommend policies that the Commission can consider for adoption. The Report includes the following chapters: Smart Grid Definition, Smart Grid Applications, Consumer Policy Issues, Technical Characteristics and Requirements, Cost-Benefit Framework and Utility Filing Requirements.

C. Hornby, Richard J. Statement Before the Illinois Commerce Commission, *Direct Testimony and Exhibits of J. Richard Hornby on Behalf of the People of the State of Illinois AG Exhibit 1.0 on Rehearing, Redacted*. August 24 2012 (No. 12-0244 On Rehearing).

Filename: Hornby Testimony and AG Exhibits

D. State of Illinois Commerce Commission. (2008). Order 07-056, *Proposed General Increase in Electric Rates*.

Filename: Illinois Commerce Commission Order 07-056

This order approving a general rate increase for ComEd contemplates the Company's proposed regulatory mechanism to recover costs associated with grid modernization and smart grid investments. ComEd's Systems Modernization Projects Adjustment Rider, or Rider SMP, would provide timely cost recovery and a pre-approval process for smart grid projects. The Illinois Commerce Commission approved the Rider SMP for the limited purpose of implementing a scaled deployment of advanced metering infrastructure as a pilot program. Further, the Commission identified a need for a policy framework to address concerns regarding the costs and benefits associated with smart grid investments, and thus established a Statewide Smart Grid Collaborative. The Commission intends to open a smart grid proceeding following the Statewide Smart Grid Collaborative.

VIII. KENTUCKY

A. *Considerations of the Implementation of Smart Grid and Smart Meter Technologies* (Case No. 201 2-00428).

Filename: Kentucky PSC-Order 20121001

B. The Kentucky's Smart Grid Roadmap Initiative (September 18, 2012); Commonwealth of Kentucky.

Filename: Kentucky Smart Grid Roadmap Initiative Sept 2012

The Kentucky Public Service Commission ("KY Commission") engaged the Univ of Louisville's Conn Center for Renewable Energy Research and the Univ of Kentucky's Power and Energy Institute to analyze the existing power infrastructure in KY and develop recommendations for future grid modernization efforts. After a 2 year effort, the following key recommendations were submitted to the KY Commission in a comprehensive Kentucky Smart Grid Roadmap Initiative Report ("KSGRI"): 1. Encourage investments focused on future-proof data network architecture, preferably one that is Internet Protocol based; 2. Creation of an official KY Smart Grid Council composed of academic, industrial, governmental, and stakeholder members; 3. Funding of energy /technology policy and technology development research within the state university system; 4. Creation of regulatory

mechanisms to foster increased investments in both cost-effective demand response programs and energy efficiency technologies such as Volt/VAR; 5. Allow for real-time and multi-tariff pricing; and 6. Establishment of clear metrics to establish priorities and goals for Smart Grid deployment in KY. Subsequently, the KY Commission issued an Order opening an administrative proceeding to address all aspects of a Smart Grid system from hardware and software issues to reliability improvement, cost recovery issues and dynamic pricing. This proceeding is on-going.

IX. MAINE

A. Maine Supreme Judicial Court. (July 2012). *ED FRIEDMAN et al. v. PUBLIC UTILITIES COMMISSION et al.* (Decision: 2012 ME 90, Docket: PUC-11-532).

Filename: Maine 90 Friedman v PUC

The Maine Public Utilities Commission's dismisses Friedman's appeal against Central Maine Power Company (CMP) regarding CMP's smart-meter technology. The complaints raised concerns about the health and safety of smart-meter technology associated with the AMI project, the technology's potential to violate individuals' privacy. The Commission issued an order stating that CMP needs to provide two alternatives for customers who choose not to have the standard wireless smart meter installed on their premises and provide for charges for those customers who elect to participate in the opt-out program.

X. MARYLAND

A. Office of Governor Martin O'Malley. (September 12, 2012). *Weathering the Storm - Report of the Grid Resiliency Task Force* (Executive Order 01.01.2012.15).

Filename: MD Grid Resiliency Task Force Sept 2012

Referencing the potential impact of climate change on regional weather patterns and the prolonged power outages brought by recent hurricanes, blizzards, and the Derecho, on July 25, 2012, the Governor signed an Executive Order specifically charging a Task Force with evaluating: 1. The effectiveness and feasibility of undergrounding supply and distribution lines; 2. Other options for infrastructure investments to improve resiliency of the grid; and 3. Options for financing and cost recovery for capital investment. Over 60 days, the Task Force assembled roundtable discussions that included almost 50 experts from around the country, created a website to share information and solicit feedback from the public, analyzed copious data received from the utilities about outage information and staffing levels, synthesized the statutory and regulatory framework in which this conversation takes place, developed eleven recommendations, and drafted this Report.

XI. NEW YORK

A. Consolidated Edison Company of New York, Inc. *Evaluation of Program Performance and Cost Effectiveness of Demand Response Programs*, Filed with the New York Public Service Commission, (December 14, 2012). (Dockets 09-E-0115, 10-E-0229 and 08-E-1463).

Filename: ConEd Cost-Effectiveness Evaluations Dec 2012

This report discusses Consolidated Edison's commercial demand response programs, Distribution Load Relief Program and Commercial System Relief Program, and residential demand response programs, Direct Load Control Program and Residential Smart Appliance Program. Consolidated Edison discusses the participation and load reduction pertaining to each demand response program. Consolidated Edison expresses concern regarding the growth rate of its commercial demand response programs, stating that continued growth of the programs is critical to continued success. Consolidated Edison states that it is considering modifications to the financial incentives and performance requirements of these programs to make them more attractive to potential participants.

Consolidated Edison expresses similar concerns with regard to its residential demand response programs. Consolidated Edison discusses the need to upgrade and update the technologies offered to residential customers as well as Consolidated Edison's hope to expand its 2012 Modlet (short for "modern outlet") pilot to a full scale program. The Modlet device is a plug-in "smart outlet" that can coordinate demand response for specific appliances, such as room air conditioners. This pilot program was also branded under the name CoolNYC.

B. Federal Energy Regulatory Commission. (December 2012). *Assessment of Demand Response & Advanced Metering* (Staff Report).

Filename: FERC Staff Report Dec 2012-DR and Advanced Metering Assessment

In the past year, significant progress has been achieved for both wholesale and retail electricity demand response and advanced metering, supported by the actions of state regulators, federal regulators and federal funding under the American Recovery and Reinvestment Act, the development of interoperability standards, and efforts of industry and customers. According to information provided by survey respondents to the FERC 2012 Demand Response and Advanced Metering Survey, the potential demand response resource contribution from all U.S. demand response programs is estimated to be nearly 72,000 MW, or about 9.2 percent of U.S. peak demand. This is an increase of about 13,000 MW from the 2010 FERC Survey. The regions with the largest estimated demand response capability are the Midwest-to-Mid-Atlantic region, the Southeast, and the Upper Midwest. With regard to advanced metering, penetration reached approximately 22.9% in 2011 in the United States, compared to approximately 8.7% in the 2010 FERC Survey (covering calendar year 2009). Florida, Texas, and the West have advanced meter penetrations exceeding 30%. As in previous surveys, electric cooperatives have the largest penetration, nearly 31%, among categories of organizations.

C. Lap, Rosy. (December 16, 2012). *Post-Sandy, ConEd evaluates undergrounding entire distribution network*

Filename: Post Sandy Con-Ed Considers Underground Distribution Network

In the aftermath of Hurricane Sandy, ConEd is evaluating whether to underground the entirety of its distribution network, an undertaking that would cost $40 billion. The majority of the utility's distribution cable is already underground. To take the rest of the system underground would also require taking telecom and cable lines underground, for an additional $20 billion. A study was conducted a few years ago and there was talk that it could triple people's rates to put things underground.

D. RAP. (July 2012). *Time-Varying and Dynamic Rate Design*.

Filename: RAP-Time-Varying Rate Design-July 2012

This report, written largely for regulators and policymakers around the globe, discusses important issues in the design and deployment of time-varying rates. The discussion is primarily focused on residential customers and small commercial customers who are collectively referred to as the mass market. The report also summarizes international experience with time-varying rate offerings.

The key findings of the report are: 1) metering technology is rapidly changing, creating the opportunity to provide time-varying rates for the mass market, 2) time-varying rate options present varying risk-reward tradeoffs to consumers, 3) There are many potential benefits of time-varying rates, 4) a number of key parameters need to be defined when designing a time-varying rate, 5) well-designed pilots are critical to proving the benefits of time-varying rates, 6) we have learned a lot about time-varying rates through recent pilots, 7) new research will further inform our understanding, and 8) there are options for facilitating the transition to time-varying rates.

XII. DOCUMENTS IN DIFFERENT FORMATS

A. POWERPOINTS (As PDFs)

1. U.S. Department of Energy. (November 2011). Collaboration and Interaction on Smart Grid Metrics and Benefits - Impact Analysis.

Filename: DOE-Impact Analysis Approach Overview

2. SmartGrid.gov. (May 2011). *List of Smart Grid Benefits*.

Filename: SmartGrid.gov-List of SG Benefits-May 2011

3. SmartGrid.gov. (May 2011). Smart Grid Assets and Functions.

Filename: SmartGrid.gov-SG Assets and Functions May2011

4. The Brattle Group. (July 2012). Architecting the Future of Dynamic Pricing.

Filename: Brattle-Faruqui-Future of Dynamic Pricing

B. PODCASTS

1. Wired Group. *Reference Work*. Wired Group Website: http://www.wiredgroup.net/Reference_Work_Resources.html

a) Smart Grid Capabilities, Benefits, Costs, and Risks
b) A New Type of Investment with Implications for Utility Oversight
c) Maximizing the Benefits of Smart Grid Investments by Regulated Utilities

C. TOOL

1. Smart Grid Research Consortium for Electric Cooperatives, Municipal Utilities, and Other Public Utilities. Smart Grid Research Consortium Website: http://www.smartgridresearchconsortium.org.

The website has a Smart Grid Cost/Benefit model which determined that AMI is not cost-effective but Voltage Reduction and Direct Load Control/Programmable Thermostats are.

D. USEFUL LINKS

1. http://www.smartgrid.gov/federal_initiatives/featured_initiatives/department_energy_convenes_smart_grid_customer_engagement_working_group