

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Joint Petition of Metropolitan Edison :
Company, Pennsylvania Electric Company :
and Pennsylvania Power Company for : Docket No. M-2009-2123950
Approval of Smart Meter Technology :
Procurement and Installation Plan :

DIRECT TESTIMONY

OF

NANCY BROCKWAY

ON BEHALF OF THE

PENNSYLVANIA OFFICE OF CONSUMER ADVOCATE

OCTOBER 21, 2009

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Exhibit NB-1	Resume and list of testimonies of Nancy Brockway

1 **INTRODUCTION**

2 **Q. Please state your name, your business affiliation, and your address.**

3 A. My name is Nancy Brockway. I am the principal of NBrockway & Associates, a firm providing
4 consulting services in the areas of energy and utilities. My address is 10 Allen Street, Boston,
5 MA 02131.

6 **Q. On whose behalf are you testifying in this proceeding?**

7 A. I am testifying on behalf of Pennsylvania Office of Consumer Advocate (OCA).

8 **Q. Please briefly describe your qualifications and experience.**

9 A. Since 1983, my professional focus has been the energy and utility industries, with particular
10 attention to the role of regulation in the protection of consumers and the environment. I was a
11 Commissioner appointed to the New Hampshire Public Utilities Commission, serving from 1998
12 to 2003. Earlier, I was for several years a hearing officer and advisor to the Maine Public
13 Utilities Commission and then to the Massachusetts Department of Public Utilities, where I
14 served two years as General Counsel of the commission. I was an expert witness on consumer
15 and low-income utility issues for seven years, with the National Consumer Law Center. Since
16 leaving the New Hampshire Commission, I have been a consultant on regulatory utility issues to
17 regulatory commissions, ratepayer advocates, low-income energy groups, and others. I also spent
18 several months serving as the Director of Multi-Utility Research and Analysis with the National
19 Regulatory Research Institute. While at NRRI, I researched and wrote a key objective study of
20 the impact of advanced metering structure and related pricing options on residential consumers. I
21 have written comments and filed testimony in the Massachusetts Smart Grid proceedings now
22 ongoing. My resume is attached as Exhibit NB-1.

23 **Q. Have you previously testified before this Commission?**

24 A. Yes, I have testified before the Pennsylvania Public Utility Commission on numerous occasions.
25

1 **Q. Have you testified on utility matters before other Commissions?**

2 A. Yes. I have filed testimony in over 30 proceedings. I have appeared before fifteen state or
3 provincial regulatory commissions.

4 **Q. What is the purpose of your testimony today?**

5 A. I have been asked to review the Smart Meter Procurement and Installation Plan (SMIP or Plan)
6 filing of Metropolitan Edison Company (MedEd), Pennsylvania Electric Company (Penelec) and
7 Pennsylvania Power Company (PennPower) (together, the Companies or FirstEnergy), and to
8 analyze the Companies' SMIPs, and analyze the impact of the SMIPs on vulnerable customers,
9 on consumer protections, and on residential customers generally.

10 **Q. Please summarize your conclusions.**

11 A. My conclusions are as follows:

- 12 • Metropolitan Edison Company, Pennsylvania Electric Company and Pennsylvania Power
13 Company have chosen a reasonable approach to developing their SMIPs.
- 14 • The Companies propose to make good use of the Commission-approved grace period to
15 ensure that their SMIPs adequately address a number of the issues that SMIPs present for
16 utilities, including the need for completion of industry and government work on standards
17 for cyber security, interoperability and privacy of customer information.
- 18 • The Companies' suggestion that they have decided to extend meter deployment out to
19 year 2022 as allowed under Act 129, without having yet completed their in depth
20 Assessment as proposed, is premature. The Companies should remain open to the
21 opportunity to deploy smart meter technology earlier than the times reflected in the
22 current long term planning if the Companies determine that such deployment is cost-
23 effective.
- 24 • Smart metering can pose risks to vulnerable customers who may not be able to participate
25 in programs and rates offered on a smart metering platform. Customers generally may

1 react adversely to the expenditures on smart metering, unless they can see the benefit to
2 themselves. Also, smart meters can be used to introduce three practices, each of which
3 pose risks to certain customers of unnecessary or unfair disconnections: remote
4 disconnection of service, prepayment metering, and service limiters.

- 5 • The Companies' proposals could be strengthened and focused by further specification of
6 areas of research and planning, as discussed below.

7 **Q. Please summarize your recommendations.**

8 A. I recommend the following:

- 9 • As part of the Assessment Period and before deployment, the Companies should perform
10 a thorough cost-benefit analysis, with sensitivities to assess the possible impact of
11 uncertainties that remain at the time of deployment. The cost-benefit analysis should be
12 comprehensive and should place particular emphasis on identifying and quantifying
13 benefits related to operational savings, reliability improvements, and energy supply
14 savings that could be enabled by smart meter technology.
- 15 • Before technology and program selection, the Companies should assure themselves that
16 necessary technical standards are in place to include in their Deployment Plan, including
17 standards and enforcement mechanisms to ensure adequate security and protect consumer
18 privacy.
- 19 • The Companies should assess the likely response of residential customers overall to the
20 imposition of AMI-enabled rates before settling on technologies and deployment plans.
21 The Companies should use customer-focused research and obtain more comprehensive
22 usage data for residential customers to better understand the uses that may be made of the
23 smart meter technology.
- 24 • The Companies should particularly assess the impacts of their proposed SMIP on
25 vulnerable customers. Working with community groups, the Company should identify to

1 what extent their customers are low-income, low-use, medically challenged, or otherwise
2 at risk, and develop plans to mitigate the risks to such customers of smart metering costs,
3 including consideration of smart metering technologies, price and program designs, and
4 equipment specification. This assessment should include a granular analysis of load
5 shapes and usage characteristics of a sample of identified vulnerable customers before the
6 end of the grace period to ensure sufficient reliable data and understanding of the needs
7 of these customers.

- 8 • The Companies should collect smart metering costs primarily on a volumetric basis rather
9 than through a fixed monthly customer charge.
- 10 • To protect consumer rights, the Companies should exclude the use of smart metering for
11 remote disconnection, prepaid metering and service limiting from their Plan at this time.
12 They can address these issues in the separate docket the Commission will open to address
13 impacts of SMI on these consumer rights. If and to the extent they do propose to include
14 meters with remote disconnection modules, they should first prepare the thorough
15 cost/benefit analysis required by the Commission. The cost/benefit analysis should
16 include a comparison of all costs of the module and its use against the operational
17 benefits if the remote disconnection capability were only used in situations where the
18 Companies had explicit customer agreement for the service termination and where they
19 knew that the premises are in fact vacant. As part of this analysis the Companies should
20 review available data on the experience of utilities that use or have used remote
21 disconnection, to learn, if possible, what has been the experience of customers of those
22 utilities.

1 **DESCRIPTION OF THE COMPANIES' PLAN**

2 **Q. Please briefly describe the Companies' Smart Grid Implementation Plan and proposed**
3 **schedule.**

4 A. According to their Smart Meter Technology Procurement and Implementation Plan (Plan), Met-
5 Ed, Penelec and Penn Power have developed a plan applicable to all three First Energy
6 subsidiaries in Pennsylvania to plan for smart metering deployment across the service territories
7 of all three Companies, and to procure and install smart meter technology. Plan at 1, note 1. The
8 Companies' Plan includes a general long-term time line based on information currently available
9 and the preparation of a more detailed short-term plan to be implemented during the 30-month
10 grace period. Plan at 1. The Companies plan to fully deploy smart metering across their service
11 territories within the 15-year period allowed by the Statute. Plan, at 5. They will begin deploying
12 smart meters once the Commission has reviewed its supplemental, detailed plan. They will
13 deploy smart meters in a tiered roll out in order to maximize the cost/benefit ratio and minimize
14 the cost to customers. *Id.*, at 5. The Companies expect that the more densely populated areas in
15 their service territories will be remetered well before the 15 year deadline. *Id.* In the first 24
16 months of the grace period established by the Commission, the Companies will develop a detailed
17 business plan for full SMI deployment. They will submit this business plan for review to the
18 Commission as a supplement to its Plan.

19 **Q. What do the Companies plan to determine in the Assessment Period?**

20 A. During the Assessment Period, the Companies will determine specific SMI needs, assess service
21 territory characteristics relevant to technology choices, select specific metering and
22 communications technology, secure vendors, train personnel, install and support test equipment,
23 and establish a detailed meter deployment schedule. *Id.* at 5. At the completion of the
24 Assessment Period, the Companies will submit to the Commission a supplement to the Plan
25 ("Deployment Plan") that will set forth in detail the Companies' plan for the full scale

1 deployment of smart meters. *Id.* During the Assessment Period, the Companies will complete
2 the major steps which are described in detail in the Companies' Plan. The Companies intend to
3 hire a consultant to assist with the needs and technology assessment. The Companies, with the
4 assistance of their consultant, will select vendors based on the results of the needs and technology
5 assessments. The Companies expect to start the vendor and technology selection process in
6 September, 2010 and continue for less than ten months.

7 **Q. What are other steps do the Companies plan to complete during the Assessment Period?**

8 A. During the Assessment Period, the Companies will also conduct an evaluation of their current
9 legacy systems to assess needs for network design. The Companies plan to begin the network
10 design (identified as needed through this assessment of needs) in January, 2011 and have it
11 completed before the end of 2013. *Id.*, at 12. The major steps to be completed are set forth in the
12 Companies' Plan. *Id.*

13 **Q. What further deployment plans do the Companies intend to specify in the Assessment**
14 **Period?**

15 A. The Companies will develop the specific details of plans for SMI installation, testing and rollout
16 during the Assessment Period. Among other things, the Companies plan to perform a formal
17 assessment of employee skill sets and organizational readiness during the grace period, and
18 prepare a training plan to implement with the SMI deployment. *Id.*, at 12.

19 **Q. How will the Companies determine the specific meter or metering for deployment?**

20 A. The Companies will assess various options for residential customer needs during the Plan review
21 and approval process to select a meter technology that provides the requisite data as identified in
22 the Implementation Order based on various criteria, including customer costs. The Companies
23 will also perform a technical trial, which will involve the deployment and testing of 5,000 to
24 10,000 smart meters before December 31, 2013, and which will consist of two major
25 components: 1) an AMI test lab; and 2) a pre-implementation assessment and upgrade. *Id.*, at 13-

1 14. Following the testing of the selected technology, the Companies will further build out the
2 necessary infrastructure, installing a minimum of 60,000 additional meters. These meters will be
3 tested in order to “de-bug” the system prior to full deployment.

4 **Q. What will the Companies’ Deployment Plan include?**

5 A. The Companies’ Deployment Plan will include, among other things: 1) a detailed long-term time
6 line, with key milestones; 2) the Companies’ choice of smart meters; 3) the costs of such meters,
7 along with an assessment of benefits; 4) a network design; 5) a communications architecture
8 design; 6) a training assessment and proposed curriculum; 7) a cost recovery forecast; 8) a
9 transition plan including communications to employees and customers; and 9) a detailed roll out
10 plan. The Companies expect that they will roll out smart meters and associated networks and
11 technologies in a tiered manner, starting with the locations within their service areas that have the
12 densest concentration of customers so as to take advantage of implementation economies. *Id.*, at
13 5.

14 **Q. What do the Companies plan with respect to Electronic Data Exchange?**

15 A. The Companies will work with the Electronic Data Exchange Working Group. No later than
16 January 2, 2010, they will submit a proposal for EDI capabilities, including planned target dates
17 for testing and certification. *Id.*, at 17.

18
19 **USE OF THE GRACE PERIOD FOR FURTHER ASSESSMENT**

20 **Q. Does FirstEnergy make use of the grace period allowed by the Commission in its Smart
21 Meter Implementation Order?**

22 A. Yes. Under the Smart Meter Procurement and Installation Implementation Order (Order entered
23 June 24, 2009)(Order or Smart Meter Implementation Order), utilities may take up to 30 months
24 after the approval of their SMIPs to achieve certain milestones in preparation for rolling out their
25 smart meter plant. The process outlined above is a reasonable approach to determining

1 specifications of metering and communications technologies, and minimizing costs for full
2 metering deployment during this grace period.

3 **Q. Do you have concerns about the Companies' estimated time line for beginning full**
4 **deployment?**

5 A. Yes. The Companies presently expect that they will not begin to deploy smart meters on a wide
6 scale basis to customers until 2017. *Id.*, at 6. They do not expect to complete deployment to all
7 customers until 2022. The Companies note that their long-term timeline is only an estimate now,
8 and that they cannot make definite plans for deployment until they have finished their assessment
9 and done the necessary design work. Below I discuss some of the still-open issues and I believe
10 it is prudent for the Companies to take the time needed to determine if these questions can be
11 resolved satisfactorily before deployment. If these issues can be resolved, the Companies should
12 be open to beginning and completing deployment on a more expeditious basis if cost effective.
13 While the analysis during the Assessment Period will guide these decisions, the analysis should
14 not simply assume the deployment schedule that the Companies currently project. Sufficient
15 sensitivities around this deployment schedule should be used to assess the most cost effective
16 means of deployment.

17 **Q. What do you conclude as to the Companies' proposed use of the Commission-established**
18 **grace period?**

19 A. The Companies have adopted a common sense and prudent approach to developing the
20 specifications for a full rollout of smart metering. The Companies propose to take the time
21 needed to do careful planning, rather than rush into deployments that may later prove to have
22 been suboptimal. Also as discussed further below, there are ongoing developments in the
23 technologies and industries involved in smart metering, and the Companies can get the benefit of
24 the grace period to observe developments and incorporate the most up-to-date, effective and cost-
25 effective smart metering approaches in their detailed Deployment Plan. At the same time, the

1 Companies should remain open to the opportunity to deploy cost-effective smart meter
2 technology earlier than the times reflected in their current long term planning.

3 4 **ASSESSMENT PERIOD ANALYSES**

5 **Q. Are there topic areas and analyses that the Companies should cover in their Assessment**
6 **Period, before developing their full deployment plan?**

7 A. Yes. There are many analyses that the Companies should, and will, undertake during this period.
8 I would like to focus on a few key analyses that should be included in the Assessment Period to
9 ensure that data is available to support the Deployment Plan. Specifically, the Companies should
10 perform a thorough cost-benefit analysis, they should assess the impacts of their proposed SMI on
11 residential customers, and particularly vulnerable customers, they should assess the likely
12 response of residential customers to the imposition of AMI-enabled rates before settling on
13 technologies and deployment plans, and they should assure themselves that necessary technical
14 standards are in place to include in their Deployment Plan, including standards and enforcement
15 mechanisms to protect consumer privacy. I discuss each of these issues in more detail below.

16 17 *Cost/Benefit Analyses*

18 **Q. What are some of the key features of the cost-benefit analysis that you would expect to see**
19 **in support of a Deployment Plan?**

20 A. In addition to identifying the costs associated with the deployment of smart metering, it is
21 important to analyze the potential benefits in some detail. Mr. Hornby discusses some of the
22 necessary analysis in his testimony, including the need to properly analyze the impacts of
23 dynamic pricing programs that may be enabled. In addition, the Companies should perform a
24 rigorous assessment of savings that can be expected in their distribution operations. I would
25 include in this review any reliability benefits that may be expected to result from the installation

1 of the smart meters. The analyses performed should look not only at the total expected costs and
2 benefits but at the timing of those costs and benefits to help guide decisions regarding
3 deployment. In addition, the Companies should analyze the costs and benefits of the various
4 functionalities to better guide their decision as to the functionalities that will be included in the
5 smart meter technology.

6
7 *Customer Analyses and Issues*

8 **Q. What analysis of residential customers should the Companies perform during the**
9 **Assessment Period?**

10 A. The Companies should attempt to assess residential customer usage characteristics to better
11 understand how their customers might use and benefit from smart meter technology. The use of
12 customer-focused research to better understand customer acceptance of the technology and
13 customer interest in various forms of programs will also be important in determining the use of
14 the technology and the types of programs or rates to implement.

15 **Q. What are some potential reactions of residential customers generally to the deployment of**
16 **the Companies' SMIPs?**

17 A. If customers are not knowledgeable about and supportive of AMI-enabled pricing structures
18 before deployment, the Companies could face a consumer backlash from disappointed customers.
19 Pacific Gas & Electric (PG&E) is facing just such a backlash now, from customers in the two
20 counties (Bakersfield and Kern) where smart metering and critical peak pricing rates were put in
21 place. Customers saw their bills go up, and many blamed it on the new smart meter technology.
22 The legislature has held hearings where angry customers have criticized PG&E. PG&E answers
23 that the increase in bills is not attributable to the SMI deployment or the associated critical peak
24 rates. But, it is having a hard time convincing its customers.

1 **Q. What are some tools the Companies can use to gauge likely customer response and identify**
2 **possible answers before deploying smart meters?**

3 A. In addition to observing the experience of other utilities, such as PG&E, the Companies can use
4 the tools of surveys, focus groups, deliberative polling, and other such market research tools, to
5 gauge customer understanding of, and possible reactions to, SMI-based pricing.

6 **Q. What are some potential impacts of an SMI on vulnerable customers?**

7 A. Vulnerable customers include low-income customers, customers with disabilities, the elderly, and
8 others who cannot afford to see bill increases, but may not enjoy many of the benefits of the
9 smart meter implementation. There are two reasons for customers not receiving such benefits.
10 First, low-use customers may have difficulty moving loads off critical peaks, at least not without
11 risk to health and safety. Customers requiring electricity to keep medicines cold or run oxygen
12 machines, for example, also are at risk if they cannot move usage off critical peaks. Some
13 customers are not able to navigate complicated electricity bill offerings. Even non-low-income
14 customers can be at risk, if their usage is low, they need electricity for medical reasons, or they
15 have difficulty navigating the chores of daily life.

16 **Q. How should the Companies assess the impacts of their deployment proposal on vulnerable**
17 **customers?**

18 A. The Companies should research bill impacts and, using bill frequency analysis and other tools,
19 estimate the bill impacts on various groups of customers. The Companies should identify the
20 extent to which their residential customers are low-income, low-use, medically challenged, or
21 otherwise at risk. The Companies should work with community groups to educate them about
22 possible smart meter technology, and obtain feedback about likely problems in the community,
23 and possible ways to address such problems (including changes to the SMIP design).

1 **Q. Do the Companies presently have the metering technology to prepare an adequate analysis**
2 **for the purpose of identifying the potential impacts of various metering or rate options on**
3 **residential customers with different usage levels and load patterns?**

4 A, It is my understanding that the Companies' current residential meters would not provide a
5 granular level of detail about customer usage to be able to fully assess the impacts on residential
6 customers.

7 **Q. What do you recommend the Companies do to enable themselves to conduct the bill**
8 **frequency and load shape research you propose for residential customers and vulnerable**
9 **residential customers?**

10 A. I recommend that during the Assessment Period, the Companies install a sufficient number of
11 interval meters at a variety of residential premises, including vulnerable customers, to support
12 detailed bill frequency and load shape analysis. This information can form the basis for a better
13 understanding of the impacts of the smart meter technology and various rate options. This
14 information will also assist the Companies in designing programs that may be able to assist
15 vulnerable customers.

16 **Q. What could the Companies do to address the problems facing vulnerable customers?**

17 A. The most important step is to keep the costs of the deployment down as much as possible. This
18 will help mitigate the bill impacts on customers who cannot necessarily participate in programs or
19 rate offerings that may be enabled by smart meters. Requiring a robust benefit/cost ratio will help
20 to keep the pressure on deployment costs and ensure that the optimal plan is chosen. Holding
21 customers harmless from (a) excessive spending on deployment, (b) insufficient savings to offset
22 deployment costs for all customers, or (c) both, would also help protect customers who cannot
23 participate directly in programs or rate offerings that may develop.

24

1 **Q. How if at all do the Companies' SMIPs help to keep the cost of deployment down as much**
2 **as possible?**

3 A. The Companies' thoughtful approach to planning and deployment afford it the time to see if the
4 market for SMI components becomes more competitive, and to get reliable estimates of the
5 savings likely to be achieved with SMI deployments. This approach will maximize the
6 cost/benefit ratio of the SMIP. Taking the time for proper assessment of the specifics of a sound
7 SMI deployment has the benefit of reducing the costs to consumers over time.

8 **Q. Are there other ways to mitigate the burdens that SMIP will place on vulnerable customers**
9 **who cannot take advantage of SMIP rebates?**

10 A. Yes. SMIP costs should be recovered primarily on a volumetric rather than fixed basis. In this
11 way, low-use customers who cannot take advantage of SMIP tariff benefits will not be as
12 burdened with costs of the new system as they would be under fixed charge cost recovery.

13

14 *Technical Issues for the Assessment Period*

15 **Q. Please now turn to the question of the dynamic nature of information technology in the**
16 **advanced metering industry. To what extent has the industry developed protocols and**
17 **standards of general applicability?**

18 A. Advanced metering infrastructure is still experiencing rapid technological development. Vendors
19 are promoting their solutions to technical problems, while industry groups are meeting with
20 government facilitation in an attempt to establish common standards, especially in key areas such
21 as cyber-security, interoperability, and protection of consumer privacy.

22 **Q. Please explain what you mean by cyber-security.**

23 A. Cyber-security refers to the security of the information passing over the communications
24 networks of the Smart Grid, and to the security of controls over system components, such as
25 circuit breakers and other components of the system essential to the functioning of the grid. It

1 also refers to the security of customer data (privacy). Security may be compromised by
2 equipment or operational faults, as well as intentional breaches by hackers, and unauthorized
3 access to data and controls.

4 **Q. What is “inter-operability”?**

5 A. Interoperability refers to the ability of any given component of the Smart Grid to communicate
6 with the other components to which it is connected, passing data, and commands, smoothly,
7 quickly and accurately back and forth. Protocols for data transfer must be compatible, if not
8 identical, for components to be interoperable.

9 **Q. Does the interconnection of elements of the grid under AMI create openings for breaches in
10 the cyber security of the grid?**

11 A. Yes. AMI is essentially a huge and complicated communications and data processing network, or
12 more accurately, a network of networks. Sensitive information will pass over the
13 communications networks set up to administer dynamic pricing and to manage grid functions.
14 New and remotely-programmable controls of various grid components will be installed.
15 Communications systems such as enterprise networks for core business data processing, network
16 access and backhaul, neighborhood or local area networks, and home area networks, will be
17 created and interconnected. The systems will be tied together more than ever. They will be more
18 complex than ever. Interoperability, size, complexity and novelty provide opportunities for
19 unauthorized data and control access.

20 **Q. Please describe the privacy issues that arise in the case of the Smart Grid and advanced
21 metering infrastructure.**

22 A. As noted above, the interconnectedness of the Smart Grid makes data carried over the
23 communications networks vulnerable to improper access by unauthorized persons. The advanced
24 metering infrastructure will at a minimum capture and store data on all consumers’ hourly usage.
25 Some argue that this information could be used to estimate which customers have which types of

1 appliances and equipment at home. It could be used to estimate whether a customer is home,
2 weekdays, or for several weeks during vacation. If customers install Home Area Networks and
3 tie their appliances and computer in to the network, that network could be hacked, and specific
4 information about electricity usage could be obtained. To the extent all these systems are hooked
5 into the customer's internet connection, the customer's computers could be at risk, as well.

6 **Q. Are industry and government working to develop standards to prevent breaches of cyber**
7 **security and of consumer privacy while maximizing interoperability?**

8 A. Yes.

9 **Q. Please outline the status of efforts to develop industry-wide cyber security and inter-**
10 **operability standards.**

11 A. Under the Energy Independence and Security Act (EISA) of 2007, the National Institute of
12 Standards and Technology (NIST) is taking the lead in promoting comprehensive standards in the
13 area of interoperability.¹ As part of this effort, NIST convened the Cyber Security Coordinating
14 Task Group, and is promoting the development and implementation of associated cyber security
15 standards. As yet, it is not possible to be sure when NIST and the entities developing the
16 standards themselves (i.e. IEEE, NERC) will be able to complete their work. NIST has issued a
17 "roadmap" for the work needed to get from here to standards (the draft NIST Framework and
18 Roadmap for Smart Grid Interoperability Standards on September 24, 2009)(Roadmap), and has
19 set timing goals for release of standards in the most important topic areas by the end of 2010.
20 The roadmap itself, however, is not a set of standards, and the timing goals for standard release
21 are very ambitious.

1 <http://www.nist.gov/smartgrid/>

1 **Q. How does NIST characterize the problem of safeguarding consumer data privacy in the**
2 **Smart Grid era?**

3 A. In the draft Roadmap released September 24, 2009, NIST noted that the major benefit provided
4 by the Smart Grid, the ability to get richer data to and from customer meters and other electric
5 devices, “is also its Achilles’ heel from a privacy viewpoint.” Roadmap, p. 84. NIST went on
6 to say that privacy advocates have raised concerns about the type and amount of billing and usage
7 information flowing through the various components of the Smart Gric, information “...that
8 could provide a detailed time-line of activities occurring inside the home.”

9 **Q How is NIST handling privacy concerns?**

10 A. NIST has set up a task force to coordinate efforts to identify privacy issues and develop ways to
11 address them.

12 **Q. What does the NIST draft report on cyber security recommend about protecting privacy of**
13 **personally identifiable information (PII)?**

14 A. The NIST report authors set out ten high-level principles for which specific standards must be
15 developed in the areas of (1) Management, Accountability and Training, (2) Notice and Purpose
16 for PII Use, (3) Choice & Consent to use PII, Collection of PII, (4) Use and Retention of PII, (5)
17 Individual Access, (6) Disclosure and Limiting Use of PII, (7) Security and Safeguards, (8)
18 Accuracy and Quality of PII, (9) Openness, and (10) Monitoring and Challenging Compliance.
19 The NIST draft report recommends that standards be developed to address the privacy risks it has
20 identified.²

21

² NIST Cyber Security Draft 7628, pp, 9-10.

1 **Q. Are there standards in place for utilities to follow to minimize threats to the cyber security**
2 **of the Smart Grid, to assure customer control of personally identifying information, and to**
3 **assure the smooth interoperability of its various parts?**

4 A. There are some standards in place for some aspects of the Smart Grid. For example, the
5 ZigBee(r) protocol is becoming the standard for communications within a home area network.
6 The industry is working hard to develop a comprehensive set of standards to provide guidance for
7 SMIP implementation. Utilities are making use of existing privacy protocols developed in other
8 contexts such as banking or credit card security, pending development of privacy programs
9 tailored to the Smart Grids.

10 **Q. Are there reasons to expect that important Smart Grid standards will not be in place before**
11 **the end of 2010?**

12 A. Yes. NIST and industry members are pushing hard to complete the primary standards work. But
13 NIST cautions that “several hundred standards that are identified or developed over the span of
14 several years may be required to achieve secure, end-to-end interoperability across a fully
15 implemented Smart Grid.”³ The NIST Roadmap uses qualifying language to describe its
16 expectations for full standard release by the end of 2010, saying for example that its priority
17 action plan will address “many” (as opposed to “all”) of the needed modification to standards
18 already denoted as “consensus” standards.⁴ In prepared comments released with the Roadmap,
19 Commerce Secretary Locke likened the Roadmap to a designer’s first detailed drawing of a
20 complex structure. “It presents a high-level conceptual model to ensure that everyone is on the
21 same page before moving forward to develop more detailed, formal Smart Grid architectures.”⁵
22 Similarly, as NIST describes the challenge on its web page:

³ <http://www.nist.gov/smartgrid/standards.html>, last viewed October 4, 2009 (Roadmap).

⁴ Roadmap. p. 38.

⁵ http://www.nist.gov/public_affairs/releases/smartgrid_092409.html.

1 The task is akin to developing standards for the next-generation telecommunications
2 network. This effort has spanned many years, continues to evolve, and involves dozens of
3 standards development organizations. Also, like the telecom network, the Smart Grid is almost
4 entirely owned and operated by industry. Therefore, Smart Grid interoperability and
5 cybersecurity standards must reflect industry consensus, with active participation, and where
6 required, leadership and coordination by government.

7 **Q. Are there other technology and design issues facing FirstEnergy in its decisions regarding**
8 **full AMI deployment?**

9 A. Best practices require that the designers of the hardware, software and communications networks
10 engineer the system to a well-defined end-state of functionalities for the system (use cases).
11 Utilities such as PG&E and Oncor have experienced difficulties when they chose technologies
12 that turned out not to have certain desired functionalities (in these cases, desired by the
13 regulators). PG&E customers are paying incremental costs for functions that conceivably could
14 have been integrated less expensively had they started with those specifications in mind before
15 designing and bidding out the metering project. Oncor finds itself trying to recover the costs of a
16 metering choice that was rendered obsolete when the state of Texas determined that utilities must
17 provide different functionalities in their smart meters. The continuing evolution of the Smart
18 Grid presents challenges to system planners, especially at this early stage in its development.

19 **Q. Are there financial risks of moving ahead before the industry and government have settled**
20 **on standards for cyber security and interoperability?**

21 A. Yes. The fact that some technical standards are still being developed creates a risk that additional
22 costs may need to be incurred if some of the technologies deployed now prove to be incompatible
23 with the standards that are ultimately established in the future.

24

1 **Q. How should the Companies address the risks of moving ahead before cyber security,**
2 **interoperability and privacy standards are establish?**

3 A. The Companies have taken a prudent course in the timetable of their SMI planning and
4 deployment. It will be prudent to use the grace period to see if the national standards are
5 developed in time to be incorporated into smart metering planning and deployment before major
6 investments must be made.

7

8 **CONSUMER PROTECTION ISSUES**

9 **Q. Are there consumer protection issues that may be raised by smart grid implementation?**

10 A. Yes. If the Companies choose meters outfitted with modules that permit remote disconnection of
11 customer service, this technology gives rise to serious consumer protection concerns. Even
12 without the remote disconnection functionality, advanced metering presents consumer issues.

13 **Q. How does implementation of smart metering technology risk undermining**
14 **important consumer protections?**

15 A. Smart meters can be used to introduce three practices, each of which pose risks to certain
16 customers of unnecessary or unfair disconnections. First, as noted, smart meters can be installed
17 with modules that permit the utility to disconnect the power to a customer's house remotely, by
18 flicking a switch at the utility's offices, without sending a technician to disconnect the meter.
19 Second, smart metering provides a relatively inexpensive foundation for implementing pre-
20 payment metering. Third, smart metering provides a relatively inexpensive foundation for
21 implementing service limiters. All three of these practices, if implemented, threaten residential
22 consumers with unfair and unnecessary service disconnection.

23

1 **Q. How can the Companies protect consumers from the risks of unfair and unnecessary service**
2 **termination?**

3 A. The Companies can exclude the use of smart metering for remote disconnection, prepaid metering
4 and service limiting from their Plan at this time. They can address these issues in the separate
5 docket the Commission will open to address impacts of SMI on these consumer rights. If and to
6 the extent they do propose to include meters with remote disconnection modules, they should first
7 prepare the thorough cost/benefit analysis required by the Commission. The cost/benefit analysis
8 should include a comparison of all costs of the module and its use against the operational benefits
9 if the remote disconnection capability were only used in situations where the Companies had
10 explicit customer agreement for the service termination and where they knew that the premises
11 are in fact vacant. As part of this analysis the Companies should review available data on the
12 experience of utilities that use or have used remote disconnection, to learn if possible what has
13 been the experience of customers of those utilities.

14

15 **CONCLUSIONS AND RECOMMENDATIONS**

16 **Q. Please summarize your conclusions.**

17 A. The Companies have adopted a common sense and prudent approach to developing the
18 specifications for a full rollout of smart metering. The Companies propose to take the time
19 needed to do careful planning, rather than rush into deployments that may later prove to have
20 been suboptimal. The Companies' thoughtful approach to planning and deployment affords it the
21 time to see if the market for SMI components becomes more competitive, and to get reliable
22 estimates of the savings likely to be achieved with SMI deployments. This approach will
23 maximize the cost/benefit ratio of the SMIP. Also, there are ongoing developments in the
24 technologies and industries involved in smart metering, and the Companies can get the benefit of

1 the grace period to observe developments and incorporate the most up-to-date, effective and cost-
2 effective smart metering approaches in their detailed Deployment Plan.

3 At the same time, however, the Companies should remain open to the opportunity to
4 deploy smart meter technology earlier than the times reflected in their current long term planning
5 if the Companies determine that such deployment is cost-effective. In addition, there are a
6 number of issues with deployment of smart metering that need to be addressed before full
7 deployment. Smart metering can pose risks to vulnerable customers who may not be able to
8 participate in programs and rates offered on a smart metering platform. Customers may react
9 adversely to the expenditures on smart metering, unless they can see the benefit to themselves.
10 Also, smart meters can be used to introduce three practices, each of which pose risks to certain
11 customers of unnecessary or unfair disconnections: remote disconnection of service, prepayment
12 metering, and service limiters.

13 **Q. Please summarize your recommendations.**

14 A. Before deployment the Companies should perform a thorough cost-benefit analysis, with
15 sensitivities to assess the possible impact of uncertainties that remain at the time of deployment.
16 Their cost/benefit test should require a robust net benefit determination. Before technology and
17 program selection, they should assure themselves that necessary technical standards are in place
18 to include in their Deployment Plan, including standards and enforcement mechanisms ensure
19 adequate security and to protect consumer privacy.

20 The Companies should assess the impacts of their proposed SMI on vulnerable
21 customers. To mitigate these risks, and maximize general customer acceptance of the
22 deployment, they should keep the costs of the deployment down to the extent possible. Also,
23 working with community groups, the Company should identify to what extent their customers are
24 low-income, low-use, medically challenged, or otherwise at risk, and develop plans to mitigate
25 the risks to such customers of smart metering costs, including consideration of smart metering

1 technologies, price and program designs, and equipment specification. This assessment should
2 include a granular analysis of load shapes and usage characteristics before the end of the grace
3 period to ensure sufficient reliable data and understanding of the needs of customers. The
4 Companies should also collect smart metering costs primarily on a volumetric basis rather than
5 through a fixed monthly charge. The Companies should assess the likely response of residential
6 customers overall to the imposition of AMI-enabled rates before settling on technologies and
7 deployment plans.

8 To protect consumer rights, the Companies should exclude the use of smart metering for
9 remote disconnection, prepaid metering and service limiting from their Plan. They can address
10 these issues in the separate docket the Commission will open to address impacts of SMI on these
11 consumer rights. If and to the extent they do propose to include meters with remote
12 disconnection modules, they should first prepare the thorough cost/benefit analysis required by
13 the Commission. The cost/benefit analysis should include a comparison of all costs of the
14 module and its use against the operational benefits if the remote disconnection capability were
15 only used in situations where the Companies had explicit customer agreement for the service
16 termination and where they knew that the premises are in fact vacant. As part of this analysis the
17 Companies should review available data on the experience of utilities that use or have used
18 remote disconnection, to learn if possible what has been the experience of customers of those
19 utilities.

20 **Q. Does this conclude your testimony?**

21 A. Yes.

22
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BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Joint Petition of Metropolitan Edison :
Company, Pennsylvania Electric Company :
and Pennsylvania Power Company for : Docket No. M-2009-2123950
Approval of Smart Meter Technology :
Procurement and Installation Plan :

EXHIBIT TO THE
DIRECT TESTIMONY
OF
NANCY BROCKWAY

ON BEHALF OF THE
PENNSYLVANIA OFFICE OF CONSUMER ADVOCATE

OCTOBER 21, 2009

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Experience

Principal, NBrockway & Associates, energy and utility consulting, 2003 to present
Director of Multi-Utility Research and Policy, NRRI, 2/08 – 10/08
Commissioner, New Hampshire Public Utilities Commission (1998-2003)
Member, New Hampshire Site Evaluation Committee (1998-2003)
Utilities consultant and attorney, National Consumer Law Center (1991-1998)
General Counsel, Massachusetts Public Utilities Commission (1989-1991)
Staff Attorney, Assistant General Counsel, Massachusetts Commission (1986-1989)
Hearings Officer, Senior Staff Attorney, Maine Public Utilities Commission (1983-1986)
Executive Director, Maine Legal Services for the Elderly, Inc. (1981-1983)
Staff Attorney, Directing Attorney, Pine Tree Legal Assistance, Inc. (1979-1981)
Staff Attorney, UMass Student Legal Services (1977-1979)
Staff Attorney, Western Massachusetts Legal Assistance, Inc. (1976-1977)
Staff Attorney, Legal Aid Society of New York (1974-1976)

**NARUC and related Committee Memberships and Public Service
(1998-2003)**

NARUC Consumer Affairs Committee (Vice-Chair)
Consumer Affairs Committee, New England Conference of Public Utility
Commissioners (Chair)
Steering Committee, National Council on Competition in the Electric Industry
ISO-NE Advisory Committee
NEPOOL Review Board Advisory Committee
NARUC Ad Hoc Committee on Competition in the Electric Industry
NARUC Ad Hoc Committee on Committee Structure, NARUC
NARUC Committee on Communications
FCC Joint Conference on Accounting
North American Numbering Council
NBANC Board of Directors

Other Activities:

Former Chair, Board of Directors, PAYS America, Inc., 2003-2008

Other Appointments and Professional Activities (1991-1998)

Independent Conservation & Load Management Expert,
Commonwealth Electric Co.
President's Council on Sustainable Development,
Energy & Transportation Task Force staff
California Low Income Governing Board
(Advisory Bd. to CPUC on low-income energy issues)
Massachusetts Energy Facilities Siting Board
Massachusetts Board of Registration of Allied Mental Health Professionals

Bar Memberships

Massachusetts
New York State and Maine (inactive)

Education

B.A. with honors, 1970, Smith College, Northampton, MA
J.D., 1973, Yale Law School, New Haven, CT
Coursework in statistics, Northeastern University, Boston, MA

NANCY BROCKWAY: TESTIMONIES

Case name	Client Name	Topic	Juris. & Docket No.	Date(s) Filed
Petition of West Penn Power Company d/b/a Allegheny Power for Expedited Approval of its Smart Meter Technology Procurement and Installation Plan	Pennsylvania Office of Consumer Advocate	Smart grid deployment	Pennsylvania PUC Docket No. M-2009-2123951	10/16/09
IMO BG&E Authorization to Deploy a Smart Grid Initiative and to Establish a Surcharge Mechanism for the Recovery of Cost.	Maryland Office of Peoples Counsel	Smart grid deployment	Maryland PSC Case No. 9208	10/13/09
IMO DTA of FortisAlberta, Phase I/II, 2010-2011	Utilities Consumer Advocate of Alberta	Smart grid deployment	Alberta Utilities Comm'n App. No. 1605170	10/9/09
Appalachian Power Company, etc. ENEC proceeding	Covenant House and West Virginia CAG	Impact of proposed rate increase on low-income customers and means to improve collection procedures.	West Virginia PSC Case No. 09-0177-E-GI	5/26/09
In Re Combined Application of South Carolina Electric and Gas	Friends of the Earth	Need for and cost of proposed Summer nuclear power plant.	South Carolina Public Service Commission, Docket No. 2008-196-E.	Direct: 10/17/08 Surrebuttal: 11/17/08
Nova Scotia Power, Inc.	NS UARB Consumer Advocate	Proposed general rate increase, rate design.	Nova Scotia Utility and Review Board, P-886	12/07
Pike County Commissioners v. PCL&P	Pennsylvania Office of the Consumer Advocate	Options to address rate shock in transition to uncapped competitive POLR rates	Pennsylvania Public Utilities Commission, Docket No. C-20065942	11/06 (hearing in January 07)
Nova Scotia Power, Inc.	NS UARB Consumer Advocate	Extra Large Industrial Interruptible Rates	Nova Scotia Utility and Review Board, P-883	8/06
UGI/Southern Union, Proposed Merger	Pennsylvania Office of the Consumer Advocate	Impacts of the Proposed Merger on Ratepayers and Rates, Risks and Benefits of Proposed Merger, Synergies, Reliability	Pennsylvania Public Utilities Commission, Docket Nos. A-120011F2000, etc.	5/06
SEMCO Energy Services Gas Cost Recovery Plan	PAYS America, Inc.	Relationship Between DSM and Gas Costs	Michigan Public Service Commission, Docket No. U-14718	5/06 (not admitted)
Re: Electric Service Reliability and Quality Standards	Delaware Public Service Commission	Application of Proposed Rules to Competitive Suppliers and Cooperatives	Delaware Public Service Board, Docket No. 50	1/06

NANCY BROCKWAY: TESTIMONIES

Exelon/Public Service Electric & Gas, Joint Petitioners	New Jersey Division of the Ratepayer Advocate	Impacts of Proposed Merger on Service Quality, Reliability, and Gas Safety, and Options to Maintain Historic Standards.	New Jersey Board of Public Utilities, BPU Docket No. EM05020106 OAL Docket No. PUC-1874-05	11/05-12/05
Exelon/Public Service Electric & Gas, Joint Petitioners	New Jersey Division of the Ratepayer Advocate	Risks and Benefits of Proposed Merger of Exelon and PSE&G, Options for Assuring Benefits and Mitigating Risk	New Jersey Board of Public Utilities, BPU Docket No. EM05020106 OAL Docket No. PUC-1874-05	11/05-12/05
Nova Scotia Power, Inc.	NS UARB Consumer Advocate	Economic Development Rates	Nova Scotia Utility and Review Board, P-882	10/05
Nova Scotia Power, Inc.	NS UARB Consumer Advocate	Revenue Requirements, Cost Allocation, Rate Design, Demand Side Management, Economic Development Rates	Nova Scotia Utility and Review Board, P-882	10/05 – 11/05
Bay State Gas Company	Local 273	Customer Service, Reliability, Low-Income Protections, Revenue Requirements	Massachusetts DTE, Docket No. 05-27	7/05
Nova Scotia Power, Inc.	Nova Scotia Utility and Review Board	Domestic Consumer Perspective on Proposed Rate Case Settlement Agreement	Nova Scotia Utility and Review Board, P-881	1/05
Cincinnati Bell Alt Reg	Communities United for Action	Universal Service and alternative regulation of telephone service	PUCO, Case No. 96-899-TP-ALT	12/97
UGI-Electric Utilities, Inc.	Pennsylvania OCC	Universal Service issues in electric industry restructuring plans	PA PUC, No. R-00973975	1997
West Penn Power Co.	“	“	PA PUC, No. R-00973981	1997
Duquesne Light Co.	“	“	PA PUC, No. R-00974101	1997
PECO, Inc.,	“	“	PA PUC, No. R-00973953	1997
PP&L	“	“	PA PUC, No. R-00973954	1997
Met Ed.	“	“	PA PUC, No. R-00974008	9/97
Penelec	“	“	PA PUC, No. R-00974009	9/97
In the Matter of the Electric Industry Restructuring Plan	New Hampshire Legal Services	Low-income rates and DSM, impacts of restructuring on low-income consumers	New Hampshire Public Utilities Commission, D.R. 96-150	Nov., Dec. 1996
Notice of Inquiry/ Rulemaking. establishing the procedures to be followed in electric industry restructuring.	Mass. CAP Directors Association, Mass. Energy Directors Association, named Low-Income Intervenors	Electric industry restructuring	Massachusetts Department of Public Utilities, D.P.U. 96-100.	to 10/98

NANCY BROCKWAY: TESTIMONIES

Universal Service Docket	Pennsylvania Office of Consumer Advocate	Rate rebalancing, universal service, telephone penetration.	Pennsylvania Public Utilities Commission Docket No. I-00940035	1996
In Re: Complaint of Kenneth D. Williams v. Houston Lighting and Power Co.	Named Low-Income Consumers	Customer service, rate design, demand-side management, revenue requirements	Texas Public Utilities Docket No. 12065	1994-5
Open Access Non-Discriminatory Transmission Services ... and Recovery of Stranded Costs	Direct Action for Rates and Equality, Providence, Rhode Island	Open transmission access in interstate commerce, and stranded costs recovery.	FERC, Nos. RM95-8-000, RM94-7-000.	1994-5
Bath Water District, Proposed Increase in Rates	Maine Office of Public Advocate	Water district cost allocation, rate design, low-income water affordability	Maine Public Utilities Commission, Docket. No. 94-034	12/94, 3/95
Application of Ohio Bell Telephone Co. for Approval of Alternative Form of Regulation	Legal Aid Society of Cleveland and Dayton	Definition of universal telecommunications service, proposal for Universal Service Access program (USA).	Public Utilities Commission of Ohio, Case No. 93-487-TP-ALT	5/4/94
Pennsylvania PUC vs. Bell Telephone of Pennsylvania	Pennsylvania Public Utility Law Project	Definition of "universal telecommunications service"	Pennsylvania PUC No. P-930715	filed 12/93
Joint Application for Approval of Demand-Side Management Programs, etc.	LG&E; Legal Aid Society of Louisville, other Joint Applicants	Cost-effective DSM programs for low-income customers; collaborative process to design DSM programs; cost allocation and cost recovery.	Kentucky PSC No. 93-150	11/8/93
Texas Utilities Electric Company	Texas Legal Services Center	Costs and benefits of DSM targeted to low-income customers	Texas PUC No. 11735	1993
Texas Utilities Electric Company	Texas Legal Services Center	Proposed Maintenance of Effort Rate for low-income customers	Texas PUC No. 11735	1993
Philadelphia Water Department	Philadelphia Public Advocate	Costs of Unrepaired System Leaks	Philadelphia Water Comm'r.	1992
New England Telephone	Rhode Island Legal Services	DNP for non-basic service	Rhode Island PUC, No. 1997	1991
Kentucky Power Co.	Kentucky Legal Services	Low Income Rate	Kentucky PSC No. 91-066	1991
Investigation into Modernization	Invited by Commission	Impact of modernization costs on low income telephone users	New York PSC	1991