

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

TESTIMONY OF

JOHN J. PLUNKETT
GREEN ENERGY ECONOMICS GROUP, INC.

ON BEHALF OF
PHILADELPHIA GAS WORKS

DOCKET NO. R-2009-2139884

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1 **I. Identification & Qualifications**

2 **Q: State your name, occupation, and business address.**

3 A: I am John J. Plunkett. I am a partner in and president of Green Energy
4 Economics Group, Inc., a small energy consultancy I co-founded in 2005.
5 My office address is 1002 Jerusalem Road, Bristol Vermont 05443.

6 **Q: Summarize your qualifications.**

7 A: My resume is attached as Exhibit JJP-1.

8 **Q: Have you testified previously in utility regulatory proceedings?**

9 A: Yes. I have testified over two dozen times before utility regulators in a dozen
10 states and three Canadian provinces.

11 **Q: Have you testified previously before the Pennsylvania Public Utility
12 Commission (PUC)?**

13 A: Yes, on several occasions since 1985. In 2006 I submitted written direct and
14 surrebuttal testimony for Citizens for Pennsylvania's Future (Pennfuture) on
15 appropriate levels of electric DSM investment in Docket Nos. 00061366 and
16 00061367 re Metropolitan Edison Company and Pennsylvania Electric
17 Company; and Docket No. R-00061346 re Duquesne Light Company. In
18 2005 I submitted testimony on behalf of PennFuture regarding Energy-
19 Efficiency portfolio investment in the Exelon merger proceeding in Docket
20 No. A-110550F0160.

21 In 1985, I testified as an expert witness on behalf of Office of Consumer
22 Advocate ("OCA") on the potential for energy efficiency to provide an
23 economical alternative to completing and operating the second unit of the
24 Limerick nuclear power station.

1 **Q: Describe your work on energy efficiency and conservation investment**
2 **plans in the United States over the last ten years.**

3 A: I have been involved in the review or preparation of many gas and electricity
4 demand-side management investment plans over the past two decades. In
5 2008-9, I testified in two proceedings before the British Columbia Utilities
6 Commission concerning the proposed DSM program plans filed (separately)
7 by Terasen Gas and BC Hydro.

8 I am in my second year working for People's Gas, a natural gas
9 utility serving the city of Chicago and its suburbs, on economic analysis in
10 the planning and implementation of its Chicagoland three-year energy
11 efficiency program portfolio. Since 2007 I have been working for New York
12 City's Economic Development Corporation on three parallel assignments,
13 including the Public Service Commission's Energy Efficiency Portfolio
14 proceeding to establish programs for Consolidated Edison's customers to
15 reduce by 15% the forecasted electricity and gas requirements for 2015. I
16 have also assisted the city in collaborative negotiations concerning
17 Consolidated Edison's gas DSM programs for 2009-2010, and in the design
18 and evaluation of its geographically targeted electric DSM program to defer
19 transmission and distribution (T&D) investment.

20 Since its inception in 2000, I have been engaged as a senior advisor for
21 Efficiency Vermont, the nation's first statewide "energy-efficiency utility." I
22 helped to establish performance goals for three, three-year contracts with the
23 Public Service Board. In the 2009-2011 contract, portfolio investment will
24 approach \$40 million annually, placing Vermont, for its size, at the forefront
25 of energy-efficiency investment in North America. My most recent
26 assignment was to lead a team to forecast economically achievable peak

1 demand and energy savings from continued efficiency investment for twenty
2 more years.

3 **Q: What experience do you have with energy efficiency and conservation**
4 **investment in China?**

5 A: I have consulted on energy efficiency and conservation at the national and
6 provincial levels in China for several non-governmental organizations since
7 2003. Since 2007, I have provided technical support on the economic and
8 financial assessment of energy efficiency and conservation investment
9 projects in Guangdong Province for the Montpelier, Vermont-based Institute
10 for Sustainable Communities. In that effort, I am currently working with
11 Chinese experts to train and technically support citizen groups in the
12 economic and financial analysis of community scale efficiency and
13 renewable projects in three cities in Guangdong.

14 For the Asian Development Bank in 2006-2007, I led a team of Chinese
15 and American experts in a pre-feasibility study of a 24-year, \$120 million
16 loan to Guangdong Province to establish a revolving financing facility for
17 industrial and commercial / institutional efficiency retrofit investments. This
18 analysis included technical, economic, and financial analysis of the
19 “efficiency power plant” portfolio, and of case studies of ten “subprojects.”
20 ADB’s Board of Directors unanimously approved the loan in June 2008.

21 From July 2003 through 2007, I was the consulting team leader for the
22 Natural Resources Defense Council on the development, assessment, and
23 implementation of Chinese demand side management investment portfolios. I
24 led the modification and application of U.S.-based program and portfolio
25 economic analysis tools for DSM planning in Jiangsu Province. There I
26 assisted with the design and planning for first-stage implementation of DSM

1 programs investing \$12 million annually on high-efficiency retrofits to
2 industrial motors and drives and commercial lighting and cooling. I provided
3 training and technical support on economic and financial analysis of
4 industrial retrofit projects for structuring and negotiating financial incentive
5 offers to customers in 2007 and 2008.

6 I was on the consulting team that drafted a national DSM
7 implementation manual last year, sponsored by the PRC's National
8 Development and Reform Commission. Working with California's investor-
9 owned utilities and American and Chinese experts, I wrote chapters
10 concerning performance indicators and cost-effectiveness analysis. The
11 Chinese central government approved and issued the national DSM manual
12 in April 2008.

13 **Q: Have you done any other work related to demand-side management**
14 **investment in Pennsylvania?**

15 **A:** Yes. In 2007 I prepared a report for Pennfuture examining the potential for
16 expanded DSM investment to offset growth in long-term electricity
17 requirements. I found that by following in the footsteps of leading DSM
18 program administrators in California and Vermont, Pennsylvania could cost-
19 effectively eliminate growth in electricity supply requirements.

20 In 2005, also on behalf of Pennfuture, I led a consulting team that
21 recommended protocols ultimately adopted by the Commission for certifying
22 compliance with PUC rulemaking to implement energy-efficiency provisions
23 of an alternative energy portfolio standard.

24 In 1997, I was the lead author of a business plan for an all-energy
25 consumer-owned cooperative to serve Philadelphia and Pittsburgh, prepared

1 on behalf of the Energy Coordinating Agency of Philadelphia and other non-
2 government organizations.

3 From 1991 to 1993, I provided technical support to the Pennsylvania
4 Energy Office in its evaluation of Pennsylvania electric utility demand-
5 management plans. With Paul Chernick, I co-authored a comprehensive,
6 study of all aspects of demand management planning and regulation. This
7 five-volume report, entitled "From Here to Efficiency," surveyed such core
8 DSM issues as program design, cost-recovery mechanisms, and cost-
9 effectiveness assessment. I still use this material for training purposes in
10 assignments elsewhere.

11 **II. Introduction and Summary**

12 **Q: On whose behalf are you testifying?**

13 A: My testimony is sponsored by Philadelphia Gas Works (PGW).

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

15 A: The purpose of my testimony is fourfold: first, to explain why in my opinion
16 it is important that PGW have an appropriately structured and reasonably
17 sized DSM plan; second, to describe the DSM program portfolio that PGW
18 proposes to implement over the next five years; third, to present the program
19 expenditures and gas savings planned for each year, and the supporting
20 calculation of benefits and costs to PGW's customers and its overall
21 economy over the lifetime of all the measures installed as a result of
22 implementing the portfolio; and fourth, to demonstrate that the programs
23 PGW proposes follow best industry design and implementation practices.

24 **Q: Summarize your testimony.**

1 A: In Section III, I explain why PGW's proposed DSM portfolio is consistent
2 with government policy to conserve natural resources, to reduce carbon
3 emissions and to use energy in the most efficient manner possible. In Section
4 IV, I describe the 7 programs PGW proposes to implement as part of its five-
5 year \$54 million demand-side management portfolio. In Section V, I explain
6 the portfolio's annual budgets, gas savings and strategy. In Section VI, I
7 describe the benefits and costs of the portfolio.

8 PGW plans to unveil the portfolio, upon PUC approval, in three phases
9 starting in September 2010, or sooner if allowed to do so. Building on the
10 success of PGW's existing low-income program, the portfolio starts by
11 enhancing the comprehensiveness of efficiency treatment and increasing the
12 number of customers treated. In 2010, PGW also plans to work with other
13 City government institutions on a five-year campaign to invest in cost-
14 effective efficiency retrofits of all municipal facilities.

15 During the second stage of program implementation, PGW will expand
16 availability of whole-house efficiency services to the rest of Philadelphia's
17 residential customers in 2011.¹ PGW will also introduce financial incentives
18 to increase penetration of high-efficiency technologies in markets in which
19 gas-using heating and other equipment is routinely bought and sold.

20 In 2012, PGW will introduce financial incentives and other assistance to
21 improve building and equipment efficiency in residential and commercial
22 construction and renovation. The third phase of portfolio implementation
23 will also include incentives and services to encourage gas efficiency retrofits
24 to existing commercial facilities.

¹ I am informed by PGW that PGW will make all efforts to begin implementation of programs earlier if allowed to do so by the Commission.

1 Throughout the five year period covered by the DSM Plan, PGW will
2 work with other market participants to integrate gas efficiency with
3 electricity, water, and other efficiency investments to minimize costs and
4 maximize benefits from program implementation.

5 These investments will require outlays on the part of PGW ranging from
6 \$0.35 to \$15.7 million annually. PGW will administer these programs by
7 continuing its successful practice of managing outside contractors to deliver
8 services meeting exacting quality standards. PGW will meet the increased
9 management responsibilities associated with expanding its DSM portfolio
10 through a combination of seasoned senior staff, modest levels of additional
11 staffing, and a few specialized consultants to help PGW specify, plan, direct,
12 oversee, report on, and evaluate the work of independent program
13 implementation contractors. PGW plans to continue the current practice of
14 regular, independent audits of the program.

15 From this cumulative investment of \$54 million, PGW expects to
16 reduce consumption by 2.64 million therms per year. Including participating
17 customers' direct investment in efficiency measures promoted by PGW's
18 programs, total program investment over five years is estimated at \$58
19 million in present worth. The benefits of these savings are valued at \$113
20 million over the life expectancy of all the efficiency measures installed
21 through the programs. Benefits are valued at the avoided costs of gas supply
22 to PGW for meeting customer requirements, as discussed in the testimony of
23 PGW witness Chernick.

24 The net economic benefits to Philadelphia Gas customers are valued at
25 \$55 million, above and beyond PGW and customer costs. These cost savings
26 in turn increase the amount of discretionary income available to City
27 households, which they are free to spend and/or save as they see fit.

1 Business customers likewise will enjoy lower operating costs, which will
2 increase profitability. Lower operating costs for City-owned and -managed
3 properties will help ease the burden on the City's residential and business
4 taxpayers as well as reducing the City's operating budget.

5 The additional income afforded City households and businesses by gas
6 bill savings by PGW programs will further stimulate economic activity as
7 customers spend more on goods and services, some of which will be
8 provided in whole or in part with local labor and other resources. This
9 economic stimulus is an indirect job-producing benefit from lowering gas
10 bills with cost-effective DSM investment and is likely to be several times
11 larger than the direct net benefit created by the PGW DSM portfolio

12 **III. Justification for PGW Gas Conservation Programs**

13 **Q. Why is it appropriate for PGW to implement a Demand-Side
14 Management energy efficiency and conservation plan?**

15 **A:** Improving efficiency in all the end uses of our energy resources is the
16 cornerstone of this nation's energy, economic, and environmental policy
17 goals. In Pennsylvania, the General Assembly has embraced this view by the
18 passage of Act 129 of 2008 which mandates, among other things, the
19 implementation of electric distribution company programs, funded by
20 ratepayers, to promote energy conservation and efficiency improvements. I
21 can think of no valid reason why the Act's mandate for utility distribution
22 company conservation programs should not also apply to natural gas utilities
23 with equal force. Over 30 years of program experience across North America
24 proves that large-scale energy efficiency and conservation investment

1 portfolios can be efficiently and cost-effectively administered by the
2 distribution utilities responsible for delivering energy service.

3 **Q. Is it particularly important for PGW to implement a DSM plan in**
4 **comparison to other natural gas utilities?**

5 A: Yes. Such a plan makes particular sense for PGW for several reasons. Its
6 rates are higher than the average for other Pennsylvania natural gas utilities.
7 Compared to other gas utilities in the Commonwealth, it has a higher
8 proportion of residential customers, a higher proportion of whom has low
9 incomes. Moreover, PGW has had a successful low-income energy
10 conservation program for some years. This particular experience puts PGW
11 in an especially strong position to implement the proposed plan.

12 **Q. Will PGW's plan, if implemented, benefit its customers?**

13 A. Yes, significantly. In the narrative description of PGW's plan, which is
14 Exhibit JJP-6 to my testimony, I describe the plan's goals and objectives:

15 PGW's DSM plan has five broad goals:

- 16 • Reduce customer bills;
- 17 • Maximize customer value;
- 18 • Contribute to the fulfillment of the City's sustainability plan;
- 19 • Reduce PGW cash flow requirements;
- 20 • Help the Commonwealth and the nation reduce greenhouse
21 gas emissions.

22 In pursuit of these goals, PGW has designed and will implement the DSM
23 plan according to the following principles:

- 24 • Field a portfolio of programs that targets cost-effective gas
25 efficiency savings among all PGW's firm heating customers;

- 1 • Maximize delivery efficiency to minimize costs and
2 maximize coverage from the available budget;
- 3 • Stage program implementation to permit orderly and
4 sustainable expansion;
- 5 • Treat customers in greatest economic need and with most
6 cost-effective opportunities first;
- 7 • Support economic development in the City, both directly
8 through more intensive employment of local resources to save
9 natural gas, and indirectly through the economic stimulus
10 generated by increasing the amount of money City
11 households and businesses have available to spend for non-
12 gas goods and services; and
- 13 • For retrofit and new construction customers, avoid lost
14 opportunities by seeking comprehensive energy savings of
15 both gas and electric consumption.

16 Accordingly, PGW's plan will provide benefits not only to its customers but
17 also to the Company, the City and the region.

18 **Q. Given all the other sources of conservation and energy efficiency**
19 **assistance from federal initiatives, why is it appropriate for PGW to**
20 **undertake its proposed plan?**

21 A. Because there is such a huge potential for cost-effective savings in PGW's
22 service territory, the gas savings and associated benefits from PGW's
23 investment will be in addition to those resulting from federally-funded
24 efforts.

1 **IV. Proposed PGW Gas Conservation Programs**

2 **Q. What kinds of efficiency opportunities does PGW's DSM Plan target?**

3 A: PGW plans to implement a comprehensive portfolio of seven programs to
4 capture energy efficiency and conservation opportunities available through
5 three distinct types of market transactions. The first and largest source of gas
6 savings is to increase energy efficiency of existing buildings by retrofitting
7 them with supplemental measures (like attic insulation) and with early
8 replacement of inefficient equipment with high-efficiency models (like
9 boilers and furnaces). The second source of efficiency savings is to upgrade
10 the efficiency of new gas-using appliances and equipment when purchased in
11 the normal course as those appliances and equipment require replacement.
12 The third type of opportunity to improve efficiency is before a building or
13 renovation is designed and constructed. PGW's DSM portfolio is explicitly
14 designed and planned to achieve cost-effective savings through all three
15 types of market transactions among residential and non-residential customers
16 by introducing programs to address each in the three-stage sequence.

17 **Q. Describe the programs targeting residential customers.**

18 A: There are three programs that target residential customers. The
19 Comprehensive Residential Retrofit Program and its sibling program, the
20 Enhanced Low-Income Retrofit Program, are both built upon a successful
21 low-income weatherization program started by PGW in 1990. These
22 programs provide free energy audits to identify cost-effective weatherization
23 and heating system replacement opportunities. The Enhanced Low-Income
24 Retrofit program targets participants in PGW's low-income program, the
25 Customer Responsibility Program (CRP). Any cost-effective weatherization

1 measures and heating system retrofits identified by the energy audit will be
2 installed at no cost to the customer.

3 The Comprehensive Residential Retrofit Program (non-low income)
4 targets the 40% of residential customers with the highest annual consumption
5 of natural gas. The program then works with participating customers to
6 implement any cost-effective opportunities identified by energy audits which
7 PGW will provide free of charge. The customer is provided with information
8 on financing and assistance in installing the measures. Upon installation, the
9 customer receives an incentive to bring the simple payback of the project
10 down to two years.

11 The Premium Efficiency Gas Appliances and Heating Equipment
12 Program goes up the supply chain to encourage consumers to choose gas
13 powered equipment that is more energy efficient. The program's
14 administrator will work with equipment manufacturers, distributors, retailers,
15 engineers, and contractors to deliver incentives covering 80% of the
16 incremental costs of premium efficiency equipment. Partners will be trained
17 in ways to market the benefits of high efficiency equipment. Technologies
18 covered by this program include high efficiency clothes washers and natural
19 gas powered space and water heating equipment.

20 **Q. Explain the program designs for nonresidential customers.**

21 A: There are four programs that cover nonresidential customers. The Municipal
22 Facilities Comprehensive Efficiency Retrofit Program performs
23 comprehensive retrofits on city owned and operated buildings. The program
24 administrator will work closely with Philadelphia City facility managers,
25 department heads, and financial officers to identify and implement energy
26 efficiency within municipal buildings. The program's main activities are

1 advocacy, engineering assistance, coordination with other programs, and
2 providing advice on financing.

3 The Commercial and Industrial Equipment Efficiency Upgrades
4 Program takes a similar approach to the Premium Efficiency Gas Appliances
5 and Heating Equipment Program. The program addresses the unique aspects
6 of the commercial and industrial equipment supply chain to increase
7 awareness and installation of high efficiency technologies. To achieve these
8 goals, incentives for 80% of the incremental cost of certain higher efficiency
9 technologies will be provided by equipment manufacturers, distributors,
10 retailers, engineers, and contractors working with the program's
11 administrator.

12 The High Efficiency Construction Program combines the efforts of
13 property developers, owners, and real estate agents with architects, engineers,
14 builders, and contractors to make energy efficient buildings a priority from
15 the inception of new construction or large scale renovations. The program
16 provides incentives for 80% of the incremental cost of higher efficiency
17 measures. PGW will explore partnerships to aid in the delivery of design and
18 engineering assistance, financing, and incentives.

19 The Commercial and Industrial Retrofit program is an offshoot of the
20 High Efficiency Construction Program focused on upgrades or changes to
21 existing systems. This includes approaches such as the early retirement of
22 inefficient industrial equipment or installing improved control systems. To
23 drive adoption of higher efficiency measures, the program will work closely
24 with the participants to deliver a custom incentive based on buying down the
25 payback time for the project.

26 **Q. Are PGW's programs modeled after successful DSM efforts elsewhere?**

1 A: Yes. In helping PGW draft the plan, I carefully examined programs and their
2 results from all over the Northeastern US, as well as efforts in Canada,
3 California, and the Midwestern US.

4 **Q. Can you demonstrate how PGW's programs are modeled on best**
5 **practices by industry leaders?**

6 A: PGW's proposed program designs incorporate the same proven strategies
7 employed by the nation's most successful natural gas energy efficiency
8 efforts. Programs run by Vermont Gas Systems (VGS), NSTAR (serving the
9 Boston area), and the Southern California Gas Company (SoCalGas)
10 illustrate key features in common with the programs PGW proposes. For
11 example, these three utilities' programs offer both residential and commercial
12 retrofit programs that begin with free energy audits to identify savings and
13 install a variety of low-cost, high-benefit measures. PGW's residential
14 retrofit programs use advanced air-sealing and insulation practices, as well as
15 heating system retrofits. The programs target high-use customers while also
16 allowing self-selected participation. The high-use customers receive
17 assistance and incentives for installing energy efficiency measures identified
18 in the audit, while the low-income participants have cost-effective measures
19 directly installed at no cost to them. And as both an added incentive and an
20 additional source of energy savings, PGW's residential retrofit programs will
21 provide for direct installation of an average of ten high-performance, high-
22 efficiency lamps in each treated household. This improves the program's
23 attractiveness to potential participants, increasing participation, total gas
24 savings, and net economic benefits.

25 Providing incentives to defray the efficiency cost premium for the
26 purchase of high-efficiency new equipment has been the cornerstone of gas

1 energy efficiency efforts across the country for decades. As new
2 technologies enter the marketplace and codes and standards eliminate the
3 least-efficient equipment, the range of technologies covered changes over
4 time. PGW's minimum efficiency requirements will be updated to meet
5 increasingly strict federal standards and to align with minimum requirements
6 with other leading efforts from utilities such as VGS, NSTAR, National Grid,
7 and SoCalGas. Like PGW's, these programs also aggressively targeted
8 market participants throughout the supply chain.

9 The most successful new construction programs take an integrated
10 approach to building efficiency, coordinating the multiple functions and
11 stages associated with building construction with the array of efficiency
12 opportunities across building energy sources, and end uses. Financial
13 incentives typically defray most or all of the incremental cost of high-
14 efficiency design, equipment, and construction over and above standard
15 market practice.

16 This approach is exemplified in the efficient construction programs of
17 the three utilities mentioned before. VGS provides 25% to 50% of the
18 incremental cost for nonresidential new construction projects. NSTAR, VGS,
19 and SoCalGas base incentives for residential buildings on the ENERGY
20 STAR® Home certification, and scale up the incentive for additional
21 efficiency measures.

22 **Q: How important is integration with other programs in best practices and**
23 **how does this apply in PGW's current plans?**

24 **A:** Integration has proved to be critical to maximizing cost-effective savings
25 from program expenditures. It helps avoid lost opportunities, reduce
26 duplications in effort, cut costs, and achieve greater and deeper savings. For

1 retrofit programs, leading gas utilities have found great success in working
2 together with electric utilities that offer similar programs. Customers enjoy
3 the greater array of options and incentives while utilities can achieve greater
4 savings and reduce costs through sharing administrative and delivery costs.
5 With regard to reducing cost through the supply chain, integrating efforts
6 with those of other regional gas utilities has proven very effective.

7 PGW will explore all possible opportunities to integrate its efforts with
8 other utilities in Pennsylvania and beyond. PGW will also work with
9 Pennsylvania's Keystone HELP Program and local banks and credit unions to
10 streamline financing options for retrofit. PGW will help make sure clear
11 information is available to customers on any Federal and State incentives for
12 which customers may be eligible.

13 **V. Proposed PGW Conservation Program Annual Budgets, Gas Savings,**
14 **and Staging**

15 **Q. How much gas will PGW's proposed DSM portfolio save?**

16 **A:** Table 1 provides the annual incremental and cumulative gas savings expected
17 to be achieved by the portfolio. Projected annual savings climb from 79
18 BBtu in the first year to 384 BBtu in the fifth year.

1

Table 1: Annual and Cumulative Gas Savings

Program Year	Year	Incremental Annual BBtu Saved (net)	Cummulative Annual BBtu Saved (net)
1	2010	0	0
2	2011	196	196
3	2012	334	530
4	2013	385	915
5	2014	406	1,321

2

Q: Are the methods PGW has used to quantify savings from its energy-efficiency programs generally consistent with those adopted by the Commission regarding electric utility DSM programs under Section 129?

3

4

5

6

A: Yes, to the best of my knowledge. I base this conclusion on my review of the Public Utility Commission’s (PUC) order of June 18, 2009 in Docket No. M-2009-2108601 and its appendix regarding the Total Resource Cost (TRC) Test.

7

8

9

10

Q. How much will it cost PGW’s ratepayers to acquire these gas savings?

11

A: Spending ramps up from \$0.25 million in 2010, to over \$15 million in 2014. Table 2 shows the year by year total spending.

12

13

Table 2: Annual Spending (Nominal \$)

Program Year	Year	Annual Spending (Nominal \$)
1	2010	\$ 350,000.00
2	2011	\$ 10,097,331.85
3	2012	\$ 13,237,762.66
4	2013	\$ 14,876,262.33
5	2014	\$ 15,653,289.04
Total:		\$ 54,214,645.87

14

Q: How will PGW stage the programs to achieve these results?

15

A: In the first program year, PGW will work on designing and implementing, as appropriate, the rollout of the Low Income Retrofit Program, Comprehensive Residential Retrofit Program, and Premium Gas Appliances and Heating Program.

16

17

18

1 Beginning in 2011, PGW will leverage experience with the CWP and its
2 pilot program to deliver the Enhanced Low-Income Retrofit Program. By
3 targeting consumption of low income customers as the highest priority,
4 PGW's program will provide the quickest benefits to all residential customers
5 because the cost of high usage by CRP customers imposes a significant
6 subsidy on other firm customers. As this program penetrates the market, that
7 subsidy will be reduced. PGW will also use 2011 to continue technical,
8 economic, and financial assessment of municipal efficiency projects, and
9 develop detailed plans for the other programs in the portfolio to be launched
10 in its first stages in 2011.

11 Further into 2011, as the Enhanced Low Income Retrofit Program
12 reaches its targeted annual pace, the same services will be rolled out to other
13 high-use residential customers. PGW will also roll out the Premium
14 Efficiency Gas Appliances and Heating Equipment Program, and the
15 Commercial and Industrial Equipment Efficiency Upgrade Program.

16 The High-Efficiency Construction Program will be introduced in 2012.
17 By then, the municipal facilities program and all of the residential programs
18 will be at or near their targeted activity levels. The C&I programs will
19 continue to ramp up and will reach their maximum participation levels in the
20 fifth year of the portfolio.

21 **Q: How did you arrive at 20% savings for the residential retrofit programs?**

22 A: As detailed in our response to the OCA's Informal Data Request Set III
23 Question 7, current savings for participants in the CWP average just over
24 15%. PGW continues to improve the CWP as results are evaluated and
25 experienced is gained. PGW will use the following techniques to increase per
26 customer savings to 20%:

- 1 • Enhance thermostat deliveries and educational techniques, as
- 2 practiced by the current CWP contractors ECA and Honeywell;
- 3 • Utilize the knowledge gained from the pilot program to increase the
- 4 number of furnace and boiler early retirements;
- 5 • Aggressively pursue air sealing, especially in high-use homes;
- 6 • Increase the number of roof insulation installations, and improve
- 7 their quality through infrared camera inspections; and
- 8 • Provide more under-porch partitions (an insulated and sealed wall
- 9 to separate the section of a basement that extends under a porch).

10 Q: How do PGW's proposed program spending and savings compare with other
11 utilities?

12 A.: Table 3 compares average spending and savings from PGW's five year
13 portfolio against averages from the actual results and planned programs of
14 other natural gas DSM portfolios.

15 **Table 3: Comparison of PGW and Other Natural Gas DSM Program Averages**

Program	Savings % of Sales	Spending per Annual Therm Saved	Spending per Lifetime Therm Saved
Residential			
PGW (2010 - 2014)	0.59%	\$ 3.47	\$0.35
Actual and Planned Program Results	0.43%	\$ 5.32	\$0.54
Nonresidential			
PGW (2010 - 2014)	0.29%	\$ 2.76	\$0.28
Actual and Planned Program Results	0.39%	\$ 3.45	\$0.35
Total			
PGW (2010 - 2014)	0.53%	\$ 3.55	\$ 0.36
Actual and Planned Program Results	0.53%	\$ 3.00	\$ 0.29

16 PGW's planned portfolio aims to achieve greater savings than the
17 average savings achieved by residential programs of other utilities. Savings
18 for PGW's total portfolio, both from residential and nonresidential programs,

1 are right in line with the average. Additionally, the cost of savings for
 2 nonresidential programs is marginally below the average of other companies,
 3 while that for residential programs is substantially below other utility
 4 program averages.

5 **Q. Can you draw any direct comparisons between PGW's individual**
 6 **program costs and savings and those of other leading gas DSM**
 7 **programs?**

8 **A:** Table 4 shows how PGW's programs compare against leading programs in
 9 the Northeast.

10 **Table 4: Comparison of PGW and Leading Northeastern Natural Gas DSM Programs**

Program	Savings % of Sales	Spending per Annual Therm Saved	Spending per Lifetime Therm Saved
Residential			
PGW (2010 - 2014)	0.59%	\$ 3.47	\$0.35
Actual and Planned Program Results	0.33%	\$ 6.27	\$0.64
Nonresidential			
PGW (2010 - 2014)	0.29%	\$ 2.76	\$0.28
Actual and Planned Program Results	0.50%	\$ 5.15	\$0.52
Total			
PGW (2010 - 2014)	0.53%	\$ 3.55	\$0.36
Actual and Planned Program Results	0.58%	\$ 3.03	\$0.31

11 This table shows that PGW's portfolio savings as a percentage of sales
 12 closely follow the average of leading Northeastern DSM portfolios. PGW
 13 achieves more savings from the residential sector due to the faster ramp up of
 14 existing DSM efforts. Other leading programs have higher savings from
 15 nonresidential sector programs due to the later staging of PGW's efforts. If
 16 we only look at the last three years of the program, PGW averages a 0.49%
 17 savings as a percentage of nonresidential sales at an average cost of \$4.37 per
 18 therm, which is more in line with other leading programs. States whose

1 programs are used in Table 4 include Massachusetts, New Hampshire,
 2 Vermont, and New York.

3 Vermont Gas's Energy Extender Portfolio provides results for a similar
 4 set of programs to PGW's planned efforts. VGS is often recognized as a
 5 national leader in DSM. The two portfolios share a similar make up of
 6 programs and are active in the same general geographic region. Table 5
 7 shows recent results for the Energy Extender Program next to PGW's
 8 proposed plan.

9 **Table 5: VGS Residential Program Results and PGW Planned Residential Programs**

Vermont Gas System's EnergyExtenders			PGW Portfolio Plans		
Year	Savings % of Sales	Spending per Annual Therm Saved	Year	Savings % of Sales	Spending per Annual Therm Saved
Residential					
2006	0.87%	\$ 3.09	2012	0.77%	\$ 4.01
2007	0.80%	\$ 3.32	2013	0.85%	\$ 4.02
2008	0.96%	\$ 3.22	2014	0.85%	\$ 4.12
Average:	0.88%	\$ 3.21		0.82%	\$ 4.05

10 The years 2012 through 2014 best represent the costs and performance
 11 of PGW's portfolio when most of the programs are operating at their full
 12 potential, and thus the best comparison with VGS, which has been operating
 13 gas DSM programs in Vermont for the past decade. Both programs achieve a
 14 high level of savings as a percentage of sales for similar costs per therm. The
 15 higher savings and lower cost of the Vermont programs stem from PGW's
 16 aim of providing services to low income households. While VGS also
 17 prioritizes low-income applicants, PGW will be more aggressive in pursuing
 18 and installing measures for this customer class.

19 NationalGrid's subsidiaries in New York State are also in the late
 20 planning stages for a natural gas DSM portfolio. In the commercial and

1 industrial sector, as with PGW's plans, NationalGrid will promote efforts
 2 through incentives and technical assistance. Participants follow either a
 3 custom or prescriptive track to receive incentives. NationalGrid has made
 4 coordination with existing programs, specifically those run by the New York
 5 State Energy Research Development Authority (NYSERDA), a priority.
 6 Table 6 shows that both utilities have similar expectations for the cost of
 7 annual therms saved.

8 **Table 6: Comparison of National Grid New York's Gas C&IDSM Plans to PGW**

NationalGrid (NY)		PGW	
Year	Spending per Annual Therm Saved	Year	Spending per Annual Therm Saved
2006	\$ 4.54	2012	\$ 5.26
2007	\$ 4.95	2013	\$ 4.19
2008	\$ 4.94	2014	\$ 3.90
Average:	\$ 4.81		\$ 4.45

9 **Q: Can you compare PGW's projections to any third party studies on best**
 10 **practices?**

11 **A:** A working paper issued by ACEEE in August 2009 titled "Saving Energy
 12 Cost-Effectively" examines the cost of saved energy (CSE) from seven
 13 leading state-level natural gas DSM portfolios. CSE measures the levelized
 14 cost of lifetime energy savings. I compare these results to those from the
 15 PGW projections in Table 7. The states covered by the study include
 16 California, Connecticut, Iowa, New Jersey, New York, Oregon, and
 17 Wisconsin.

1 **Table 7: Comparison of CSE for PGW ad Leading Gas DSM Portfolios**

	CSE Using Paper's Assumptions	CSE Using Internal Assumptions	Achieved CSE from Seven Leading States
PGW			
2010	\$ -	\$ -	
2011	\$ 0.44	\$ 0.53	
2012	\$ 0.34	\$ 0.41	
2013	\$ 0.33	\$ 0.40	
2014	\$ 0.33	\$ 0.39	
AVERAGE	\$ 0.29	\$ 0.34	\$0.34
MEDIAN	\$ 0.33	\$ 0.40	\$0.32
MIN	\$ -	\$ -	\$0.14

2 Table 7 shows two scenarios. The first scenario calculates the CSE using the
3 same assumptions that the paper does. It uses a discount rate of 5% and an
4 average measure life of 18 years. The second scenario shows the CSE using
5 the more conservative assumptions that went into the PGW portfolio
6 analysis. This uses a discount rate of 5.9% and an average measure life of 15
7 years. In both PGW portfolio scenarios, the CSE declines each year as the
8 programs ramps up. Both of PGW's annual CSE from 2012-2014 fall right in
9 line with the mean and median values from the other state's portfolios. The
10 paper's assumptions yield an average CSE of \$0.29 and the internal
11 assumptions lead to \$0.34, compared to a mean of \$0.34 and median of \$0.32
12 for the other states.

13 **VI. Benefits and Costs of Proposed PGW Conservation Investment Portfolio**

14 **Q. How did you assess the benefits and costs of PGW's proposed DSM**
15 **portfolio?**

16 **A.** PGW compared the benefits and costs of gas DSM investment from two
17 perspectives: total resource costs, and gas system costs. The primary test for

1 DSM cost-effectiveness is the TRC test, which accounts for all the benefits
2 and costs to the economy of the efficiency investment, regardless of who
3 enjoys or pays them. This is the test the PUC has adopted for assessing the
4 economic merits of electric utility DSM programs. Benefits are valued at the
5 avoided marginal costs of gas supply, as discussed further in the testimony of
6 PGW witness Chernick. Benefits also include avoided electricity costs for
7 measures that save electricity. Costs consist of the efficiency measure costs
8 and the costs of marketing, technical assistance, management, and other
9 program functions that are more or less fixed with respect to the volume of
10 program activity and/or the number of efficiency measures installed. The net
11 benefits to the economy from cost-effective DSM investment are the
12 difference between the present worth of benefits and costs of the programs
13 over the lifetimes of all the measures installed as a result of the program.

14 The gas system perspective, by contrast, counts only those benefits and
15 costs of DSM programs that fall within the sphere of costs paid by all gas
16 system ratepayers. It indicates the extent to which a program or portfolio of
17 programs benefits the group of ratepayers supporting the investment. The
18 gas system perspective omits avoided electricity costs from the calculation of
19 benefits; it also omits the portion of efficiency measure costs paid for directly
20 by participants.

21 **Q. What are the lifetime costs and benefits you estimate from implementing**
22 **PGW's DSM plan?**

23 **A:** Table 8 is an overview of the cost-effectiveness of PGW's planned portfolio.

1 **Table 8: Cost-Effectiveness Analysis of PGW Portfolio**

PROGRAM	Total Resource PV Benefits	Total Resource PV Costs	PGW PV Costs	Total Resource PV Net Benefits	Total Resource B/C Ratio
Comprehensive Residential Heating Retrofit	\$ 37,679,103	\$ 21,617,885	\$ 10,950,799	\$ 16,061,218	1.74
Enhanced Low-income retrofit	\$ 37,044,268	\$ 21,972,192	\$ 22,316,612	\$ 15,072,076	1.69
Premium efficiency gas appliances and heating equipment	\$ 26,519,663	\$ 4,740,331	\$ 4,740,331	\$ 21,779,332	5.59
Commercial and industrial equipment efficiency upgrades	\$ 1,656,514	\$ 1,366,816	\$ 1,170,821	\$ 289,698	1.21
Municipal facilities comprehensive efficiency retrofit	\$ 3,676,093	\$ 3,290,862	\$ 1,734,161	\$ 385,230	1.12
High-efficiency construction	\$ 3,268,894	\$ 1,925,587	\$ 1,925,587	\$ 1,343,307	1.70
Commercial and industrial retrofit	\$ 3,313,027	\$ 2,040,365	\$ 995,061	\$ 1,272,662	1.62
Portfolio-Wide Costs		\$ 854,207	\$ 854,207	\$ (854,207)	
Total Portfolio	\$ 113,157,561	\$ 57,808,244	\$ 44,687,579	\$ 55,349,317	1.96

2 The portfolio provides PGW customers benefits with a present value of
 3 \$113.2 million at a cost, including the customer's own investment, of \$57.8, for
 4 net benefits to customers of \$55.3 million. The present value of PGW's costs is
 5 \$44.7 million. Almost 85% of benefits, \$101 million, come from residential
 6 programs with a comparable amount of the cost going to the same programs.

7 Almost all the programs in the portfolio are highly cost effective with
 8 benefit-cost ratios above 1.5, except for the municipal and commercial and
 9 industrial equipment programs. The Premium Efficiency Gas Appliances and
 10 Heating program is particularly cost effective, providing over \$26 million in
 11 benefits for under \$5 million. Almost one third, or \$37 million, of the
 12 portfolio's savings comes from the Enhanced Low-income Retrofit Program,
 13 the cornerstone of PGW's portfolio.

14 As stated in Section VIII of the narrative description of PGW's plan,
 15 which is an exhibit to my testimony, the cost-effectiveness analysis and rate
 16 and bill analysis are contained in a functioning, self-documenting MS Excel
 17 workbook which is available upon request for easy review.

1 **Q. How will these net benefits stimulate economic activity?**

2 A. The present worth of net benefits under the TRC represents a long-term
3 injection of wealth into the economy. For residential customers, the
4 reduction in the total costs of gas service means an increase in after-tax
5 disposable income. People can use this extra money to save (which today for
6 most means paying down debt) or spend. Likewise, lower gas bills for
7 business customers mean either increased profit margins, more competitive
8 product and service pricing, or both. Businesses will re-invest the resulting
9 extra profits, or distribute them to owners, or some combination of the two.
10 Either way, the total resource cost savings will stimulate additional business
11 activity.²

12 Moreover, the amount of additional economic activity stimulated by the
13 efficiency investment will end up being several times the net benefits due to
14 re-spending within the local, state, and regional economies. While there is
15 doubtless considerable “leakage” as some spending takes place outside
16 Pennsylvania, the majority of the economic benefits stay at the state and local
17 levels.

18 This economic activity generated by the net economic benefits of
19 efficiency investment is in addition to the economic activity generated
20 directly by expenditures on the part of both PGW and program participants to
21 install the efficiency measures.

22 **Q. How much additional employment do you estimate that PGW’s plan will**
23 **generate?**

² In macroeconomic terms, economic activity is defined as aggregate demand. It is the sum of consumer spending, business investment, government spending, and the trade balance of the economy in question, in this case, Pennsylvania’s.

1 A: PGW estimates that between 595 and 991 net new jobs will be created
2 through the proposed DSM efforts. Most of the gains come from shifting
3 spending away from the less job-intensive energy sector towards more job-
4 intensive sectors such as food production. Jobs gained in the energy
5 efficiency sector tend to offset potential job losses in the broader energy
6 services sector. Recent studies from the American Council for an Energy-
7 Efficiency Economy (ACEEE) have estimated that up to 90% of new jobs
8 created from DSM efforts stays within the state where the DSM programs are
9 located. Of the 90%, the majority of those new jobs are created close to
10 where savings occur.

11 **VII. Conclusions and Recommendations**

12 **Q: What conclusions do you reach?**

13 A: I conclude that the energy efficiency program portfolio advanced in this
14 proceeding by PGW is cost-effective and therefore economically beneficial
15 to PGW's customers and Pennsylvania's economy. In addition to saving
16 money, energy savings from the portfolio will reduce greenhouse gas
17 emissions, benefitting the environment. These proposals, as described above,
18 are also consistent with other leading gas DSM programs approved by other
19 state Commissions and implemented by utilities in those jurisdictions.

20 **Q: On the basis of these conclusions, what are your recommendations to the**
21 **Commission?**

22 A: I strongly recommend that the Commission order implementation of this
23 program. Any delay in implementation represents delay of the benefits that
24 will occur.

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

1 A: Yes.