

**BEFORE THE STATE OF NEW JERSEY
BOARD OF PUBLIC UTILITIES**

**IN THE MATTER OF THE PETITION OF)
NEW JERSEY NATURAL GAS COMPANY .) BPU DKT. NO. GO12070640
FOR APPROVAL OF THE EXTENSION OF)
ENERGY-EFFICIENCY PROGRAMS AND)
THE ASSOCIATED COST RECOVERY)
MECHANISM PURSUANT TO N.J.S.A 48:3-98.1)**

**DIRECT TESTIMONY OF ROBERT FAGAN
ON BEHALF OF THE
DIVISION OF RATE COUNSEL**

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20 EXHIBIT RF-1: RESUME OF ROBERT FAGAN

1 I. STATEMENT OF QUALIFICATIONS

2 **Q. WHAT IS YOUR NAME, POSITION AND BUSINESS ADDRESS?**

3 A. My name is Robert Fagan. I am Senior Associate with Synapse Energy
4 Economics, Inc., 485 Massachusetts Ave., Cambridge, MA 02139.

5 **Q. PLEASE DESCRIBE SYNAPSE ENERGY ECONOMICS.**

6 A. Synapse Energy Economics is a research and consulting firm specializing in
7 electricity industry regulation, planning and analysis. Synapse works for a variety
8 of clients, including consumer advocates, regulatory commissions, and
9 environmental advocates.

10 **Q. PLEASE DESCRIBE YOUR EXPERIENCE IN THE AREA OF**
11 **ELECTRIC UTILITY RESTRUCTURING, REGULATION AND**
12 **PLANNING.**

13 A. My experience is summarized in my resume, which is attached as Exhibit RF-1. I
14 am a mechanical engineer and energy economics analyst who has analyzed
15 energy industry issues for more than 25 years. In my current position at Synapse,
16 I focus on many aspects of the electric power industry, including assessment and
17 implementation of energy efficiency and demand response alternatives, as well as
18 economic and technical analysis of transmission systems, wholesale and retail
19 electricity markets, and renewable resource alternatives including on-shore and
20 off-shore wind and solar PV.

21 **Q. PLEASE DESCRIBE YOUR PROFESSIONAL EXPERIENCE BEFORE**
22 **BEGINNING YOUR CURRENT POSITION AT SYNAPSE ENERGY**
23 **ECONOMICS.**

24 A. Before joining Synapse Energy Economics, I previously worked at Tabors
25 Caramanis and Associates analyzing various electricity industry issues; at Charles
26 River Associates, analyzing and supporting expert testimony on electricity and
27 energy industry issues; at Rhode Islanders Saving Energy (RISE), as a
28 commercial and industrial facilities energy auditor, including facilitation of

1 participation in electric utility DSM programs; and at Narragansett Electric (now,
2 National Grid – Rhode Island) in the transmission and distribution department. I
3 hold an M.A. degree from Boston University in Energy and Environmental
4 Studies, and a B.S. degree from Clarkson University in Mechanical Engineering.

5 **II. SCOPE AND PURPOSE OF TESTIMONY**

6 **Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS CASE?**

7 A. I am testifying on behalf of the New Jersey Division of Rate Counsel (“Rate
8 Counsel”).

9 **Q. HAVE YOU TESTIFIED BEFORE ON NJNG RGGI EE PROGRAMS?**

10 A. Yes. I submitted testimony one year ago in the NJNG filing for an extension of
11 the SAVEGREEN programs in Docket No. GR11070425.

12 **Q. WHAT IS THE SCOPE AND PURPOSE OF YOUR TESTIMONY IN THIS**
13 **PROCEEDING?**

14 A. This testimony describes the results of my review and analysis of the petition of
15 New Jersey Natural Gas Company (“NJNG” or “the Company”) for approval of a
16 four-year extension of its Regional Greenhouse Gas Initiative (“RGGI”) energy
17 efficiency (“EE”) programs, also known as “SAVEGREEN” programs, and
18 NJNG’s responses to discovery. My testimony addresses the overall cost-
19 effectiveness and design of the EE programs that NJNG proposes to continue with
20 modifications.

21 **III. SUMMARY OF FINDINGS AND RECOMMENDATIONS**

22 **Q. ON WHAT MATTERS DO YOU PRESENT FINDINGS?**

23 A. My findings address the following matters:

- 24 A. NJNG’s current EE programs
- 25 B. NJNG’s proposed new programs—overview
- 26 C. Program benefits
- 27 D. Cost/benefit analysis

- 1 E. Residential EE program proposal
- 2 F. OPOWER program proposal
- 3 G. Oil Tank Removal proposal
- 4 H. Commercial EE program proposal
- 5 I. Access to Affordable Energy (“Access”) pilot program
- 6 J. Program evaluation
- 7 K. CEP Program Developments
- 8 L. Program Term
- 9 M. Source of Funding

10 **Q. PLEASE SUMMARIZE YOUR MAJOR FINDINGS.**

- 11 A. My major findings may be summarized as follows.
- 12 1. NJNG has not provided an estimate of the extent of incremental savings or
 - 13 participation expected from their programs, beyond what would be achieved with
 - 14 only New Jersey Clean Energy Program (“CEP” or “NJCEP”) efforts.
 - 15 2. NJNG provides little to no evidence that supports the level of incentives that it
 - 16 proposes to offer.
 - 17 3. The primary residential programs, those that supplement CEP’s
 - 18 WARMAdvantage and Home Performance with Energy Star (“HPwES”)
 - 19 programs, are not cost-effective using either or both of the Total Resource Cost
 - 20 (“TRC”) and Program Administrator (“PA”) benefit-cost tests.

21 **Q. WHAT ARE YOUR RECOMMENDATIONS?**

- 22 A. In summary, in view of the many serious difficulties with the Company’s
- 23 proposals I describe in the body of my testimony, the BPU should deny most
- 24 elements of the Petition as proposed, allowing only for the OPOWER and Access
- 25 Pilot to proceed in the current incarnations.

1 **IV. ANALYSIS OF NJNG'S PROPOSED ENERGY EFFICIENCY PROGRAMS**

2 **A. NJNG's Current Energy Efficiency Programs**

3

4 **Q. PLEASE DESCRIBE THE ENERGY EFFICIENCY PROGRAMS**
5 **CURRENTLY OFFERED BY NJNG.**

6 A. NJNG conducts EE activities initially approved by the Board in an Order dated
7 July 17, 2001 in Docket Nos. EO09010056 and GO09010057. The programs
8 were subsequently extended, with modifications, by Order dated September 24,
9 2010 in Docket No. GO10030225 and again by Order dated January 18, 2012 in
10 Docket No. GR11070425. The Company refers to these as the "SAVEGREEN"
11 programs. NJNG's SAVEGREEN programs generally provide additional
12 incentives and services to customers who participate in CEP. NJNG's current
13 SAVEGREEN offerings that go beyond NJCEP incentives include:

- 14 • A residential program offering audits and enhanced rebates or financing to
15 residential and certain commercial customers who are participating in the
16 NJCEP WARMAdvantage program, which provides rebates for high- heating
17 equipment and water heaters. It also offers financing to customers
18 participating in the NJCEP HPwES program, which provides incentives for
19 residential customers to implement "whole house" energy efficiency
20 measures, such as insulation and caulking.
- 21 • OPOWER, a pilot program, which provides NJNG's customers with an online
22 tool containing educational and informational data to help them reduce their
23 energy consumption.
- 24 • A pilot program, called Access to Affordable Energy Pilot Program ("Access
25 Pilot Program" or "Access"), offering conversions from electric to high-
26 efficiency gas heating systems, or installation of efficient electric heat pumps,
27 to 200 low-income homeowners who currently receive more than \$50 in
28 monthly electric Universal Service Fund benefits. This program includes the
29 collection of data to evaluate the resulting energy savings.

1 Notably, NJNG ratepayers are subject to the Societal Benefits Charge (“SBC”), a
2 portion of which funds the CEP pursuant to N.J.S.A. 48:3-60(a). A portion of the
3 SBC funds collected goes to supporting renewable energy programs, while most
4 supports EE. NJNG is required to collect \$15.9 million through SBC charges in
5 2012.¹ SBC collections for 2013 to 2016 are currently being considered by the
6 Board in its ongoing Comprehensive Resource Analysis (“CRA”) proceedings in
7 Docket No. EO11050324V.

8 **B. NJNG’s Proposed New Programs - Overview**
9

10 **Q. PLEASE DESCRIBE WHAT IS BEING PROPOSED IN THE**
11 **COMPANY’S PETITION.**

12 A. In the present Petition, NJNG seeks to extend the scope and duration of the
13 current SAVEGREEN programs. The Petition is filed pursuant to N.J.S.A. 48:3-
14 98.1, the requirements of which are clarified in the Board’s May 12, 2008 Order
15 in Docket No. EO08030164 (the “RGGI MFR Order”).

16 The EE programs for which NJNG seeks approval include an extension of the
17 Residential program with modifications, implementation of a new Oil Tank
18 Removal Grant program, an extension of its OPOWER pilot, implementation of
19 new Commercial programs, and an additional year for completing the Access
20 Pilot Program.

21 Specifically, the proposed offerings include the following:

- 22 • Residential
 - 23 ○ Segment I/customers starting with NJCEP’s WARMAdvantage
 - 24 Program (residential and certain commercial customers) (“Residential
 - 25 Segment I”)

¹ See Appendix to the Order Establishing 2009-2012 Funding Level, Docket No. EO07030203 (6/18/10).

- 1 • Free HPwES home energy audit, required as a condition of
- 2 taking incentives from NJNG for WARMAdvantage
- 3 measures, and
- 4 • One of the following three incentive options:
 - 5 • An extra customer incentive of \$300, over and above
 - 6 CEP WARMAdvantage incentives, for an efficient
 - 7 residential gas furnace or boiler, or
 - 8 • An extra customer incentive of \$300, over and above
 - 9 CEP WARMAdvantage incentives, for an efficient
 - 10 residential gas water heater, or
 - 11 • If the customer chooses to install an efficient residential
 - 12 gas furnace/boiler and water heater at the same time,
 - 13 one of the following:
 - 14 ○ An extra customer incentive of \$900, over and
 - 15 above NJCEP WARMAdvantage incentives, or
 - 16 ○ On-Bill Repayment Plan (“OBRP”) of up to
 - 17 \$6,500 for a 5 year term (not available to
 - 18 commercial customers)
 - 19 ○ Segment II/customers starting with OBRP (“Residential Segment II”)
 - 20 • 10-year, 0% on-bill financing for up to \$10,000 of net
 - 21 customer costs to implement NJCEP HPwES measures
 - 22 (residential only), or
 - 23 • Expansion of WARMAdvantage OBRP to up to \$10,000 to
 - 24 cover HPwES measures within 6 months of the audit.
 - 25 ○ Oil Tank Removal Grant, available to customers starting with
 - 26 WARMAdvantage and converting from oil to gas, for up to \$1,200 for

1 removal of a below-ground tank or up to \$800 for removal of an
2 above-ground tank

3 ○ OPOWER

4 ● Commercial and industrial

5 ○ Small Commercial Program, offering a match of NJCEP SmartStart
6 Building Program incentives up to \$15,000 for the installation of
7 efficient gas equipment to customers with a peak demand of 200 kW
8 or less

9 ○ Large Commercial Program, offering a match of NJCEP SmartStart
10 Building Program incentives up to \$25,000 for the installation of
11 efficient gas equipment to customers with a peak demand of greater
12 than 200 kW

13 ○ Direct Install Program, offering two-year, 0% on-bill financing for the
14 value of projects not covered by the NJCEP Direct Install program

15 The Company also proposes to continue its pilot program, called “Access”, for an
16 additional year to complete the pilot for the originally approved 200 customers.

17 **C. Program Benefits**
18

19 **Q. WHAT PROGRAM BENEFITS SHOULD BE ANALYZED IN SUPPORT**
20 **OF A PROPOSAL FOR ENERGY EFFICIENCY PROGRAMS?**

21 A. Analysis should estimate the benefits that arise from the proposed program alone
22 as well as estimating the combined benefits of the proposed program and other
23 programs targeting the same energy usage. Since NJNG is proposing subsidies
24 that are incremental to those available through the NJCEP, it should consider the
25 incremental benefits associated with those costs. Without consideration of the
26 incremental benefits of the proposed programs, including incremental energy
27 savings and other benefits discussed below, justification for the magnitude of the
28 programs overall and the budget allocation amongst them is incomplete and

1 insufficient. Although the required analysis is complex, projections of incremental
2 program participation and savings are a basic part of utility EE filings in other
3 states and can be done with the help of experts.²

4 **Q. HAS THE COMPANY QUANTIFIED THE INCREASE IN**
5 **PARTICIPATION IN NJCEP DUE TO ITS PROPOSED PROGRAMS?**

6 A. No. Most of NJNG’s proposed EE programs are structured to provide additional
7 monetary incentives to efficiency measures already available through NJCEP.
8 NJNG only offered anecdotal support for a claim that its residential program
9 incentives lead to overall increased participation in two of the NJCEP programs—
10 WARMAdvantage and HPwES—within its service territory.³ More importantly,
11 NJNG does not estimate “free ridership”, or the extent to which SAVEGREEN
12 program participants would have participated in the NJCEP independent of the
13 existence of NJNG’s incremental incentive for energy efficiency measures. Thus,
14 NJNG has failed to demonstrate its programs increase participation beyond that
15 expected with NJCEP participation alone.

16 **Q. HAS THE COMPANY QUANTIFIED THE ENERGY SAVINGS IMPACTS**
17 **OF ITS PROPOSED PROGRAMS SEPARATE FROM THAT WHICH**
18 **WOULD BE EXPECTED WITH THE NJCEP PROGRAMS ALONE?**

19 A. No. As with participation, NJNG has not quantified the energy savings impacts
20 arising from its proposed programs alone. In Schedule TJM-2 and TJM-3, NJNG
21 provided gas and electricity savings for the proposed programs, but these energy
22 savings estimates include the combined benefits of both the CEP and NJNG’s
23 proposed programs.⁴

² See for example the Technical Resource Manual used in Massachusetts to compute energy efficiency savings, at http://www.ma-eeac.org/docs/MA%20TRM_2011%20PLAN%20VERSION.PDF; and associated regulatory filings in Massachusetts on three-year gas efficiency plans, available at www.ma-eeac.org.

³ See the Company’s response to RCR-EE-22.

⁴ See the Company’s response to RCR-EE-4.

1 The RGGI MFR Order requires the utility to “quantify and deduct from the
2 energy and capacity savings any free rider effects and the business as usual
3 benefits from homeowners and businesses installing Energy Efficiency or
4 Renewable Energy without the N.J.S.A. 48:3-98.1 benefits or incentives.”⁵ Since
5 the CEP was developed prior to the RGGI Law and pre-dates the Company’s
6 instant proposal, it would be appropriate to include the CEP in the baseline
7 against which the energy savings and other attributes of the Company’s proposed
8 programs would be evaluated, otherwise the savings claimed by NJNG would be
9 “double counting” those obtained through CEP. In any event, it is essential that a
10 more rigorous technical evaluation that assesses incremental benefits be
11 conducted in order to meaningfully assess the Company’s proposals. This is the
12 only way the Company can demonstrate that its investments are prudent.

13 **Q. BEYOND ITS FAILURE TO DEMONSTRATE THAT ITS INCENTIVES**
14 **ARE NECESSARY TO INCREASE PARTICIPATION, HAS THE**
15 **COMPANY PROVIDED JUSTIFICATION FOR THE PROPOSED LEVEL**
16 **OF INCENTIVES?**

17 A. No. NJNG offered some evidence of the incremental cost of energy efficient
18 measures, which is one component that should be considered when designing EE
19 incentive levels. (See the response to RCR-EE-13.) However, the Company does
20 not demonstrate that any specific level of additional incentives are necessary to
21 incent customer participation in the CEP, no less that any incentives are necessary
22 at all.

⁵ *I/M/O Electric Public Utilities Offering Energy Efficiency and Conservation Programs Investing in Class I Renewable Energy Resources, and Offering Class I Renewable Energy Programs in their Respective Service Territories on a Regulated Basis Pursuant to N.J.S.A. 48:3-98.1, BPU Dkt. No. EO08030164, Appendix A, p.6 (May 12, 2008).*

1 **D. Cost-Benefit Analysis**

2

3 **Q. DID THE COMPANY CONDUCT A COST-BENEFIT ANALYSIS OF ITS**
4 **PROPOSED ENERGY EFFICIENCY PROGRAMS?**

5 A. NJNG conducted an analysis for the combined NJCEP/SAVEGREEN program
6 costs and benefits, but no Cost-Benefit Analysis (“CBA”) was conducted for the
7 SAVEGREEN program separate from CEP effects. The results of NJNG’s
8 prospective CBA are presented in Exhibit NJNG-13 of its Petition, and revisions
9 thereto in response to RCR-EE-20 and RCR-EE-25.

10 **Q. PLEASE EXPLAIN THE KEY COST-BENEFIT ANALYSES, OR COST**
11 **BENEFIT TESTS, USED BY NJNG.**

12 A. Prospective CBA provides estimates of the aggregate economic benefits and costs
13 of EE from various perspectives. In my opinion two tests are particularly useful,
14 the TRC test and the PA test.

15 The TRC test is essentially a test used to determine the overall economic cost-
16 effectiveness of EE programs in general. It is used throughout the industry as a
17 tool to screen EE programs for fundamental economic effectiveness. The TRC
18 test predicts the net benefits of EE based on its combined effects on both the
19 customers participating and those not participating in a program. The TRC costs
20 include both the costs incurred by the program administrator (in this case, OCE,
21 NJNG and its ratepayers), and the costs borne by direct participants in the
22 program. The TRC benefits are the net “avoided” costs of supplying and
23 delivering the energy that would have been consumed absent EE, including those
24 environmental benefits that have a monetary value in the market. The benefits for
25 the TRC also include “other fuel” savings⁶, and non-energy benefits such as
26 increased productivity, air quality improvements, and reduced time and resources

⁶ For example, a gas efficiency program might result not only in saving gas through more thermally efficient furnaces, but in saving electricity, such as with lower fan motor usage and/or more efficient furnace fan motors.

1 required to deal with late payments, which are reduced due to due to reduced
2 energy bill burdens on customers.

3 The PA perspective is also very useful, but in a different way. Essentially, the PA
4 test indicates if program design decisions are effective in maximizing the
5 contributions obtained from participating customers and minimizing (or best
6 leveraging) the use of funds available from ratepayers. The PA test measures the
7 net costs of a program as a resource option based on the costs incurred by the
8 program administrator, including incentive costs but excluding the costs to
9 participants. The benefits are the same as in the TRC except that “other fuel” and
10 non-energy benefits for participants are excluded. The PA test determines
11 whether the benefits from the program specific to the entity implementing the
12 programs outweigh program investments. This is a key indicator to find out
13 whether ratepayer money is spent meaningfully, or if the program designs have
14 successfully maximized the contributions that come from directly-participating
15 customers.

16 Although not a bright-line standard, a benefit-cost ratio less than 1.0 for either of
17 these tests is generally considered to indicate that the program is not cost-
18 effective.

19 **Q. PLEASE SUMMARIZE THE KEY CONCERNS YOU HAVE WITH**
20 **NJNG’S USE OF THESE COST-BENEFIT TESTS.**

21 A. The CBA that NJNG performed includes estimates of the costs and benefits of its
22 EE proposals from the TRC, Program Administrator, and other perspectives.
23 However, the Company’s CBA has several serious flaws that affect the validity of
24 reported results:

- 25 1. Most critically, NJNG’s CBA does not measure the benefits of its program
26 alone, but only of the joint NJNG/CEP program. To measure the benefits
27 of its program, NJNG’s CBA should begin with an estimate of the
28 incremental participation and savings that would be realized compared
29 with a CEP-only program. Because they include participation and savings

1 that would occur due to CEP even in the absence of NJNG's programs, the
2 test results do not apply to the NJNG component of the program alone.

- 3 2. NJNG's CBA does not include the CEP administration costs. Although
4 NJNG provided its estimates of the CEP administration costs for the
5 residential programs per the Company's response to RCR-EE-20, the
6 Company claims that it is only an illustrative example. Further, the
7 Company did not provide any CEP administration costs associated with its
8 proposed new commercial and industrial customer programs.
- 9 3. NJNG assumes that there will be no participants who would have installed
10 EE program measures without the program (i.e., free ridership is zero).
11 This assumption is unrealistic and unsupported, and is in contrast to utility
12 CBAs in other jurisdictions, which realistically assume some level of
13 naturally occurring efficiency gains. This approach overestimates the
14 benefits of the program.

15 **Q. DID THE COMPANY FIND THAT ITS PROPOSED SET OF**
16 **RESIDENTIAL PROGRAMS THAT PROVIDE A SUPPLEMENTAL**
17 **INCENTIVE TO THE NJCEP WOULD BE COST-EFFECTIVE?**

- 18 A. No. Even recognizing the fact that the CBA results put forth by the Company are
19 for the combined NJNG/CEP programs and do not represent "stand alone" effects
20 for the NJNG incentives, the Residential Segment I and Segment II programs⁷ are
21 still not cost effective or are only borderline cost effective. Using the TRC test,
22 the Segment I and Segment II programs have benefit-cost ratios ranging from
23 0.26 to 1.33. Under the PA test, the Residential Segment I and Segment II benefit-
24 cost ratios range from 0.3 to 1.01. (See NJNG-13.) As expected, this finding also
25 holds true if CEP administrative costs are included in overall program costs per

⁷ The residential programs in Segment I are referred to as "Furnace/Boiler Grant", "Water Heater Only", "Furnace/WH Combo Grant", and "Furnace/WH Combo OBRP" in NJNG-13. Segment II includes "HPES Tier II OBRP" and "HPES Tier III OBRP" in NJNG-13. The Oil Tank Removal program consists of "Oil to Gas Furnace/WH Grant" and "Oil to Gas Furnace/WH OBRP" in NJNG-13. OPOWER is treated separately in NJNG-13.

1 the Company's response to RCR-EE-20. When the Oil Tank Removal and
2 OPOWER programs are excluded, the entire residential portfolio – in aggregate,
3 and by individual program - becomes uneconomic based on the PA test and the
4 TRC test.

5 Beyond NJNG's analysis, supporting evidence indicates low cost effectiveness
6 and high spending per MMBTU saved for the Residential Segment I and Segment
7 II programs. In 2012, Applied Energy Group (AEG) released an evaluation of the
8 NJCEP. The AEG analysis indicated low cost effectiveness of the NJCEP
9 WARMAdvantage and HPwES programs even before NJNG incremental
10 incentives, achieving 0.68 and 0.19 TRC ratios respectively.⁸ It is reasonable to
11 expect that an increase in the incentives for these programs through a
12 supplementary utility program with redundant administrative structure (i.e.,
13 NJNG's SAVEGREEN structure) would not improve their cost effectiveness, and
14 that is indeed the case as is shown with the cost effectiveness results seen in
15 Exhibit NJNG-13.

16 Likewise, the AEG June 2012 evaluation found that the NJCEP HPwES program
17 had high spending per MMBTU saved relative to a peer group of 25 organizations
18 in Northeast and Midwest states with mature demand-side management programs.
19 Before utility incremental incentives, total NJCEP HPwES expenditures in 2011
20 amounted to \$173 per MMBTU, more than double the peer group's average
21 spending per unit saved. Additional utility incentives make these programs look
22 worse as compared to the peer group for spending per MMBTU. When utility
23 incentives are factored in, total expenditures in 2011 were \$218 per MMBTU in
24 New Jersey, more than 160% higher than the peer group (AEG, p. 13).

⁸ Applied Energy Group, Evaluation of New Jersey's Clean Energy Programs, June 11, 2012. p. 2.

1 **Q. DID THE COMPANY FIND THAT ITS SMALL AND LARGE**
2 **COMMERCIAL PROGRAMS ARE COST-EFFECTIVE?**

3 A. NJNG's CBA considers the Small and Large Commercial programs together.
4 Based on the Company's results, these programs, in combination with the CEP
5 programs, are cost-effective with a PA ratio of 4.87 and a TRC of 2.93 per NJNG-
6 13. This finding holds if CEP administrative costs are factored in per the
7 Company's response to RCR-EE-20. However, it is not known whether the NJNG
8 program alone would pass the screen, since NJNG's analysis is only for the
9 combined NJNG/CEP program.

10 **Q. DID THE COMPANY FIND THAT ITS PROPOSED DIRECT INSTALL**
11 **COMMERCIAL PROGRAM WOULD BE COST-EFFECTIVE?**

12 A. Yes. Based on the Company's results, the Direct Install Commercial program, in
13 combination with the OCE program, is cost-effective with a PA ratio of 3.65 and
14 a TRC of 2.85 per NJNG-13. This finding holds true if CEP administrative costs
15 are factored in per the Company's response to RCR-EE-20. However, as with the
16 other programs, NJNG's analysis is for the combined NJNG/CEP program, and it
17 is not known whether the NJNG Direct Install program alone would pass the
18 screen.

19 **Q. DID THE COMPANY FIND THAT ITS PROPOSED OPOWER**
20 **PROGRAM IS COST-EFFECTIVE?**

21 A. The OPOWER program is marginally cost-effective with a PA ratio of 1.14 and a
22 TRC of 1.41 per NJNG-13. However, this program serves a useful educational
23 purpose that is not reflected in the CBA results.

24 **Q. DID THE COMPANY FIND THAT ITS PROPOSED OIL TANK**
25 **REMOVAL PROGRAM WOULD BE COST-EFFECTIVE?**

26 A. Yes. The Oil Tank Removal program has a high TRC test result (See NJNG-13
27 and the response to RCR-EE-25). This result is largely because the benefits
28 considered in the TRC test include the fuel cost savings that result because the per
29 MMBTU costs of oil are significantly higher than gas. The fuel cost savings

1 resulting from conversions from oil to gas are high, and thus the benefits reflected
 2 in the test are also high. The Oil Tank Removal program also exhibits a high PA
 3 test ratio, but it appears that NJNG included oil savings in this result⁹ – for the PA
 4 test, oil savings should be excluded.

5 **E. Residential EE Program Proposal**

7 **Q. PLEASE SUMMARIZE RESIDENTIAL PROGRAM COST-EFFECTIVENESS.**

9 A. Table 1 below shows the key CBA indicators from NJNG’s response to
 10 discovery. The main residential programs, those that supplement CEP incentives
 11 with NJNG incentives, perform poorly under cost-effectiveness testing. As
 12 illustrated in the table, the HPwES Tier II OBRP is the only one of six programs
 13 that passes the TRC test, and all six fail the PA test. The source for these data is
 14 the response to RCR-EE-25.

15 **Table 1. Residential Segment I and II Program Cost Effectiveness (Benefit/Cost Ratio) Using PA**
 16 **and TRC Cost Effectiveness Tests**

	Furnace/Boiler Grant	Water Heater Only Grant	Furnace/WH Combo Grant	Furnace/WH Combo OBRP	HPwES Tier II OBRP	HPwES Tier III OBRP
Program Administrator	0.86	0.30	0.71	0.73	0.59	0.70
Total Resource Cost	0.95	0.26	0.80	0.76	1.24	0.91

17 A. Note: Less than 1.0 indicates costs are greater than benefits (i.e., not cost-effective). Source: Response to RCR-EE-25.

18 **Q. PLEASE STATE YOUR RECOMMENDATION FOR THE RESIDENTIAL**
 19 **WARMADVANTAGE AND HPwES PROGRAMS.**

20 A. These programs offer on-bill financing, which is not available from CEP.
 21 However, in light of their poor cost effectiveness, as discussed in my testimony
 22 above and as shown in Table 1, I recommend discontinuance of the NJNG

⁹ The excel spreadsheets provided in response to RCR-EE-20 contain detailed PA test component information that shows inclusion of oil savings in the PA test ratio calculation.

1 Residential Segment I and II programs (those supplementing HPwES and
2 WARMAdvantage CEP offerings).

3 At a minimum, NJNG residential programs should not be approved for extension
4 until and unless 1) they demonstrate cost-effectiveness 2) they document
5 incremental savings above the savings associated with implementation of the CEP
6 measures alone, and 3) they show why additional program support from NJNG is
7 necessary to incent increased customer participation in the CEP HPwES and
8 WARMAdvantage programs (or modifications of those programs, per the new
9 CEP structure in 2013) in NJNG's area. Furthermore, we suggest such program
10 restructuring be informed by insights consistent with the recommendations of a
11 third party evaluation. However, given the results of the AEG evaluation and the
12 problems with NJNG's CBA, I doubt that it is possible to restructure these
13 programs to make them cost-effective.

14 **F. OPOWER Program Proposal**
15

16 **Q. IS THE OPOWER PROGRAM COST-EFFECTIVE?**

17 A. Although OPOWER is only marginally cost effective per the Program
18 Administrator Cost Test, this program should be continued because it offers a
19 service that 1) has educational value and 2) is not available from CEP. However,
20 NJNG should determine whether and to what extent the customers participating in
21 OPOWER use existing rebates from the CEP and SAVEGREEN programs to
22 ensure that OPOWER savings are not double-counted.

23 **G. Oil Tank Removal Proposal**
24

25 **Q. PLEASE STATE YOUR CONCERNS WITH THE COMPANY'S**
26 **PROPOSED OIL TANK REMOVAL PROGRAM.**

27 A. The Oil Tank Removal program is a load-building program and would generate
28 revenues for the Company, and increase gas use. Further, as discussed above, the
29 relatively high cost-effectiveness of this program on a TRC basis is significantly

1 driven by the fuel costs savings resulting from the conversion from oil to gas. The
2 factors make it inappropriate to use gas ratepayer funds intended to promote
3 natural gas energy efficiency for this proposed new program. While it is
4 reasonable to allow NJCEP WARMAdvantage incentives for new gas furnaces or
5 boilers that are installed as part of a fuel-switching decision by customers, the oil
6 tank removal grant itself should not be funded through the RGGI EE program
7 structure since it does not promote reduced natural gas consumption.

8 **H. Commercial EE Program Proposals**

9 **Q. PLEASE PRESENT YOUR CONCERNS WITH THE COMPANY'S** 10 **PROPOSED SMALL AND LARGE COMMERCIAL PROGRAM.**

11 A. The Company has not explained why doubling participant incentives available
12 through the CEP is desirable or necessary. There is no analysis showing that
13 increases in incentives could increase participation. The Company has not
14 estimated the incremental energy savings that its program would yield, over and
15 above the savings that will be realized if only the existing level of CEP incentives
16 is available.

17 Although the Small and Large Commercial program appears to be cost-effective
18 with the combined incentives from CEP and NJNG, it is redundant to the CEP.
19 This program should not be approved unless 1) it can be shown that the NJNG
20 program will result in incremental savings above the savings associated with
21 implementation of the CEP measures alone, and 2) NJNG shows why additional
22 program support from NJNG is necessary to incent increased customer
23 participation in the CEP.

24 NJNG could consider restructuring these programs to more carefully and cost-
25 effectively complement CEP offerings. While such program redesign or
26 restructuring is not the focus of this testimony, I suggest that the programs in
27 general should seek to coordinate any unique value offered by NJNG (such as, but
28 not limited to, the capacity to provide on-bill financing, or the use of relevant
29 service-territory specific EE program knowledge not available to NJCEP) with the

1 overall implementation structure of the CEP programs when they are revised
2 through the new CEP Program Administrator arrangements in 2013.

3 **Q. PLEASE PRESENT YOUR ASSESSMENT OF THE COMPANY'S**
4 **PROPOSED DIRECT INSTALL COMMERCIAL PROGRAM.**

5 A. NJNG's Direct Install program would offer on-bill financing, which is not
6 available from CEP, and appears to be cost effective (again, on a combined
7 NJNG/CEP basis). Although NJNG has not demonstrated that its program will
8 increase savings beyond what would occur with CEP alone, this program has a
9 reasonable likelihood of providing incremental benefits. This program could be
10 allowed to go forward but only if NJNG can show that it will provide incremental
11 savings above the savings associated with implementation of the CEP measures
12 alone, and that the additional incentives from NJNG are necessary to incent
13 customer participation in the CEP Direct Install program in NJNG's area.

14 **I. Access for Affordable Energy Pilot Program**
15

16 **Q. PLEASE PRESENT YOUR ASSESSMENT OF THE COMPANY'S**
17 **"ACCESS TO AFFORDABLE ENERGY" PROPOSAL.**

18 A. The Access to Affordable Energy pilot should be allowed to proceed for another
19 year at its Board-approved funding level in Docket No. GR11070425.

20 **J. Program Evaluation**
21

22 **Q. PLEASE ASSESS NJNG'S PROGRAM EVALUATION.**

23 A. It is unknown if several of the NJNG programs in their current form have the
24 potential to be cost-effective. As noted above, a number of the programs offer
25 incremental incentives to those offered by CEP. Some form of program evaluation
26 is required to determine if NJNG programs may possibly be cost-effective if
27 structured differently. I recommend that an evaluation be conducted to assess the
28 efficacy of the overall program structure.

1 Any NJNG EE programs that the Board decides to approve should be subjected to
2 third party evaluation. This evaluation should consider, at a minimum, 1) whether
3 or not improvements are available that could improve program overall cost-
4 effectiveness, 2) how the NJNG program structure can best complement the CEP
5 structure and incentive design, when it becomes more clear what the CEP
6 structure will be, and 3) how to document incremental savings above the savings
7 associated with implementation of the CEP measures alone.

8 Evaluation should consider budget allocation. NJNG is spending 84% of the
9 program budget on the residential programs, and only 16% on the commercial
10 programs. Given that the commercial programs have a higher cost-effectiveness
11 than the residential programs, NJNG should consider providing more funding to
12 the commercial programs.

13 **K. CEP Program Developments**
14

15 **Q. DOES NJNG DOCUMENT HOW THE PROPOSED SAVEGREEN**
16 **PROGRAM EXTENSION WILL CONTRIBUTE TOWARDS MEETING**
17 **NJ EMP GOALS?**

18 A. No, not with any specificity. The 2011 Energy Master Plan contemplates a shift
19 from rebates to increased reliance on financing programs within the CEP (2011
20 New Jersey Energy Master Plan, “Redesign the Delivery of State Energy
21 Efficiency Programs”, page 119). It is not clear how NJNG’s proposed financing
22 incentives would interface with the CEP programs if the latter are transformed to
23 rely on financing.

24 Even after the NJNG evaluation is complete, the Board should not approve any of
25 the NJNG programs other than OPOWER and the Access extension, until 1) the
26 Board has determined the direction and structure of the NJCEP at the end of the
27 currently ongoing Comprehensive Energy Efficiency and Renewable Energy
28 Resource Analysis (CRA) process; and 2) the Board accepts a set of EE programs
29 recommended by the new CEP Program Administrator (CEP PA).

1 **L. Program Term**

2
3 **Q. PLEASE DISCUSS THE PROPOSED TERM OF NJNG'S PROGRAM.**

4 A. NJNG proposes a four year term for its proposed programs.

5 The AEG evaluation finds that lack of stability is hurting programs, implying the
6 importance of longer-term program implementation certainty. I agree with this
7 premise in the abstract; however, until the NJNG programs are better designed,
8 made cost-effective, and structured to complement (rather than replicate) CEP
9 structures, four years is excessive, especially given changes occurring at the state
10 level concerning the CEP. For example:

- 11 • CEP is shifting its emphasis to providing more loan-based programs, making
12 NJNG's financing programs potentially redundant, depending on the
13 differences in successful financing programs that rely on on-bill vs. off-bill
14 mechanisms.¹⁰ It is possible that the qualitative benefits of on-bill refinancing
15 (OBR) may not outweigh high costs.
- 16 • The AEG Evaluation finds that HPwES is not cost effective and needs
17 restructuring. The form of this restructuring will probably not be decided until
18 after the new CEP Program Administrator structure is in place. Once
19 restructured, NJNG's program could become redundant and/or need to be
20 redesigned.

21 While it may be fair to say that changing priorities of CEP administrators have
22 adversely affected NJNG's programs, a 4-year term for the current proposal would
23 not solve the problem. As long as NJNG SAVEGREEN program staff is trying to
24 coordinate with CEP staff, any instability in the CEP will affect the NJNG
25 programs. Until the CEP programs are stabilized, it is difficult to ascertain what
26 long-term program certainty would look like for NJNG programs. Because of the
27 uncertainty associated with the structure of the CEP as discussed above, any

¹⁰ Rate Counsel is submitting comments on a proposed transition to financing-based mechanisms in the CRA proceeding, BPU Dkt, No. EO11050324V.

1 NJNG EE programs that the Board decides to approve should be limited to a one
2 year term.

3 **M. Source of Funding**
4

5 **Q. HOW SHOULD PROGRAM FUNDING SOURCES BE IDENTIFIED AND**
6 **ACCOUNTED FOR?**

7 A. For any NJNG EE programs that the Board decides to approve, the program
8 descriptions should clearly state the source of funding (CEP or NJNG). This has
9 been an issue for the existing programs. For example, the response to discovery
10 request INFORMAL-1 states that NJNG, in some instances, provides funding for
11 grants that would otherwise be paid out of the NJCEP budget. Specifically,
12 customers who install “whole house” energy efficiency measures can qualify for
13 an NJCEP grant of up to \$5,000. Under its current programs, NJNG, instead of
14 OCE, funds such grants for customers who participate in the SAVEGREEN
15 OBRP. If these programs do go forward, the program language should make it
16 clear that NJNG does not have the ability to disburse payment of incentives
17 currently paid by OCE without further authorization from the Board.
18

19 **V. RECOMMENDATIONS**

20 **Q. WHAT ARE YOUR RECOMMENDATIONS REGARDING THE**
21 **CURRENT PETITION?**

22 A. In summary, I recommend the following:

- 23 1. I recommend discontinuance of the NJNG Residential Segment I and II programs
24 (those supplementing HPwES and WARMAdvantage CEP offerings) as currently
25 structured, because they are not cost-effective.

26 At a minimum, NJNG residential programs should not be approved until and
27 unless 1) they demonstrate cost-effectiveness 2) they document incremental
28 savings above the savings associated with implementation of the CEP measures

1 alone, and 3) they show why additional program support from NJNG is necessary
2 to incent increased customer participation in the CEP HPwES and
3 WARMAdvantage programs (or modifications of those programs, per the new
4 CEP structure in 2013) in NJNG's area. Furthermore, I suggest such program
5 restructuring be informed by insights consistent with the recommendations of a
6 third party evaluation.

7 2. Although OPOWER is only marginally cost effective per the PA test, this
8 program should be continued because it offers a service that 1) has educational
9 value and 2) is not available from CEP.

10 3. The Oil Tank Removal Grant program should not be funded through the RGGI
11 EE program structure. This program increases gas consumption and company
12 sales revenues.

13 4. Although the combined Small and Large Commercial programs appear to be cost-
14 effective when considered together with CEP, NJNG's proposed programs are
15 structured to provide additional monetary incentives to efficiency measures
16 already available through the CEP. These programs should not be allowed to go
17 forward as currently proposed unless it can be shown that they will cost-
18 effectively provide incremental savings above the savings associated with
19 implementation of the CEP measures alone, and that the additional incentives
20 from NJNG are necessary to incent customer participation in the CEP SmartStart
21 program in NJNG's area. Furthermore, NJNG should consider restructuring these
22 programs to reduce or eliminate redundant elements already provided by CEP,
23 such as direct incentive matching. NJNG should offer unique value (such as, but
24 not limited to, the capacity to provide on-bill financing, or the use of relevant
25 service-territory specific EE program knowledge not available to NJCEP) as a
26 complement to the CEP commercial and industrial program structure, as it will
27 exist in 2013 with the new CEP Program Administrator.

28 5. NJNG's Direct Install program offers on-bill financing, which is not available
29 from CEP, and appears to be cost effective on a combined basis with the CEP.
30 This program has a reasonable likelihood of providing incremental benefits

1 because it is targeted to reducing “access to capital” barriers through the OBRP.
2 However, NJNG has not demonstrated that its program will increase the savings
3 beyond what would occur with CEP alone. This program should only be allowed
4 to go forward if NJNG can show that the additional incentives from NJNG (the
5 value of OBRP) are necessary to incent customer participation in the CEP Direct
6 Install program in NJNG’s area.

7 6. The Access to Affordable Energy pilot should be allowed to proceed for another
8 year at its Board-approved funding level in Docket No. GR11070425.

9 7. Aside from the OPOWER and Access programs, the Board should not approve
10 NJNG SAVEGREEN programs until 1) the Board has determined the direction
11 and structure of the CEP at the end of the currently ongoing CRA process; and 2)
12 the Board accepts a set of EE programs recommended by the new CEP Program
13 Administrator (CEP PA). At that time, re-designed NJNG SAVEGREEN
14 programs, if developed, should be reviewed to ensure they complement, and not
15 replicate, new CEP offerings.

16 8. Any NJNG EE programs that the Board decides to approve should be subject to
17 third party evaluation. This evaluation should consider, at a minimum, 1) whether
18 or not the NJNG-specific components of the programs promote additional
19 participation and savings above what the NJCEP would achieve without NJNG
20 program additions, 2) whether or not improvements are available that could
21 improve program overall cost-effectiveness as measured by both the TRC and PA
22 test, and 3) in general, and specifically, how the NJNG program structure can best
23 complement the CEP structure and incentive design, when it becomes more clear
24 what the CEP structure will be.

25 9. For any NJNG EE programs that the Board decides to approve, the program
26 descriptions should clearly state the source of funding (CEP or NJNG). NJNG
27 funds should not be used to pay for services that the CEP otherwise would
28 provide.

1 I do not recommend that NJNG forego future EE efforts. However, any future
2 proposal should present programs that are well designed, complement the soon-to-be-
3 modified CEP program structures, and are clearly cost-effective.

4 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

5 A. Yes, it does. However, I reserve my right to amend my testimony subject to
6 updated information from the Company.

7

Exhibit RF-1

Resume of Robert M. Fagan

Robert M. Fagan

Senior Associate

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SUMMARY

Mechanical engineer and energy economics analyst with over 25 years of experience in the energy industry. Activities focused primarily on electric power industry issues, especially economic and technical analysis of transmission, wholesale electricity markets, renewable resource alternatives and assessment and implementation of demand-side alternatives.

In-depth understanding of the complexities of, and the interrelationships between, the technical and economic dimensions of the electric power industry in the US and Canada, including the following areas of expertise:

- Wholesale energy and capacity provision under market-based and regulated structures; the extent of competitiveness of such structures.
- Potential for and operational effects of wind power integration into utility systems.
- Transmission use pricing, encompassing congestion management, losses, LMP and alternatives, financial and physical transmission rights; and transmission asset pricing (embedded cost recovery tariffs).
- Physical transmission network characteristics; related generation dispatch/system operation functions; and technical and economic attributes of generation resources.
- RTO and ISO tariff and market rules structures and operation.
- FERC regulatory policies and initiatives, including those pertaining to RTO and ISO development and evolution.
- Demand-side management, including program implementation and evaluation; and load response presence in wholesale markets.
- Building energy end-use characteristics, and energy-efficient technology options.
- Fundamentals of electric distribution systems and substation layout and operation.
- Energy modeling (spreadsheet-based tools, industry standard tools for production cost and resource expansion, building energy analysis, understanding of power flow simulation fundamentals).
- State and provincial level regulatory policies and practices, including retail service and standard offer pricing structures.

-
- Gas industry fundamentals including regulatory and market structures, and physical infrastructure.

PROFESSIONAL EXPERIENCE

Synapse Energy Economics, Inc., Cambridge, MA. 2004 – Present. Senior Associate
Responsibilities include consulting on issues of energy economics, analysis of electricity utility planning, operation, and regulation, including issues of transmission, generation, and demand-side management. Provide expert witness testimony on various wholesale and retail electricity industry issues. Specific project experience includes the following:

- Analysis of Eastern Interconnection Planning Collaborative processes, including modeling structure and inputs assumptions for demand, supply and transmission resources.
- Analysis of need for transmission facilities in Maine, Ontario, Pennsylvania, Virginia, Minnesota.
- Ongoing analysis of wholesale and retail energy and capacity market issues in New Jersey, including assessment of BGS supply alternatives and demand response options.
- Analysis of PJM transmission-related issues, including cost allocation, need for new facilities and PJM's economic modeling of new transmission effects on PJM energy market.
- Ongoing analysis of utility-sponsored energy efficiency programs in Rhode Island as part of the Rhode Island DSM Collaborative; and ongoing analysis of the energy efficiency programs of New Jersey Clean Energy Program (CEP) and various utility-sponsored efficiency programs (RGGI programs).
- Analysis of California renewable integration issues for achieving 33% renewable energy penetration by 2020, especially modeling constructs and input assumptions.
- Analysis of proposals in Maine for utility companies to withdraw from the ISO-NE RTO.
- Analysis of utility planning and demand-side management issues in Delaware.
- Analysis of effect of increasing the system benefits charge (SBC) in Maine to increase procurement of energy efficiency and DSM resources; analysis of impact of DSM on transmission and distribution reinforcement need.
- Evaluation of wind energy potential and economics, related transmission issues, and resource planning in Minnesota, Iowa, Indiana, and Missouri; in particular in relation to alternatives to newly proposed coal-fired power plants in MN, IA and IN.
- Analysis of need for newly proposed transmission in Pennsylvania and Ontario.
- Evaluation of wind energy "firming" premium in BC Hydro Energy Call in British Columbia.
- Evaluation of pollutant emission reduction plans and the introduction of an open access transmission tariff in Nova Scotia.
- Evaluation of the merger of Duke and Cinergy with respect to Indiana ratepayer impacts.
- Review of the termination of a Joint Generation Dispatch Agreement between sister companies of Cinergy.
- Assessment of the potential for an interstate transfer of a DSM resource between the desert southwest and California, and the transmission system impacts associated with the resource.

-
- Analysis of various transmission system and market power issues associated with the proposed Exelon-PSEG merger.
 - Assessment of market power and transmission issues associated with the proposed use of an auction mechanism to supply standard offer power to ComEd native load customers.
 - Review and analysis of the impacts of a proposed second 345 kV tie to New Brunswick from Maine on northern Maine customers.

Tabors Caramanis & Associates, Cambridge, MA 1996 -2004. Senior Associate.

- Provided expert witness testimony on transmission issues in Ontario and Alberta.
- Supported FERC-filed testimony of Dr. Tabors in numerous dockets, addressing various electric transmission and wholesale market issues.
- Analyzed transmission pricing and access policies, and electric industry restructuring proposals in US and Canadian jurisdictions including Ontario, Alberta, PJM, New York, New England, California, ERCOT, and the Midwest. Evaluated and offered alternatives for congestion management methods and wholesale electric market design.
- Attended RTO/ISO meetings, and monitored and reported on continuing developments in the New England and PJM electricity markets. Consulted on New England FTR auction and ARR allocation schemes.
- Evaluated all facets of Ontario and Alberta wholesale market development and evolution since 1997. Offered congestion management, transmission, cross-border interchange, and energy and capacity market design options. Directly participated in the Ontario Market Design Committee process. Served on the Ontario Wholesale Market Design technical panel.
- Member of TCA GE MAPS modeling team in LMP price forecasting projects.
- Assessed different aspects of the broad competitive market development themes presented in the US FERC's SMD NOPR and the application of FERC's Order 2000 on RTO development.
- Reviewed utility merger savings benchmarks, evaluated status of utility generation market power, and provided technical support underlying the analysis of competitive wholesale electricity markets in major US regions.
- Conducted life-cycle utility cost analyses for proposed new and renovated residential housing at US military bases. Compared life-cycle utility cost options for large educational and medical campuses.
- Evaluated innovative DSM competitive procurement program utilizing performance-based contracting.

Charles River Associates, Boston, MA, 1992-1996. Associate. Developed DSM competitive procurement RFPs and evaluation plans, and performed DSM process and impact evaluations. Conducted quantitative studies examining electric utility mergers; and examined generation capacity concentration and transmission interconnections throughout the US. Analyzed natural gas and petroleum industry economic issues; and provided regulatory testimony support to CRA staff in proceedings before the US FERC and various state utility regulatory commissions.

Rhode Islanders Saving Energy, Providence, RI, 1987-1992. Senior Commercial/Industrial Energy Specialist. Performed site visits, analyzed end-use energy consumption and calculated energy-efficiency improvement potential in approximately 1,000 commercial, industrial, and institutional buildings throughout Rhode Island, including assessment of lighting, HVAC, hot water, building shell, refrigeration and industrial process systems. Recommended and assisted in implementation of energy efficiency measures, and coordinated customer participation in utility DSM program efforts.

Fairchild Weston Systems, Inc., Syosset, NY 1985-1986. Facilities Engineer. Designed space renovations; managed capital improvement projects; and supervised contractors in implementation of facility upgrades.

Narragansett Electric Company, Providence RI, 1981-1984. Supervisor of Operations and Maintenance. Directed electricians in operation, maintenance, and repair of high-voltage transmission and distribution substation equipment.

EDUCATION

Boston University, M.A. Energy and Environmental Studies, 1992
Resource Economics, Ecological Economics, Econometric Modeling

Clarkson University, B.S. Mechanical Engineering, 1981
Thermal Sciences

Additional Professional Training and Academic Coursework

Utility Wind Integration Group - Short Course on Integration and Interconnection of Wind Power Plants Into Electric Power Systems (2006).

Regulatory and Legal Aspects of Electric Power Systems – Short Course – University of Texas at Austin (1998)

Illuminating Engineering Society courses in lighting design (1989).

Coursework in Solar Engineering; Building System Controls; and Cogeneration at Worcester Polytechnic Institute and Northeastern University (1984, 1988-89).

Graduate Coursework in Mechanical and Aerospace Engineering – Polytechnic Institute of New York (1985-1986)

SUMMARY OF TESTIMONY

New Jersey Board of Public Utilities. Direct testimony in the matter of the petition of Pivotal Utility Holdings, Inc. D/B/A Elizabethtown gas for authority to extend the term of energy efficiency programs with certain modifications and approval of associated cost recovery. Docket No. GO11070399. Hearing conducted December 16, 2011.

New Jersey Board of Public Utilities. Oral testimony before the Board, on certain aspects of the Board's inquiry into capacity and transmission interconnection issues, Docket No. EO11050309. Hearing conducted October 14, 2011.

New Jersey Board of Public Utilities. Certification before the Board, I/M/O a Generic Stakeholder Proceeding To Consider Prospective Standards for Gas Distribution Utility Rate Discounts and Associated Contract Terms, Docket Nos. GR10100761 and ER10100762. Issues addressed included SBC charge rates associated with gas generation. Testimony filed January 28, 2011.

New Jersey Board of Public Utilities. Oral testimony before the Board, on certain aspects of the Basic Generation Service (BGS) procurement plan for service beginning June 1, 2011. Docket No. ER10040287. Hearing conducted September, 2010.

Virginia State Corporation Commission. Pre-filed Direct Testimony filed October 23, 2009 on behalf of the Sierra Club on the need for the Potomac-Appalachian Transmission Highline (PATH), a 765 kV proposed transmission line across West Virginia, Virginia and Maryland. Proceedings are currently terminated as filing party (American Electric Power and Allegheny Power) withdrew the application pending additional RTEP analyses by PJM scheduled for 2010. Testimony addressed issues of need and modeling of DSM resources as part of the PJM RTEP planning processes.

Pennsylvania Public Utility Commission. Direct Testimony filed June 30, 2009 on behalf of the Pennsylvania Office of Consumer Advocate on the need for the Susquehanna-Roseland 500 kv proposed transmission line in portions of Luckawanna, Luzerne, Monroe, Pike, and Wayne counties. Testimony assessed the modeling for the proposed line, including load forecasts, energy efficiency resources, and demand response resources. Docket number A-2009-2082652. Surrebuttal testimony filed August 24, 2009.

Delaware Public Service Commission. Report on Behalf of the Staff of the Delaware Public Service Commission, filed in Docket No. 07-20, Delmarva's IRP docket, "Review of Delmarva Power & Light Company's Integrated Resource Plan", April 2, 2009. Jointly authored with Alice Napoleon, William Steinhurst, David White, and Kenji Takahashi of Synapse Energy Economics.

State of Maine Public Utilities Commission. Pre-filed Direct Testimony on the Application of Central Maine Power for a Certificate of Public Convenience and Necessity for the proposed Maine Power Reliability Project (MPRP), a \$1.55 billion transmission enhancement project. Direct testimony focus on the non-transmission alternatives analysis conducted on behalf of CMP. Maine PUC Docket 2008-255, filed January 12, 2009 (direct) and surrebuttal (February 2, 2010) on behalf of the Maine Office of Public Advocate. Docket proceeding 2008-255, hearings completed in February 2010.

New Jersey Board of Public Utilities. Oral testimony before the Board, jointly with Bruce Biewald, on certain aspects of the Basic Generation Service (BGS) procurement plan for service beginning June 1, 2009. Docket No. ER08050310. Hearing conducted on September 29, 2008.

Wisconsin Public Service Commission. Direct and Surrebuttal Testimony in Docket 6680-CE-170 on behalf of Clean Wisconsin in the matter of an application by Wisconsin Power and Light for a CPCN for construction of a 300 MW coal plant. The testimony focused on the alternative energy options available with wind power, and the effect of the MISO RTO in helping provide

capacity and energy to the Wisconsin area reliably without needed the proposed coal plant. The CPCN was denied by the WPSC in December 2008. Testimony filed in August (Direct) and September (Surrebuttal), 2008.

Ontario Energy Board. Pre-Filed Direct Testimony filed on behalf of Pollution Probe in the matter of the Examination and Critique of Demand Response and Combined Heat and Power Aspects of the Ontario Power Authority's Integrated Power System Plan and Procurement Process, Docket EB-2007-0707. The testimony addressed issues associated with the planned levels of procurement of demand response, combined heat and power, and NUG resources as part of Ontario Power Authority's long-term integrated planning process. Testimony filed on August 1, 2008. Docket is open; additional Power System Plan and Procurement filings expected from the Ontario Power Authority.

Ontario Energy Board. Direct and Supplemental Testimony filed jointly with Mr. Peter Lanzalotta on behalf of Pollution Probe in the matter of Hydro One Networks Inc. application to construct a new 500 kV transmission line between the Bruce Power complex and the town of Milton, Ontario. Docket EB-2007-0050. The testimony addressed issues of congestion (locked-in energy) modeling, need, and series compensation and generation rejection alternatives to the proposed line. Testimony filed on April 18, 2008 (Direct) and May 15, 2008 (Supplemental).

Federal Energy Regulatory Commission. Direct and Rebuttal Testimony on PJM Regional Transmission Expansion Plan (RTEP) Cost Allocation issues in Dockets ER06-456, ER06-954, ER06-1271, ER07-424, EL07-57, ER06-880, et al. The testimony addressed merchant transmission cost allocation issues. Testimony filed on behalf of the New Jersey Department of the Public Advocate, Ratepayer Division. Testimony filed on January 23, 2008 (Direct) and April 16, 2008 (Rebuttal).

Minnesota Public Utilities Commission. Supplemental Testimony and Supplemental Rebuttal Testimony on applicants' estimates of DSM savings in the Certificate of Need proceeding for the Big Stone II coal-fired power plant proposal. In the Matter of the Application by Otter Tail Power Company and Others for Certification of Transmission Facilities in Western Minnesota and In the Matter of the Application to the Minnesota Public Utilities Commission for a Route Permit for the Big Stone Transmission Project in Western Minnesota. OAH No. 12-2500-17037-2 and OAH No. 12-2500-17038-2; and MPUC Dkt. Nos. CN-05-619 and TR-05-1275. Testimony filed December 21, 2007 (Supplemental) and January 16, 2008 (Supplemental Rebuttal).

Pennsylvania Public Utility Commission. Direct testimony filed before the Commission on the effect of demand-side management on the need for a transmission line and the level of consideration of potential carbon regulation on PJM's analysis of need for the TrAIL transmission line. Docket Nos. A-110172 *et al.* Testimony filed October 31, 2007.

Iowa Public Utilities Board. Direct testimony filed before the Board on wind energy assessment in Interstate Power and Light's resource plans and its relationship to a proposed coal plant in Iowa. Docket No. GCU-07-01. Testimony filed October 21, 2007.

New Jersey Board of Public Utilities. Direct testimony before the Board on certain aspects of PSE&G's proposal to use ratepayer funding to finance a solar photovoltaic panel initiative in support of the State's solar RPS. Docket No. EO07040278. Testimony filed September 21, 2007.

Indiana Utility Regulatory Commission. Direct Testimony filed before the Commission addressing a proposed Duke – Vectren IGCC coal plant. Testimony focused on wind power potential in Indiana. Filed on behalf of the Citizens Action Coalition of Indiana, Cause No. 43114 May 14, 2007.

State of Maine Public Utilities Commission. Pre-filed testimony on the ability of DSM and distributed generation potential to reduce local supply area reinforcement needs. Testimony filed before the Commission on a Request for Certificate of Public Convenience and Necessity to Build a 115 kV Transmission Line between Saco and Old Orchard Beach. Testimony filed jointly with Peter Lanzalotta, on behalf of the Maine Public Advocate. Docket No. 2006-487, February 27, 2007.

Minnesota Public Utilities Commission. Rebuttal Testimony on wind energy potential and related transmission issues in the Certificate of Need proceeding for the Big Stone II coal-fired power plant proposal. In the Matter of the Application by Otter Tail Power Company and Others for Certification of Transmission Facilities in Western Minnesota and In the Matter of the Application to the Minnesota Public Utilities Commission for a Route Permit for the Big Stone Transmission Project in Western Minnesota. OAH No. 12-2500-17037-2 and OAH No. 12-2500-17038-2; and MPUC Dkt. Nos. CN-05-619 and TR-05-1275. December 8, 2006.

British Columbia Utilities Commission. In the Matter of BC Hydro 2006 Integrated Electricity Plan and Long Term Acquisition Plan. Pre-filed Evidence filed on behalf of the Sierra Club (BC Chapter), Sustainable Energy Association of BC, and Peace Valley Environment Association. October 6, 2006. Testimony addressing the “firming premium” associated with 2006 Call energy, liquidated damages provisions, and wind integration studies.

Maine Joint Legislative Committee on Utilities, Energy and Transportation. Testimony before the Committee in support of an Act to Encourage Energy Efficiency (LD 1931) on behalf of the Maine Natural Resources Council, February 9, 2006. The testimony and related analysis focused on the costs and benefits of increasing the system benefits charge to increase the level of energy efficiency installations by Efficiency Maine.

Nova Scotia Utilities and Review Board (UARB). Testimony filed before the UARB on behalf of the UARB staff, In The Matter of an Application by Nova Scotia Power Inc. for Approval of Air Emissions Strategy Capital Projects. Filed January 30, 2006. The testimony addressed the application for approval of installation of a flue gas desulphurization system at NSPI's Lingan station and a review of alternatives to comply with provincial emission regulations.

New Jersey Board of Public Utilities. Direct and Surrebuttal Testimony filed before the Commission addressing the Joint Petition Of Public Service Electric and Gas Company And Exelon Corporation For Approval of a Change in Control Of Public Service Electric and Gas

Company And Related Authorizations (the proposed merger), BPU Docket EM05020106. Joint Testimony with Bruce Biewald and David Schlissel. Filed on behalf of the New Jersey Division of the Ratepayer Advocate, November 14, 2005 (direct) and December 27, 2005 (surrebuttal).

Indiana Utility Regulatory Commission. Direct Testimony filed before the Commission addressing the proposed Duke – Cinergy merger. Filed on behalf of the Citizens Action Coalition of Indiana, Cause No. 42873, November 8, 2005.

Illinois Commerce Commission. Direct and Rebuttal Testimony filed before the Commission addressing wholesale market aspects of Ameren’s proposed competitive procurement auction (CPA). Testimony filed on behalf of the Illinois Citizens Utility Board in Dockets 05-0160, 05-0161, 05-0162. Direct Testimony filed June 15, 2005; Rebuttal Testimony filed August 10, 2005.

Illinois Commerce Commission. Direct and Rebuttal Testimony filed before the Commission addressing wholesale market aspects of Commonwealth Edison’s proposed BUS (Basic Utility Service) competitive auction procurement. Testimony filed on behalf of the Illinois Citizens Utility Board and the Cook County State’s Attorney’s Office in Docket 05-0159. Direct Testimony filed June 8, 2005; Rebuttal Testimony filed August 3, 2005.

Indiana Utility Regulatory Commission. Responsive Testimony filed before the Commission addressing a proposed Settlement Agreement between PSI and other parties in respect of issues surrounding the Joint Generation Dispatch Agreement in place between PSI and CG&E. Filed on behalf of the Citizens Action Coalition of Indiana, Consolidated Causes No. 38707 FAC 61S1, 41954, and 42359-S1, August 31, 2005.

Indiana Utility Regulatory Commission. Direct Testimony filed before the Commission in a Fuel Adjustment Clause (FAC) Proceeding concerning the pricing aspects and merits of continuation of the Joint Generation Dispatch Agreement in place between PSI and CG&E, and related issues of PSI lost revenues from inter-company energy pricing policies. Filed on behalf of the Citizens Action Coalition of Indiana, Cause No. 38707 FAC 61S1, May 23, 2005.

Indiana Utility Regulatory Commission. Direct Testimony filed before the Commission concerning the pricing aspects and merits of continuation of the Joint Generation Dispatch Agreement in place between PSI and CG&E. Filed on behalf of the Citizens Action Coalition of Indiana, Cause No. 41954, April 21, 2005.

State of Maine Public Utilities Commission. Testimony filed before the Commission on an Analysis of Eastern Maine Electric Cooperative, Inc.’s Petition for a Finding of Public Convenience and Necessity to Purchase 15 MW of Transmission Capacity from New Brunswick Power and for Related Approvals. Testimony filed jointly with David Schlissel and Peter Lanzalotta, on behalf of the Maine Public Advocate. Docket No. 2005-17, July 19, 2005.

State of Maine Public Utilities Commission. Testimony filed before the Commission on an Analysis of Maine Public Service Company Request for a Certificate of Public Convenience and Necessity to Purchase 35 MW of Transmission Capacity from New Brunswick Power.

Testimony filed jointly with David Schlissel and Peter Lanzalotta, on behalf of the Maine Public Advocate. Docket No. 2004-538 Phase II, April 14, 2005.

Nova Scotia Utilities and Review Board (UARB). Testimony filed before the UARB on behalf of the UARB staff, In The Matter of an Application by Nova Scotia Power Inc. for Approval of an Open Access Transmission Tariff (OATT). Filed April 5, 2005. The testimony addressed various aspects of OATTs and FERC's *pro forma* Order 888 OATT.

Texas Public Utilities Commission. Testimony filed before the Texas PUC in Docket No. 30485 on behalf of the Gulf Coast Coalition of Cities on CenterPoint Energy Houston Electric, LLC. Application for a Financing Order, January 7, 2005. The testimony addressed excess mitigation credits associated with CenterPoint's stranded cost recovery.

Ontario Energy Board. Testimony filed before the Ontario Energy Board, RP-2002-0120, et al., Review of the Transmission System Code (TSC) and Related Matters, Detailed Submission to the Ontario Energy Board in Response To Phase I Questions Concerning the Transmission System Code and Related Matters, October 31, 2002, on behalf of TransAlta Corporation; and Reply Comments for same, November 21, 2002. Related direct and reply filings in response to the Ontario Energy Board's "Preliminary Propositions" on TSC issues in May and June, 2003.

Alberta Energy and Utilities Board. Testimony filed before the Alberta Energy and Utilities Board, in the Matter of the Transmission Administrator's 2001 Phase I and Phase II General Rate Application, no. 2000135, pertaining to Supply Transmission Service charge proposals. Joint testimony filed with Dr. Richard D. Tabors. March 28, 2001. Testimony filed on behalf of the Alberta Buyers Coalition.

Ontario Energy Board. Testimony filed before the Ontario Energy Board, RP-1999-0044, Critique of Ontario Hydro Networks Company's Transmission Tariff Proposal and Proposal for Alternative Rate Design, January 17, 2000. Testimony filed on behalf of the Independent Power Producer's Society of Ontario.

PAPERS, PUBLICATIONS AND PRESENTATIONS

Potential Impacts of Replacing Retiring Coal Capacity in the Midwest Independent System Operator (MISO) Region with Natural Gas or Wind Capacity, with Rick Hornby, David White, John Rosenkranz, Patrick Knight, and Rachel Wilson. Prepared for the Iowa Utilities Board (IUB), September 14, 2012.

The Potential Rate Effects of Wind Energy and Transmission in the Midwest ISO Region, with Max Chang, Patrick Knight, Melissa Schultz, Tyler Comings, Ezra Hausman, and Rachel Wilson. Prepared for Eergy Future Coalition, August 31, 2012.

Indian Point Energy Center Nuclear Plant Retirement Analysis, with Tim Woolf and Matt Wittenstein. Prepared for Natural Resources Defense Council, and Riverkeeper, October 17, 2011.

Assessing the Multiple Benefits of Clean Energy: A Resource for States, with a multi-disciplinary team of consultants. Prepared for U.S. Environmental Protection Agency, February 1, 2010.

Synapse Report and Ohio Comments in Case No. 09-09-EL-COI, "The Value of Continued Participation in RTOs", with Rick Hornby and Bruce Biewald. Prepared for Ohio Consumers' Counsel, May 26, 2009.

Review of AmerenUE February 2008 Integrated Resource Plan, with Rick Hornby, Jeff Loiter, Phil Mosenthal, Tom Franks, and David White. Prepared for Missouri Department of Natural Resources, June 18, 2008.

LMP Electricity Markets: Market Operations, Market Power, and Value for Consumers with Ezra Hausman, David White, Kenji Takahashi, and Alice Napoleon. Prepared for American Public Power Association, February 5, 2007.

Interstate Transfer of a DSM Resource: New Mexico DSM as an Alternative to Power from Mohave Generating Station. Jointly authored with Tim Woolf, Bill Steinhurst and Bruce Biewald. Presented at the 2006 ACEEE Summer Study on Energy Efficiency in Buildings and published in the proceedings. (2006)

SMD and RTO West: Where are the Benefits for Alberta? Keynote Paper prepared for the 9th Annual Conference of the Independent Power Producers Society of Alberta, with Dr. Richard D. Tabors, March 7, 2003.

A Progressive Transmission Tariff Regime: The Impact of Net Billing, presentation at the Independent Power Producer Society of Ontario annual conference, November 1999.

Tariff Structure for an Independent Transmission Company, with Richard D. Tabors, Assef Zobian, Narasimha Rao, and Rick Hornby, TCA Working Paper 101-1099-0241, November 1999.

Transmission Congestion Pricing Within and Around Ontario, presentation at the Canadian Transmission Restructuring Infocast Conference, Toronto, June 2-4, 1999.

The Restructured Ontario Electricity Generation Market and Stranded Costs. An internal company report presented to the Ontario Ministry of Energy and Environment on behalf of Enron Capital and Trade Resources Canada Corp., February 1998.

Alberta Legislated Hedges Briefing Note. An internal company report presented to the Alberta Department of Energy on behalf of Enron Capital and Trade Resources Canada, January 1998.

Generation Market Power in New England: Overall and on the Margin. Presentation at Infocast Conference: New Developments in Northeast and Mid-Atlantic Wholesale Power Markets, Boston, June 1997.

The Market for Power in New England: The Competitive Implications of Restructuring. Prepared for the Office of the Attorney General, Commonwealth of Massachusetts, by Tabors Caramanis & Associates with Charles River Associates, April 1996. R. Fagan was a key member of the team that produced the report.

Estimating DSM Impacts for Large Commercial and Industrial Electricity Users. Lead investigator and author, with M. Gokhale, D.S. Levy, P.J. Spinney, G.C. Watkins. Presented at The Seventh International Energy Program Evaluation Conference, Chicago, Illinois, August 1995, and published in the Conference Proceedings.

Sampling Issues in Estimating DSM Savings: An Issue Paper for Commonwealth Electric. Prepared with G.C. Watkins, Charles River Associates. Report for COM/Electric System, filed with the MA Dept. of Public Utilities (MDPU), April 28, 1995, Docket # DPU 95-2/3-CC-1.

Demand-side Management Information Systems (DSMIS) Overview. Electric Power Research Institute Technical Report TR-104707. Robert M. Fagan and Peter S. Spinney, principal investigators, prepared by Charles River Associates for EPRI, January 1995.

Impact Evaluation of Commonwealth Electric's Customized Rebate Program. With P.J. Spinney and G.C. Watkins. Charles River Associates, Initial and Updated Reports, April 1994, April 1995, and April 1996. 1995 updated report filed with the MDPU, April 28, 1995, Docket # DPU 95-2/3-CC-1. The initial report filed with the MDPU, April 1, 1994.

Northeast Utilities Energy Conscious Construction Program (Comprehensive Area): Level I and Level II Impact Evaluation Reports. With Peter S. Spinney (CRA) and Abbe Bjorklund (Energy Investments). Charles River Associates Reports prepared for Northeast Utilities, June and July 1994.

The Role of Trade Allies in C&I DSM Programs: A New Focus for Program Evaluation, Paper authored by Peter J. Spinney (Charles River Associates) and John Peloza (Wisconsin Electric Power Corp.). Presented by Bob Fagan at the Sixth International Energy Evaluation Conference, Chicago, Illinois, August 1993.

Resume dated October 2012.