

**BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF DELAWARE**

**IN THE MATTER OF THE)
APPLICATION OF DELMARVA)
POWER AND LIGHT COMPANY,)
EXELON CORPORATION, PEPCO)
HOLDINGS, INC., PURPLE)
ACQUISITION CORPORATION,)
EXELON ENERGY DELIVERY) PSC DOCKET NO. 14-193
COMPANY, LLC AND NEW SPECIAL)
PURPOSE ENTITY FOR APPROVALS)
UNDER THE PROVISION OF 26 *DEL.C.*)
§§ 215 AND 1016)
(FILED JUNE 18, 2014))**

DIRECT TESTIMONY

OF

PAUL R. PETERSON

ON BEHALF OF

THE DNREC DIVISION OF ENERGY & CLIMATE

December 12, 2014

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1 **I. STATEMENT OF QUALIFICATIONS**

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

3 A. My name is Paul Peterson. I am a Principal with Synapse Energy Economics,
4 Inc., a consulting company with an address of 485 Massachusetts Avenue,
5 Cambridge, Massachusetts.

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

7 A. I am submitting testimony on behalf of the Division of Energy & Climate
8 (“Division”) of the Department of Natural Resources and Environmental Control
9 (“DNREC”) of the State of Delaware.

10 **Q. Please describe your education and professional background.**

11 A. I hold a Bachelor of Arts Degree in Political Science from Williams College and a
12 Juris Doctor Degree from Western New England University School of Law. I
13 began my career in the energy field with the University of Vermont Extension
14 Service in 1978 as an Energy Agent assisting residential and commercial
15 customers with energy audits and energy efficiency measures. In 1990 I began
16 work for the Vermont Public Service Board as a Hearing Officer and Utilities
17 Analyst. In 1998 I took a position with ISO New England as Manager of
18 Regulatory Affairs. In 2001 I began my current employment with Synapse
19 Energy Economics. For Synapse, I have focused on wholesale electricity markets
20 and regional planning issues, primarily in the Northeast, but more recently in
21 Texas and the West. A copy of my resume is attached hereto as ATTACHMENT
22 PRP- 1.

1 **Q. Have you previously testified before utility regulatory agencies?**

2 A. Yes. I have previously testified before the Arizona Corporation Commission,
3 Connecticut Department of Public Utility Control, Public Utilities Commission of
4 Texas, Vermont Public Service Board, Maryland Public Service Commission, and
5 the Federal Energy Regulatory Commission, on a number of technical matters
6 relating to wholesale markets and system planning.

7 Most recently, I submitted testimony in this same merger case on behalf of the
8 Division of Rate Counsel in BPU Docket No. EM1406058 (November 18, 2014),
9 and on behalf of the Maryland Office of People's Counsel in PSC Case No. 9361
10 (December 8, 2014).

11 **II. PURPOSE AND SUMMARY OF TESTIMONY**

12 **Q. What is the purpose of your testimony in this proceeding?**

13 The purpose of my testimony is to identify concerns regarding concentration of
14 ownership, market power, and potential market manipulation related to the
15 proposed Exelon-PHI merger that may impact customers of Delmarva Power and
16 Light Company ("Delmarva"). My testimony reviews the proposed merger
17 regarding the concentration of ownership of resources and transmission facilities
18 that the merger would create; and overall concerns about the loss of
19 competitiveness in an industry that, in general, needs more entities competing in
20 the markets and at all levels of the regional bulk power system. The issues that I
21 have examined relate to concerns of divergent interests when it comes to Exelon's
22 participation in PJM wholesale markets and planning processes that could impact
23 Delaware's interests in promoting renewable energy, energy efficiency and

1 maintaining transparent, competitive energy markets in PJM as identified by
2 Witness Noyes.

3 **Q. What are your findings?**

4 A. My findings are summarized as:

- 5 1. The merger of Exelon-PHI would not significantly increase generation
6 ownership to cause horizontal market power concerns, and the increased
7 transmission ownership from the merger is off-set, to a certain extent, by
8 existing FERC-enforced Open Access requirements for wholesale
9 transactions. However, the larger footprint of the merged Exelon-PHI creates
10 several other concerns. These concerns include the role of the new merged
11 company as a wholesale market participant in the interconnection study
12 process for new generation, and in the setting of transfer limits for elements of
13 the transmission system.
- 14 2. On the resource side, there are concerns regarding potential market abuses
15 arising from the expanded participation of non-traditional resources such as
16 demand response (DR) and energy efficiency (EE) in wholesale capacity
17 markets. The merged Exelon-PHI will have generation and demand side
18 resources that can be offered into the energy, reserve, and capacity markets.
19 Decisions about the quantities of DR and EE to offer into these markets can
20 have significant impacts on the clearing prices paid to all resources. The
21 proposed merger would provide the new Exelon-PHI company with greater
22 quantities of these resources and expanded opportunities to impact clearing
23 prices in more zones.

1 3. On the transmission side, the expanded control of transmission facilities that
2 the merger would create raises concerns about both the interconnection studies
3 for new independent generation facilities and the published line ratings that
4 govern flows over the bulk power system. Transmission owners are the
5 primary sources of information for both of these functions; the ability to delay
6 competitive generation through complex interconnection studies or prevent
7 higher flows over the wires by posting low line ratings are detrimental to an
8 efficient, lower cost system.

9 4. The proposed merger would also create new issues about governance in the
10 PJM stakeholder process. These governance concerns include both the ability
11 to influence PJM's independence and the impact on the decision making
12 process in committees, subcommittees, and issue-focused task forces.

13 **Q. How will the proposed merger affect competition?**

14 A. The proposed merger will reduce the amount of competition in an industry that
15 needs to have more competitive entry at all levels. The new merged company will
16 increase Exelon's circuit miles of transmission owned by 65% (from Exelon's
17 current 7,177 circuit miles to a combined 11,819 circuit miles). Those combined
18 transmission assets received almost 25% of all transmission credits collected from
19 the PJM market, according to the Independent Market Monitor. The proposed
20 merger would result in Exelon providing transmission and distribution services to
21 25% more customers (Exelon's current 6.6 million electric customers will
22 increase to a combined 8.4 million electric customers). The merger takes two
23 large companies that are both members in PJM and reduces them to one. In

1 weighing the benefits and detriments of this merger, the reduced competition
2 among providers of resources, the reduced competition among builders of
3 transmission facilities, and the reduced participation in the RTO governance
4 process are all detriments. The Commission must determine whether the benefits
5 of the merger outweigh the detriments; nonetheless, the detriments are real and
6 need to be considered by the Commission when balancing the benefits and
7 detriments of this proposal.

8 **Q. What are your recommendations?**

9 A. To lessen, but not eliminate, the impacts of these potential detriments, the
10 Commission should only approve the merger if the following conditions are met:

- 11 1. The new Exelon-PHI will appoint an independent third party to review all the
12 results of its interconnection study process.
- 13 2. The new Exelon-PHI will allow an independent third-party review of all of its
14 demand resource offers, including decisions to not offer resources, into the
15 PJM energy market and the annual Base Residual Auction for capacity
16 resources.
- 17 3. The new Exelon-PHI will fully comply with FERC Order 1000 principles that
18 will encourage competition in the construction of transmission facilities,
19 including the elimination of right-of-first-refusal for incumbent transmission
20 owners.
- 21 4. The new Exelon-PHI will remain in PJM for the next ten years and, after the
22 ten-year period, seek Commission approval of any decision to leave PJM.

1 5. The new Exelon-PHI explains how PHI affiliates in the PJM stakeholder
2 process will act independently to adopt positions and advance rule changes
3 that will benefit PHI customers, including Delmarva customers.

4 6. The new Exelon-PHI explains how consolidating two votes to one vote in the
5 sector-weighted voting process in PJM will not negatively impact PHI
6 customers, including Delmarva customers.

7 **III. SPECIFIC ISSUES**

8 **Q. Please describe your concerns regarding horizontal market power issues**
9 **presented by this proposed merger.**

10 A. Traditional merger concerns about the increased concentration of generation
11 ownership and the potential for the exercise of horizontal market power do not
12 apply in this situation due to the previous divestiture of PHI generation assets and
13 overall competition from other generation resources. However, the proposed
14 merger will provide Exelon with control over significant new demand resource
15 assets in the form of demand response (DR) and energy efficiency (EE) resources
16 resulting from PHI utility programs, including Delmarva programs. These are new
17 demand resources in addition to demand resources currently under Exelon
18 control. To the extent that these resources are offered into the daily PJM energy
19 market and the annual Base Residual Auction to meet future capacity needs, they
20 may displace generation resources, including generation resources owned by the
21 newly merged entity. Decisions about the quantity of demand resources that will
22 be entered into these markets and the prices at which they are offered will create
23 opportunities to exercise market power. The new Exelon-PHI will be able to offer

1 demand resources (or withhold them) from the daily energy market and the annual
2 capacity auction in a manner that could affect prices in numerous PJM load zones
3 as well as on a system-wide basis.

4 **Q Do you have an example of a wholesale market auction where demand**
5 **resources affected the clearing price?**

6 A. Yes, there was an Ohio proceeding that describes how the failure to offer EE
7 resources into the PJM Base Residual Auction (as a capacity resource) in 2012
8 had a significant impact on the auction clearing price in that zone. The clearing
9 price would probably have declined from \$357/MW-Day to just over \$200/MW-
10 Day if the utility had offered an additional 300 MW of EE resources. The total
11 capacity cost savings to the utility's customers would have been in the millions of
12 dollars. More importantly, the capacity cost savings to the customers of **all** the
13 utilities in that zone would have been approximately \$600 million.

14 The filed testimony of Chris Neme from the Ohio proceeding is attached to this
15 testimony as Attachment PRP-2.

16 **Q. Please describe your concerns regarding vertical market power issues**
17 **presented by this proposed merger.**

18 A. Traditional concerns related to vertical market power abuse are substantially
19 reduced due to Federal Energy Regulatory Commission (FERC) requirements for
20 non-discriminatory access to transmission and the PJM Open Access
21 Transmission Tariff (OATT). The newly merged company will not be able to
22 exclude other generation resources from using its transmission assets in a
23 competitive market framework to deliver power.

1 However, if the merger is approved, the new entity may be able to exercise a form
2 of vertical market power in its review of interconnection requests from new
3 generation facilities. The study process for new generation requests is a joint
4 effort of the local transmission provider and PJM staff. As the local transmission
5 provider, the new Exelon-PHI could either delay the study process or exaggerate
6 the interconnection costs, or both, in an effort to prevent new generation resources
7 from competing with its existing resources.

8 A related issue raised by the Independent Market Monitor (“IMM”) is the
9 information that a merged Exelon-PHI entity would provide to PJM regarding line
10 ratings and the ability to transfer power from one load zone to another. The line
11 ratings become particularly important during stressed system conditions, such as
12 summer peak load or winter polar vortex events. The concern raised by the IMM
13 is that a merged Exelon-PHI will have a greater ability to affect zonal prices and
14 favor its generation assets by strategically misinforming or conservatively
15 understating to PJM the actual line ratings.

16 **Q. Are there ways to reduce concerns about the new merged company**
17 **exercising horizontal and vertical market power?**

18 A. Yes, these market power or market abuse concerns can be reduced through
19 specific mitigations in the form of an Order conditioning Commission approval of
20 the merger on Exelon-PHI allowing greater scrutiny of its demand resource offers
21 into the daily energy market and the annual capacity auction by the IMM,
22 allowing an independent third-party review of the interconnection study process,

1 and submitting more detailed analyses to PJM and the IMM of the line ratings for
2 its transmission system under a variety of stressed conditions.

3 **Q. What are your concerns about PJM governance issues related to the**
4 **proposed merger?**

5 A. I have three general concerns regarding the proposed merger and its impact on the
6 PJM governance process. The first concern is the direct result of the proposed
7 merger; the other two concerns are about making an existing situation worse.

8 My first governance concern is that the proposed merger will create a new entity
9 with a larger footprint within the PJM Interconnection in terms of customers
10 served, combined transmission assets, and resources under its control. This larger
11 entity exacerbates the current situation in PJM where there are several very large
12 entities and hundreds of smaller entities that participate in the PJM stakeholder
13 process to develop rules and procedures for the entire PJM Interconnection that
14 spans 13 states and the District of Columbia. The merger will provide Exelon with
15 an even stronger position from which it can influence PJM. Because participation
16 in PJM is voluntary, one way to leverage influence with PJM staff is to threaten to
17 withdraw if particular Exelon-PHI positions are not supported by PJM. To limit
18 this method of leveraging its influence, the Commission should require, as a
19 condition of merger approval, that the new Exelon-PHI will commit to remain in
20 PJM for an extended period of time and, after that time period, to submit to
21 approval by the Commission of any decision to withdraw from the PJM
22 Interconnection.

23 **Q. What is your second governance concern?**

1 A. My second governance concern has to do with the voting structure for PJM upper
2 level committees. The Members Committee and the Markets & Reliability
3 Committee (MRC) have sector-weighted voting. Prior to the merger, Exelon and
4 PHI each have one vote. After the merger, there will be a single Exelon-PHI vote.
5 It is not clear the criteria that the newly merged company will use to cast its single
6 vote: how will the interests of all of Exelon's customers be represented by just
7 one vote, particularly when some affiliates may benefit from a vote in favor of a
8 particular change while other affiliates may see higher costs? Also, how will the
9 newly merged company vote in situations when the interests of its generation
10 affiliates may conflict with the interests of the PHI load customers it serves,
11 including Delmarva customers? The Commission should require Exelon to
12 address these concerns as a condition of approval of the proposed merger.

13 **Q. What is your third governance concern?**

14 A. My third governance concern has to do with the voting structure of the lower
15 committees, including working groups and task forces. The three standing
16 committees below the Members and MRC have simple majority voting with each
17 affiliate counting as a vote. All other sub-committees and task forces operate on a
18 consensus basis with no formal voting; however, each of these groups reports
19 back to one of the three standing committees. The use of a simple majority vote of
20 all members, with affiliates counted, creates concerns; the proposed merger of
21 Exelon and PHI will exacerbate those concerns. Simply stated, Exelon has 11
22 affiliate votes today; the merger will provide Exelon with four additional votes for
23 a total of 15. Attachment PRP-3 is a simplified version of the committee structure

1 in PJM that helps illustrate the various voting rules for each stakeholder
2 committee.

3 The standing committees typically delegate issues to a sub-group. In the sub-
4 groups, there are often straw polls to help narrow the issues under consideration
5 and try to achieve consensus. Sub-groups often report out a majority view and
6 minority views in their report to the standing committee. At the standing
7 committee, a simple majority vote for a proposal will end the voting process and
8 the issue then goes to the two senior committees for sector-weighted voting.

9 There are many instances when minority proposals are not even considered. The
10 governance issue in play here is that a few people (with many affiliates) at the
11 standing committee can dominate and control the issues. This is particularly a
12 problem for PJM members that may have special needs or unique perspectives on
13 issues. At the lower committees, the issues are framed through straw polls and
14 general consensus that may not provide for a minority view to even be passed up
15 to one of the standing committees. A minority view that makes it to the standing
16 committee now faces the same hurdle of simple majority voting; there are often a
17 few stakeholders casting ten or more votes based on their affiliates relationships.

18 The proposed merger will provide Exelon with even more votes than it has today
19 and eliminates the ability of PHI affiliates to vote their own interests. There may
20 be a market rule change that would be beneficial for many of Exelon's pre-merger
21 customers but not good for Delmarva customers (and perhaps customers of other
22 PHI affiliates). How will the new Exelon-PHI vote at the Market Implementation
23 Committee? The same concern may apply to a transmission project that may

1 benefit one group of Exelon affiliates but impose some of the costs on all PJM
2 members. How will the new Exelon-PHI vote at the Planning Committee? A
3 proposed market rule change could benefit owners of generation assets at the
4 expense of demand resources, such as the demand resource and energy efficiency
5 programs run by the PHI utilities, including Delmarva? How would Exelon vote
6 in the Members Committee? One possible solution would be to require Exelon to
7 split its votes, as a merger approval condition, at the lower and standing
8 committees to reflect the divergent interests of its affiliates. Even if Exelon agreed
9 to this solution, there would be questions about how it would be enforced. At a
10 minimum, the Commission should recognize this as one of the negative aspects of
11 the proposed merger and ask Exelon to explain how it proposes to address this
12 situation.

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

14 A. Yes.

ATTACHMENT PRP- 1 RESUME FOR PAUL R. PETERSON

Paul R. Peterson

Principal
Synapse Energy Economics
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EMPLOYMENT

Synapse Energy Economics Inc., Cambridge, MA.

Principal, March 2001 - present.

Provide consulting services on a variety of energy and electricity related studies. Represent New England consumer advocate and environmental concerns in NEPOOL and ISO New England working groups. Monitor reliability and markets issues in RTOs and ISOs. Champion better integration of demand resources in bulk power systems. Current focus on transmission planning and FERC Order 1000 issues. Participate in FERC proceedings on system planning and market design issues.

ISO New England Inc., Holyoke, MA.

Coordinator of Regulatory Affairs, 2000 – 2001.

Coordinate regulatory activities with individual state public utility commissions, the New England Conference of Public Utilities Commissioners (NECPUC), and the Federal Energy Regulatory Commission (FERC). Assist the General Counsel on a variety of specific tasks and documents; draft letters and reports for the Chief Executive Officer.

Public Information and Government Affairs, 1998 – 1999.

Worked with all ISO-NE constituencies including NEPOOL Participants, regulatory agencies, and stakeholder groups in large-group and small-group formats. Developed and presented materials that described ISO-NE's functions, special projects (including Year 2000 rollover issues), and future evolution.

Vermont Public Service Board, Montpelier, VT.

Policy Analyst, 1997 - 1998.

Monitored House and Senate legislation on electric restructuring; helped coordinate the passage of Senate Bill S.62 in 1997. Coordinated the New England Conference of Public Utilities Commissioners (NECPUC) activities regarding NEPOOL restructuring; assisted in drafting documents to create an Independent System Operator (ISO) for New England. Worked on New England task forces to develop a model rule for electric disclosure projects for consumer information and regulatory compliance.

Utilities Analyst, 1990 - 1997.

Reviewed regulated utility filings for changes in rates; judicial Hearing Officer for contested cases on a wide range of topics; wrote all decisions regarding annual utility applications for Weatherization Tax Credits. Focused on integrated resource planning and electric industry restructuring; initial Hearing Officer for the Energy Efficiency Utility docket. Chaired the Staff Energy Committee of NECPUC.

Energy Analysis, Burlington, VT. Consultant, 1990.
Energy-efficiency program design and evaluation.

UVM Extension Service, Burlington, VT.

Area Energy Agent, 1985 - 1990.

Performed tasks pursuant to an annual contract with Vermont Department of Public Service to conduct energy research, design energy efficiency programs and provide public education (see attached list of publications).

Home Energy Audit Team (H.E.A.T.), 1978 - 1985.

Home energy audits; energy surveys for commercial, municipal, and non-profit buildings; energy education and information.

The Close-Up Foundation, Washington, D.C. Program Administrator, 1975 - 1978.
Directed weekly government studies program for 200 high school students and teachers; supervised a staff of fifteen; coordinated curriculum and logistical aspects of program.

EDUCATION

Admitted to Vermont Bar, February 1992

Western New England College School Of Law, Springfield, MA.

Juris Doctor degree, cum laude, May 1990

American Jurisprudence Award: Remedies, 1989

Merit Scholarship recipient

Student Bar Association Representative

Williams College, Williamstown, MA

Bachelor of Arts degree, cum laude, June 1974

Political Science and Environmental Studies

Tyng Scholarship recipient

National Judicial College, Reno, NV

Administrative Hearings, Sept., 1994

Civil Mediation, March, 1996

Civil Mediation, July, 1997 (faculty assistant)

American Inns of Court, Northern Vermont Chapter

1995-1996, member

1996-1997, member

Continuing Legal Education, Vermont Bar Association

Americans with Disabilities Act, April 1992

Ethical Issues/Governmental Agencies, October 1992
Advance Medical Directives, May 1993
Family Law Workshop, September 1993
Negotiating Settlements, May 1994
Physician Assisted Suicide Symposium, October 1996
Electric Industry Restructuring, March 1999
Advance Medical Directives, May 1999
International Law Update, June 2000
UVM Continuing Education, Brattleboro, VT
Small Computer Course, Spring 1983
Communications Workshops, Spring 1983 & Spring 1984

RECENT PUBLICATIONS AND TESTIMONY

Balancing Market Opportunities in the West: How participation in an expanded balancing market could save customers hundreds of millions of dollars, prepared for the Western Grid Group, by Paul Peterson, Spencer Fields, and Melissa Whited, October 2014.

Synapse Comments on FAST Proposals in ERCOT, prepared for Sierra Club, Lone Star Chapter, by Paul Peterson, Melissa Whited, and Spencer Fields, May 28, 2014.

Demand Response as a Power System Resource, prepared for Regulatory Assistance Project, by Doug Hurley, Paul Peterson, and Melissa Whited, May 2013.

PJM System Planning: Enhancements for the 21st Century, prepared for Sierra Club, by Paul Peterson, Vladlena Sabodash, Matthew Wittenstein, and Doug Hurley, June 20, 2011.

Public Policy Impacts on Transmission Planning, prepared for Earthjustice, by Paul Peterson, Vladlena Sabodash, Rachel Wilson, and Doug Hurley, December 21, 2010.

Demand Response Potential in ISO New England's Day-Ahead Energy Market, prepared for Massachusetts Office of the Attorney General, by Paul Peterson, Doug Hurley, and Vladlena Sabodash, October 11, 2010.

Demand Side Resource Potential: A Review of Global Energy Partners' Report for Midwest ISO, prepared for Project for Sustainable FERC Energy Policy, by Paul Peterson, Vladlena Sabodash, and Kenji Takahashi, September 3, 2010.

Energy Market Savings from Price Responsive Demand Participation, prepared for NEPOOL Clients in Alternative Resources and End User Sectors, by Paul Peterson and Vladlena Sabodash, November 24, 2009.

Impact of PRD Participation in Day-Ahead Energy Market, prepared for NEPOOL Clients in Alternative Resources and End User Sectors, by Paul Peterson, Doug Hurley, and Vladlena Sabodash, October 16, 2009.

Synapse Report and Ohio Comments in Case No. 09-09-EL-COI, "The Value of Continued Participation in RTOs", prepared for Ohio Consumers' Counsel, by Paul Peterson, Ezra Hausman, Bob Fagan, and Vladlena Sabodash, May 26, 2009.

Energy Efficiency in the PJM Capacity Market, comments Before the Federal Energy Regulatory Commission (FERC), by Paul Peterson, January 9, 2009.

An RPM Case Study: Higher Costs for Consumers, Windfall Profits for Exelon: A study of the impacts of PJM's Reliability Pricing Model for the Illinois Citizens Utility Board, by Ezra Hausman, Paul Peterson, David White, and Bruce Biewald, October 18, 2005.

Capacity Revenues for Existing, Base Load Generation in the PJM Interconnection: A Pennsylvania Case Study: A report on the impacts of PJM's Reliability Pricing Model for the Pennsylvania Office of Consumer Advocate by Paul Peterson, David White, and Bruce Biewald, June 10, 2005.

Capacity for the Future: Kinky Curves and Other Reliability Options: A report on various approaches to pricing capacity resources for Northeast Consumer Advocate Offices, by Paul Peterson, David White, Amy Roschelle, and Bruce Biewald, December 20, 2004.

FERC's Transmission Pricing Policy: New England Cost Impacts: A report on the cost impacts of FERC's proposal to provide incentives to transmission owners through PL03-01-000 for New England Consumer Advocate Offices, by Paul Peterson, David White, Nick Doolittle, and Amy Roschelle, September 29, 2003.

The New England Experiment: An Evaluation of the Wholesale Electricity Markets: A report on the evolution of the New England electricity markets prepared for New England Consumer Advocate Offices by Paul Peterson, David White, Bruce Biewald, and Cliff Chen, June, 2003.

Financial Insecurity: The Increasing Use of Limited Liability Companies and Multi-Tiered

Holding Companies to Own Nuclear Power Plants: A Synapse Energy Economics, Inc. report prepared for the STAR Foundation and Riverkeeper, Inc., by David Schlissel, Paul Peterson, and Bruce Biewald, August 7, 2002.

Best Practices in Market Monitoring: A Survey of Current ISO Activities and Recommendations for Effective Market Monitoring and Mitigation in Wholesale Electricity Markets, prepared for the Maryland OPC, the Pennsylvania OCA, the Delaware DPA, the New Jersey DRA and the OPC of DC, November 2001.

The Other Side of Competitive Markets: Developing Effective Load Response in New England's Electricity Market, prepared for The Maine Department of Attorney General and the Maine Office of the Public Advocate, June 2001.

Clean Air and Reliable Power: Connecticut HB 6365 Will Not Jeopardize Electric System Reliability, prepared for The Clean Air Task Force on behalf of The Connecticut Coalition for Clean Air, May 2001.

UNIVERSITY OF VERMONT EXTENSION SERVICE

Residential Construction Survey, Survey of Vermont new home construction for construction techniques, energy-efficient design, appliance loads, etc. 1986, 1989.

Vermont Vacation Home Energy Study, Survey of vacation home energy consumption and impact on Vermont statewide electrical demand. 1989.

Dairy Farm Energy Use, A detailed examination of electrical energy consumption on forty Vermont dairy farms to identify opportunities for improving energy-efficiency. 1987.

Mobile Home Booklet, A fresh look at energy saving opportunities for mobile homeowners. Specific problems of cold climates are addressed. 1987.

Dairy Farm Energy Project, Implemented \$400,000 grant from Vermont Department of Agriculture for installation of milk-cooling equipment that also produced hot water. 1989.

Vocational Building Trades Instructors, Annual workshops on energy-efficient construction practices for the teachers of Vermont building trades students. Classroom presentations on selected topics. 1986 - 1989.

Brattleboro Community Energy Education Project, Coordinated a Central Vermont Public Service Company funded project to promote energy-efficiency awareness through community programs. 1985.

TESTIMONY

Marlyand Public Service Commission (2014): Evaluation of concentration of ownership, market power, and market manipulation related to the proposed Exelon-PHI merger (Case No. 9361)

State of New Jersey Board of Public Utilities (2014): Evaluation of concentration of ownership, market power, and market manipulation related to the proposed Exelon-PHI merger (Docket No. EM14060581)

State of Vermont Public Service Board (2006): Review of Vermont Transmission Planning Process (Docket No. 7081)

Town of Charlotte, VT (2006): Summary of VELCO Northwest Reliability Testimony Docket (No. 6860)

Office of Consumer Advocate of the Commonwealth of Pennsylvania (2006): Comments on the FERC Technical Conference on RPM (Docket ER05-1410)

Arkansas Public Utilities Commission (2006): Resource Planning Guidelines for Electric Utilities and Consideration of Sec. 111(d)(12) of the Energy Policy Act of 2005 (Docket No. 06-028-R)

Texas Public Utilities Commission (2004): Petition of Entergy Gulf States for Certification of an Independent Organization for the Entergy Settlement area in Texas (Docket No. 28818)

Rhode Island Energy Facilities Siting Board (2004): Narragansett Electric Company E-183 115kV Transmission Line Relocation Project (Docket No. SB-2003-1)

CT Siting Council (2003): CL&P Application for a Transmission Facility (Docket No. 217)

Arizona Corporations Commission (2002): APS Generic Proceeding on Electric Restructuring (Docket No. E-00000A-02-00051)

Nevada Public Utilities Commission (2002): NPC Wholesale Markets Cost Recovery (Docket No. 01-11029)

PROFESSIONAL CONFERENCES

Federal Energy Regulatory Commission Conference, Philadelphia, PA. March 2001.
National Association Of Regulatory Utility Commissioners, Washington, DC. 1998 - 2000

Advanced Integrated Resource Planning Seminar, Berkeley, CA 1995

ACEEE Summer Study, Pacific Grove, CA 1992 & 1994

1991 DOE Low-Level Radioactive Waste Conference, Atlanta, GA

Resume dated November 2014.

ATTACHMENT PRP-2 TESTIMONY OF CHRIS NEME

**BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO**

**In the Matter of Ohio Edison Company,)
The Cleveland Electric Illuminating)
Company, and the Toledo Edison)
Company for Authority to Provide for a) **Case No. 12-1230-EL-SSO**
Standard Service Offer Pursuant to Section)
4928.143, Revised Code, in the Form of an)
Electric Security Plan.)**

**DIRECT TESTIMONY OF CHRIS NEME
ON BEHALF OF
SIERRA CLUB**

May 21, 2012

1 **I. INTRODUCTION AND QUALIFICATIONS**

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

3 A: My name is Chris Neme. I am a co-founder and Principal of Energy Futures Group, a
4 consulting firm that provides specialized expertise on energy efficiency markets, programs and
5 policies. My business address is P.O. Box 587, Hinesburg, VT 05461.

6 **Q: Please describe your educational background.**

7 A: I received a Master of Public Policy (MPP) degree from the University of Michigan (Ann
8 Arbor) in 1986. That is a two-year, multi-disciplinary degree focused on applied economics,
9 statistics and policy development. I also received a Bachelor's degree in Political Science from
10 the University of Michigan (Ann Arbor) in 1985. My first year of graduate school counted
11 towards both my Masters' and Bachelor's degrees.

12 **Q: Please summarize your business and professional experience.**

13 A: As a Principal in Energy Futures Group, I play major roles in a variety of energy efficiency
14 consulting projects. Examples of recent projects include:

- 15 • helping develop a Technical Reference Manual of deemed savings assumptions for Ohio
16 and the Mid-Atlantic states;
- 17 • representing the Natural Resources Defense Council in consultations with utilities and
18 other parties in Illinois and Michigan;
- 19 • serving as an elected stakeholder representative on an Ontario gas utility's annual energy
20 savings Audit Committee as well as a province-wide gas efficiency Technical Evaluation
21 Committee;
- 22 • providing guidance to key stakeholders in Germany, the United Kingdom and other
23 European countries on the design of efficiency policies and programs (on behalf of the
24 Regulatory Assistance Project);

- 1 • supporting the redesign of a portfolio of efficiency programs for a southern utility; and
- 2 • serving as co-chair of the Research and Evaluation Committee of the Northeast Energy
- 3 Efficiency Partnership's (NEEP's) regional Evaluation, Measurement and Verification
- 4 forum.

5 Prior to co-founding Energy Futures Group I worked for 17 years for the Vermont Energy
6 Investment Corporation (VEIC), the last 10 as Director of its Consulting Division managing a
7 group of 30 professionals with offices in three states. Most of our consulting work involved
8 critically reviewing, developing and/or supporting the implementation of electric, gas, and multi-
9 fuel energy efficiency programs for clients across North America and beyond. As a member of
10 VEIC's Senior Management Team, I also helped launch Efficiency Vermont in 2000 – a then
11 new statewide “efficiency utility” VEIC was selected to operate – and became intimately
12 familiar with a myriad of issues associated with the day-to-day delivery of energy efficiency
13 programs. I also helped shape the New England ISO's rules for inclusion of efficiency and other
14 demand resources in its Forward Capacity Market and led the development of VEIC's first bids
15 of peak savings from efficiency programs into that market.

16 During my career in energy efficiency I have played major roles in energy efficiency potential
17 studies in five states and provinces, served as a technical advisor to utility-stakeholder
18 “collaboratives” in seven states, and reviewed or developed efficiency programs for clients in
19 more than 20 states and provinces as well as parts of Europe. I have also led courses on
20 efficiency program design, published widely on a range of efficiency topics and served on
21 numerous national and regional efficiency committees, working groups and forums. A copy of
22 my curriculum vitae is attached as Attachment CN-1.

23 **Q: Have you previously filed expert witness testimony in a proceeding before the Public**
24 **Utilities Commission of Ohio (PUCO)?**

25 A: Yes, I filed and defended testimony before the PUCO in 1990 regarding options, including
26 efficiency investments, for complying with acid rain legislation. I have filed expert witness
27 testimony on approximately 25 other occasions before similar regulatory bodies in nine other

1 states and provinces, including the neighboring jurisdictions of Michigan, Ontario and Illinois
2 during the past two years.

3 **II. TESTIMONY OVERVIEW**

4 **Q: What is the purpose of your testimony?**

5 A: The purpose of my testimony is to critique the proposal by FirstEnergy (hereafter
6 occasionally referred to as “the Companies”) to “potentially” bid up to 65 MW of efficiency
7 resources into PJM’s Base Residual Auction (BRA) for peak capacity in the ATSI region for the
8 2015/2016 year. The auction took place the week of May 7th 2012.

9 **Q: Can you summarize your conclusions regarding First Energy’s proposal?**

10 A: I find the Companies’ proposal to be imprudent. The Companies should have been prepared
11 to bid a much greater volume of efficiency savings – on the order of 5 to 6 times more – into the
12 market. Failing to bid into the capacity market all of the eligible efficiency resources that the
13 Companies have already acquired and should be expecting to acquire between now and the
14 Spring of 2015 will likely have cost their customers hundreds of millions of dollars.

15 **III. Eligible Efficiency Resources**

16 **Q: Please summarize what the Companies committed to do with respect to bidding of**
17 **efficiency resources into the PJM BRA for 2015/2016?**

18 A: The Companies committed to bid up to 65 MW of efficiency resources into the market. That
19 is comprised of 15 MW of residential lighting (i.e. CFLs) and 50 MW of commercial and
20 industrial (C&I) lighting.¹ The commitment is contingent on whether PJM accepts the
21 Companies’ proposed Evaluation, Measurement and Verification (EM&V) plan for those
22 resources as well as whether the Companies can obtain customer agreements that assign
23 ownership of the C&I lighting resources to them.²

¹ Supplemental Testimony of William Ridmann, p. 2, lines 19-21.

² Ibid., pp. 2-3.

1 **Q: Why does First Energy need “ownership” of C&I lighting resources?**

2 A: It is important that more than one party is not bidding the same resource into the capacity
3 market. Thus, anyone who bids efficiency resources into a capacity market must “own” them.

4 **Q: Why is there an issue *now* with the Companies acquiring ownership of peak capacity**
5 **attributes of efficiency measures installed between June 1, 2011 and Spring of 2012?**

6 A: That is a good question. The rules regarding bidding of efficiency resources into PJM’s
7 capacity market have been widely available for several years. Thus, any utility administrator of
8 efficiency programs should have already considered the importance of acquiring the ownership
9 rights to such resources and made assigning ownership a condition of participation in its
10 programs (e.g. as part of the language on all rebate forms and other program offers). The
11 Companies failed to obtain ownership in this way and now find themselves in the position of
12 needing to go back and contact customers who have installed efficiency measures in an attempt
13 to retroactively acquire ownership of those savings.

14 **Q: Beyond ownership and an approved EM&V plan, what other criteria limit the**
15 **efficiency measures that can be bid into the PJM capacity market?**

16 A: PJM only gives capacity credit to efficiency measures that were installed within four years of
17 the period addressed by an auction. Because the BRA which took place the week of May 7,
18 2012 was for resources available during the 2015/2016 year (i.e. the period beginning June 1,
19 2015 and ending May 31, 2016), only measures installed between June 1, 2011 and May 31,
20 2015 would be eligible to address capacity needs in the May 2012 auction.

21 **Q: Is FirstEnergy planning to bid all the efficiency resources that its programs generated**
22 **from the entire June 2011 through May 2015 period into the May 7, 2012 BRA?**

23 A: No. The 65 MW the Companies were considering bidding into the market was limited to
24 lighting savings, and only those lighting savings that were generated between June 1, 2011 and

1 April 5, 2012.³ As I discuss extensively below, that represents a small fraction of the efficiency
2 resources it could have bid into the market.

3 **Q: Why did the Companies not plan to bid other eligible efficiency resources into the**
4 **2015/2016 PJM capacity market?**

5 A: First, with respect to other non-lighting savings achieved through early April 2012 and any
6 savings achieved between early April 2012 and the end of May 2012, the Companies state that
7 they decided not to bid them into the capacity market due to

8 *“...the limited magnitude of energy efficiency savings produced by those projects since*
9 *June 2011, the lack of ownership authority to offer the resources into the PJM BRA,*
10 *incremental EM&V costs, increased EM&V performance risks related to the projects and*
11 *risks related to forecasting future installations through May 31, 2012.”⁴*

12 With respect to efficiency resources that the Companies will acquire between June 2012 and
13 May 2015, the Companies stated that they chose not to bid them into the PJM capacity market
14 due to the considerations and risks noted in the quote above as well as:

15 *...additional uncertainty related to regulatory approvals beyond the Companies’ existing*
16 *EE/PDR Portfolio Plans.”⁵*

17 **Q: Is the explanation for why the Companies chose not to bid additional resources that**
18 **will have been acquired before the end of May 2012 reasonable?**

19 A: No. It is not.

20 Absent full access to the Companies detailed efficiency program performance data it is difficult
21 for me to estimate *precisely* how much additional peak demand savings would likely have been
22 acquired between June 2011 and May 2012. However, I can say with confidence that those
23 additional savings are not insignificant. Consider residential CFLs. The Companies themselves

³ FE response to SC Set 1, INT-6b.

⁴ FE response to SC Set 1, INT-1g.

⁵ Ibid.

1 have estimated that their 2011 program generated 38 MW of peak demand savings.⁶
2 Approximately 23 MW were generated just between June 1, 2011 and December 31, 2012.⁷ If
3 similar levels of savings per month were realized between January and May 2012, total peak
4 demand savings between June 2011 and May 2012 from just this program would be on the order
5 of 40 MW. In contrast, the Companies were offering to bid in only 15 MW of savings from
6 residential CFLs. Similar calculations suggest that the Companies could have expected
7 approximately 8 MW of peak demand savings from their residential refrigerator turn-in program
8 between June 2011 and May 2012; yet they planned to bid no savings from this program. The
9 bottom line is that the magnitude of additional efficiency resources acquired between June 2011
10 and May 2012 that were not bid into the market is substantial.

11 Second, in my experience with bidding Efficiency Vermont's entire portfolio of efficiency
12 savings into the New England capacity market, EM&V costs were substantially outweighed by
13 just the revenue from the market – even when the market clearing price was on the order of half
14 of what it was projected to be and one-third of what it ended up being for the ATSI region for
15 2015/2016.⁸ And that is just when considering the revenue from the capacity market. When one
16 also considers the much more substantial benefits to the Companies' customers of lowering the
17 market clearing price of capacity, EM&V costs should be a non-issue.

18 Third, the Companies have provided no information to demonstrate how EM&V risks associated
19 with the additional efficiency resources that it chose not to bid into the market would be so high
20 as to justify that decision. Indeed, bidding a broader portfolio of efficiency savings into the
21 market could actually *reduce* EM&V risk by putting the Companies' "eggs" in more than one or
22 two "baskets". Also, the Companies could have hedged against risk by being a little
23 conservative in their estimates of additional savings from other measures and/or from measures

⁶ Ohio Edison Companies, The Cleveland Electric Illuminating Companies and the Toledo Edison Companies, "Energy Efficiency and Peak Demand Reduction Program Portfolio Status Report to the Public Utilities Commission of Ohio for the period January 1, 2011 to December 31, 2011", Docket Numbers 12-1533-EL-EEC, 12-1534-EL-EEC and 12-1535-EL-EEC, May 15, 2012.

⁷ Based on FE response to SC Set 2-INT-13b.

⁸ On April 8, 2012, UBS, a global financial services firm, released an investment research report which forecast that the market clearing price in the ATSI region would be \$200/MW-Day. According to a more recent Reuters article, two other experts were forecasting the ATSI clearing price to be \$250-\$300/MW-day or more (<http://af.reuters.com/article/commoditiesNews/idAFL1E8G893P20120509>). The final market clearing price for the region ended up being more 357 per MW-day. In contrast, the New England forward capacity market has cleared at prices ranging from \$2.95 to \$3.43 per kW-month – equivalent to approximately \$100 to \$115 per MW-day – over the past several years.

1 installed in the two months after the filing of its EM&V plan with PJM. Assuming that they will
2 not produce any demonstrable peak savings, which is effectively what the Companies have
3 assumed by not bidding their peak savings into the market, is not an appropriate balancing of
4 potential risks and rewards – particularly given the substantial magnitude of the potential
5 rewards which I discuss below.

6 Fourth, the uncertainty regarding how much additional peak demand savings would be acquired
7 between early April 2012 and the end of May 2012 should be quite modest. The Companies
8 know how much savings they are acquiring on a monthly basis and what the trends in those
9 acquisitions appear to be. Further, for many larger commercial and industrial efficiency projects,
10 the Companies should have a pretty good idea of what is in their “pipelines” and when those
11 “pipeline projects” are likely to be completed. This kind of uncertainty is faced by every
12 administrator of efficiency programs all the time, including administrators who routinely bid
13 efficiency resources into capacity markets. Again, to essentially assume that no additional peak
14 demand savings will be acquired during this period is an inappropriate balancing of potential
15 risks and rewards.

16 Finally, it is important to acknowledge that the Companies’ concern about the need to
17 demonstrate ownership of efficiency resources is legitimate. However, as I discuss above, a
18 significant portion of the additional savings that the Companies did not bid into the market are
19 residential savings for which ownership should be a non-issue. Moreover, there is no reason the
20 Companies could not have sought ownership of non-lighting savings from commercial and
21 industrial customers in the same way it was seeking ownership of lighting savings. Finally, as I
22 discuss above, though ownership is a legitimate issue, it is one that First Energy should have
23 addressed much earlier, rather than raising it after the fact consistent with Ohio policy mentioned
24 above.

25 **Q: What is your response to the Companies’ suggestion that they should not bid efficiency**
26 **resources that would be acquired after May 2012 into the 2015/2016 BRA because they do**
27 **not have regulatory approval for future programs?**

1 A: While the Companies do not have approved efficiency program plans for future years, it is
2 clear that current law will require them to continue to increase their efforts to promote efficiency
3 in the future. Thus, the risk of falling short of commitments made in the market is tantamount to
4 the risk of falling short of meeting statutory savings goals.

5 It is worth noting that utilities in similar positions in other states – such as Commonwealth
6 Edison in Illinois (which also bids into PJM) and National Grid in Massachusetts (which bids
7 into the New England ISO’s market) – are active participants in regional capacity markets,
8 bidding not only efficiency resources that they have already acquired but also resources they
9 expect to acquire in future years. Both of those utilities (and others like them) make assumptions
10 regarding continued funding of efficiency programs in years beyond those for which their
11 regulators have approved plans. In some cases they add a little conservatism into their bids to
12 hedge against risks; in others they do not. In all cases they view the rewards of participation to
13 be too great to not bid future years’ peak savings.

14 In short, there is no good excuse for electing to not bid any future efficiency resources into the
15 PJM capacity market. The stakes for FirstEnergy’s customers are far too high. One Ohio
16 statutory policy is to ensure consumers the availability of reasonably priced retail electric
17 service. Ohio law also encourages and mandates energy efficiency programs. It is unacceptable
18 that the Companies did not at least assess the potential benefits of bidding efficiency into the
19 PJM capacity market and bring that assessment along with an articulation of their concerns about
20 risks to the Commission for discussion – and early enough to allow thoughtful exploration of the
21 issues without jeopardizing the ability to meet deadlines for bidding. The Companies should be
22 accountable for financial harm done to their customers due to their failure to adequately
23 anticipate, prepare for and participate to the fullest extent possible in PJM’s 2015/2016 Base
24 Residual Auction.

25 **Q: If the Companies had ownership of all efficiency resources installed after June 1, 2011,**
26 **and had systems in place to assure ownership of all new efficiency resources it will acquire**
27 **between now and May of 2015, approximately how many MWs of efficiency resources**
28 **could they have bid into the 2015/2016 BRA?**

1 A: As Table 1 shows, I estimate that FirstEnergy could have bid on the order of 361 MW of
 2 efficiency resources into the 2015/2016 BRA. That is between five and six times as much as the
 3 maximum of 65 MW that the Companies indicated they might bid into the market.

4 **Table 1: Peak Savings from First Energy’s Ohio Efficiency Programs**
 5 **That Could Have Been Bid into PJM’s 2015/2016 BRA**
 6

	2011	2012	2013	2014	2015
	Actuals	Estimate	Estimate	Estimate	Estimate
Sales Compliance Baseline (GWh)		52,803	52,803	52,803	52,803
Incremental Annual Savings Requirement (%)		0.80%	0.90%	1.00%	1.00%
Incremental Annual Savings/Requirement (GWh)	825	422	475	528	528
Estimated Banked Savings from previous year (GWh)		257			
Cumulative Annual Savings Requirement (GWh)	825	991	1,466	1,994	2,522
Peak MW to MWh savings ratio	5,804	5,804	5,804	5,804	5,804
Incremental Annual MW Savings from EE	142	73	82	91	91
% of Incr. Annual MW savings eligible for 2015/16 BRA	54%	100%	100%	100%	42%
7 Peak MW Savings Eligible for 2015/16 BRA					361

8 **Q: Please summarize how you arrive at the estimate of approximately 361 MW.**

9 A: For 2011, I started with the annualized peak demand savings from efficiency programs that
 10 the Companies themselves have estimated they acquired.⁹ I then estimated, by program, how
 11 much of the savings were acquired after June 1st of that year based on estimates provided by
 12 FirstEnergy.¹⁰ The end result of these assumptions is that only 54% of the 142 MW of
 13 incremental annualized efficiency peak demand savings that First Energy produced in 2011 were
 14 assumed to be eligible to be bid in the 2015/2016 BRA.

⁹ Incremental annualized savings from FirstEnergy’s 2011 efficiency programs were computed by subtracting cumulative annualized savings through 2010 from Appendix A of the Companies’s2010 Portfolio Status Report (Ohio Edison, The Cleveland Electric Illuminating Companies and The Toledo Edison Companies, “Energy Efficiency & Peak Demand Reduction Program Portfolio Status Report for the Period January 1, 2010 through December 31, 2010, Dockets 11-2956-EL-EEC, 11-2958-EL-EEC, and 11-2959-EL-EEC, May 23, 2011) from the cumulative annualized savings through 2011 from Appendix A of FirstEnergy’s 2011 Portfolio Status Report (Ohio Edison Companies, The Cleveland Electric Illuminating Companies and the Toledo Edison Companies, “Energy Efficiency and Peak Demand Reduction Program Portfolio Status Report to the Public Utilities Commission of Ohio for the period January 1, 2011 to December 31, 2011”, Docked Numbers 12-1533-EL-EEC, 12-1534-EL-EEC and 12-1535-EL-EEC, May 15, 2012).

¹⁰ FE response to SC Set 2, INT-13.

1 For 2012 through 2015, I assumed that the Companies would generate just enough energy
2 savings (GWh) to meet their statutory obligations.¹¹ For 2012, I also assumed that the excess pro
3 rata savings generated by the Companies 2011 programs would be banked and used to lower the
4 amount of savings they needed to generate in 2012. I converted energy savings to peak demand
5 savings using the ratio of MWh to peak MW savings (i.e. 5804:1) that was evident from the
6 Companies' incremental annualized 2011 results.

7 For 2015, I reduced the resulting peak demand savings by 58% to reflect the fact that only the
8 first five months of savings could be used to meet a June 1, 2015 obligation.

9 **Q: You say “approximately” 361 MW. Does that mean 361 MW is not a precise number?**

10 A: Correct. I do not have access to the Companies' detailed efficiency program data, load
11 forecasts and other data that would be necessary to develop an estimate with the level of
12 refinement that I would want to support an actual bid into the 2015/2016 BRA. That said, I
13 believe the 361 MW estimate is a good approximation of what the Companies could have bid. It
14 is certainly more than precise enough to support the conclusions I offer in this testimony.

15 **Q: What factors could make the amount that FirstEnergy could have bid into the**
16 **2015/2016 BRA different than 361 MW?**

17 A: There are several:

- 18 • **Assumption that the statutory savings targets are met, but not exceeded.** FirstEnergy
19 initially planned to exceed its targets, to give itself a margin of error. Indeed, FirstEnergy
20 has estimated that its actual cumulative pro rata savings through 2011 (across all three of
21 its subsidiary companies), exceeded its cumulative GWh savings target by 32% (counting
22 savings from both approved and programs and pending projects.¹² To the extent that the
23 Companies might plan to exceed targets in the future, it would have been able to either
24 bid more than 361 MW or to use the excess as hedge against risk.

¹¹ Statutory energy savings obligations were calculated using the same compliance sales baseline estimated by the Companies for 2011 (Exhibit 1 from the Companies' 2011 Portfolio Status Report).

¹² FirstEnergy's 2011 Portfolio Status Report, Table 2-1.

- 1 • **Assumption that the Companies would bank all excess savings.** The Companies have
2 indicated that they plan to bank any excess 2011 savings. However, it is not clear that
3 would necessarily be the case with excess savings in future years, particularly if the
4 Companies were to become eligible for shareholder incentives for exceeding targets and
5 had to face a choice of earning incentives or banking excess savings. To the extent that
6 the Companies would not bank all future excess savings, they would have been able to
7 either bid more into the market or use the excess as a hedge against risk.
- 8 • **No load growth.** For simplicity, my analysis assumed that the MWh savings target in
9 2011 and beyond would be based on the same baseline sales levels as the 2011 target.
10 Thus, to the extent that sales increase, my GWh savings estimates (and therefore my peak
11 MW savings estimates) would be low.
- 12 • **No conversion of ICAP to UCAP.** My estimated savings value does not include the
13 roughly 3% adder typically used to convert energy efficiency's ICAP value to the UCAP
14 value on which capacity market payments are made.
- 15 • **Post-2011 savings from Transmission and Distribution (T&D) projects.** My estimate
16 of the amount of efficiency savings the Companies could have bid into the 2015/2016
17 BRA implicitly assumes that the portion of energy savings requirements met by T&D
18 projects remains the same as in 2011. Going forward, the Companies have complete
19 control over the extent to which their efficiency targets are met with end use efficiency
20 on their customers' side of the meter.
- 21 • **Mercantile customer savings from 2012 through 2015 assumed to be entirely from**
22 **measures installed post June 1, 2011.** Though there is a three year window for
23 mercantile efficiency investments to receive incentives, I would expect that pre-June
24 2011 mercantile efficiency projects to represent a small portion of savings claimed by
25 FirstEnergy in 2012 and beyond. The deadline for submitting applications for 2008
26 installations is already passed and I would expect many projects installed in 2009, 2010
27 and early 2011 to have already been claimed by First Energy as part of its efforts to meet
28 goals in those years.

1 The bottom line is that even if one took a worst case assumption with respect to all of the items
2 above, the amount of efficiency resources that the Companies could bid into the 2015/2016 BRA
3 is dramatically higher than the 65 MWs which the Companies have indicated is the maximum
4 they would bid. Indeed, the Companies' own estimation that they could potential bid 65 MW
5 into the auction suggests my estimate of 361 MW is reasonable.

6 **Q: How does the Companies' statement that they could potentially bid 65 MW into the**
7 **auction suggest your estimate of 361 MW is reasonable?**

8 A: As I discuss earlier, the 65 MW estimated by the Companies represents only lighting savings,
9 from only about 10 months of efficiency programs. However, the Companies were eligible to
10 bid in efficiency resources from 48 months of programs. Thus, if their estimate of biddable
11 savings lighting savings from June 2011 through early April 2012 was equally applicable to
12 subsequent months (through May 2015), one could conclude that the Companies was able to bid
13 over 300 MW of just lighting savings. It is easy to imagine how that number could grow to 361
14 MW or more once non-lighting savings and adjustments for the impacts of Ohio's increasing
15 statutory savings requirements are considered.

16 **IV. IMPLICATIONS OF UNDER-BIDDING EFFICIENCY RESOURCES**

17 **Q: What are the implications of First Energy's decision to bid no more than 65 MW of**
18 **efficiency resources into the 2015/2016 BRA?**

19 A: The Companies' decision will have two major adverse consequences for their customers:
20 1. Customers will forgo a substantial revenue stream from an investment for which they are
21 already committed to pay; and
22 2. Customers will pay much more for capacity than they would otherwise need to pay
23 because they will have to acquire generating capacity that will be redundant with the
24 capacity savings produced by First Energy's efficiency programs and, more importantly,
25 because the failure to bid efficiency resources into the market on a "price-taking basis"
26 will cause the market clearing price for capacity – i.e. the price that will be paid to all

1 capacity that clears the market – to be significantly higher than it otherwise would have
2 been.

3 The second impact – higher market clearing prices for capacity paid by FirstEnergy’s customers
4 – is by far the larger of the two impacts.

5 **Q: How much revenue from the capacity market will FirstEnergy’s customers lose as a**
6 **result of the Companies’ failure to bid into the market all of the eligible peak demand**
7 **savings from its current and future efficiency programs?**

8 A: The value depends on the market clearing price for capacity in PJM’s ATSI region. At the
9 time I was writing this testimony, the 2015/2016 BRA was underway. Forecasts for the market
10 clearing price ranged from \$200 to \$300 per MW-day.¹³ The BRA ultimately cleared at a final
11 price of \$357/MW-day for annual resources in ATSI.¹⁴ At \$357/MW-day, the foregone revenue
12 associated with the roughly 300 additional MW of peak savings FirstEnergy chose not to bid into
13 the market is approximately \$39 million. If, as I discuss below, the market clearing price would
14 have declined by about \$150/MW-day due to the bidding of the additional 300 MW of efficiency
15 resources, the foregone revenue would have been on the order of \$22 million.

16 **Q: How much more will FirstEnergy’s Ohio customers pay for capacity in the 2015/2016**
17 **BRA as a result of FirstEnergy’s failure to bid those additional 300 MW of energy**
18 **efficiency savings into the market?**

19 A: The price of capacity in 2015/16 for the FirstEnergy/ATSI area is largely determined by a
20 Variable Resource Requirement Curve (“VRRC”) set by PJM, the amount of capacity bidding
21 into the area, and the import constraint. The VRRC is interpolated from the following points
22 (“UCAP” refers to Unforced Capacity):

¹³ On April 8, 2012, UBS, a global financial services firm, released an investment research report which forecast that the market clearing price in the ATSI region would be \$200/MW-Day. According to a more recent Reuters article, two other experts were forecasting the ATSI clearing price to be \$250-\$300/MW-day or more (<http://af.reuters.com/article/commoditiesNews/idAFL1E8G893P20120509>).

¹⁴ Those results were released one business day before this testimony was due, so I have not been able to analyze them in any detail.

Point	UCAP Bid, MW	UCAP Price, \$/MW-Day
A	15,419	\$537.33
B	15,981	\$358.22
C	16,542	\$71.64

Source: 2015-2016 RPM Base Residual Auction Planning Parameters,
updated April 17, 2012.

1 The price would decline approximately 32¢/MW-day for each additional MW bid from 15,457
2 MW up to 15,981 MW, and approximately 51¢/MW-day for each additional MW bid above
3 15,981 MW.¹⁵ This decline at first glance may seem like a small change, but it is multiplied by
4 the number of in-zone MW's clearing in the auction and then by 365 days per year. The 5,418
5 MW that can be supplied from outside the ATSI zone would be priced at the RTO zone price.
6 The total bill for in-zone capacity in the ATSI area in 2015/2016 would be roughly as follows:¹⁶

Point	UCAP Level, MW	Net of Capacity from Transmission	UCAP Price, \$/MW- Day	\$ Million for in- Zone Capacity
A	15,419	10,002	\$537.33	\$1,962
B	15,981	10,563	\$358.22	\$1,381
C	16,542	11,125	\$71.64	\$291

7
8 As noted above, the ATSI clearing price was \$357/MW-day, slightly below the price at point B,
9 and the cleared capacity was 10,667.6 MW, slightly above the capacity requirement for point B.
10 In that range, the market clearing price declines by approximately \$0.51 for every additional
11 MW of capacity bid into the market. Thus, the additional 300 MW of efficiency savings
12 FirstEnergy could have bid into the market would have reduced the market clearing price for
13 capacity by approximately \$150/MW-day, if all the resources that cleared at the actual
14 \$357/MW-day also cleared at the resulting price of about \$200/MW-day. If some resources that
15 cleared at \$357/MW-day would not have cleared at \$200/MW-day, the clearing price would be

¹⁵ Since PJM makes a number of other adjustments, final pricing is somewhat different from the VRRRC value.

¹⁶ The total bill would also vary with the mix of resources (annual, limited, and extended summer resources) and other PJM adjustments.

1 somewhat higher, but the amount of capacity that cleared (and for which customers would be
2 charged) would decline.

3 **Q: How much would that affect bills of FE customers?**

4 A: Until more detailed information is available from PJM,¹⁷ it is not possible to say definitively
5 what the effect on bills would have been. However, the effects are likely to have been quite
6 large – as much as several million dollars of increased costs for Ohio consumers.

7
8 **Q: How do you arrive at that estimate?**

9 A: For the 10,667.6 MW of capacity procured in the ATSI zones, a \$150/MW-day change in the
10 market clearing price would reduce charges to ATSI customers by approximately \$600 million in
11 unnecessary capacity payments. A significant portion of the ATSI region capacity costs are born
12 by FirstEnergy’s Ohio customers.¹⁸ Thus, if the excess cost is \$600 million, Ohio customers will
13 pay several million dollars extra.

14 15 **V. RECOMMENDATIONS**

16 **Q: What recommendations do you have for the Public Utilities Commission regarding**
17 **FirstEnergy’s failure to bid fully bid its current and future efficiency program peak**
18 **savings into PJM’s 2015/2016 BRA?**

19 A: I have several recommendations of which the Commission should modify the stipulation
20 and/or require as a condition prior to approval:

- 21 1. **Accountability for financial harm caused to Ohio customers.** The Companies should
22 be held financially accountable, in some substantive way, for the economic harm their
23 failure to fully bid their current and future efficiency program peak savings will cause
24 their customers. Any financial penalty would ideally be in the form of a requirement to
25 acquire additional efficiency resources – over and above those needed to meet statutory

¹⁷ Additional information on the ATSI supply curve may become available shortly, if PJM issues a BRA report addendum, as it did for the 2014/2015 BRA on May 31, 2011.

¹⁸ Specific percentages were provided in the Companies’ confidential discovery responses.

1 requirements.¹⁹ One option would be to require shareholders to fund acquisition of
2 sufficient additional efficiency resources (i.e. over and above those required to meet Ohio
3 statutory savings requirements) to produce net present value benefits to consumers that
4 are comparable to the excess costs they incur due to the Companies failure to bid all
5 eligible efficiency savings into the 2015/2016 BRA.

6 2. **Requirement for Commission approval of a plan for future BRAs.** For the next
7 (2016/2017) and all subsequent Base Residual Actions, the Commission should require
8 that FirstEnergy submit its plan for bidding of efficiency resources for approval by the
9 Commission. The plan should be filed at least 90 days before the deadline for submitting
10 all pre-requisites for bidding (e.g. an M&V Plan) to PJM. The plan should be approved
11 through a process in which other parties have an opportunity to participate.

12 3. **Default requirement to bid all eligible efficiency resources in future BRAs.** For the
13 next (2016/2017) and all subsequent Base Residual Actions, the Commission should
14 establish a default requirement that FirstEnergy will bid all eligible efficiency resources
15 that it can reasonably expect to acquire in the process of meeting Ohio's statutory
16 efficiency savings requirements. For 2016/2017 that means all efficiency resources it
17 will reasonably expect to acquire between June 2012 and May 2016. FirstEnergy would
18 have to present compelling evidence that the financial cost and/or financial risk of
19 bidding certain efficiency resources into the market would be greater than the likely
20 benefits (both capacity payments and impacts on market clearing prices) in order to
21 exclude any expected efficiency savings from its bids.

22 4. **Assuring ownership of future efficiency peak capacity credits.** The Commission
23 should require FirstEnergy to put in place, as soon as feasible, mechanisms for assuring
24 its ownership of all peak capacity credits generated by its efficiency programs in the

¹⁹ If the Companies should become eligible in the future to earn shareholder incentives for exceeding goals, such goals should be defined as the Ohio statutory requirements plus the additional savings associated with this recommendation. In other words, they should not be able to earn shareholder incentives for savings they would be required to acquire to address the imprudence of their less than full participation in the 2015/2016 BRA.

1 future. As noted above, this may be as simple as adding language to all rebate forms,
2 other financial incentive documents and other relevant program documents.

3 **5. Assessing cost-effectiveness of additional efficiency investments.** As part of the
4 development of its bidding plan (per my second recommendation above), FirstEnergy
5 should be required to assess whether additional efficiency resources – i.e. over and above
6 the level of savings currently required by statute – would generate more capacity benefits
7 (in the form of both capacity payments and impacts on market clearing prices) than they
8 would cost to acquire. To the extent that they would, the Companies should be required
9 to acquire all such additional cost-effective resources.

10 **Q: Does this conclude your testimony?**

11 A: Yes.



EDUCATION

M.P.P., University of Michigan, 1986

B.A., Political Science, University of Michigan, 1985

EXPERIENCE

2010-present: Principal, Energy Futures Group, Hinesburg, VT

1999-2010: Director of Planning & Evaluation, Vermont Energy Investment Corp., Burlington, VT

1993-1999: Senior Analyst, Vermont Energy Investment Corp., Burlington, VT

1992-1993: Energy Consultant, Lawrence Berkeley National Laboratory, Gaborone, Botswana

1986-1991: Senior Policy Analyst, Center for Clean Air Policy, Washington, DC

PROFESSIONAL SUMMARY

Chris Neme leads a variety of consulting projects for clients across the United States, Canada, and Europe. He specializes in analysis of markets for energy efficiency measures and the design and evaluation of programs and policies to promote them. Prior to co-founding Energy Futures Group, he served as Director of the Vermont Energy Investment Corporation's 30-person consulting division. During his more than 20 years in the energy efficiency industry, Mr. Neme has conducted analyses of efficiency potential in five states; reviewed or developed efficiency programs in more than 20 states and provinces and in Europe; supported utility-stakeholder "collaboratives" in eight states, and defended expert witness testimony before regulatory commissions in ten different states and provinces. Mr. Neme has led several different training courses on the elements of good efficiency program design. He has also published papers and/or presented assessments of efficiency markets, programs and policies through a wide variety of publications, conferences, Consortium for Energy Efficiency Technical Committees, ENERGY STAR working groups and other forums. Mr. Neme recently served as Co-Chair of NEEP's EM&V Research and Evaluation Committee.

SELECTED PROJECTS

- **Regulatory Assistance Project - U.S.** Providing on-going technical support on efficiency policy and program design, including drafting a report on the U.S. experience using efficiency programs to cost-effectively defer transmission and distribution system investments; providing technical assistance and training to Arkansas and Connecticut regulators; and helping to administer an initiative to provide technical support on efficiency program planning and evaluation to Energy Foundation grantees and regulatory staff. (2010 to present)
- **Regulatory Assistance Project - Europe.** Providing on-going technical support on efficiency policy and program design to RAP and its partners in the United Kingdom, Germany, Belgium and other countries. This has included reviewing draft European Union policies on Energy Savings Obligations, EM&V protocols and other related issues. Drafted a policy brief on policy and design considerations for an efficiency feed-in-tariff. Also drafted (and presented at 2011 ECEEE conference in France) a 64-page report that reviewed leading residential retrofit programs in North America and Europe and proposed a "roadmap" for achieving deep retrofits in half of the building stock. Reviewing and draft (2009 to present)



- ***Natural Resources Defense Council (Illinois & Michigan).*** Critically reviewed multi-year DSM plans filed by Commonwealth Edison, Ameren, Detroit Edison and Consumers Energy. Drafted and defended regulatory testimony on critiques. Represent NRDC in monthly stakeholder-utility collaborative meetings in both Illinois and Michigan to discuss program designs, evaluation priorities, draft evaluation reports and other related topics. (2010 to present)
- ***Green Energy Coalition (Ontario).*** Representing a coalition of environmental groups in various regulatory proceedings. Present recommendations on DSM policies, critically review and negotiate with utilities on proposed DSM Plans, serve (elected by non-utility stakeholders) on utility Evaluation/Audit Committees which oversee an annual savings verification process and evaluation planning, and defend expert witness testimony. (1993 to present)
- ***Northeast Energy Efficiency Partnerships.*** Managing Regional EM&V forum project to develop savings estimates for emerging technologies. Responsibilities include drafting RFP to hire a contractor to perform the work, managing the contractor's work, and facilitating a committee of program administrators overseeing the project. Also serve as Senior Advisor on the development of a Technical Reference Manual for Mid-Atlantic States. (2009 to present)
- ***Ohio Sierra Club.*** Critically reviewing First Energy's and other utilities' multi-year DSM plans. Participating in periodic stakeholder-utility collaborative meetings. (2012)
- ***DC Department of the Environment (Washington DC).*** Part of VEIC team administering the DC Sustainable Energy Utility (SEU). Primary responsibilities are characterizing the DC efficiency market and supporting the design of efficiency programs that the SEU will be implementing. (2011 to present)
- ***Iowa Consumer Advocate.*** Critically reviewed several electric and gas utilities' DSM plans and savings claims. Assisted with the development of regulatory testimony. Currently serve as technical advisor to statewide collaborative process, occasionally providing input on utility evaluation plans and other topics. (1994 to present)
- ***Regulatory Assistance Project – Global.*** Assisted RAP in framing several global research reports. Co-authored the first report – an extensive “best practices guide” on government policies for achieving energy efficiency objectives, drawing on experience with a variety of policy mechanism employed around the world. (2011)
- ***Tennessee Valley Authority.*** Assisted CSG team providing input to TVA on the redesign of its residential efficiency program portfolio to meet aggressive new five-year savings goals. (2010)
- ***Efficiency Vermont.*** Oversaw residential program planning, input to the VT Department of Public Service on evaluation planning, input to NEEP's regional EM&V forum, and development of M&V plan and other aspects of bids of efficiency resources into New England's Forward Capacity Market (FCM) from March 2000 through Spring 2010.
- ***Ohio Public Utilities Commission.*** Senior Advisor to a project to develop a web-based Technical Reference Manual (TRM). The TRM includes deemed savings assumptions, deemed calculated savings algorithms and custom savings protocols. It is designed to serve as the basis for all electric and gas efficiency program savings claims in the state. (2009 to 2010)



CHRISTOPHER NEME, PRINCIPAL

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- ***New Jersey Clean Energy Program.*** Oversaw support of Honeywell-led team delivering all statewide residential efficiency and renewable energy programs. Led work on program design, regulatory filings, savings algorithms, and evaluation planning. (2006 to 2010)
- ***New York State Energy Research and Development Authority (NYSERDA).*** Led several analyses of residential electric and gas efficiency potential (over 20 years) for New York State. Scenarios included continuation of existing initiatives, new budget constraints and a least-cost approach to meeting greenhouse gas emission reduction targets. (2001 to 2010)



- ***NSTAR Collaborative.*** Oversaw all technical assistance on the design and implementation of six residential DSM programs. Personally led work on two programs (high use retrofit & low income). This involved negotiations with NSTAR on goals, budgets and program designs, and technical assistance on selection of delivery contractors, development of field protocols to guide measure installation decisions, and review of program results. All work was conducted on behalf of the Massachusetts Non-Utility Parties. (1999 to 2005)
- ***Oregon Energy Trust.*** Part of a team that developed case studies of successful community-based efficiency or renewable energy efforts across North America, synthesized lessons learned from those examples, and developed recommendations for how the trust might more effectively advance its mission through community-based approaches to promoting efficiency. (2004-2005)
- ***Natural Resource Defense Council – New Jersey Utilities Collaborative.*** Oversaw all technical assistance on the design of and implementation planning for eight statewide residential DSM programs and one statewide renewable energy program. Personally led work on two of the programs (Electric HVAC and Gas HVAC). This involved facilitation of monthly meetings with all seven electric and gas utilities in the state; negotiations with the utilities on budgets, goals, and program designs; and extensive technical assistance on a variety of programmatic issues, including the development of marketing plans and evaluation plans. (1994 to 2003)
- ***Long Island Power Authority Clean Energy Plan.*** Led team that designed the four major residential programs (three efficiency, one PV) incorporated into the plan in 1999. Oversaw extensive technical support to the implementation of those programs. This involved assistance with the development of goals and budgets, development of savings algorithms, cost-effectiveness screening, and on-going program design refinements. (1998 to 2009)
- ***Northeast Energy Efficiency Partnerships Residential HVAC Initiative.*** Served as NEEP's Residential HVAC Program Manager. Responsible for promoting NEEP's program design concept to utilities in the Northeast, providing technical support to efforts to implement the design, and promoting the adoption of improved federal efficiency standards (and ENERGY STAR standards) for central air conditioners. (1997 to 2005)
- ***Southern Maryland Electric Cooperative.*** Led review and feedback on residential efficiency program portfolio. Also led impact evaluation of residential new construction and home retrofit programs. (1994 to 1998)
- ***Lawrence Berkeley Laboratory/Botswana.*** Conducted both economic and institutional analyses of the potential for cost-effective end-use energy efficiency improvements in southern Africa. Principal focus was on the electricity sector in Botswana. Initiated discussions between the Botswana government and LBL on the benefits of energy efficient building codes and the possibility of LBL developing such a code for Botswana. (1992)

**SELECTED PUBLICATIONS**

- “An Energy Efficiency Feed-in-Tariff: Key Policy and Design Considerations”, published by the Regulatory Assistance Project, March/April 2012 (with Richard Cowart)
- “U.S. Experience with Efficiency as a Transmission and Distribution System Resource”, published by the Regulatory Assistance Project, February 2012 (with Rich Sedano)
- “Achieving Energy Efficiency: A Global Best Practices Guide on Government Policies”, published by the Regulatory Assistance Project, February 2012 (with Nancy Wasserman)
- “Residential Efficiency Retrofits: A Roadmap for the Future”, published by the Regulatory Assistance Project, May 2011 (with Meg Gottstein and Blair Hamilton)
- “Is it Time to Ditch the TRC?” Proceedings of ACEEE 2010 Summer Study on Energy Efficiency in Buildings, Volume 5 (with Marty Kushler).
- “A Comparison of Energy Efficiency Programmes for Existing Homes in Eleven Countries”, prepared for the United Kingdom Department of Energy and Climate Change on behalf of the Regulatory Assistance Project, 19 February 2010 (with Blair Hamilton et al.).
- “Energy Efficiency as a Resource in the ISO New England Forward Capacity Market”, in *Energy Efficiency*, published on line 06 June 2010 (with Cheryl Jenkins and Shawn Enterline).
- “Energy Efficiency as a Resource in the ISO New England Forward Capacity Market”, Proceedings of the 2009 European Council on an Energy Efficient Economy Summer Study, pp. 175-183 (with Cheryl Jenkins and Shawn Enterline).
- “Playing with the Big Boys: Energy Efficiency as a Resource in the ISO New England Forward Capacity Market”, Proceedings of ACEEE 2008 Summer Study Conference on Energy Efficiency in Buildings, Volume 5 (with Cheryl Jenkins and Blair Hamilton)
- “Recommendations for Community-Based Energy Program Strategies”, Final Report, developed for the Energy Trust of Oregon, June 1, 2005 (with Dave Hewitt et al.)
- “Shareholder Incentives for Gas DSM: Experience with One Canadian Utility”, Proceedings of ACEEE 2004 Summer Study Conference on Energy Efficiency in Buildings, Volume 5 (with Kai Millyard).
- “Shareholder Incentives for Gas DSM: Experience with One Canadian Utility”, Proceedings of ACEEE 2004 Summer Study Conference on Energy Efficiency in Buildings, Volume 5 (with Kai Millyard).
- “Cost Effective Contributions to New York’s Greenhouse Gas Emission Reduction Targets from Energy Efficiency and Renewable Energy Resources”, ACEEE 2004 Summer Study Proceedings, Volume 8 (with David Hill et al.).
- “Opportunities for Accelerated Electric Energy Efficiency Potential in Quebec: 2005-2012”, prepared for Regroupement national des conseils regionaux de l’environnement du Quebec, Regroupement des organismes environnementaux energie and Regroupement pour la



responsabilite sociale des entreprises, May 16, 2004 (with Eric Belliveau, John Plunkett and Phil Dunsky).

- “Review of Connecticut’s Conservation and Load Management Administrator Performance, Plans and Incentives”, for Connecticut Office of Consumer Counsel, October 31, 2003 (with John Plunkett, Phil Mosenthal, Stuart Slote, Francis Wyatt, Bill Kallock and Paul Horowitz)
- “Energy Efficiency and Renewable Energy Resource Development Potential in New York State”, for New York Energy Research and Development Authority, August 2003 (with John Plunkett, Phil Mosenthal, Stave Nadel, Neal Elliott, David Hill and Christine Donovan).
- “Assessment of Economically Deliverable Transmission Capacity from Targeted Energy Efficiency Investments in the Inner and Metro-Area and Northwest and Northwest/Central Load Zones”, for Vermont Electric Power Company, Final Report: April 2003 (with John Plunkett et al.).
- “Residential HVAC Quality Installation: New Partnership Opportunities and Approaches”, Proceedings of ACEEE 2002 Summer Study Conference on Energy Efficiency in Buildings, Volume 6 (with Rebecca Foster, Mia South, George Edgar and Put Murphy).
- “Using Targeted Energy Efficiency Programs to Reduce Peak Electrical Demand and Address Electric System Reliability Problems”, published by the American Council for an Energy Efficient Economy, November 2000 (with Steve Nadel and Fred Gordon).
- “Energy Savings Potential from Addressing Residential Air Conditioner and Heat Pump Installation Problems”, American Council for an Energy Efficient Economy, February 1999 (with John Proctor and Steve Nadel).
- “Promoting High Efficiency Residential HVAC Equipment: Lessons Learned from Leading Utility Programs”, Proceedings of ACEEE 1998 Summer Study Conference on Energy Efficiency in Buildings, Volume 2 (with Jane Peters and Denise Rouleau).
- PowerSaver Home Program Impact Evaluation, report to Potomac Edison, February 1998 (with Andy Shapiro, Ken Tohinaka and Karl Goetze).
- “PowerSaver Home Program Impact Evaluation”, prepared for Southern Maryland Electric Cooperative, December 9, 1997 (with Andy Shapiro, Ken Tohinaka and Karl Goetze).
- “A Tale of Two States: Detailed Characterization of Residential New Construction Practices in Vermont and Iowa”, Proceedings of ACEEE 1996 Summer Study Conference on Energy Efficiency in Buildings, Volume 2 (with Blair Hamilton, Paul Erickson, Peter Lind and Todd Presson).
- “New Smart Protocols to Avoid Lost Opportunities and Maximize Impact of Residential Retrofit Programs”, in Proceedings of ACEEE 1994 Summer Study on Energy Efficiency in Buildings, pp. 9.147-9.157 (with Blair Hamilton and Ken Tohinaka).
- “Economic Analysis of Woodchip Systems” and “Finding Capital to Pay for a Woodchip Heating System”, Chapters 6 and 8 in *Woodchip Heating Systems: A Guide for Institutional and Commercial Biomass Installations*, published by the Council of Northeastern Governors, July 1994.



- “PSE&G Lost Opportunities Study: Current Residential Programs and Relationship to Lost Opportunities”, prepared for the PSE&G DSM Collaborative, June 1994 (with Blair Hamilton, Paul Berkowitz and Wayne DeForest).
- “Long-Range Evaluation Plan for the Vermont Weatherization Assistance Program”, prepared for the Vermont Office of Economic Opportunity, February 1994 (with Blair Hamilton and Ken Tohinaka).
- “Impact Evaluation of the 1992-1993 Vermont Weatherization Assistance Program”, prepared for the Vermont Office of Economic Opportunity, December 1993 (with Blair Hamilton and Ken Tohinaka).
- “Electric Utilities and Long-Range Transport of Mercury and Other Toxic Air Pollutants”, published by the Center for Clean Air Policy, 1991.
- “Coal and Emerging Energy and Environmental Policy”, in *Natural Resources and Environment*, 1991 (with Don Crane).
- “Acid Rain: The Problem”, in EPA Journal, January/February 1991 (with Ned Helme)
- “An Efficient Approach to Reducing Acid Rain: The Environmental Benefits of Energy Conservation”, published by the Center for Clean Air Policy, 1989.
- “The Untold Story: The Silver Lining for West Virginia in Acid Rain Control”, published by the Center for Clean Air Policy, 1988.
- “Midwest Coal by Wire: Addressing Regional Energy and Acid Rain Problems”, published by the Center for Clean Air Policy, 1987.
- “Acid rain: Road to a Middleground Solution”, published by the Center for Clean Air Policy, 1987 (with Ned Helme).

CERTIFICATE OF SERVICE

It is hereby certified that a true copy of the foregoing *Direct Testimony of Chris Neme on Behalf of Sierra Club*, was served upon the persons listed below via electronic transmission this 21st day of May, 2012.

/s/ Christopher J. Allwein

Christopher J. Allwein

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ATTACHMENT PRP-3 ADAPTED PJM STAKEHOLDER PROCESS

Adapted PJM Stakeholder Process

