PUBLIC VERSION

STATE OF NEW JERSEY
BOARD OF PUBLIC UTILITIES

I/M/O THE PETITION OF PUBLIC SERVICE ELECTRIC & GAS COMPANY FOR APPROVAL OF THE ENERGY STRONG PROGRAM	))))	**BPU Docket Nos. EO13020155 and GO13020156**

DIRECT TESTIMONY OF DAVID E. DISMUKES, PH.D.
ON BEHALF OF THE
DIVISION OF RATE COUNSEL

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BPU DOCKET NO. EO13020155 and GO13020156

I. Introduction

Q. WOULD YOU PLEASE STATE YOUR NAME AND BUSINESS ADDRESS?

A. My name is David E. Dismukes. My business address is 5800 One Perkins Place Drive, Suite 5-F, Baton Rouge, Louisiana, 70808.

Q. WOULD YOU PLEASE STATE YOUR OCCUPATION AND CURRENT PLACE OF EMPLOYMENT?

A. I am a Consulting Economist with the Acadian Consulting Group ("ACG"), a research and consulting firm that specializes in the analysis of regulatory, economic, financial, accounting, statistical, and public policy issues associated with regulated and energy industries. ACG is a Louisiana-registered partnership, formed in 1995, and is located in Baton Rouge, Louisiana with additional staff in Los Angeles, California.

Q. DO YOU HOLD ANY ACADEMIC POSITIONS?

A. Yes. I am a full Professor, Associate Executive Director, and Director of Policy Analysis at the Center for Energy Studies, Louisiana State University. I am also an Adjunct Professor in the E. J. Ourso College of Business Administration (Department of Economics), an Adjunct Professor in the School of the Coast and Environment (Department of Environmental Sciences), the Director of the Coastal Marine Institute, and a member of the graduate research faculty at LSU. Attachment A provides my academic vita that includes a full listing of my publications,

presentations, pre-filed expert witness testimony, expert reports, expert legislative testimony, and affidavits.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. I have been retained by the New Jersey Division of Rate Counsel ("Rate Counsel") to provide an expert opinion to the Board of Public Utilities ("BPU" or "Board") on a number of policy, program design, and economic impact issues associated with the "Energy Strong" proposal by Public Service Electric and Gas Company ("PSE&G" or "the Company") filed on February 20, 2013. My testimony will address the overall economic impact of both the electric and natural gas components of the proposal. I will also address number of issues associated with the Energy Strong proposal, with a particular emphasis on the public policy issues associated with the Company's natural gas delivery ("NGD") proposals. Mr. Edward McGee, an independent engineering consultant for ACG, will address the specific engineering issues associated with the Company's NGD proposals.

Q. HAVE YOU PREPARED ANY SCHEDULES IN SUPPORT OF YOUR RECOMMENDATIONS?

A. Yes. I have prepared 28 schedules in support of my direct testimony that were prepared by me or under my direct supervision.

Q. ARE THERE ANY OTHER RATE COUNSEL WITNESSES ADDRESSING THE COMPANY'S PROPOSAL?

A. Yes. In addition to myself and Mr. McGee, Rate Counsel is also sponsoring the testimony of Ms. Andrea Crane, who addresses the accounting and revenue requirement issues; Mr. Matthew Kahal, who addresses financial and rate of return issues; and Mr. Charles Salamone, who addresses

the engineering issues associated with the Company's electric distribution company ("EDC") proposals.

Q. HOW IS THE REMAINDER OF YOUR TESTIMONY ORGANIZED?

A. My testimony is organized into the following sections:

- Section II: Summary of Recommendations
- Section III: Overview of Company Proposal
- Section IV: The Proposed Energy Strong Program will Result in a Negative Economic Impact
  - A. The Company Uses an Incorrect Economic Impact Methodology
  - B. The Company's Economic Impact Methods Do Not Appear to Account for Leakages
  - C. The Company's Economic Impact Methods Do Not Appropriately Account for The Impact of Rate Increases
  - D. Distribution of Program Impacts
- Section V: Analysis of the Proposed NGD Program
  - A. Analysis of the Company's Pipe Composition, Replacement and Leak Rates
  - B. The Company has not Shown the Need for the NGD Component of its Energy Strong Proposal
  - C. Program Design Deficiencies

II. Summary of Recommendations

Q. PLEASE SUMMARIZE THE RESULTS OF YOUR ECONOMIC IMPACT ANALYSIS OF THE COMPANY'S ENERGY STRONG PROGRAM.

A. The negative impacts associated with the $329.7 million in rate increases that are likely to arise from the Energy Strong proposal outweigh any positive impacts that may arise from the Program's construction and development activities. The net economic impacts of the program show that the Company's Energy Strong proposal is likely to lead to a net contraction of New Jersey economic output of $338.4 million (on a net present value or "NPV" basis) and a reduction of total New Jersey employment by almost 39,300 job-years over the life of the program.

Q. WILL THESE NEGATIVE ECONOMIC IMPACTS BE EVENLY DISTRIBUTED ACROSS THE NEW JERSEY ECONOMY?

A. No. The distributional impacts of the Energy Strong program on New Jersey households, businesses, and industries will also be skewed. For instance, proportionately more of the cost of the program will be shouldered by lower and middle class households. Further, while the construction and utility sectors of the New Jersey economy will benefit substantially from the Energy Strong program, other parts of the economy will, on balance, suffer. This includes service sector-based companies as well as heavy manufacturing and industry such as pharmaceuticals, petrochemical manufacturing, and petroleum refining: all energy intensive industries that will pay more in higher electricity and natural gas rates than they will likely see in any economic "ripple" effects on the New Jersey economy.

Q. WOULD YOU PLEASE SUMMARIZE YOUR PRIMARY RECOMMENDATIONS REGARDING THE NATURAL GAS INFRASTRUCTURE PROPOSALS?

A. I agree with Mr. McGee's recommendation that the Board consider approving certain portions of the Company's NGD resiliency proposals, particularly those that harden several of the Company's metering and regulation ("M&R") stations that were flooded during Superstorm Sandy. However, I recommend that the Board reject the pipeline replacement component of the

Company's Energy Strong NGD proposals since (1) the Company has not shown a need or appropriate replacement prioritization for this program and (2) the replacement program is very large and its associated cost recovery mechanism suffers from a number of program design deficiencies.

Q. EXPLAIN WHY THE COMPANY HAS NOT SHOWN AN APPROPRIATE NEED AND REPLACEMENT PRIORITIZATION FOR ITS PIPELINE REPLACEMENT PROPOSALS.

A. From a policy perspective, the pipeline replacement component of Company's Energy Strong proposal suffers from several deficiencies including:

1) The pipeline replacement proposals incorrectly prioritizes the mains that will be replaced (prioritizing flood areas over most leak-prone pipes) which the Company has not demonstrated are consistent with general distribution integrity management planning ("DIMP") policy principles.
2) The Company has provided little to no estimated benefits, or cost-benefit analyses, to support its NGD proposals.

Q. CAN YOU EXPLAIN THE PROGRAM DESIGN DEFICIENCIES ASSOCIATED WITH THE COMPANY'S PROPOSED NGD COST RECOVERY MECHANISM?

A. The NGD component of the Company's Energy Strong proposal suffers from a number of deficiencies that include the following:

1) The proposal includes tracker-eligible costs that are large and go far beyond those normally allowed in other NGD infrastructure tracker mechanisms.

2) The Company is seeking approval of both the replacement/hardening program and each program's associated costs. In other words, the Company conditions approval of its NGD Energy Strong program on pre-approval of its total and its individual NGD investments.

3) The Energy Strong revenue requirement will be developed on a projected rather than actual basis.

4) There are no offsets for O&M cost savings.

5) There is no sunset, program review or rate case filing requirement.

6) There are no performance benchmarks and metrics.

7) The proposed program does not include a number of ratepayer protection mechanisms included in many NGD infrastructure cost trackers.

Q. DO YOU HAVE ANY ADDITIONAL RECOMMENDATIONS SHOULD THE BOARD DECIDE TO APPROVE SOME PORTION OF NGD COMPONENT OF THE COMPANY'S ENERGY STRONG PROPOSAL?

A. Yes. I recommend that the Board modify the Company's NGD Energy Strong proposal should it decide to accept some portion of the natural gas components of the plan. These modifications include:

- Establishing a tracker-based approach that utilizes a regulatory asset (i.e., deferral method) similar to those in place for other New Jersey natural gas distribution utilities.
- If the Board utilizes a contemporaneous, as opposed to deferral method for recovering pipeline replacement costs, then it should establish a cost review process consistent with those already in place for other New Jersey natural gas distribution utilities and defer the evaluation of the prudence of the Company's investments until the time of its next, clearly

defined rate case. The Board should explicitly reject the Company's assertion that approval of any form of the Energy Strong program constitutes a prudence "pre-approval."

- Establishing sunset provisions that tie an overall program effectiveness review to a mandatory rate case in three years consistent with other New Jersey natural gas distribution company infrastructure programs.
- A limitation on tracker cost recovery to only the capital costs associated with the Company's replacement investments: all other non-capital related components of the Company's NGD Energy Strong proposal should not be eligible for tracker recovery.
- Only those costs associated with the hardening of prior-flooded M&R stations and the incremental replacement of cast iron and bare steel services should be included as being eligible for tracker recovery. The Company's tracker cost recovery should be limited to the replacement of 148 miles of cast iron mains or 25 miles per year, a replacement rate consistent with the increment above what was replaced during the test year of (2009) Company's last rate case. Services replacement investments should not be included in the Energy Strong proposal. The Company has consistently replaced in excess of the proposed annual replacements of 6,667 services. Replacement prioritization, as discussed by Mr. McGee, should be based on the most-risky (most leak-prone) pipe; flooding or prior outage histories should be considerations that rank second to safety-related factors.
- A total investment cap that does not exceed $34.4 million in any given year and is consistent with the Company's estimated average cost of replacing 148 miles of cast iron, (or 25 miles per year) as well as raising the five M&R stations that were flooded by the Company's last major storm event. This represents 19.2 percent of the Company's original NGD Energy Strong request.

- A rate impact cap of one percent of total revenues per year.
- The inclusion of a net total O&M offset of $0.235 million.
- The inclusion of performance standards and benchmarks consistent with other New Jersey natural gas utilities. This would include an annual reduction of 283 leaks or a 12 percent annual reduction in the Company's leak inventory.

III. Overview of Company Proposal

Q. PLEASE DESCRIBE THE COMPANY'S ENERGY STRONG PROPOSAL?

A. The Company is proposing to spend close to $4.0 billion in "estimated" infrastructure costs in order to harden and improve its electric and natural gas delivery system resiliency.[1] The Company justifies this investment based on both its recent experience in responding to Hurricane Sandy and other recent storm events, and the potential that these severe weather patterns will continue into the future.[2] The Company claims that its Energy Strong program will improve the durability and stability of its energy distribution infrastructure, making it better able to withstand the impacts of hurricanes and other several weather events, and enabling it to respond faster to customer service outages.[3]

Q. HOW WILL THE COSTS OF THE ENERGY STRONG PROGRAM BE RECOVERED FROM RATEPAYERS?

A. The Company proposes to recover the costs associated with its Energy Strong proposal on a monthly basis through two separate surcharges, called Energy Strong Adjustment Mechanisms ("ESAMs"), that will be assessed upon all electric and natural gas distribution service customers,

[1] Company Petition at ¶10.
[2] Company Petition at ¶ 94, and Direct Testimony of Jorge L. Cardenas, 4: 70-72.
[3] Company Petition at ¶¶ 8-9.

respectively.[4] This method of cost recovery, commonly referred to as a "tracker," differs considerably from traditional rate of return regulation in which prudently incurred costs are only recovered in a traditional rate case. I will discuss a number of regulatory and policy issues associated with tracker mechanisms later in my testimony.

Q. DOES THE ENERGY STRONG PROPOSAL INCLUDE AN ANNUAL SURCHARGE REVIEW PROCESS?

A. Yes. The Company proposes to have its ESAM reviewed at the end of each year while the tracker is in place. This review will include what the Company refers to as an examination of the "prudence" of the expenses and investments incurred in the prior year,[5] a reconciliation of prior year projected and actual costs, and the presentation, presumably for Board approval, of a projected revenue requirement to be used in the next period's surcharge. The Company proposes to roll-in the unrecovered net project investment into base rates at the time of its next rate case,[6] but the specific timing of this rate case has gone undefined.

Q. DOES THE ENERGY STRONG PROPOSAL INCLUDE ANY SUNSET PROVISIONS?

A. No, the proposal does not include any sunset provisions nor does the Company offer to have its program, or its effectiveness, reviewed in any pre-defined future rate case. Further, the Company's proposal, as will be discussed in more detail later, has a very ambiguously defined *ex post* prudence review process that is entirely inconsistent with traditional ratemaking practices. The Company notes that it will take ten years for the totality of its investments to be completed yet only asks for approval for five years of the plan in the current petition.[7] The Company also

[4] Company Petition at ¶12.
[5] Company Petition at ¶122-123.
[6] Company Petition at ¶123.
[7] Company Petition at ¶12; Direct Testimony of Jorge L. Cardenas, 6:128-132.

notes that it anticipates coming before the Board in the future for approval of the remaining five year portion of the investment.[8] The Company's proposal, however, has no explicit tie to a future rate case.

Q. WHAT SPECIFIC PROGRAMS ARE INCLUDED IN THE COMPANY'S PROPOSED ENERGY STRONG PROGRAM?

A. The Company's plan is comprised of two primary sets of "resiliency" and "hardening" investments: one for the Company's Electric Distribution Company ("EDC") operations and the other for the Company's NGD operations. The Company's proposal also includes a request for a periodic cost recovery mechanism that will allow it to recover not only the investment costs associated with these programs, but also their corresponding operations & maintenance ("O&M") expenses. The Company estimates a total investment of $3.94 billion, with total EDC-related investments of $2.76 billion and NGD-related investments of $1.18 billion.[9,10] Annual total capital investments and expenses for each program component and sub-component are summarized in Schedule DED-1.

Q. PLEASE DISCUSS THE EDC-RELATED COMPONENT OF THE COMPANY'S ENERGY STRONG PROPOSAL.

A. The Company's EDC-related investments are comprised of two primary components: an "Electric Delivery Hardening Program," (hereafter, "EDC Hardening Program") and an "Electric Delivery Infrastructure Resiliency Program" (hereafter "EDC Resiliency Program"). The EDC Hardening Program is estimated to account for $2.11 billion (or 53.5 percent) of the Company's

[8] Direct Testimony of Jorge L. Cardenas, 7:135-136.
[9] Company Petition at ¶10.
[10] The Company has also included O&M expenses in its revenue requirement, specifically for (1) the training of employees hired by the Company to assist in the completion of the Energy Strong Program; (2) accelerated inspection of poles related to the Pole Replacement Program; and (3) administrative costs and the conversion of licenses and media associated with the relocation of the emergency operating centers. See Company Responses to RCR-A-4 and RCR-G-POL-55.

overall Energy Strong proposal and the EDC Resiliency Program is estimated to account for $0.65 billion (or 16.6 percent) of the Company's overall Energy Strong proposal.

Q. PLEASE DISCUSS THE NGD-RELATED COMPONENTS OF THE COMPANY'S ENERGY STRONG PROPOSAL.

A. The Company's NGD-related proposals are based upon two sub-programs that are designed to "harden" the Company's natural gas delivery system.[11] The first sub-program is the "Metering and Regulation ("M&R") Station Flood and Storm Surge Mitigation" (hereafter "M&R Station Program") and is anticipated to take eight years to complete at an estimated total cost of $140 million.[12] The M&R Station sub-program represents 11.9 percent of the Company's proposed NGD-related Energy Strong costs, and 3.6 percent of the Company's overall Energy Strong proposal. The second NGD sub-program consists of a proposal to replace approximately 750 miles of cast iron mains and 40,000 bare steel services (hereafter "NGD Replacement Subprogram")[13] at an estimated total program cost of $1.04 billion. The NGD Replacement Subprogram represents 88.1 percent of the Company's proposed NGD-related program costs and 26.4 percent of the overall Energy Strong proposal.

Q. PLEASE DISCUSS THE M&R STATION SUB-PROGRAM IN GREATER DETAIL.

A. The M&R Station sub-program proposes to raise nine different M&R stations and one liquefied natural gas ("LNG") plant above their anticipated flood levels.[14] The Company notes that each of these facilities were either directly impacted by Superstorm Sandy, or are located in a

[11] Company Petition at ¶93.
[12] Company Petition at ¶100 and Attachment 1.
[13] Company Petition at ¶¶101 – 102 and 110; Direct Testimony of Jorge L. Cardenas, 39:891-896.
[14] Company Petition at ¶95; Direct Testimony of Jorge L. Cardenas, 35:774-775.

newly defined flood hazard zone.[15] The Company is also "evaluating" other potential locations included several Liquefied Petroleum Gas ("LPG") storage tanks in Linden, Harrison, and Camden.[16]

Q. PLEASE DISCUSS THE NGD REPLACEMENT SUB-PROGRAM.

A. The NGD Replacement sub-program is the larger of the two NGD-related Energy Strong proposals. The Company proposes to (1) replace 750 miles of cast iron mains with either plastic or protected steel pipes and (2) raise the pressure in the areas in which these facilities are located to a considerably higher elevation in order to eliminate the potential for water intrusion.[17] The sub-program also includes the replacement of approximately 40,000 unprotected steel service lines.[18]

Q. HAS THE COMPANY PROVIDED ANY ESTIMATED ANNUAL REVENUE REQUIREMENTS FOR ITS ENERGY STRONG PROPOSAL?

A. Yes, and a summary of those estimates has been provided in Schedule DED-2 for both the Company's EDC and NGD operations. The schedule shows that if the Energy Strong proposal is approved in its current form, and at its current levels of investment, electric and natural gas delivery rates will likely increase by $29.5 million in 2014, $65.1 million in 2015, $86.8 million in 2016, $80.1 million in 2017, $65.7 million in 2018, and $2.5 million in 2019; or by a total of $181.4 million over the next three years. These increases, coupled with the increases anticipated from New Jersey's social and renewable energy programs could result in estimated rate increases of over $1.26 billion over the next six years. I will discuss these potential rate impacts in greater detail in the economic impact section of my testimony.

[15] Company Petition at ¶95; Direct Testimony of Jorge L. Cardenas, 35:775 to 36:777.
[16] Company Petition at ¶95; Direct Testimony of Jorge L. Cardenas, 36:779-780.
[17] Company Petition at ¶101-102; Direct Testimony of Jorge L. Cardenas, 39:891-893.
[18] Company Petition at ¶102.

IV. The Proposed Energy Strong Program will Result in a Negative Economic Impact

A. The Company Uses an Incorrect Economic Impact Methodology

Q. WOULD YOU PLEASE EXPLAIN HOW LARGE UTILITY INITIATIVES LIKE THE PROPOSED ENERGY STRONG PROGRAM CAN AFFECT A STATE ECONOMY?

A. Yes. Large capital expenditure programs, like the Company's Energy Strong proposal, can lead to both positive and negative economic impacts. For instance, the capital investments and expenditures associated with the Company's proposals will likely lead to a number of construction, craft trade, engineering, and other employment opportunities for the New Jersey economy. These activities can be thought of as the benefits of the Company's program, that, in turn can have ripple effects (or "multiplier" effects) since every direct job associated with the program is backed with a number of supporting activities that can range from accounting and delivery services down to new retail sales made to the workers employed in the variously proposed Energy Strong sub-programs.

Q. HOW CAN ANY NEGATIVE IMPACTS ARISE FROM A BIG CAPITAL INTENSIVE INITIATIVE LIKE THE ENERGY STRONG PROPOSAL?

A. The negative impacts arise from the fact that the program is not free, and has to be paid for by ratepayers through increases in utility rates. The rate increases required to fund the Energy Strong program reduce household disposable income and increase costs to business and industries. These rate increases create a negative impact on a regional economy since they reduce income and increase costs for several classes of market participants without any corresponding direct economic offset (or transfer). A reduction in household income, or an increase in business costs, reduces the amount of money spent on goods and services, which in turn, leads to negative ripple or multiplier

effects in a regional economy, in much same way program-related expenditures result in positive ripple effects.

Q. HOW DO YOU DETERMINE THE OVERALL "NET" ECONOMIC BENEFITS OF SOMETHING LIKE THE ENERGY STRONG PROGRAM?

A. Net economic impacts are determined by subtracting (1) the total negative economic impacts created by the Energy Strong program's rate increases from (2) the total positive economic impacts created by program's construction and development activities. In other words, it is necessary to estimate whether or not the decrease in economic activity from the Energy Strong program's rate increases is more than the increase in economic benefits associated with the project's construction and development activities. The full range of costs and benefits, including their corresponding "multiplier" effects, need to be considered in this calculation. A schematic of how this impact works is provided in Schedule DED-3.

Q. HAS THE COMPANY ESTIMATED THE ECONOMIC IMPACTS THAT IT BELIEVES WILL ARISE FROM ITS ENERGY STRONG PROPOSAL?

A. Only in part. The Company has provided incomplete economic impact analyses that themselves suffer from a number of deficiencies. Initially, the Company provided a limited estimate of the positive economic impacts that it believes will result from the implementation of its Energy Strong program. In the Petition and supporting testimony, the Company estimated that the program's investments and expenditures would create over 900 full time equivalent ("FTE") jobs.[19] This initial analysis did not attempt to represent a more complete economic impact analysis (or "net economic benefits" analysis) that considers both the positive economic impacts resulting from project expenditures and the reduction in economic activity created by the rate increase

[19] Company Petition at ¶114-115; Direct Testimony of Jorge L. Cardenas, 42:953-955.

needed to finance the proposed program. The Company has also provided, very late in the process, a study by the Brattle Group that it refers to as a "break-even" analysis. I will discuss the natural gas related issues with the Company's "break-even" analysis later in my testimony.

Q. HOW DID THE COMPANY ESTIMATE ITS LIMITED ENERGY STRONG ECONOMIC IMPACTS?

A. The Company states that its economic impacts estimates are based upon what it represents as "BPU established formulae."[20] The calculation of the direct employment impacts are relatively straightforward since an "employment per project expenditure" is developed by the Company and then multiplied by total anticipated program expenditures. The Company notes that the calculations are derived from internal estimates but does not provide the supporting documentation that reconciles or maps these internal "direct employment per expenditure" estimates to any internal company information. While the supporting documentation does provide an estimate of the "multiplier" impacts of the program, these were not directly included in the Company's Petition or testimony. Further, the analysis does not include other forms of economic impacts such as the changes in state economic output, wages or value-added.[21]

Q. ARE THERE ANY DEFICIENCIES IN THE COMPANY'S INITIAL ECONOMIC IMPACT ANALYSIS?

A. Yes, the Company's analysis has a number of deficiencies. First, the Company's estimates of the increased economic activity expected to result from its proposed program expenditures appear to be overstated, since the estimates do not appear to adjust program expenditures for

[20] Ibid.

[21] For the NGD-related proposals, the Company calculated an estimated 1,812 FTE jobs over five years by dividing its estimated total expenditures of $906 million by an estimated $500,000 in expenditures required to create one FTE job. For the EDC-related proposal, the Company estimated 2,838 FTE jobs over five years by dividing its estimated $1.7 billion in total program expenditure by an estimated $600,000 in expenditure to create one FTE job. Company Response to RCR-ECON-1. The two FTE estimates (1,812 and 2,838) sum to 4,650, divided by 5, amounts to 930 FTE jobs, or an amount "over 900" FTEs.

"leakages" associated with out-of-state purchases. Second, as noted above, the Company's economic impact estimates fail to consider the negative economic impacts associated with the rate increases resulting from the proposed Energy Strong program, if implemented. Third, the Company fails to address the very uneven distribution of the costs and benefits its proposal is likely to create for different sectors of New Jersey's economy.

B. The Company's Economic Impact Methods Do Not Appear to Account for Leakages

Q. LET'S TALK ABOUT THE FIRST DEFICIENCY YOU DISCUSSED EARLIER. CAN YOU EXPLAIN WHAT YOU MEAN BY AN ECONOMIC "LEAKAGE"?

A. Yes. An economic leakage occurs when a portion of some overall economic "shock" (which, as noted, can be an expenditure or cost) is made outside of the study area under investigation. When the study area of interest is a State, a leakage simply represents the out-of-state share of total expenditures. If, for example, a particular project is anticipated to make 30 percent of its expenditures out-of-state, and total capital expenditures for the project is assumed to be $100 million, then $30 million can be thought of as a "leakage." In order to estimate economic impacts, this $30 million is typically "backed-out" of the economic impact analysis since it represents purchases (and theoretically benefits or costs) that occur out-of-state as opposed to in-state. The direct, indirect, and induced impacts associated with the $30 million will occur out of state. Failure to properly account for these leakages can lead to a bias in economic impact modeling results.

Q. DID THE COMPANY'S ECONOMIC IMPACT ESTIMATES INCLUDE A LEAKAGE ADJUSTMENT?

A. No, they do not appear to adjust for any out of state leakage since: (1) 100 percent of the program expenditures are multiplied by an ambiguous internal Company FTE estimate; and (2) there is no supporting documentation that directly links any leakage estimate to this FTE driver.[22] This suggests that the Company's economic benefit analysis assumes that 100 percent of all of the Energy Strong capital expenditures will occur in-state. Given the size of the Energy Strong program, and its relatively short duration, assuming that 100 percent of all program expenditures will occur in the state is unrealistic. Moreover, such an assumption is inconsistent with information provided elsewhere in the Company's filing that recognizes that a large share of equipment and services will come from firms outside of the state.[23]

Q. HAVE YOU PERFORMED ANY ANALYSES ESTIMATING THE COMPANY'S POTENTIAL PROGRAM EXPENDITURE LEAKAGES?

A. Yes. I have developed estimates of the total in-state Energy Strong expenditures based, primarily, upon internal Company budgeting estimates.[24] There are some instances, however, where the Company's budgeting information was incomplete. In those instances I deferred to estimated sector-specific in-state expenditure profiles included in IMPLAN economic analysis modeling software. This is the same model that I use to estimate a more comprehensive set of Energy Strong program economic impacts.

Q. PLEASE DESCRIBE THE IMPLAN MODEL.

A. The IMPLAN model was originally developed by U.S. Forestry Service for use in developing its five-year resource management plans; hence the name "IMPLAN" or "impact analysis for planning." Over the years, the IMPLAN modeling framework was privatized, with

[22] Company Response to RCR-ECON-1.
[23] Company Responses to RCR-ECON-29 through RCR-ECON-46.
[24] Company Response to RCR-ECON-1; WP-JC-ES-1 (electric) and WP-JC-ES-1G (gas).

MIG, Inc. (formerly "Minnesota IMPLAN Group, Inc.") serving as the corporation responsible for the production, maintenance, and improvement of the modeling framework and data The model itself is based upon "input-output accounting [that] describes commodity flows from producers to intermediate and final consumers."[25] IMPLAN has data on 440 sectors and constructs Social Accounting Matrices ("SAMs") to describe "all commodity flows, not only purchases and production of sales and commodities, but also transfer payments to and from institutions." The commodity flows between industries are what drive the economic multipliers. IMPLAN utilizes data from a number of sources including the Bureau of the Census, Bureau of Labor Statistics, and the Bureau of Economic Analysis ("BEA").[26]

Q. IS IMPLAN A WELL-RESPECTED MODEL FOR EXAMINING REGIONAL ECONOMIC IMPACTS, PARTICULARLY THOSE ASSOCIATED WITH ENERGY INDUSTRIES?

A. Yes. The IMPLAN model is not only well-respected, but also has been used extensively in modeling economic impacts of energy-related projects. For example, IMPLAN has been used to estimate the employment and gross state product impacts of renewable portfolio standards in states including Arizona, Wisconsin, Nebraska, Colorado, Texas, and Washington.[27] In fact, the Clean Energy States Alliance cites IMPLAN as an appropriate model for evaluating the benefits and costs of an RPS.[28] The Edward J. Bloustein School of Planning and Public Policy at Rutgers University also cites IMPLAN as a model that can be used to estimate economic impacts of energy

[25]Lindall, Scott A., and Douglas C. Olson. "The IMPLAN input-output system." *Stillwater MN* (1996).
[26]Hartgen, David T. Traffic Congestion in North Carolina. Status, Prospects and Solutions. March 2007.
[27] Ernest Orlando Lawrence Berkeley National Laboratory. Weighing the Costs and Benefits of State Renewables Portfolio Standards: A Comparative Analysis of State-Level Policy Impact Projections. May 2007. Table 3 on page 24.
[28] Clean Energy States Alliance. Evaluating the Benefits and Costs of a Renewable Portfolio Standard. A Guide for State RPS Programs. May 2012, p.15.

infrastructure investments.[29] IMPLAN has also been utilized by the U.S. Department of the Interior's Bureau of Ocean Energy Management ("BOEM") in estimating economic impacts of holding lease sales in the Gulf of Mexico[30] as well as the MAG-PLAN Alaska model.[31] I personally have worked with IMPLAN in estimating economic impacts of similar infrastructure investments for over 15 years. IMPLAN has also been used to model a number of non-energy based natural resource impacts by federal agencies such as the U.S. Department of Transportation ("USDOT") and the U.S. Department of Agriculture ("USDA").[32]

Q. TURNING BACK TO THE ISSUE OF LEAKAGES, PLEASE DESCRIBE HOW THE IMPLAN MODEL ESTIMATES IN-STATE EXPENDITURE PROFILES.

A. These in-state expenditure profiles are based upon what is commonly referred to as a set of Regional Purchasing Coefficients ("RPCs") included in the IMPLAN model. These RPCs simply estimate the percent of any given industry's/sector's demand met by in-state suppliers/producers. For example, the RPC for the "electronic computer manufacturing" sector within IMPLAN is less than one percent, indicating that most computer manufacturing services are conducted outside, rather than within, New Jersey. The higher the RPC, the higher the in-state expenditure share.

Q. DOES THE COMPANY'S APPARENT OMISSION OF LEAKAGES MEAN THAT ITS ESTIMATED ECONOMIC IMPACTS ARE OVERSTATED?

[29] Edward J. Bloustein School of Planning and Public Policy, Rutgers University. *Economic Impacts of Energy Infrastructure Investment.* October 2010.
[30] U.S. Department of the Interior: Mineral Management Service Gulf of Mexico OCS Region. Gulf of Mexico OCS Oil and Gas Lease Sales: 2003-2007. Final Environmental Impact Statement. Volume I: Chapters 1-10.
[31] U.S. Department of the Interior: Bureau of Ocean Energy Management. *MAG-PLAN Alaska Update.* May 2012.
[32] U.S. Department of Transportation. Analyzing the Economic Impact of Transportation Projects Using RIMS II, IMPLAN, and REMI. 2000.
See http://www.nrcs.usda.gov/wps/portal/nrcs/detail/null/?cid=nrcs143_009732.

A. Yes. The limited direct economic impacts (benefits) estimated by the Company are likely overstated, among other problems, by as much as 40 percent since, over the entire eight year project development period, 40 percent of the expenditures needed to support the Energy Strong program, on average, will come from other out-of-state vendors and suppliers.[33]

Q. HAVE YOU PREPARED ANY ESTIMATES OF THE POSITIVE, CONSTRUCTION-RELATED ECONOMIC BENEFITS LIKELY TO ARISE FROM THE COMPANY'S ENERGY STRONG PROPOSAL?

A. Yes. I take the expenditure timeline provided by the Company,[34] and adjust that annual construction profile for leakages using the methodology I just discussed. These estimated in-state expenditures are then used as monetary inputs linked to the appropriate IMPLAN sectors of the New Jersey economy. For instance, assume the program included one million dollars in pipe-related in-state expenditures. The pipeline manufacturing and development sector of the New Jersey economy would be assigned one million in new "direct" economic activity, which in turn would be used to estimate the indirect and induced impacts of these initial capital expenditure. This process was undertaken for each and every in-state expenditure type included in the Company's Energy Strong proposal in order to estimate the direct, indirect, and induced economic impacts for state output, labor income, employment and value added. The positive economic impacts associated with the construction of the Energy Strong proposal program are presented in Schedule DED-4, and show that the program will lead to an increase in NPV gross state product of $2.97 billion, will increase total employment over the entire period of the program by almost 22,700 job years, will increase labor income by an NPV $1.1 billion and will provide an additional NPV $1.7 billion in value added to the New Jersey economy. While these estimates seem large,

[33] Company Responses to RCR-ECON-29 through RCR-ECON-46.
[34] Company Response to RCR-ECON-8.

they are all calculated across the full time period upon which the Company's rate impact analysis was based (i.e., 66 years).

C. The Company's Economic Impact Methods Do Not Appropriately Account for The Impact of Rate Increases

Q. LET'S TURN TO THE SECOND ISSUE YOU RAISED EARLIER: DO THE COMPANY'S ECONOMIC IMPACT ESTIMATES APPROPRIATELY ACCOUNT FOR THE NEGATIVE ECONOMIC IMPACTS CREATED BY THE RATE INCREASE NEEDED TO FUND THE PROGRAM?

A. No. The Company's analysis fails to take into account the fact that the rate increases needed to fund the Energy Strong program expenditures will lead to a certain level of negative economic impacts. For instance, the Company estimates an annual average rate increase of some $2.638 million NPV for all customers over the life of its program.[35] On average, ratepayers are expected to see their rates increase by some $119 million each year the program is in place.

Q. WILL ALL OF THESE RATE IMPACT-CREATED LOSSES OCCUR WITHIN THE NEW JERSEY ECONOMY?

A. No. Households, businesses, and industries are expected to reduce all their overall expenditures (holding income constant) as a result of the Energy Strong program rate increases. This includes a reduction in both in-state and out-of-state expenditures, so some of the negative impacts of the program will be "exported" to other states through reduced out-of-state purchases. I used the IMPLAN RPCs, discussed earlier in my testimony, to account for these rate impact related leakages.

[35] SS-ES-3E and SS-ES-3G.

Q. WILL THE COMPANY'S ENERGY STRONG PROPOSAL RESULT IN NET POSITIVE ECONOMIC BENEFITS IF THE NEGATIVE IMPACTS OF THE PROPOSED RATE INCREASES ARE CONSIDERED?

A. No. A simple comparison of the negative impacts associated with the Company's estimated rate increase, versus the positive impacts from its construction and development activities, shows that the costs of the program (rate impacts) exceed its benefits (construction and development) as shown in Schedule DED-4. As I noted earlier, the net economic impacts of the program provided in this schedule represent the difference between the total benefits associated with the Energy Strong proposal (construction, development expenditures) and their total costs (rate impacts). The results of this analysis show that the Company's Energy Strong proposal is likely to lead to a net contraction of New Jersey economic output of $338.4 million NPV and a reduction of New Jersey employment by almost 39,300 job-years.

Q. CAN YOU PUT SOME PERSPECTIVE ON THESE NEGATIVE NET EMPLOYMENT IMPACTS?

A. Yes, the negative net employment impacts associated with the Company's Energy Strong proposal appear large when reported in the absolute, and while important, need to be put into some perspective. First, these employment estimates are provided on a cumulative basis for a 24 (electric) to 66 (natural gas) year period associated with the Company's own pro forma and rate impact analyses.[36] So, while some of these impacts occur in the relatively near term, other impacts, particularly those associated with the negative rate impacts, occur over a longer period of time. Second, the cumulative employment impacts are represented in terms of "job-years" which is simply the number of jobs times the number of impact years in the study. So, a 100 job-year

[36] Company Response to RCR-G-POL-58, Attachments WP-SS-ES-1E and WP-SS-ES-1G.

impact could be interpreted as 100 jobs for one year, or a one job impact over 100 years. The use of job-years is an attempt to put some temporal perspective on the overall employment impact, and a simple estimate of the average annual employment impact can be developed using these impacts by dividing total job-year impacts by the total number of years to get an annual average employment impact. While the specific impact in any given year may differ from this number, it can be used as a general approximation of the impact in any given year, on average, across the study period under investigation. The Energy Strong proposal represents a significant increase in Company expenditures that will have a meaningful impact on the economy, both positively and negatively, for an extended period of time. On balance, however, the program is very likely to be a drag on the New Jersey economy that will have uneven and potentially inequitable impacts.

D. Distribution of Program Impacts

Q. HAVE YOU STUDIED HOW THESE ECONOMIC COSTS AND BENEFITS WILL BE DISTRIBUTED WITHIN THE NEW JERSEY ECONOMY?

A. Yes. I have conducted two different distributional impact analyses for the Company's Energy Strong program. The first distributional analysis estimates the allocation of costs and benefits among New Jersey households (residential customers) if the Energy Strong program is approved. The second distributional analysis estimates the allocation of costs and benefits of the Energy Strong proposal among various different non-household economic sectors of the New Jersey economy. Both analyses attempt to: (1) estimate whether the benefits of the program are generally uniform across all New Jersey stakeholder groups; and if not, (2) estimate the "winners" and "losers" associated with the program, if approved.

Q. ARE THE ESTIMATED ECONOMIC IMPACTS ASSOCIATED WITH THE COMPANY'S ENERGY STRONG PROPOSAL UNIFORMLY DISTRIBUTED ACROSS RESIDENTIAL HOUSEHOLD INCOME CLASSES?

A. No, and Schedule DED-5 shows the estimated losses across differing income level ranges, from the Company's Energy Strong proposal. A number of results can be highlighted from this chart:

1) All of the bars on this graph are negative, indicating that all residential customers (households) across all income groupings are likely to experience net losses in income if the Company's proposal is approved as offered.
2) The negative economic impacts are not uniform; in other words, the bars are not of the same size/proportion across all income classes.
3) The Company's Energy Strong program will negatively impact lower and middle class households relatively more than upper income households.

Q. HOW ARE THE ESTIMATED IMPACTS DISTRIBUTED ACROSS NEW JERSEY INDUSTRIES AND BUSINESSES?

A. These estimated impacts over different industry sectors show dramatic differences between the "winners" and "losers" in the New Jersey economy. The largest relative "winner" in this is the construction sector if the Energy Strong proposal is approved since a large share of the Company's hardening activities are construction-related in nature. The electric utility and natural gas utility distribution industries is estimated to be the next highest relative winner, since a large share of the expenditures and profits associated with these activities will remain with this sector of the economy.

Q. WHAT SECTORS OF THE NEW JERSEY ECONOMY ARE LIKELY TO LOSE IF THE ENERGY STRONG PROPOSAL IS APPROVED?

A. A relatively broad set of industry sectors are estimated to lose if the Energy Strong proposal is approved. Energy-intensive industries in the New Jersey economy, such as pharmaceuticals, petrochemicals, and petroleum refining, are also anticipated to suffer net losses if the Energy Strong proposal is approved. The reasons for the net losses are similar to the ones discussed earlier for residential households. There will be relatively more businesses and industries that are likely to see a net decrease in their economic output rather than a net gain. The reason is that many of these sectors are either (a) not directly impacted by the types of economic activity that will be generated by the Energy Strong program expenditures or (b) the rate impacts associated with the program far exceed any potential increased business opportunities for many of these sectors of the New Jersey economy.

V. Analysis of the Proposed NGD Program

A. Analysis of the Company's NGD Pipe Composition, Replacements and Leak Rates

Q. PLEASE EXPLAIN THE PRIMARY REASON WHY MANY STATES HAVE ADOPTED PIPELINE REPLACEMENT TRACKERS.

A. Many states have considered or adopted pipeline replacement infrastructure trackers in order to reduce the leak-related risks associated with older facilities, like mains and services, that are collectively referred to as "priority facilities."[37] Over the past several years, there has been increasing public and policy awareness of the role that leaks play in safety-related incidents.[38]

[37] American Gas Foundation, Gas Distribution Infrastructure: Pipeline Replacement and Upgrades – Cost Recovery Issues and Approaches (July 2012), p. ES-1; *see also* RE: Case No. 9159 Priority Pipe Replacement Progress Report – 2012, Maryland Case No. 9159, Mail Log No. 146074.

[38] *See* Department of Transportation's Pipeline Safety Awareness site: http://opsweb.phmsa.dot.gov/pipelineforum/index.html.

Most of this increasing awareness is the result of a number of unfortunate high-profile accidents that have occurred across the U.S. While not all of these high-profile incidents were the result of leaks from priority facilities, increased attention to all aspects of the pipeline industry's integrity management practices has suggested the need for the accelerated replacement of these priority facilities and, from a utility regulatory perspective, how the costs of those replacement activities should be recovered.

Q. WHAT DO YOU MEAN BY PRIORITY FACILITIES?

A. Priority facilities are usually those associated with facilities that are comprised of pipe materials that were installed decades ago and are no longer used, such as cast iron and unprotected bare steel mains and service lines.[39] In some instances, the definition of priority facilities can be expanded to certain types of equipment or couplings that create leak-related challenges.[40]

Q. PLEASE DISCUSS THE CHALLENGES THAT CAN ARISE FROM CAST IRON FACILITIES.

A. Cast iron mains and services were installed during a period prior to the 1970s. Cast iron was a common material type used in early evolving natural gas distribution systems.[41] While many of these pipes can continue to operate reasonably well, they can become brittle over time and can experience breaks, particularly for smaller diameter pipes in extreme weather conditions.[42] Cast iron pipes can also be subject to a special form of corrosion referred to as "graphitization" where

[39] *See* http://opsweb.phmsa.dot.gov/pipeline_replacement/.
[40] *See* http://opsweb.phmsa.dot.gov/pipeline_replacement/.
[41] According to the U.S. Department of Transportation, cast iron pipe was gradually superseded by ductile iron pipe, which is a direct development, with most existing manufacturing plants transitioning to the new material during the 1970s and 1980s. There is currently almost no new manufacture of cast iron pipe. Available at: http://opsweb.phmsa.dot.gov/pipelineforum/reports-and-research/cast-iron-pipeline/.
[42] U.S. Department of Transportation, The State of the National Pipeline Infrastructure, Available at: http://opsweb.phmsa.dot.gov/pipelineforum/docs/Secretarys%20Infrastructure%20Report_Revised%20per%20PHC_103111.pdf.

the pipe degrades to a softer material that tends to flake and is also subject to potential breaks and cracks.[43]

Q. PLEASE DISCUSS THE CHALLENGES THAT CAN ARISE FROM UNPROTECTED BARE STEEL FACILITIES.

A. Unprotected, or uncoated steel pipes and services, are commonly referred to as bare steel facilities.[44] These facilities are subject to corrosion which can cause them to develop pits, holes, and hot spots that, in turn, can compromise pipe integrity leading to natural gas leaks.[45] These pipes were installed extensively throughout the U.S. before the availability of plastic pipes and, ultimately, the use of protective coatings.[46] It was not until 1971 that federal safety mandates required all steel pipe to be installed with protective coatings.[47]

Q. ARE THESE PRIORITY FACILITIES UNIFORMLY DISTRIBUTED ACROSS ALL U.S. NATURAL GAS UTILITIES?

A. No. As I noted earlier, most of these priority mains, particularly those associated with cast iron facilities, tend to be located in the older natural gas utility systems of the Northeast and Mid-Atlantic regions of the country.

Q. PLEASE EXPLAIN WHY COMPARISONS OF UTILITY FACILITIES COMPOSITION, PIPELINE REPLACEMENT RATES, AND LEAKS ARE USEFUL IN EVALUATING INFRASTRUCTURE TRACKER REQUESTS.

A. These comparisons can be useful in assessing replacement tracker need as well as past utility replacement and leak performance under traditional regulation. These statistics can also be

[43] Ibid.
[44] See, http://opsweb.phmsa.dot.gov/pipeline_replacement/bare_steel_inventory.asp.
[45] Ibid.
[46] Ibid.
[47] Ibid.

useful in formulating performance metrics and incentives should a regulator decide to move forward with some form of replacement tracker mechanism.

Q. HAVE YOU PREPARED ANY ANALYSES OF THE COMPANY'S CURRENT AND HISTORIC PIPELINE INVENTORY, PIPELINE REPLACEMENT RATES, AND LEAK PERFORMANCE?

A. Yes. I have prepared a series of schedules (Schedule DED-6 to Schedule DED-24) that examine the Company's inventory of cast iron mains and bare steel services, its replacement rates on both of these types of facilities, and the leaks incurred on both types of assets. I have also provided a number of comparisons of the trends in the Company's priority facilities to those of a group of regional natural gas distribution utilities.

Q. WHAT IS THE SOURCE OF THE DATA YOU USED FOR YOUR ANALYSIS?

A. I utilized data from the U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration ("PHMSA"), Office of Pipeline Safety ("OPS," generally "OPS data"). The OPS collects a variety of information from pipeline operators under its jurisdiction in accordance with federal pipeline safety regulations. This annual data is required by 49 CFR 191.11, which states that "…each operator of a distribution pipeline system shall submit an annual report for that system on Department of Transportation Form RSPA F 7100.1-1. This report must be submitted each year, no later than March 15, for the preceding calendar year."[48] Some of the information submitted in this report is provided to the public, including the "Distribution, Transmission, and Liquid Annual Data" that was used in this analysis.

Q. DID YOU USE ANY INFORMATION PROVIDED BY THE COMPANY IN RESPONSE TO DISCOVERY?

[48] 49 CFR 191.11.

A. Yes. Some of the summary statistics and historic trend analyses are from Company-specific information provided in discovery.

Q. WHAT TIME PERIOD DID YOU USE FOR YOUR ANALYSIS?

A. I used the time period spanning from 1990 to the year with the most recently available information (2012). This long period of time allows for an adequate historic comparison of replacement and leak trends over what could be interpreted as various different positive and negative changes in the natural gas industry, public and regulatory policy, and in the economy.

Q. HOW DID YOU DEFINE THE REGIONAL UTILITY COMPARISON GROUP?

A. I followed a two-step process. The first step identifies all natural gas utilities in the Mid-Atlantic region and sorts them, from largest to smallest, by residential delivery volumes and number of customers. The second step attempts to select an equal number of utilities that are larger and smaller than the Company, in such a manner that places the Company at, or very near, the median of the distribution of utilities selected (i.e., an equal number of both larger and smaller-sized distribution utilities). However, because the Company is the largest in the region, I selected 15 companies with sales and customers comparable in size to the Company. A table comparing these utilities and their number of customers and sales has been provided in Schedule DED-6.

Q. DOES THE COMPANY HAVE A LARGE SHARE OF CAST IRON MAINS COMPARED TO OTHER MID-ATLANTIC GAS UTILITIES?

A. Yes. Schedule DED-7 provides a materials break-down of the Company's distribution mains. The 2012 inventory of the Company's mains indicate they are comprised of unprotected steel (5.8 percent); cast iron (23.5 percent) cathodically protected steel (27.4 percent); and plastic (43.2 percent). The schedule shows that the Company has a relatively high share of cast iron mains relative to its other pipeline material types. Schedule DED-8 compares the Company's cast iron

pipeline shares to other regional Mid-Atlantic utilities. The comparison shows that the Company's share of cast iron mains is large relative to most other comparable utilities.

Q. HOW DO THE COMPANY'S MAINS REPLACEMENT RATES COMPARE TO OTHER REGIONAL GAS UTILITIES?

A. Schedule DED-9 presents a comparison of the Company's annual cast iron mains replacement trends relative to other regional gas utilities. The statistics included in this chart are indexed to a common year, 1991 (i.e., replacement levels for all utilities equal 1.0 in that year). For example, a reading of 1.10 would be equal to a 10 percent increase relative to 1991 levels; whereas, an index number below 1.0 would indicate performance activity levels that are lower than the base year. This analysis shows that the Company's cast iron replacement rates have been below those of other comparable utilities despite the fact that the Company has a relatively higher than average share of cast iron mains. In fact, the Company's relative replacement performance matched or exceeded the regional peer group in only three of the last 21 years. The Company's relative replacement performance peaked in 2008 and has decreased considerably in each year since that time relative to its 1991 performance.

Q. HAVE YOU COMPARED THE COMPANY'S REPLACEMENT TRENDS WITH OTHER NEW JERSEY GAS UTILITIES?

A. Schedule DED-10 provides a comparison of the Company's mains replacements trends with other New Jersey utilities. The analysis shows that, historically, the Company's relative cast iron replacement rate has been well below other New Jersey natural gas utilities. The Company's relative replacement of cast iron mains has been consistent with other New Jersey utility in only one out of the last 21 years.

Q. HAVE YOU COMPARED THE COMPANY'S LEAK INVENTORY WITH OTHER REGIONAL UTILITIES?

A. Yes. Schedule DED-11 compares the Company's total leak inventory at the end of the year with other regional utilities on an indexed basis. The Company's leak inventory (from all types of leaks) has fallen since its peak in 2004. However, the relative position of the Company's leak inventory is consistently higher than the relative leak inventory of other regional utilities in every year since 1997. Further, regional utilities have seen a steady and consistent decrease in their relative leak inventory in every year since 2007. PSE&G's leak inventory generally increased from 2007 to 2010, and while decreasing since 2010, is still relatively higher than the regional utility group.

Q. HAVE YOU COMPARED THE COMPANY'S LEAK INVENTORY TRENDS WITH OTHER NEW JERSEY GAS UTILITIES?

A. Yes. Schedule DED-12 provides a comparison of the Company's leak inventory with other New Jersey utilities. The schedule shows that the Company's relative leak inventory performance has been much better relative to other New Jersey utilities from the period between 2007 and 2010. The Company's leak performance is comparable to other New Jersey utilities over the last two years as other in-state gas utilities significantly decreased their leak inventories starting in 2009 and continuing through to 2012.

Q. HAVE YOU COMPARED THE COMPOSITION OF THE COMPANY'S MOST RECENT LEAK REPAIRS WITH THOSE OF OTHER UTILITIES?

A. Yes. Schedule DED-13 compares the composition of the Company's leak repairs with other New Jersey and regional gas utilities. The chart shows that natural forces are the biggest cause of the Company's leak repairs. For the regional utilities, and other New Jersey utilities,

corrosion is the main concern. Leaks caused by excavation, materials or welds, and equipment are generally consistent across all three groups.

Q. HAS THE COMPANY PROVIDED ANY DETAILED STATISTICS ON ITS CAST IRON MAINS?

A. Yes. The Company provided some specific statistics on its total cast iron inventory, leaks and the number of breaks associated with its cast iron mains over the past five years. Schedule DED-14 provides a comparison of the Company's cast iron mains inventory to its annual cast iron breaks. Schedule DED-15 provides a comparison of the Company's cast iron replacements and its annual cast iron breaks, while Schedule DED-16 shows the historic trends in the leak rates per mile of cast iron pipes versus its number of cast iron breaks. Each schedule shows that: (1) the Company's replacement rate of cast iron mains has decreased in each year since 2008; (2) the number of cast iron pipe breaks has decreased considerably since 2009, and (3) the leak rates per cast iron mains is at its lowest level in over five years and 46 percent lower than the recent 2009 peak.

Q. HOW LARGE IS THE CAST IRON PIPELINE REPLACEMENT COMPONENT OF THE COMPANY'S PROPOSAL RELATIVE TO OTHER COMPANIES WITH LARGE SHARES OF CAST IRON?

A. Schedule DED-17 shows that the Company's proposed cast iron pipeline replacement rate is higher than a sampling of other companies with large shares of cast iron main. In fact, in terms of miles of cast iron mains, the Company's proposed replacement rate of 125 miles per year is 30 percent more than its 2008 replacements, which is the largest single year of replacements in the past eight years. Moreover, the Company's proposal is two to three times the amount of miles of cast iron mains replaced in any year by the Company since 2008. However, when examined on

the basis of an annual change in the Company's cast iron main as a share of total main, page 2 of Schedule DED-17 shows that the Company's recent replacements as a share of total is actually less than that seen by many regional natural gas utilities (because the Company's denominator is so large). The Company is proposing, however, to increase that annual change in cast iron share significantly.

Q. LET'S TURN TO YOUR ANALYSIS OF THE COMPANY'S SERVICE LINES REPLACEMENT TRENDS. WOULD YOU PLEASE EXPLAIN THE FIRST SCHEDULE IN THIS ANALYSIS?

A. Schedule DED-18 examines the Company's service line inventory by materials type for 2012. The Company's current service line inventory is made up primarily of plastic (63 percent), followed by protected steel (20 percent), and non-protected steel (17 percent). Schedule DED-19 compares the Company's priority service line composition to other utilities in the Mid-Atlantic region as well as their relative corrosion-related leak rates per total service lines and per bare steel service lines. The analysis shows that the Company's bare steel service line shares are relatively higher, yet not the highest, in the selected Mid-Atlantic utility group. Further, the Company's corrosion-related leaks per total service lines and corrosion related leaks per bare steel service lines compare well to other regional utilities.

Q. HOW DO THE COMPANY'S SERVICE LINE REPLACEMENT RATES COMPARE TO OTHER REGIONAL UTILITIES?

A. The Company's replacement bare steel service replacement rates compare well with other utilities, particularly relative to the last five years. Schedule DED-20 shows that the Company exceeded, or was slightly below the relatively bare steel service replacement rate for other regional utilities.

Q. HOW DO THE COMPANY'S BARE STEEL SERVICE LINE REPLACEMENTS COMPARE TO OTHER NEW JERSEY GAS UTILITIES?

A. Schedule DED-21 shows that the Company's bare steel service replacement rates compare well on a relative basis to other New Jersey gas utilities, primarily over the past five years. In fact, the Company's bare steel service replacements have exceeded the composite average for other New Jersey gas utilities, by a relatively meaningful relative level, in 2009 and 2012.

Q. HOW DO THE COMPANY'S BARE STEEL REPLACEMENT RATES COMPARE WITH ITS HISTORIC CORROSION-RELATED LEAKS?

A. These also compare relatively well, as seen in Schedule DED-22. As noted earlier, the Company's bare steel service replacement rates were exceptionally high over the past five years. Corrosion-related leaks have been falling considerably, however, since about 2004. Leaks have fallen by 18 percent over the more recent 2009-2012 period.

Q. HOW DO THE COMPANY'S CORROSION-RELATED LEAKS COMPARE WITH OTHER REGIONAL UTILITIES INCLUDING THOSE IN NEW JERSEY?

A. Schedule DED-23 shows that the Company's corrosion-related leaks for its service lines compare relatively well to the regional utility average since at least the early to mid-1990s. Schedule DED-24 provides the same comparison against New Jersey gas utilities. PSE&G's service line corrosion-related leaks have historically been higher than the New Jersey utility average with the exception of 2012 where the Company's relative leaks fell below those of other state utilities.

Q. WHAT CONCLUSIONS DO YOU REACH FROM THESE MAINS AND SERVICES LINE COMPARISONS?

A. I reach the following conclusions:

1) The Company has, and continues to report, a relatively high proportion of cast iron mains relative to its total mains inventory.
2) The Company's relative cast iron replacement rates are estimated to be below those reported for other regional and New Jersey gas utilities.
3) The Company's cast iron replacement proposals, however, would put it in a position of replacing pipe at rates considerably higher than some of the historically highest (not average) average replacement rates. For instance, the Company's highest annual rate of replacement since 2009 has been 58 miles. Now, it proposes to replace 125 miles of cast iron pipe not just in one year, but consistently across an eight year period.
4) The Company reports a relatively higher level of leaks in inventory than other regional utilities, but comparable to other New Jersey gas utilities. New Jersey gas utilities, however, have been reducing their relative leak inventory at rates far greater than the Company over the past five years and passed the Company on a relative basis in 2012.
5) The Company's service line replacement and leak trends are comparable to other regional and New Jersey utilities.
6) The Company's cast iron replacement proposal is significantly higher than other utilities with higher shares of cast iron main.

Q. DO YOU THINK THE COMPANY'S CURRENT INVENTORY, REPLACEMENT RATE AND LEAK INVENTORY TRENDS SUPPORT THE NGD PORTION OF ITS ENERGY STRONG PROPOSAL?

A. No. First, the Company's bare steel service line replacement performance and leak rate trends appear to be comparable to those of other regional utilities. There is no special policy need, at least from the trends shown in the OPS data, to develop some new cost recovery mechanism to

change this current rate of replacement. Second, while the Company does have a relatively high share of cast iron mains, its prior replacement of those mains has been relatively lackluster in comparison to other regional utilities. The Company's relatively slow rate of replacement calls into question its ability to replace cast iron pipe over the course of the proposed Energy Strong program at rates considerably faster than it has done over the past 21 years. In fact, it has taken the Company roughly 17 years to replace the same mileage of cast iron pipe it now proposes to replace in six. Thus, there appears to be no merit in approving the NGD portion of the Company's Energy Strong proposal, particularly without any performance standards or metrics. I will discuss this further in a later section of my testimony.

B. The Company Has Not Shown the Need for the NGD Component of its Energy Strong Proposal

1. Overview of the NGD Components of the Energy Strong Proposal

Q. PLEASE EXPLAIN THE COMPANY'S M&R STATION PROPOSAL IN GREATER DETAIL.

A. As noted in Section 3 above, the Company has defined nine different M&R stations, including one LNG storage/peak shaving plant, as well as one LNG plant that it believes will benefit from flood and/or storm surge mitigation.[49] The Company notes that these M&R/LPG/LNG facilities were selected because they were either directly impacted by Hurricane Sandy or are now within a "newly defined flood hazard zone."[50] The LNG plant was selected since it lost secondary power, experienced some flooding, and is within revised flood maps promulgated by the Federal Emergency Management Agency ("FEMA").[51] Although not

[49] Company Petition at ¶95; Direct Testimony of Jorge L. Cardenas, 35:774-775.
[50] Company Petition at ¶95; Direct Testimony of Jorge L. Cardenas, 35:775 to 36:777.
[51] Company Petition at ¶97; Direct Testimony of Jorge L. Cardenas, 36:796-797.

specifically defined within the proposal, the Company additionally states as part of the proposed M&R Station proposal other sites such as the Company's Liquefied Petroleum Gas ("LPG") storage tanks in Linden, Harrison and Camden, will be evaluated for potential storm impact mitigation.[52]

Q. WHAT IS THE ANTICIPATED COST AND SCHEDULE FOR THIS M&R SUB-PROGRAM?

A. This M&R station sub-program is estimated to cost $140 million and will take eight years to complete.[53] The Company states that it will conduct and complete its mitigation activities on the five stations directly impacted by Hurricane Sandy in the first five years of the program, and will then focus on the remaining four stations in the last three years that were not directly impacted by the storm.[54] The mitigation activities at the Burlington LNG plant are anticipated to take four years[55] to complete and will run concurrent with the initial M&R projects.[56] The Company notes that work on the five stations impacted by Hurricane Sandy, and the Burlington LNG plant, account for 55 percent of total sub-program expenditures.[57]

Q. DID ANY OF THESE M&R STATIONS EXPERIENCE ANY OUTAGES OR DAMAGE DURING HURRICANE SANDY?

A. The five M&R stations the Company plans to address in the first five years of the program, as well as the Burlington LNG plant, did experience physical damage as a result of Hurricane Sandy, defined as damage to station equipment, electronics, or loss of power supplies due to storm surge.[58] In total, the Company incurred repair costs of $219,746 to repair damage to M&R stations

[52] Direct Testimony of Jorge L. Cardenas, 36:779-780.
[53] Company Petition at ¶100; Direct Testimony of Jorge L. Cardenas, 39:878-880.
[54] Company Petition at ¶¶96, 99; Direct Testimony of Jorge L. Cardenas, 36:784-786 and 37:805-806.
[55] Company Petition at ¶97; Direct Testimony of Jorge L. Cardenas, 36:795-797.
[56] *See* Direct Testimony of Jorge L. Cardenas, 36:794-797 and 37:812 to 38:832.
[57] Company Petition at ¶¶96-99; Direct Testimony of Jorge L. Cardenas, 37:805 and 37:812 to 38:847.
[58] Company Response to RCR-G-POL-35.

throughout the Company's system in the wake of Hurricane Sandy.[59] However, the Burlington LNG plant, while losing secondary power during Hurricane Sandy,[60] did not experience flooding due to storm surge,[61] and did not experience outages during any of the recent major storm events.[62] In fact, of the Company's LNG and LPG assets, only the Harrison LPG Station was out-of-service during Hurricane Sandy.[63] However, Hurricane Sandy occurred during a period when the plant in question was not needed, and thus no gas customers experienced outages.[64]

Q. HAS THE COMPANY IDENTIFIED THE NUMBER OF CUSTOMERS DURING HURRICANE SANDY IMPACTED BY THESE SPECIFIC M&R STATION OUTAGES?

A. No, but Hurricane Sandy itself had relatively minor outage impact on the Company's natural gas distribution system. As stated by the Company, storm surge from Hurricane Sandy occurred in 25 towns in PSE&G's service territory and required gas inspections in approximately 41,500 premises and replacement of over 6,300 meters.[65] However, in total only 1,133 customers on the PSE&G NGD system lost natural gas service.[66]

Q. PLEASE EXPLAIN THE COMPANY'S PIPELINE REPLACEMENT SUB-PROGRAM.

A. The Company proposes to replace approximately 750 miles of cast iron mains with either plastic or protected steel pipe.[67] The Company also proposes to replace over 40,000 bare steel

[59] Company Response to RCR-G-POL-38. Note that this cost includes costs to repair damage to the Company's Harrison LPG Plant.
[60] Company Response to RCR-G-POL-32.
[61] Company Response to RCR-G-POL-32.
[62] Company Response to S-PSEG-ES-42.
[63] Company Response to S-PSEG-ES-42.
[64] Company Response to S-PSEG-ES-42.
[65] Company Petition at ¶7; Direct Testimony of Jorge L. Cardenas, 4:80-83.
[66] Company Response to RCR-G-POL-22. Note that the Company's response to RCR-G-POL-22 shows that the "Number of Customers that were without gas service" totals 1,133. However, the Company's response to RCR-G-POL-51 indicates that the "Number of Customers Impacted" totals 6,808. Presumably, all of these customers did not experience service outages otherwise they would be included in the total provided in RCR-G-POL-22.
[67] Company Petition at ¶101; Direct Testimony of Jorge L. Cardenas, 39:891-893.

service lines.[68] Some district regulators will be replaced at the time the cast iron mains are replaced.[69] The Company's replacement sub-program also includes a proposal to increase the operating pressure in flood zones and other targeted areas to eliminate the potential for water intrusion. According to the Company, leaks are of a particular concern in areas where the distribution system is located in flood zones or areas of potential tidal/storm surge.[70] The Company asserts that this water intrusion, in turn, can result in widespread outages until the water entry is stopped and the system has been dewatered.

Q. DID THE COMPANY IDENTIFY ANY OUTAGES DURING HURRICANE SANDY THAT WERE CREATED BY THESE CAST IRON MAINS OR BARE STEEL SERVICE LINES?

A. No, but as stated previously, Hurricane Sandy had only minimal outage impact on the Company's natural gas distribution system.

Q. WHAT IS THE ESTIMATED COST AND SCHEDULE FOR THE PROJECTS INCLUDED IN THE NGD PIPELINE REPLACEMENT SUB-PROGRAM?

A. The Company estimates that the replacement of applicable cast iron and bare steel mains and services will cost $1.04 billion and take a total of six years to complete.[71] The Company plans to prioritize the replacement of cast iron mains in municipalities that have previously experienced flooding or storm surge in prior storms, including Hurricane Irene and Sandy.[72] The second priority will be to replace all cast iron pipe located within or in the proximity of FEMA flood

[68] Company Petition at ¶102; Direct Testimony of Jorge L. Cardenas, 39:894-896.
[69] Company Petition at ¶107.
[70] Company Petition at ¶103; Direct Testimony of Jorge L. Cardenas, 39:899 to 40:909.
[71] Company Petition ¶110; and Direct Testimony of Jorge L. Cardenas, 42:946-947.
[72] Company Petition ¶106; and Direct Testimony of Jorge L. Cardenas, 41:925-926.

zones.[73] The Company estimates that the proposed plan will reduce the Company's cast iron infrastructure by approximately 20 percent.[74]

Q. HAS THE COMPANY PROVIDED ANY COMPELLING POLICY RATIONALE FOR THE NGD COMPONENT OF ITS ENERGY STRONG PROGRAM AND ITS CORRESPONDING COST TRACKER MECHANISM?

A. No, at least not from a policy perspective and particularly relative to the Company's pipeline replacement proposals. Mr. McGee will discuss the engineering-related deficiencies of the program. However, from a policy perspective, the pipeline replacement component of the Company's Energy Strong proposal suffers from several deficiencies including:

1) The pipeline replacement proposals places an incorrect prioritization on how priority mains will be replaced (prioritizing flood areas over highest leak-prone pipes) which the Company has not demonstrated are consistent with general DIMP policy principles.
2) The Company has provided little to no estimated benefits, or cost-benefit analyses, to support its NGD proposals.

2. NGD Replacement Program Prioritization Issues

Q. ARE THE PRIORITIZATION POLICIES ASSOCIATED WITH THE COMPANY'S PROPOSED NGD REPLACEMENT PROGRAM CONSISTENT WITH MOST INFRASTRUCTURE REPLACEMENT TRACKER PROPOSALS?

A. No, since the program prioritizes the replacement of priority mains and services on their location relative to flood and storm surge zones, and does not target asset replacement on those with the highest leaks and the greatest potential for safety-related problems. For instance, the Company notes that it will prioritize the replacement of cast iron mains that are located in areas

[73] Company Petition ¶106; Direct Testimony of Jorge L. Cardenas, 41:926-927.
[74] Direct Testimony of Jorge L. Cardenas, 41:929-931.

significantly impacted by Hurricane Sandy and then in areas within newly defined flood zones.[75] The Company also proposes to increase system pressures in these flood zone areas which, in turn, will require additional priority mains replacements in neighboring non-flood areas.[76]

Q. WHY WILL THE COMPANY NEED TO REPLACE ADDITIONAL CAST IRON PIPES IN AREAS THAT ARE NOT INCLUDED IN FLOOD ZONES OR HURRICANE SANDY-IMPACTED AREAS?

A. It is my understanding that the Company will need to replace these proximity cast iron facilities in order to avoid the increased leaks that could arise once the proposed system pressure increases are initiated. Mr. McGee discusses the engineering issues related to this aspect of the Company's proposal. However, as noted earlier in my testimony, cast iron pipes are considered a leak-prone material type and increasing pressure on these pipes can increase the probability of additional leaks and system stresses. The Company proposes to replace these neighboring cast iron facilities at the same time it replaces those in flood zones in order to eliminate the potential for additional pressure-induced leak problems. Again, Mr. McGee addresses the technical and engineering issues associated with this proposal in greater detail in his direct testimony.

Q. ARE YOU AWARE OF ANY OTHER APPROVED NGD INFRASTRUCTURE REPLACEMENT MECHANISMS THAT EMPHASIZE GEOGRAPHIC FACTORS OTHER THAN LEAK/SAFETY CONCERNS?

A. No. From a policy perspective, most approved natural gas infrastructure mechanisms focus on the replacement of the most leak prone assets over other considerations. For instance, the New Hampshire Public Utilities Commission, in approving a program aimed at accelerating the

[75] Company Petition ¶106; Direct Testimony of Jorge L. Cardenas, 41:925-927.
[76] Company Response to RCR-G-POL-42.

replacement of cast iron and bare steel pipes on the National Grid distribution system, noted that these pipes are "determined to be the ones most likely to leak or fail,"[77] and that

> Through this program, the Company is able to remove from service those pipes most likely to endanger public safety by leaking or failing, while permitting the Company the ability to recover the reasonable costs of replacing pipe without being subject to the degree of regulatory lag often associated with the replacement of such assets.[78]

Q. EXPLAIN WHY THE COMPANY'S PROPOSALS ARE INCONSISTENT WITH DIMP POLICY PRINCIPLES.

A. DIMP principles generally require operators of natural gas distribution pipelines to develop, write, and implement a distribution integrity management program addressing the following eight elements: (1) knowledge of system infrastructure, (2) identification of threats, (3) evaluation and prioritization of risks, (4) identification and implementation of measures to mitigate risks, (5) measurement of performance, monitoring of results, and evaluation of effectiveness, (6) periodic evaluation and improvement, (7) record retention plan, and (8) a plan for reporting of results.[79] Important to the question at issue here is element 3, requiring natural gas distribution pipeline operators to prioritize risks. Under the Federal Regulations, element 3 requires operators to evaluate the risks associated with its distribution pipeline, and further clarifies that:

> In this evaluation, the operator must determine the relative importance of each threat and estimate and rank the risks posed to its pipeline. This evaluation must consider each applicable current and potential threat, the likelihood of failure associated with each threat, and the potential consequences of such a failure. An operator may subdivide its pipeline into regions with similar characteristics (e.g. contiguous areas within a distribution pipeline consisting of mains, services and other appurtenances;

[77] EnergyNorth Natural Gas, Inc. d/b/a National Grid NH 2009 Cast Iron/Bare Steel Replacement Program Reconciliation, Docket DG 09-095, Order No. 24,996 Approving Revised Distribution Rate, p.2.
[78] EnergyNorth Natural Gas, Inc. d/b/a National Grid NH 2009 Cast Iron/Bare Steel Replacement Program Reconciliation, Docket DG 09-095, Order No. 24,996 Approving Revised Distribution Rate, p.8.
[79] Federal Register/Vol. 74, No. 232 at 63935 (49 CFR 192.1015).

> areas with common materials or environmental factors), and for which similar actions likely would be effective in reducing risk.[80]

Q. HAS THE PHMSA PROVIDED ANY FURTHER GUIDANCE ON HOW OPERATORS SHOULD PRIORITIZE RISKS TO SYSTEM INFRASTRUCTURE?

A. Yes. PHMSA has distributed a series of Frequently Asked Questions ("FAQs") to "clarify, explain, and promote better understanding of the distribution pipeline integrity management rules."[81] In response to the question of whether every pipeline type must assess each of PHMSA's eight threats to be in compliance with DIMP, PHMSA states:

> Yes, an operator's DIMP must consider each of the 8 threats for the pipeline system. The eight threats categories are corrosion, natural forces, excavation damage, other outside force damage, material or welds, equipment failure, incorrect operations, and other concerns that could threaten the integrity of its pipeline.[82]

Furthermore, in giving guidance regarding requirements on evaluation of risk, PHMSA explicitly states that:

> Operators must consider the risks (…) that might result from each threat. A potential incident of relatively low likelihood which produces significant consequences may be a higher risk than an incident with somewhat greater likelihood which may not produce major consequences.[83]

Q. DOES THE COMPANY'S DISTRIBUTION INTEGRITY MANAGEMENT PLAN MAKE REFERENCE TO THE PRIORITIZING OF RISKS DUE TO THREATS AND POTENTIAL CONSEQUENCES?

A. Yes. **BEGIN CONFIDENTIAL** [redacted]

[80] Federal Register/Vol. 74, No. 232 at 63934-63935 (49 CFR 192.1007).
[81] Gas Distribution Integrity Management Program: FAQs, U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, http://primis.phmsa.dot.gov/dimp/faqs htm#c1.
[82] Gas Distribution Integrity Management Program: FAQs, U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Question C.4.b.2, emphasis added.
[83] Gas Distribution Integrity Management Program: FAQs, U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Question C.4.c.1, emphasis added.

[redacted]

END CONFIDENTIAL

Q. DOES THE COMPANY'S DISTRIBUTION INTEGRITY MANAGEMENT PLAN INCLUDE AN EVALUATION OF THREATS CAUSED BY FLOODING?

A. Yes. **BEGIN CONFIDENTIAL** [redacted]

END CONFIDENTIAL

3. Cost-Benefit Analysis

Q. DID THE COMPANY PROVIDE ANY COST-BENEFIT OR COST-EFFECTIVENESS STUDIES FOR ITS NGD INITIATIVES?

A. No, it has not conducted a quantitative cost-benefit analysis for its NGD initiatives. When originally asked in discovery to provide such analysis, back on May 31, 2013, the Company was only able to provide costs associated with the initiatives, and a qualitative assessment of benefits resulting from the initiatives.[88] However, on October 7, 2013, the Company provided a very late-

[84] Company Response to RCR-G-POL-11, CONFIDENTIAL Attachment PSEG DIMP 2012, p. 2. Emphasis added.
[85] Company Response to RCR-G-POL-11, CONFIDENTIAL Attachment PSEG DIMP 2012, p. 15.
[86] Company Response to RCR-G-POL-11, CONFIDENTIAL Attachment PSEG DIMP 2012, p. 52.
[87] Company Response to RCR-G-POL-11, CONFIDENTIAL Attachment PSEG DIMP 2012, p. 52.
[88] Company Response to RCR-ECON-5, as well as S-PSEG-ES-40, S-PSEG-ES-42, and S-PSEG-ES-46.

filed supplement to RCR-ECON-5 that includes a "break-even" analysis that was recently prepared on the Company's behalf by the Brattle Group. I reserve the right to supplement or modify my testimony and exhibits based upon my pending analysis of the Brattle Group Report (RCR-ECON-5 (Supp'l)).

Q. DO YOU HAVE ANY PRELIMINARY OPINIONS REGARDING THE BRATTLE GROUP STUDY?

A. Yes. First and foremost, the Board should be wary of any study that purports to support the cost-effectiveness of a policy proposal four months after that policy proposal has been made. The Brattle Report appears to simply offer justification for the Company's massive spending proposal well after the program has been conceptualized, developed, and offered to the Board for approval. Secondly, the Brattle Report, by its own admission, is not a "cost-benefit" study but what it refers to as a "break-even" analysis: an approach that assumes that if there were a 100 percent guarantee that a major weather-related event like Hurricane Sandy were to happen again in the future, with unprecedented customer outage levels, i.e. tens of thousands of customers out for multiple days, then the cost of the NGD proposals included in the Energy Strong proposal will "break-even" with its benefits. The problem with the Brattle Group's approach is that it is entirely "results-driven" being based upon an equally unreasonable standard of evaluation that in no way can lead to rates that are fair, just and reasonable since the "break even" analysis "over-values" future incidents and is entirely inconsistent with well-established methodologies used in analyzing risk.

Q. WHAT DO YOU MEAN BY "OVER-VALUING" THE BENEFITS OF THE ENERGY STRONG PROPOSAL?

A. The Brattle Group study assumes that an extreme storm event with unprecedented customer impacts will occur in the future with 100 percent certainty. This is certainly not the case, and not the approach typically utilized to determine the value of fair insurance that scales insurance premiums to the expected value of the potential loss. For instance, if an individual purchases a five-year term life insurance policy for one million dollars, and that individual has a one percent chance of dying over the next five years, given lifestyle and health practices, then the individual would be willing to purchase insurance for a premium up to an amount about $2,000 per year[89]). By analogy, the Company's proposal assumes that this individual has a 100 percent chance of dying within five years, and would be willing to pay the full amount of potential coverage (i.e., one million dollars) to insure against that event, thereby ensuring a 'break-even" outcome for having purchased the insurance.

Q. DO YOU AGREE WITH THE BRATTLE GROUP'S PRESUMPTION THAT THE PROBABILITY OF FUTURE EXTREME WEATHER EVENTS IS "NOT PRESENTLY AVAILABLE" THEREBY JUSTIFYING ITS "BREAK-EVEN" APPROACH?

A. No, since insurance companies, and those offering or securing insurance products, typically assess and re-assess these probabilities on a regular basis before and after major storm events. While these probabilities are not known with certainty, there are ranges of estimates of such events occurring in the future. Furthermore, while the probability of future extreme weather events may not be "presently available" to the authors of the study, it is highly unlikely that estimates of these events do not exist since they have been, and continue to be, the subject of considerable past as

[89] One million times 0.01 divided by 5 years is 2,000 per year.

well as ongoing research.[90] The authors' conclusions simply serve to justify the Company's proposal since the analysis assumes a 100 percent probability of major storm event occurring after the Company's proposal is complete. This forces ratepayers into over-insuring, and over-paying, for future storm events through the purchase of insurance in the form of ratepayer-supported "asset hardening."

Q. HAVE YOU CONDUCTED ANY COST-BENEFIT ANALYSIS ASSOCIATED WITH THE COMPANY'S ENERGY STRONG NGD PROPOSALS?

A. Yes. Schedule DED-25 provides an alternative analysis that examines the cost effectiveness of the Company's Energy Strong NGD proposal, by quantifying both the environmental and economic benefits of the program. The data utilized in the analysis includes: EPA methane emission factors;[91] the Company's proposed pipeline replacements and costs; estimated O&M savings; city-gate prices reported by the EIA that were extrapolated on a percentage basis based upon the most recent natural gas commodity price forecast included in the Energy Information Administration's ("EIA") *Annual Energy Outlook 2013*;[92] and the most recently reported carbon emission credit prices reported for the Regional Greenhouse Gas Initiative ("RGGI").[93]

[90] *See for instance,* Peterson, T.C., P.A. Stott, and S. Herring. 2012. Explaining extreme events of 2011 from a climate perspective. American Meteorological Society; Pall, P., T. Aina, D. A. Stone, P. A. Stott, T. Nozawa, A. G. J. Hilberts, D. Lohmann, and M. R. Allen, 2011: Anthropogenic greenhouse gas contribution to flood risk in England and Wales in autumn 2000. *Nature*, 470, 382-385; Seneviratne, S.I., N. Nicholls, D. Easterling, C.M. Goodess, S. Kanae, J. Kossin, Y. Luo, J. Marengo, K. McInnes, M. Rahimi, M. Reichstein, A. Sorteberg, C. Vera, and X. Zhang, 2012: Changes in climate extremes and their impacts on the natural physical environment. In: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp. 109-230; Stott, P. A., D. A. Stone, and M. R. Allen, 2004: Human contribution to the European heatwave of 2003. *Nature*, 432, 610–614.

[91] 40 CFR Part 98.

[92] Annual Energy Outlook 2013; with Projections to 2040 (April 2013), U.S. Energy Information Administration, Table 13.

[93] *See*, Regional Greenhouse Gas Initiative, Auction 20 Results; http://www.rggi.org/market/co2_auctions/results.

Q. WHAT ARE THE RESULTS OF YOUR COST-BENEFIT ANALYSIS?

A. Using an estimated O&M offset of $3,042 per mile for the proposed Energy Strong program, the results show estimated O&M cost benefits (from the value of avoided O&M) of $1.2 million. Commodity cost savings (from the value of avoided leaks) are estimated to be over $1.6 million, and environmental benefits (from the value of avoided GHG emissions) are estimated to be $210,000. Total benefits for the proposed Energy Strong program are $3.0 million. As shown in Schedule DED-25, the revenue requirement for this program however, more than offsets these benefits resulting in negative net program benefits and a benefit/cost ratio of less than one for each program.

Q. DOES THIS COST-BENEFIT ANALYSIS YOU JUST DESCRIBED INCLUDE ANY ECONOMIC COSTS OR BENEFITS ASSOCIATED WITH THE PROGRAM'S CONSTRUCTION ACTIVITIES OR RATE IMPACTS?

A. No, but the results of my cost-benefit analysis can be compared to my earlier economic impact analyses to determine whether the additional environmental and economic benefits are enough to "swing" the net economic impacts of the Company's proposal positive. As noted earlier, the NPV value associated with the environmental and economic benefits of the Company's program are some $1.8 million on an NPV basis. This is far less than the $338.4 million in negative NPV reduction in output I estimated earlier in my testimony. Thus, even with these additional benefits, the Company's proposal is likely to lead to negative net economic impacts for the New Jersey economy.

Q. HAVE YOU INCLUDED ANY "HARDENING" OR "RESILIENCY" BENEFITS ASSOCIATED WITH THE COMPANY'S PROGRAM?

A. No, since until very recently, the Company has not provided any comprehensive information on the asserted hardening and resiliency benefits of its electric and natural gas proposals. As I noted earlier, I am still in the process of evaluating the Company's analysis (included in the Brattle Report) and will consider the impact of these potential hardening and resiliency benefits in any supplemental testimony that I believe may be necessary in order to respond to this late-filed information.

C. Program Design Deficiencies

1. Commonly-Accepted Infrastructure Tracker Design Characteristics

Q. HAVE ANY OTHER STATE COMMISSIONS APPROVED TRACKERS THAT ALLOW NATURAL GAS DISTRIBUTION UTILITIES TO RECOVER THE COSTS OF THEIR ACCELERATED REPLACEMENT ACTIVITIES?

A. Yes. Pipeline replacement tracker mechanisms, sometimes called "infrastructure trackers," or "capital tracker" mechanisms, have been adopted by some regulatory commissions for purposes of allowing more immediate cost recovery associated with a utility's replacement of certain "priority" or "leak-prone" mains and services. To date, these pipeline replacement trackers have been primarily relegated to the replacement of cast iron and unprotected steel facilities. In a few instances, these replacement programs have been extended to include the accelerated replacement of mechanical or other type couplings. Schedule DED-26 provides a map of the states that have allowed utilities to implement and use various types of replacement cost trackers as a means of recovering the costs associated with their accelerated pipeline replacement activities. To date, there are 26 states that allow for the use of pipeline cost recovery trackers.[94]

[94] The District of Columbia also allows for an infrastructure cost recovery rate mechanism.

Q. DOES APPROVAL OF AN INFRASTRUCTURE COST MECHANISM IN EACH OF THESE STATES MEAN THAT EVERY IN-STATE UTILITY IS AUTOMATICALLY ALLOWED TO RECOVER THEIR INFRASTRUCTURE REPLACEMENT COSTS THROUGH A TRACKER?

A. No. While 26 states have allowed pipeline trackers to be used, not all utilities in those states have been granted such mechanisms. To date, 57 natural gas utilities have actively-approved pipeline replacement trackers. There are, however, 237 investor-owned natural gas utilities in the U.S. indicating that only 24 percent of all investor-owned gas utilities in the U.S. have an active pipeline tracker mechanism.

Q. ARE TRACKERS A MANDATORY PRE-REQUISITE FOR THE ADOPTION OF A PIPELINE REPLACEMENT PROGRAM?

A. No, and in fact, numerous other utilities manage to maintain safe, reliable, and economic service without the adoption of an investment cost tracker mechanism. For instance, both Connecticut Natural Gas and Yankee Gas have accelerated their replacements of bare steel and cast iron pipe without the use of a cost tracker.[95] Another example is a recent Puget Sound Energy ("PSE") case in which PSE was ordered by the Washington Utilities and Transportation Commission to accelerate the replacement of identified risky polyethylene pipe without the adoption of a cost recovery tracker.[96]

Q. ARE PIPELINE TRACKER MECHANISM APPROVALS CONCENTRATED IN ANY PARTICULAR PART OF THE COUNTRY?

[95] In re: Application of Connecticut Natural Gas Corporation for a Rate Increase. Before the Connecticut Department of Public Utility Control. Docket No. 08-12-06. Order Dated June 30, 2009, pp. 100-101; In re: Application of Yankee Gas Services for a Rate Increase. Before the Connecticut Department of Public Utility Control. Docket No. 004-06-01. Order Dated December 8, 2004, p. 13.

[96] In re: Washington Utilities and Transportation Commission v. Puget Sound Energy, Inc. Before the Washington Utilities and Transportation Commission. Docket UG-110723. Order 07 Dated May 18, 2012, p. 18.

A. Yes. While a number of states across the U.S. have approved pipeline replacement trackers, most of the individual utilities that have approved trackers tend to be concentrated in the eastern U.S. where there are relatively high shares of priority mains and services. Schedule DED-27 provides a table comparing the priority main shares across differing U.S. states and regions. New Jersey is located in the Mid-Atlantic region. On average, the Mid-Atlantic region has one of the higher shares of priority mains of any region in the U.S. at 21 percent of total pipeline miles. In New Jersey, about 23 percent of total pipeline miles are priority mains.

Q. IS TRACKER DESIGN UNIFORM FOR THOSE STATES THAT HAVE APPROVED INFRASTRUCTURE COST RECOVERY MECHANISMS?

A. No. Approved infrastructure trackers differ in terms of the types of costs allowed for recovery, their sunset or review provisions, their terms, whether or not they include any investment limitations or rate impact caps, among other program components. Schedule DED-28 presents a table that outlines the major components of each currently-approved NGD infrastructure tracker. The remainder of this section of my testimony will compare various aspects of the Company's NGD infrastructure tracker to those approved in other parts of the country.

Q. DOES NEW JERSEY HAVE ANY APPROVED NATURAL GAS INFRASTRUCTURE TRACKERS IN PLACE?

A. Yes. Excluding the Company's various CIP programs, New Jersey currently has three approved natural gas infrastructure trackers in place for New Jersey Natural Gas Company ("NJNG"), Elizabethtown Gas Company ("E-Town") and South Jersey Gas Company ("SJG"). Each of these trackers were approved as part of a settlement between the individual utilities, Board Staff, and Rate Counsel, and are based upon a number of important principles:

1) Pipeline replacement costs are not contemporaneously recovered but instead are booked to a regulatory asset, with a return, for recovery at the time of each utility's respective rate case.
2) Cost recovery is limited to only investments associated with reducing safety-related leaks on priority mains and services.[97]
3) There are benchmarks and performance measures that are tied to program returns.[98]
4) Rates of return have been adjusted to recognize the lower risk of cost recovery under the tracker mechanism.[99]

[97] In the Matter of the Petition of New Jersey Natural Gas Company for Approval of the Safety Acceleration and Facility Enhancement Program pursuant to N.J.S.A. 48:2-23, and for Approval of the Associated Recovery Mechanism Pursuant to N.J.S.A. 48:2-21 and N.J.S.A. 2-21.1, BPU Docket GO12030255, Order dated October 23, 2012, p. 2; In the Matter of the petition of South Jersey Gas Company to Implement an Accelerated Infrastructure Replacement Program and Associated Recovery Mechanism Pursuant to N.J.S.A. 48:2-21 and N.J.S.A. 48:2-21.1, BPU Docket No. GO12070670, Order dated February 20, 2013 , p. 3; and In the Matter of the Petition of Pivotal Utility Holdings, Inc. d/b/a Elizabethtown Gas for Approval of an Accelerated Infrastructure Replacement Program and an Associated Cost Recovery Mechanism, BPU Docket No. GO12070693, Order dated August 21, 2013, p. 5 ¶3.

[98] In the Matter of the Petition of New Jersey Natural Gas Company for Approval of the Safety Acceleration and Facility Enhancement Program pursuant to N.J.S.A. 48:2-23, and for Approval of the Associated Recovery Mechanism Pursuant to N.J.S.A. 48:2-21 and N.J.S.A. 2-21.1, BPU Docket GO12030255, Order dated October 23, 2012, pp. 6-7; In the Matter of the petition of South Jersey Gas Company to Implement an Accelerated Infrastructure Replacement Program and Associated Recovery Mechanism Pursuant to N.J.S.A. 48:2-21 and N.J.S.A. 48:2-21.1, BPU Docket No. GO12070670, Order dated February 20, 2013 , p. 5; and In the Matter of the Petition of Pivotal Utility Holdings, Inc. d/b/a Elizabethtown Gas for Approval of an Accelerated Infrastructure Replacement Program and an Associated Cost Recovery Mechanism, BPU Docket No. GO12070693, Order dated August 21, 2013, p. 9 ¶27.

[99] In the Matter of the Petition of New Jersey Natural Gas Company for Approval of the Safety Acceleration and Facility Enhancement Program pursuant to N.J.S.A. 48:2-23, and for Approval of the Associated Recovery Mechanism Pursuant to N.J.S.A. 48:2-21 and N.J.S.A. 2-21.1, BPU Docket GO12030255, Order dated October 23, 2012, pp. 5-6; In the Matter of the petition of South Jersey Gas Company to Implement an Accelerated Infrastructure Replacement Program and Associated Recovery Mechanism Pursuant to N.J.S.A. 48:2-21 and N.J.S.A. 48:2-21.1, BPU Docket No. GO12070670, Order dated February 20, 2013 , p. 2; and In the Matter of the Petition of Pivotal Utility Holdings, Inc. d/b/a Elizabethtown Gas for Approval of an Accelerated Infrastructure Replacement Program and an Associated Cost Recovery Mechanism, BPU Docket No. GO12070693, Order dated August 21, 2013, p. 7 ¶19.

5) The trackers include a number of ratepayer protection mechanisms and offsets such as expenditure caps,[100] and a clear sunset provision with rate case filing requirements. [101]

Q. DOES THE COMPANY'S ENERGY STRONG PROGRAM SUFFER FROM ANY PROGRAM DESIGN DEFICIENCIES RELATIVE TO OTHER APPROVED INFRASTRUCTURE TRACKER MECHANISMS?

A. Yes. The NGD component of the Company's Energy Strong proposal suffers from a number of deficiencies that include the following:

1) The proposal includes tracker-eligible costs that are large and go far beyond those normally allowed in other NGD infrastructure tracker mechanisms.

2) The Company is seeking approval of both the replacement/hardening program and each program's associated costs. In other words, the Company conditions approval of its NGD Energy Strong program on pre-approval of its total and its individual NGD investments.

3) The Energy Strong revenue requirement will be developed on a projected rather than actual basis.

4) There are no offsets for O&M cost savings.

5) There is no sunset, program review or rate case filing requirement.

[100] In the Matter of the Petition of New Jersey Natural Gas Company for Approval of the Safety Acceleration and Facility Enhancement Program pursuant to N.J.S.A. 48:2-23, and for Approval of the Associated Recovery Mechanism Pursuant to N.J.S.A. 48:2-21 and N.J.S.A. 2-21.1, BPU Docket GO12030255, Order dated October 23, 2012, pp. 4-5; In the Matter of the petition of South Jersey Gas Company to Implement an Accelerated Infrastructure Replacement Program and Associated Recovery Mechanism Pursuant to N.J.S.A. 48:2-21 and N.J.S.A. 48:2-21.1, BPU Docket No. GO12070670, Order dated February 20, 2013 , p. 3; and In the Matter of the Petition of Pivotal Utility Holdings, Inc. d/b/a Elizabethtown Gas for Approval of an Accelerated Infrastructure Replacement Program and an Associated Cost Recovery Mechanism, BPU Docket No. GO12070693, Order dated August 21, 2013, p. 7 ¶18.

[101] In the Matter of the Petition of New Jersey Natural Gas Company for Approval of the Safety Acceleration and Facility Enhancement Program pursuant to N.J.S.A. 48:2-23, and for Approval of the Associated Recovery Mechanism Pursuant to N.J.S.A. 48:2-21 and N.J.S.A. 2-21.1, BPU Docket GO12030255, Order dated October 23, 2012, p. 6; In the Matter of the petition of South Jersey Gas Company to Implement an Accelerated Infrastructure Replacement Program and Associated Recovery Mechanism Pursuant to N.J.S.A. 48:2-21 and N.J.S.A. 48:2-21.1, BPU Docket No. GO12070670, Order dated February 20, 2013 , p. 4; and In the Matter of the Petition of Pivotal Utility Holdings, Inc. d/b/a Elizabethtown Gas for Approval of an Accelerated Infrastructure Replacement Program and an Associated Cost Recovery Mechanism, BPU Docket No. GO12070693, Order dated August 21, 2013, p. 8 ¶20.

6) There are no performance benchmarks and metrics.

7) The proposed program does not include a number of ratepayer protection mechanisms included in many NGD infrastructure cost trackers.

2. Expansive Scope of Eligible Costs for Tracker Recovery

Q. DO OTHER NATURAL GAS INFRASTRUCTURE TRACKERS ALLOW FOR THE RECOVERY OF ALL TYPES OF PIPELINE INTEGRITY MANAGEMENT COSTS?

A. No. A large number of utilities with approved pipeline replacement tracker mechanisms are restricted in the types of costs that are recovered from ratepayers on a periodic basis. For most states, these mechanisms are restricted to just capital-related investments and do not include O&M expenses nor other potentially "related" costs such as the development of pipeline inventory databases or geographic information systems ("GIS"). Further, and most important to this proceeding, most states restrict pipeline tracker cost recovery to incremental and accelerated replacement of "priority" mains and services and do not include the types of hardening investments, such as raising the elevation of certain natural gas distribution facilities, that are included in PSE&G's proposal.[102] There are only a few instances where these trackers have been expanded so broadly to include expansive sets of costs that are normally reserved for base rate treatment.

Q. ARE YOU AWARE OF ANY OTHER NATURAL GAS UTILITIES THAT HAVE SUFFERED SIGNIFICANT WATER INTRUSION EVENTS AND HAVE REQUESTED INFRASTRUCTURE TRACKERS SIMILAR TO THOSE PROPOSED BY PSE&G?

[102] Such as the Company's proposal to raise certain M&R stations, LNG facilities and potentially several LPG storage facilities.

A. No. I am only aware of the three other natural gas utilities located in New Jersey that have requested trackers. One utility worth examining, Entergy New Orleans, saw considerably more water intrusion and damage than all three New Jersey utilities during the course of Hurricane Katrina in 2005.

Q. WOULD YOU PLEASE DISCUSS THE DAMAGE CAUSED BY HURRICANES KATRINA AND RITA?

A. Yes. On August 29, 2005, Hurricane Katrina, and on September 24, 2005 Hurricane Rita, hit the State of Louisiana. More than 1,100 lives were lost, approximately 18,000 businesses were destroyed, along with schools, roads, public facilities, and homes. The hurricanes caused extensive flooding and damage to the infrastructure of the combined electric and gas utility in the area, Entergy New Orleans ("ENO"). ENO estimated that about 10 percent of the total damage to its electric and natural gas infrastructure was caused by the storms, with approximately 90 percent due to flooding caused by the failure of the levee system.[103] Damage to the gas infrastructure included:

- 12 of 13 operational city gates (i.e. connections from high pressure natural gas transmission pipelines to lower pressure city distribution lines) experienced damage;
- Approximately four million gallons of salt water entered the natural gas distribution system, flooding approximately 60 percent of the system and causing catastrophic damage to approximately 257 miles of cast iron pipe, 277 miles of low-pressure steel, 310 miles of high-pressure steel, and over 1,400 miles (out of approximately 2,500 miles) of gas service lines; and
- More than 80 percent of natural gas meters and regulators were destroyed.[104]

[103] Disaster Recovery Initiative, Louisiana Office of Community Development, Action Plan Amendment Number 6 for Disaster Recovery Funds, February 9, 2007, p. 1. See www.doa.la.gov/cdbg/dr/plans/Amend6-Utilities-Approved_07-02-09.pdf.
[104] Disaster Recovery Initiative, Louisiana Office of Community Development, Action Plan Amendment Number 6 for Disaster Recovery Funds, February 9, 2007, p. 1. See www.doa.la.gov/cdbg/dr/plans/Amend6-Utilities-Approved_07-02-09.pdf.

Q. WHAT WAS THE ESTIMATED COST TO RESTORE AND REBUILD THE DAMAGE CAUSED BY HURRICANES KATRINA AND RITA?

A. The cost to restore the gas and electric system was initially estimated by ENO at $842 million. A consulting firm hired by the City of New Orleans estimated the costs at: $160.9 million attributable to electric infrastructure restoration, $121.8 million related to gas infrastructure restoration; $355.0 million for natural gas rebuilding, for a total of $637.7 million.[105] Insurance proceeds available to offset these costs were estimated at $250.0 million for a net total cost of $387.0 million. On October 12, 2006, the Louisiana Recovery Authority ("LRA") approved a Resolution allocating up to $200 million of Community Development Block Grant ("CDBG") Program funds for future costs in restoring electricity and natural gas service to ENO's customers.[106]

Q. DID ENO FILE FOR BANKRUPTCY BECAUSE OF THESE REBUILDING EFFORTS?

A. Yes, on September 23, 2005, ENO filed for reorganization under Chapter 11 of the U.S. Bankruptcy Code. The Company also obtained bankruptcy court approval to receive up to $200 million debtor-in-possession loans from Entergy Corporation to continue operations.[107]

Q. WHEN DID ENO EXIT BANKRUPTCY AND WHAT WERE THE CIRCUMSTANCES?

A. On May 8, 2007, ENO was able to exit bankruptcy with all creditors being paid in full and retention of all of its employees. One month earlier, ENO was awarded $171.7 million in CDBG

[105] Disaster Recovery Initiative, Louisiana Office of Community Development, Action Plan Amendment Number 6 for Disaster Recovery Funds, February 9, 2007, p. 2. See www.doa.la.gov/cdbg/dr/plans/Amend6-Utilities-Approved_07-02-09.pdf.
[106] Disaster Recovery Initiative, Louisiana Office of Community Development, Action Plan Amendment Number 6 for Disaster Recovery Funds, February 9, 2007, p. 3. See www.doa.la.gov/cdbg/dr/plans/Amend6-Utilities-Approved_07-02-09.pdf.
[107] Entergy Notes, Entergy New Orleans Exits Bankruptcy, May 2007.

funds and also signed a settlement agreement with an affiliate of AIG insurance company netting $53.7 million. It its announcement, ENO stated:

> Emerging from bankruptcy along with the awarding of the CDBG grant is great news for our customers, who have endured so much in the wake of the greatest natural disaster our nation has ever experienced…. It means that storm costs which would have been passed along in monthly bills will be covered through other means.[108]

Q. DID ENO RAISE RATES OR REQUEST A TRACKER TO RECOVER THE COSTS ASSOCIATED WITH THE RESTORING AND REBUILDING ITS HURRICANE DAMAGED SYSTEM?

A. No. ENO specifically noted that the rebuild of its natural gas system had no rate impact on customers.[109] The steps ENO took to ensure this no-rate impact outcome included:

- Rebuilding the gas system under budget and ahead of schedule at no cost to the customer.
- Fighting for alternative sources of funds for costs associated with Hurricane Katrina in order to mitigate costs on the customer, such as CDBG funds and insurance proceeds.
- Through innovations and continuous process improvements, ENO was approximately $5 million under budget during the first phase (three years) of the project.
- ENO's actions were recognized internationally as the Global Infrastructure Project of the Year by McGraw-Hill's Platts Global Energy Awards based on strategic planning, efficiency and timeliness. [110]

3. Prudence and Investment Cost Pre-Approval

[108] Entergy Notes, Entergy New Orleans Exits Bankruptcy, May 2007.
[109] Entergy New Orleans, "Natural Gas System Rebuild – No Rate Impact on Customers." See http://www.entergy-neworleans.com/gas/rate_impact.aspx.
[110] Entergy New Orleans, "Natural Gas System Rebuild – No Rate Impact on Customers." See http://www.entergy-neworleans.com/gas/rate_impact.aspx.

Q. PLEASE EXPLAIN HOW THE COMPANY EXPECTS THE PRUDENCE OF ITS NGD ENERGY STRONG COSTS TO BE EVALUATED?

A. The Company notes that near the end of the initial annual period, and every annual period thereafter, the Company will file an annual true up filing. This filing will allow for a review of the prudency of actual costs associated with implementation of the approved Energy Strong.[111] In discovery, the Company elaborated that in the current proceeding it is seeking a determination from the Board as to prudency prior to investments in Energy Strong being made, and that this future prudency review will only address the prudency of actual costs incurred with the program.[112] The Company's definition of prudence, however, is inconsistent since despite this pre-approval assertion, it later notes that the reasonableness of the costs incurred to implement the approved projects would be subject to Board approval.[113]

Q. DOES THE COMPANY EXPECT THE BOARD TO "PRE-APPROVE" THE INVESTMENTS INCLUDED IN ITS ENERGY STRONG PROPOSAL?

A. Yes, the Company very clearly indicates that it "is seeking a determination from the BPU that the investments are prudent prior to the investments being made"[114] which differs considerably from asking the Board to generally approve the NGD components of the Energy Strong program and its general need. The Board must reject this pre-approval proposal, since to do so, runs entirely counter to regulatory policy practices wherein investments and expenses are then incurred, cost recovery is sought, and the prudence of the investments and expenses are evaluated and approved or rejected. The Company's proposal would be the proverbial cart before the horse and have the Board approve investments well before they are even incurred.

[111] Revised Direct Testimony of Stephen Swetz, 12:9-13.
[112] Company Response to AARP-1.
[113] Revised Direct Testimony of Stephen Swetz, 12:11; *See also*, Company Response to AARP-1 and AARP-2.
[114] Company Response to AARP-1.

Q. ARE THE PROPOSED NGD ENERGY STRONG INVESTMENTS AND COSTS OFFERED ON A FIXED OR "NOT-TO-EXCEED" BASIS?

A. No. The Company has clearly characterized its Energy Strong costs as being comprised of "estimates," which likely means the actual amounts will differ from what has been included in its current filing.[115] The Company does note that it "has not requested unlimited authority and is willing to discuss the level of authority it has to spend under the Energy Strong program and its components." [116] However, no specific cap or spending limitation has been offered at this time.

Q. ARE ANY OF THE OTHER RECENTLY-APPROVED NATURAL GAS INFRASTRUCTURE TRACKERS IN NEW JERSEY PREMISED ON COST "PRE-APPROVAL?"

A. No. All of the natural gas and electric infrastructure trackers that have been approved over the past several years do not include "pre-approval" provisions, at least relative to their costs. Investments, and other costs (to the extent they are allowed) are typically subjected to a prudence review on either an annual basis, or during the course of the utility's next rate case.

4. Use of a Forecasted Test Year

Q. LET'S TURN TO THE SECOND ADMINISTRATIVE DEFICIENCY YOU IDENTIFIED EARLIER. IS THE USE OF PROJECTED COSTS FOR SURCHARGE PURPOSES REASONABLE?

A. No. The Company's proposal, if approved, would define all of the Company's proposed five year Energy Strong investments as prudent, and thus subject to recovery.[117] At the ultimate

[115] *See* Direct Testimony of Jorge L. Cardenas, 15:304-306; 16:330-331; 18:380-381; 19:405-407; 20:432-434; 22:459-461; 23:481-483; 23:495-496; 25:541-543; 26:557-558; 28:595-597; 28:605-606; 29:632-633; 30:656-658; 31:670-672; 32:692-693; and 33:725-726.
[116] Company Response to RCR-G-POL-86.
[117] Revised Direct Testimony of Stephen Swetz, 12:9-12; Company Response to AARP-1.

conclusion of the Energy Strong program, concurrent with the program's incorporation into base rates, the Company proposes to "reset" the then current Energy Strong Adjustment Charge ("ESAC") to recover or refund any under or over recovery.[118] The Company proposes to monitor all electric and gas ESAC balances on a monthly basis, informing the Board 75 days prior to the date the respective balances are anticipated to be extinguished.[119] Any remaining balance existing at the end of this 75 day period will be credited to the respective electric or gas Energy Efficiency Economic Stimulus Program Clause.[120] The use of an anticipated revenue requirement for each of Energy Strong's proposed five years of reliability investments effectively establishes a forecasted test year for the rates established under this tracker.

Q. DOES THE BOARD'S PRIOR APPROVAL OF THE CAPITAL INFRASTRUCTURE PROGRAM CIP I AND CIP II REPRESENT POLICY PRECEDENT FOR THE USE OF FORECASTED DATA IN SETTING SURCHARGE LEVELS?

A. No. As explained earlier, both programs (CIP I and CIP II) were approved under unique, known, and ongoing challenges associated with the last economic recession. The CIP I was premised as a response to then Governor Corzine's October 16, 2008 Economic Stimulus Plan,[121] while the CIP II was proposed as a continuation of accelerated capital spending as the New Jersey

[118] Revised Direct Testimony of Stephen Swetz, 13:2-4.
[119] Revised Direct Testimony of Stephen Swetz, 13:4-7.
[120] Revised Direct Testimony of Stephen Swetz, 13:7-10.
[121] In the Matter of the Proceeding for Infrastructure Investment and a Cost Recovery Mechanism for All Gas and Electric Utilities, and In the Matter of the Petition of Public Service Electric & Gas Company for Approval of a Capital Economic Stimulus Infrastructure Investment Program and an Associated Cost Recovery Mechanism Pursuant to N.J.S.A. 48:2-21 and 48:21.1, BPU Docket Nos. EO090910049 and GO09010050, Decision and Order Approving Stipulation, p. 1.

economy was seen to need further stimulus.[122] The Board was very clear in approving these mechanisms that they represented extraordinary ratemaking treatment in response to unique circumstances.[123]

Q. DO THE CIP I AND CIP II PROPOSALS DIFFER FROM THE PROPOSED ENERGY STRONG PROGRAM IN ANY OTHER SIGNIFICANT WAY?

A. Yes. CIP I only covered 38 defined capital investment projects[124] which were constructed in its planned fiscal year 2009, 2010, and 2011.[125] Likewise, CIP II only covered eight defined gas capital investment projects constructed within one year of the approval, and 24 defined electric

[122] In the Matter of the Petition of Public Service Electric and Gas Company for Approval of an Extension of the Electric Capital Economic Stimulus Infrastructure Investment Program and Associated Cost Recovery Mechanism; and to Roll into Rate Base the Net Capital Investment for All the Qualifying Projects form the Initiative Capital Economic Stimulus Infrastructure Investment Program Upon Completion Pursuant to N.J.S.A. 48:2-23, 48:2-21 and 48:2-21.2 and for Changes in the Tariff for Electric Service, B.P.U.N.J. No. 15 Electric, and the Tariff for Gas Service, B.P.U.N.J. No. 15 Gas Pursuant to N.J.S.A. 48:2-21, BPU Docket Nos. EO11020088 and GO10110862, Decision and Order Approving Stipulation, p. 3.

[123] In the Matter of the Proceeding for Infrastructure Investment and a Cost Recovery Mechanism for All Gas and Electric Utilities, and In the Matter of the Petition of Public Service Electric & Gas Company for Approval of a Capital Economic Stimulus Infrastructure Investment Program and an Associated Cost Recovery Mechanism Pursuant to N.J.S.A. 48:2-21 and 48:21.1, BPU Docket Nos. EO090910049 and GO09010050, Decision and Order Approving Stipulation, pp. 7-8; and In the Matter of the Petition of Public Service Electric and Gas Company for Approval of an Extension of the Electric Capital Economic Stimulus Infrastructure Investment Program and Associated Cost Recovery Mechanism; and to Roll into Rate Base the Net Capital Investment for All the Qualifying Projects form the Initiative Capital Economic Stimulus Infrastructure Investment Program Upon Completion Pursuant to N.J.S.A. 48:2-23, 48:2-21 and 48:2-21.2 and for Changes in the Tariff for Electric Service, B.P.U.N.J. No. 15 Electric, and the Tariff for Gas Service, B.P.U.N.J. No. 15 Gas Pursuant to N.J.S.A. 48:2-21, BPU Docket Nos. EO11020088 and GO10110862, Decision and Order Approving Stipulation, pp. 8-9.

[124] In the Matter of the Proceeding for Infrastructure Investment and a Cost Recovery Mechanism for All Gas and Electric Utilities, and In the Matter of the Petition of Public Service Electric & Gas Company for Approval of a Capital Economic Stimulus Infrastructure Investment Program and an Associated Cost Recovery Mechanism Pursuant to N.J.S.A. 48:2-21 and 48:21.1, BPU Docket Nos. EO090910049 and GO09010050, Decision and Order Approving Stipulation, p. 4.

[125] In the Matter of the Petition of Public Service Electric and Gas Company for Approval of an Extension of the Electric Capital Economic Stimulus Infrastructure Investment Program and Associated Cost Recovery Mechanism; and to Roll into Rate Base the Net Capital Investment for All the Qualifying Projects form the Initiative Capital Economic Stimulus Infrastructure Investment Program Upon Completion Pursuant to N.J.S.A. 48:2-23, 48:2-21 and 48:2-21.2 and for Changes in the Tariff for Electric Service, B.P.U.N.J. No. 15 Electric, and the Tariff for Gas Service, B.P.U.N.J. No. 15 Gas Pursuant to N.J.S.A. 48:2-21, BPU Docket Nos. EO11020088 and GO10110862, Decision and Order Approving Stipulation, p. 2.

capital investment projects constructed within two years and two months of approval.[126] In the order approving the CIP I and II programs, the Board found "it was appropriate and within the Board's authority to allow infrastructure projects which had already been researched and planned by the companies to be accelerated."[127] More importantly, each had a nexus to a future rate case. The proposed Energy Strong program, on the other hand, covers investments proposed to be made within a period of five years,[128] and is relatively undefined in scope.

5. Omission of O&M Savings Offset

Q. HAS THE COMPANY OFFERED TO OFFSET THE COSTS OF ANY OF ITS NGD REPLACEMENT INVESTMENTS WITH ANY ASSOCIATED O&M COST SAVINGS?

A. No, despite the fact that the Company identifies approximately $3.4 million in total O&M savings associated with broken cast iron main repair, water infiltration, and district regulator areas for 2014 to 2021.[129] On average, this equates to $424,579 per year of O&M savings associated with the program per year.

Q. SHOULD THE COMPANY'S ENERGY STRONG GAS SURCHARGE REFLECT THESE POTENTIAL COST SAVINGS?

A. Yes, at least for costs associated with the NGD Replacement sub-program. Most natural gas infrastructure cost tracker requests are predicated on the belief that the accelerated replacement

[126] In the Matter of the Petition of Public Service Electric and Gas Company for Approval of an Extension of the Electric Capital Economic Stimulus Infrastructure Investment Program and Associated Cost Recovery Mechanism; and to Roll into Rate Base the Net Capital Investment for All the Qualifying Projects form the Initiative Capital Economic Stimulus Infrastructure Investment Program Upon Completion Pursuant to N.J.S.A. 48:2-23, 48:2-21 and 48:2-21.2 and for Changes in the Tariff for Electric Service, B.P.U.N.J. No. 15 Electric, and the Tariff for Gas Service, B.P.U.N.J. No. 15 Gas Pursuant to N.J.S.A. 48:2-21, BPU Docket Nos. EO11020088 and GO10110862, Decision and Order Approving Stipulation, p. 3.

[127] In the Matter of the Proceeding for Infrastructure Investment and a Cost Recovery Mechanism for All Gas and Electric Utilities, and In the Matter of the Petition of Public Service Electric & Gas Company for Approval of a Capital Economic Stimulus Infrastructure Investment Program and an Associated Cost Recovery Mechanism Pursuant to N.J.S.A. 48:2-21 and 48:21.1, BPU Docket Nos. EO090910049 and GO09010050, Decision and Order Approving Stipulation, p. 5.

[128] Direct Testimony of Jorge L. Cardenas, 6:128-130.

[129] Company Response to RCR-G-POL-67.

of priority mains and services will result in lower leaks. These lower leaks, in turn, will result in O&M cost savings since fewer repairs, equipment, and personnel will need to be dedicated to leak repairs relative to the level usually included in base rates. Failure to account for these savings will simply lead to a windfall to the Company and its shareholders. Further, the inclusion of an O&M cost savings offset will encourage operating and investment efficiencies since only those mains/services with the higher potentials for avoided emissions will be prioritized.

Q. DO THE APPROVED TRACKERS FOR ANY OTHER NEW JERSEY NATURAL GAS UTILITIES INCLUDE O&M SAVINGS OFFSETS?

A. Yes. Most of the recently-approved natural gas infrastructure trackers approved by the Board include some form of O&M savings recognition. In most of these prior infrastructure tracker proceedings, New Jersey's other natural gas utilities have agreed to one of two approaches: 1) defer in a separate regulatory liability account any amount of leak repair O&M costs less than the amount included in base rates. At the time the infrastructure projects are rolled into rate base, the regulatory liability associated with the leak repair will be amortized into rates over a four-year period; or 2) exclude any "incremental operation and maintenance expenses" in future infrastructure filings.[130]

[130] In the Matter of the Proceeding for Infrastructure Investment and a Cost Recovery Mechanism for All Gas and Electric Utilities, and In the Matter of the Petition of New Jersey Natural Gas Company for Approval of an Accelerated Energy Infrastructure Investment Program Pursuant to N.J.S.A. 48:2-23, and for Approval of Necessary Changes to Gas Rates and Changes in the Company's Tariff for Gas Service Pursuant to N.J.S.A. 48:2-21, BPU Docket Nos. EO090910049, GO09010052, and GR07110889, Decision and Order Approving Stipulation, p. 5; In the Matter of the Petition of New Jersey Natural Gas Company for Approval of an Extension of the Accelerated Energy Infrastructure Investment Program Pursuant to N.J.S.A. 48:2-23 and for Approval of Necessary Changes in the Company's Tariff for Gas Service Pursuant to N.J.S.A. 48:2-21 Et. Seq., BPU Docket Nos. GR07110889 and GR10100793, Decision and Order Approving Stipulation, p. 3; In the Matter of the Petition of New Jersey Natural Gas Company for Approval of the Safety Acceleration and Facility Enhancement Program Pursuant to N.J.S.A. 48:2-23, and for Approval of the Associated Recovery Mechanism Pursuant to N.J.S.A. 48:2-21 and N.J.S.A. 2-21.1, BPU Docket No. GO12030255, Order, p. 6; In the Matter of the Proceeding for Infrastructure Investment and a Cost Recovery Mechanism for All Gas and Electric Utilities, and In the Matter of the Petition of Pivotal Utility Holdings, Inc. d/b/a Elizabethtown Gas for Approval of a Utility Infrastructure Enhancement Cost Recovery Rider, BPU Docket Nos. EO090910049 and GO09010053, Decision and Order Approving Stipulation, p. 5; In the Matter of the Petition of Pivotal Utility Holdings, Inc. d/b/a Elizabethtown Gas for Approval of an Accelerated Infrastructure Replacement Program and an Associated

Q. DO OTHER NATURAL GAS REPLACEMENT RIDERS INCLUDE AN OFFSET FOR THE RELATED O&M SAVINGS?

A. Yes. Schedule DED-28 shows that 18 utilities' infrastructure riders include an offset for the O&M savings associated with infrastructure replacement investments that reduce leaks including gas utilities located in Arkansas, Georgia, Illinois, Kentucky, Massachusetts, Maine, Michigan, Ohio, and Oregon.

6. Exclusion of Sunset, Program Review or a Mandatory Future Rate Case Filing

Q. DOES THE COMPANY'S PROPOSAL INCLUDE A DEFINITIVE TERM OR "SUNSET" ASSOCIATED WITH THE PROPOSED ENERGY STRONG PROGRAM?

A. No. The Company is asking for approval for the first five years of what is likely to be a ten year investment program.[131] The Company noted that it will return to the Board at some point in the future to request continued approval for the remaining five years of its program; presumably after the first five years of the program is complete.[132] This does not constitute a "sunset" since (1) the currently-proposed five year filing does not include any type of concluding review about whether the program and tracker were effective and will need to be extended into the future; and

Cost Recovery Mechanism, BPU Docket No. GO12070693, Order, p. 8; In the Matter of the Proceeding for Infrastructure Investment and a Cost Recovery Mechanism for All Gas and Electric Utilities, and In the Matter of the Petition of South Jersey Gas Company for Approval of a Capital Investment Recovery Tracker Pursuant to N.J.S.A. 48:2-21.1 and N.J.S.A. 48:2-21, BPU Docket Nos. EO090910049 and GO09010051, Decision and Order Approving Stipulation, p. 5; In the Matter of the Annual Filing of South Jersey Gas Company to Adjust its Capital Investment Recovery Tracker ("CIRT") and for Approval of an Extension of the CIRT Pursuant to N.J.S.A. 48:2-21 and N.J.S.A. 48:2-21.1, and In the Matter of the Petition of South Jersey Gas Company for Approval of Increased Base Tariff Rates and Charges for Gas Service and Other Tariff Revision, BPU Docket Nos. GR10100765 and GR10010035, Decision and Order Approving Stipulation, p.4.; and In the Matter of the Petition of South Jersey Gas Company to Implement an Accelerated Infrastructure Replacement Program and Associated Recovery Mechanism Pursuant to N.J.S.A. 48:2-21 and N.J.S.A. 48:2-21.1, BPU Docket No. GO12070670, Order, p. 5.

[131] Direct Testimony of Jorge L. Cardenas, 6:128:132.

[132] Direct Testimony of Jorge L. Cardenas, 6:134 to 7:136.

(2) the Company does not commit to a future rate case but simply agrees to a second five year filing, at some indeterminate period in the future.

Q. DO OTHER NEW JERSEY NATURAL GAS UTILITIES HAVE SUNSETS OR DEFINED RATE CASE REVIEWS?

A. Yes. Each of the currently approved natural gas infrastructure trackers are tied to a future rate case filing. First, NJNG's Safety Acceleration and Facility Enhancement Program ("SAFE Program"), approved by the Board in Docket No. GO12030255 on October 23, 2012, requires NJNG to file a base rate case by no later than November 15, 2015, or slightly longer than three years from the approval of the mechanism.[133] SJG's Accelerated Infrastructure Replacement Program ("AIRP"), approved by the Board in Docket No. GO12070670 on February 20, 2013, requires SJG to file a base rate case by no later than December 15, 2015, or slightly less than three years from adoption of the mechanism.[134] Likewise, E-Town's Accelerated Infrastructure Replacement Program ("AIR") approved by the Board in Docket No. GO12070693 on August 21, 2013, requires E-Town to file its next rate case by September 1, 2016, which is approximately three years from adoption of the mechanism.[135]

Q. DO OTHER UTILITIES WITH INFRASTRUCTURE RIDERS HAVE TERMINATING DATES, SUNSETS OR A TIE TO A FUTURE RATE CASE?

[133] In the Matter of the Petition of New Jersey Natural Gas Company for Approval of the Safety Acceleration and Facility Enhancement Program pursuant to N.J.S.A. 48:2-23, and for Approval of the Associated Recovery Mechanism Pursuant to N.J.S.A. 48:2-21 and N.J.S.A. 2-21.1, BPU Docket GO12030255, Order dated October 23, 2012, p. 6.

[134] In the Matter of the petition of South Jersey Gas Company to Implement an Accelerated Infrastructure Replacement Program and Associated Recovery Mechanism Pursuant to N.J.S.A. 48:2-21 and N.J.S.A. 48:2-21.1, BPU Docket No. GO12070670, Order dated February 20, 2013, p. 4.

[135] In the Matter of the Petition of Pivotal Utility Holdings, Inc. d/b/a Elizabethtown Gas for Approval of an Accelerated Infrastructure Replacement Program and an Associated Cost Recovery Mechanism, BPU Docket No. GO12070693, Order dated August 21, 2013, p. 8 ¶20.

A. Yes. Schedule DED-28 shows that over 69 percent of the natural gas capital expenditure trackers that have been proposed in other jurisdictions have included definitive terms and expirations.

Q. DOES THE COMPANY'S ENERGY STRONG PROPOSAL INCLUDE ANY BENCHMARKS OR PERFORMANCE METRICS?

A. No. The Company's proposal excludes any form of benchmark or performance metrics. This is a problem since the NGD investments are purportedly being made to minimize natural gas leaks, which in turn presumably lead to improved safety and reliability, thereby: (1) potentially reducing the occurrence of safety-related incidents; (2) potentially reducing lost and unaccounted for commodity gas; and (3) potentially reducing repair and maintenance costs associated with leaking pipes and equipment. The omission of benchmarks and performance standards shifts, at least in part, integrity management performance risk away from the Company and onto ratepayers since the Company is unlikely to be penalized if any of these benefits fail to materialize since a standard for evaluating these potential outcomes (i.e., reduced leaks, reduced accidents, and reduced gas losses) has not been established. This is a good example of how cost tracker mechanisms tend to "decouple" cost recovery from the benefits of traditional regulatory methods and safeguards. Further, the failure to create any form of standards or benchmarks within a cost tracker mechanism shifts the regulatory burden of prudence away from the utility and towards ratepayers. In the past, utilities made investments and were required to show these investments were prudently-incurred before they were entered into rates. However, under a tracker, regulators and ratepayers, for all practical purposes, are compelled to show why costs already included in tracker-based rates are not prudent.

Q. HOW DO BENCHMARKS AND PERFORMANCE STANDARDS HELP TO "RECOUPLE" COST RECOVERY AND TRADITIONAL REGULATORY SAFEGUARDS?

A. Benchmarks and performance standards help to set upfront governing rules and create an objective screen on how utility cost and investment performance will be evaluated. This creates benefits for both parties since utilities have upfront knowledge of the standards to which they will be held for any later review. Likewise, regulators and ratepayers also have a definitive understanding of the anticipated performance improvements that will arise from the utility's integrity-improving activities.

Q. HAVE ANY OTHER NEW JERSEY GAS DISTRIBUTION COMPANIES AGREED TO INCLUDE A BENCHMARK OR TARGET IN THEIR INFRASTRUCTURE REPLACEMENT TRACKERS?

A. Yes. In approving the SAFE Program for NJNG, the Board approved a stipulation in which NJNG agreed to reduce leaks on its system by 272 leaks, exclusive of new, incremental, leaks occurring subsequent to 2011. This represented a commitment by NJNG to reduce leaks on its system by approximately 60 percent during the SAFE program term.[136] In its recently approved AIRP, SJG agreed to use its best efforts to reduce active leak inventory on its system by 632 leaks, exclusive of new, incremental, leaks occurring subsequent to October 31, 2012. This again represents a commitment by SJG to reduce leaks on its system by approximately 60 percent during the AIRP term.[137] E-Town likewise agreed in implementing its AIR to reduce its active leak

[136] In the Matter of the Petition of New Jersey Natural Gas Company for Approval of the Safety Acceleration and Facility Enhancement Program pursuant to N.J.S.A. 48:2-23, and for Approval of the Associated Recovery Mechanism Pursuant to N.J.S.A. 48:2-21 and N.J.S.A. 2-21.1, BPU Docket GO12030255, Order dated October 23, 2012, p. 6.

[137] In the Matter of the petition of South Jersey Gas Company to Implement an Accelerated Infrastructure Replacement Program and Associated Recovery Mechanism Pursuant to N.J.S.A. 48:2-21 and N.J.S.A. 48:2-21.1, BPU Docket No. GO12070670, Order dated February 20, 2013, p. 5.

inventory by 2,214 leaks, exclusive of new, incremental, leaks occurring subsequent to May 1, 2013. As in the case of NJNG and SJG, this represents a commitment by E-Town to reduce leaks on its system by 60 percent during the term of the AIR.[138]

Q. DO THESE OTHER NEW JERSEY GAS INFRASTRUCTURE REPLACEMENT TRACKERS INCLUDE PENALTY MECHANISMS FOR FAILURE TO MEET THESE PERFORMANCE TARGETS?

A. Yes. NJNG, SJG and E-Town have agreed through their mechanism to condition the rates of return they are allowed to earn on their tracker investments to their leak reduction performance. Within each company's next base rate case proceeding, the companies have agreed that if its respective performance target is not met, it will reduce the amount of carrying costs to be included in rates proportional to actual amount of leaks the Company was able to reduce.[139] For instance, if any of the three companies are only able to reduce existing leaks on its system by 30 percent (half the agreed upon leak rate performance target), the company would give up half of the eligible accumulated carrying charges associated with these investments.

Q. DOES THE ENERGY STRONG PROPOSAL SURCHARGE INCLUDE ANY RATEPAYER PROTECTIONS?

A. No. The Company's Energy Strong surcharge does not contain ratepayer protection mechanisms that are often found in approved infrastructure tracker mechanisms. These protections

[138] In the Matter of the Petition of Pivotal Utility Holdings, Inc. d/b/a Elizabethtown Gas for Approval of an Accelerated Infrastructure Replacement Program and an Associated Cost Recovery Mechanism, BPU Docket No. GO12070693, Order dated August 21, 2013, pp. 8-9 ¶26.

[139] In the Matter of the Petition of New Jersey Natural Gas Company for Approval of the Safety Acceleration and Facility Enhancement Program pursuant to N.J.S.A. 48:2-23, and for Approval of the Associated Recovery Mechanism Pursuant to N.J.S.A. 48:2-21 and N.J.S.A. 2-21.1, BPU Docket GO12030255, Order dated October 23, 2012, pp. 6-7; In the Matter of the petition of South Jersey Gas Company to Implement an Accelerated Infrastructure Replacement Program and Associated Recovery Mechanism Pursuant to N.J.S.A. 48:2-21 and N.J.S.A. 48:2-21.1, BPU Docket No. GO12070670, Order dated February 20, 2013 , p. 5; and In the Matter of the Petition of Pivotal Utility Holdings, Inc. d/b/a Elizabethtown Gas for Approval of an Accelerated Infrastructure Replacement Program and an Associated Cost Recovery Mechanism, BPU Docket No. GO12070693, Order dated August 21, 2013, p. 9 ¶27.

include, but are not limited to: caps on expenditures; recovery limitations on the amount of capital expenditures and annual rate impacts; a well-defined set of criteria for determining the investments included in the plan; and cost savings or other offsets resulting from the plan.[140] Schedule DED-28, that identified common program design characteristics for other natural gas utility infrastructure trackers, also identifies ratepayer protection mechanisms included in these plans.

Q. ARE TOTAL EXPENDITURE CAPS COMMON IN OTHER APPROVED INFRASTRUCTURE TRACKER MECHANISMS?

A. Yes. Total expenditure caps are relatively common with infrastructure/reliability-related trackers. Schedule DED-28 shows that at least 14 of the 57 surveyed natural gas utility infrastructure riders have caps on the total expenditures allowed to be recovered through the mechanism. In addition, capital expenditure caps can be designed to limit both the annual as well as the total capital expenditures over a capital tracker's term. Some states have set caps in a relative manner (limiting capex to a share of total revenues), while others do so on an absolute dollar amount basis ("hard cap"). While PSE&G has provided an estimated capital and expense budget for the next five years, the Company has not stated that these investment amounts will be treated as a "hard" or "not-to-exceed" expenditure cap. Infrastructure tracker mechanisms that exclude some type of expenditure cap run the risk of overcapitalization and/or inefficiencies. This is

[140] *See, for instance,* Department of Public Utilities, In re: Petition of Bay State Gas Company, pursuant to G.L. c. 164, § 94 and 220 C.M.R. § 5.00 et seq., for Approval of a General Increase in Gas Distribution Rates Proposed in Tariffs M.D.P.U. Nos. 70 through 105, and for Approval of a Revenue Decoupling Mechanism, D.P.U. 09-30. Order Dated October 30, 2009; Department of Public Utilities, In re: Petition of Massachusetts Electric Company and Nantucket Electric Company, pursuant to G. L. c. 164, § 94, and 220 C.M.R. § 5.00 et seq., for a General Increase in Electric Rates and Approval of a Revenue Decoupling Mechanism, D.P.U. 09-39. Order Dated November 30, 2009; Department of Public Utilities, In re: Petition of Boston Gas Company, Essex Gas Company and Colonial Gas Company, each d/b/a National Grid, pursuant to G.L. c. 164, § 94 and 220 C.M.R. § 5.00 et seq., for Approval of a General Increase in Gas Distribution Rates, a Targeted Infrastructure Recovery Factor, and a Revenue Decoupling Mechanism, D.P.U. 10-55. Order Dated November 2, 2010; In the Matter of Petition of New England Gas Company, pursuant to G.L. c. 164, § 94 and 220 C.M.R. § 5.00 et seq., for Approval of a General Increase in Gas Distribution Rates, a Targeted Infrastructure Recovery Factor, and a Revenue Decoupling Mechanism, set forth in the following tariffs: M.D.P.U. Nos. 1002B and 1003A through 1024A, D.P.U. 10-114. Order Dated March 31, 2011.

particularly important for a program as large as Energy Strong: a 20 percent cost overrun for a $4.0 billion dollar program, for instance, is $800 million.

Q. DOES THE COMPANY'S PROPOSAL INCLUDE ANY RATE IMPACT OR BILL IMPACT CAPS?

A. No. A rate impact cap is an important ratepayer protection mechanism since it limits the impact of a utility's reliability or modernization expenditures on household, business, or industrial customers' electricity bills to some pre-defined percent. A part of the utility's revenue requirement that is above the fixed percentage cap is either deferred or treated in a fashion consistent with traditional ratemaking practices. The Company's proposal does not include a rate impact cap despite the fact that the order of magnitude for these impacts could be quite significant. Schedule DED-28 also shows that several states have adopted rate impact caps as part of their natural gas capital tracker mechanisms.

Q. HAS THE COMPANY CONFIRMED ITS OBLIGATION TO PROVIDE SAFE AND RELIABLE SERVICE SHOULD THE ENERGY STRONG PROPOSAL BE REJECTED?

A. Yes, the Company noted in its Petition that it would "continue to invest prudently in the electric and gas system and their current designs, providing service to our customer with incremental improvements and repairs being made as necessary and appropriate"[141] and that it "intends to maintain the current levels of investment for traditional system reinforcements, replacements, upgrades, environmental/regulatory obligations, new business and support items such as tools, and vehicles" regardless of tracker approval.[142]

[141] Direct Testimony of Jorge L. Cardenas, 6:114-116.
[142] Company Response to RCR-E-106.

Q. WHAT ARE YOUR PRIMARY RECOMMENDATIONS REGARDING THE NGD COMPONENT OF THE COMPANY'S ENERGY STRONG PROPOSAL?

A. I agree with Mr. McGee's recommendation that the Board consider approving certain portions of the Company's NGD resiliency proposals, particularly those that harden several of the Company's M&R stations that were flooded during Superstorm Sandy. However, I recommend that the Board reject the pipeline replacement component of the Company's Energy Strong NGD proposals since, as I noted in detail earlier, the Company has not shown (1) a need or appropriate replacement prioritization for this program and (2) the replacement program is very large and its associated cost recovery mechanism suffers from a number of program design deficiencies.

Q. DO YOU HAVE ANY ADDITIONAL RECOMMENDATIONS SHOULD THE BOARD DECIDE TO APPROVE SOME PORTION OF NGD COMPONENT OF THE COMPANY'S ENERGY STRONG PROPOSAL?

A. Yes. I recommend that the Board modify the Company's NGD Energy Strong proposal should it decide to accept some portion of the natural gas components of the plan. These modifications include:

- Establishing a tracker-based approach that utilizes a regulatory asset (i.e., deferral method) similar to those in place for other New Jersey natural gas distribution utilities.
- If the Board utilizes a contemporaneous, as opposed to deferral method for recovering pipeline replacement costs, then it should establish a cost review process consistent with those already in place for other New Jersey natural gas distribution utilities and defer the evaluation of the prudence of the Company's investments until the time of its next, clearly defined rate case. The Board should explicitly reject the Company's assertion that approval of any form of the Energy Strong program constitutes a prudence "pre-approval."

- Establishing sunset provisions that tie an overall program effectiveness review to a mandatory rate case in three years consistent with other New Jersey natural gas distribution company infrastructure programs.
- A limitation on tracker cost recovery to only the capital costs associated with the Company's replacement investments: all other non-capital related components of the Company's NGD Energy Strong proposal should not be eligible for tracker recovery.
- Only those costs associated with the hardening of prior-flooded M&R stations and the incremental replacement of cast iron and bare steel services should be included as being eligible for tracker recovery. The Company's tracker cost recovery should be limited to the replacement of 148 miles of cast iron mains or 25 miles per year, a replacement rate consistent with the increment above what was replaced during the test year of (2009) Company's last rate case. Services replacement investments should not be included in the Energy Strong proposal. The Company has consistently replaced in excess of the proposed annual replacements of 6,667 services. Replacement prioritization, as discussed by Mr. McGee, should be based on the most-risky (most leak-prone) pipe; flooding or prior outage histories should be considerations that rank second to safety-related factors.
- A total investment cap that does not exceed $34.4 million in any given year and is consistent with the Company's estimated average cost of replacing 148 miles of cast iron, (or 25 miles per year) as well as raising the five M&R stations that were flooded by the Company's last major storm event. This represents 19.2 percent of the Company's original NGD Energy Strong request.
- A rate impact cap of one percent of total revenues per year.
- The inclusion of a net total O&M offset of $0.235 million.

- The inclusion of performance standards and benchmarks consistent with other New Jersey natural gas utilities. This would include an annual reduction of 283 leaks or a 12 percent annual reduction in the Company's leak inventory.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY FILED ON OCTOBER 28, 2013?

A. Yes it does. However, I reserve the right to supplement my testimony if any updated or additional information becomes available during the course of this proceeding. I also reserve the right to supplement my testimony after further and more detailed review of any late-filed discovery responses, including the Brattle Group Report.

CURRICULA VITA/ATTACHMENT A

Attachment A

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EDUCATION

Ph.D., Economics, Florida State University, 1995.
M.S., Economics, Florida State University, 1992.
M.S., International Affairs, Florida State University, 1988.
B.A., History, University of West Florida, 1987.
A.A., Liberal Arts, Pensacola State College, 1985.

Master's Thesis: *Nuclear Power Project Disallowances: A Discrete Choice Model of Regulatory Decisions*

Ph.D. Dissertation: *An Empirical Examination of Environmental Externalities and the Least-Cost Selection of Electric Generation Facilities*

ACADEMIC APPOINTMENTS

Louisiana State University, Baton Rouge, Louisiana

Center for Energy Studies

2007-Current	Director, Division of Policy Analysis
2006-Current	Professor
2003-Current	Associate Executive Director
2001-2006	Associate Professor
2000-2001	Research Fellow and Adjunct Assistant Professor
1995-2000	Assistant Professor

School of the Coast and the Environment (Department of Environmental Studies)

2010-Current	Adjunct Professor

E.J. Ourso College of Business Administration (Department of Economics)

2006-Current	Adjunct Professor
2001-2006	Adjunct Associate Professor
1999-2000	Adjunct Assistant Professor

Florida State University, Tallahassee, Florida

College of Social Sciences, Department of Economics

1995	Instructor

PROFESSIONAL EXPERIENCE

Acadian Consulting Group, Baton Rouge, Louisiana

2001-Current	Consulting Economist/Principal
1995-2000	Consulting Economist/Principal

Econ One Research, Inc., Houston, Texas

2000-2001	Senior Economist

Florida Public Service Commission, Tallahassee, Florida
Division of Communications, Policy Analysis Section

1995	Planning & Research Economist

Division of Auditing & Financial Analysis, Forecasting Section

1993	Planning & Research Economist
1992-1993	Economist

Project for an Energy Efficient Florida &
Florida Solar Energy Industries Association, Tallahassee, Florida

1994	Energy Economist

Ben Johnson Associates, Inc., Tallahassee, Florida

1991-1992	Research Associate
1989-1991	Senior Research Analyst
1988-1989	Research Analyst

GOVERNMENT APPOINTMENTS

2007-Current	Louisiana Representative, Interstate Oil and Gas Compact Commission; Energy Resources, Research & Technology Committee.
2007-Current	Louisiana Representative, University Advisory Board Representative; Energy Council (Center for Energy, Environmental and Legislative Research).

2005	Member, Task Force on Energy Sector Workforce and Economic Development (HCR 322).
2003-2005	Member, Energy and Basic Industries Task Force, Louisiana Economic Development Council
2001-2003	Member, Louisiana Comprehensive Energy Policy Commission.

PUBLICATIONS: BOOKS AND MONOGRAPHS

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2. *Distributed Energy Resources: A Practical Guide for Service.* (2000). With Ritchie Priddy. London: Financial Times Energy.

PUBLICATIONS: PEER REVIEWED ACADEMIC JOURNALS

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3. "Estimating the Impact of Royalty Relief on Oil and Gas Production on Marginal State Leases in the US." (2006). With Jeffrey M. Burke and Dmitry V. Mesyanzhinov. *Energy Policy* 34(12): 1389-1398.

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5. "Deregulation of Generating Assets and the Disposition of Excess Deferred Federal Income Taxes." (2004). With K.E. Hughes II. *International Energy Law and Taxation Review*. 10 (October): 206-212.

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9. "Modeling Regional Power Markets and Market Power." (2001). With Robert F. Cope. *Managerial and Decision Economics.* 22:411-429.

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12. "Capacity and Economies of Scale in Electric Power Transmission" (1999). With Robert F. Cope and Dmitry Mesyanzhinov. *Utilities Policy* 7: 155-162.

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PUBLICATIONS: PEER REVIEWED PROCEEDINGS

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3. "Applications for Distributed Energy Resources in Oil and Gas Production: Methods for Reducing Flare Gas Emissions and Increasing Generation Availability" (2000). With Ritchie D. Priddy. *Proceedings of the International Energy Foundation – ENERGEX 2000.* July.

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5. "New Paradigms for Power Engineering Education." (1997). With Fred I. Denny. *Proceedings of the International Association of Science and Technology for Development*. October: 499-504.

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PUBLICATIONS: OTHER SCHOLARLY PROCEEDINGS

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21. "White Paper or White Flag: Do FERC's Concessions Represent A Withdrawal from Wholesale Power Market Reform?" (2003). With K.E. Hughes II. *Oil, Gas and Energy Quarterly*. 52: 197-207.

22. "Clear Skies" or Storm Clouds Ahead? The Continuing Debate over Air Pollution and Climate Change" (2003). With K.E. Hughes II. *Oil, Gas and Energy Quarterly*. 51: 823-848.

23. "Economic Displacement Opportunities in Southeastern Power Markets." (2003). With Dmitry V. Mesyanzhinov. *USAEE Dialogue*. 11: 20-24.

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26. "The Role of Alaska North Slope Gas in the Southcentral Alaska Regional Energy Balance." (2002). With William Nebesky and Dmitry Mesyanzhinov. *Natural Gas Journal*. 19: 10-15.

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28. "Do Economic Activities Create Different Economic Impacts to Communities Surrounding the Gulf OCS?" (2002). With Williams O. Olatubi. *IAEE Newsletter*. Second Quarter: 16-20.

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33. "A is for Access: A Definitional Tour Through Today's Energy Vocabulary." (2001). With K.E. Hughes II. *Oil, Gas and Energy Quarterly*. 49:947-973.

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38. "The Post-Restructuring Consolidation of Nuclear-Power Generation in the Electric Power Industry." (2000) With K.E. Hughes II. *Oil, Gas and Energy Quarterly*. 49: 751-765.

39. "Issues and Opportunities for Small Scale Electricity Production in the Oil Patch." (2000). With Ritchie D. Priddy. *American Oil and Gas Reporter*. 49: 78-82.

40. "Distributed Energy Resources: The Next Paradigm Shift in the Electric Power Industry."

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41. "Coming to a Neighborhood Near You: The Merchant Electric Power Plant." (1999). With K.E. Hughes II. *Oil, Gas, and Energy Quarterly.* 48:433-441.

42. "Slow as Molasses: The Political Economy of Electric Restructuring in the South." (1999). With K.E. Hughes II. *Oil, Gas, and Energy Quarterly.* 48: 163-183.

43. "Stranded Investment and Non-Utility Generation." (1999). With Michael T. Maloney. *Electricity Journal* 12: 50-61.

44. "Reliability or Profit? Why Entergy Quit the Southwest Power Pool." (1998). With Fred I. Denny. *Public Utilities Fortnightly*. February 1: 30-33.

45. "Electric Utility Mergers and Acquisitions: A Regulator's Guide." (1996). With Kimberly H. Dismukes. *Public Utilities Fortnightly.* January 1.

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1. *Unconventional Resources and Louisiana's Manufacturing Development Renaissance* (2013). Baton Rouge, LA: LSU Center for Energy Studies, 93 pp.

2. *Removing Big Wind's "Training Wheels:" The Case for Ending the Production Tax Credit* (2012). Washington, DC: American Energy Alliance, 19 pp.

3. *The Impact of Legacy Lawsuits on Conventional Oil and Gas Drilling in Louisiana*. (2012). Baton Rouge, LA: LSU Center for Energy Studies, 62 pp.

4. *Diversifying Energy Industry Risk in the GOM: Post-2004 Changes in Offshore Oil and Gas Insurance Markets*. (2011) With Christopher P. Peters. U.S. Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico Region, New Orleans, LA. OCS Study BOEM 2011-054. 95pp.

5. *OCS-Related Infrastructure Fact Book. Volume I: Post-Hurricane Impact Assessment*. (2011). U.S. Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico Region, New Orleans, LA. OCS Study BOEM 2011-043. 372 pp.

6. *Fact Book: Offshore Oil and Gas Industry Support Sectors*. (2010). U.S. Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico Region, New Orleans, LA. OCS Study BOEM 2010-042. 138pp.

7. *The Impacts of Greenhouse Gas Regulation on the Louisiana Economy*. (2011). With Michael D. McDaniel, Christopher Peters, Kathryn R. Perry, and Lauren L. Stuart. Louisiana Greenhouse Gas Inventory Project, Task 3 and 4 Report. Prepared for the Louisiana Department of Economic Development. Baton Rouge, LA: LSU Center for Energy Studies, 134 pp.

8. *Overview of States' Climate Action and/or Alternative Energy Policy Measures*. (2010). With Michael D. McDaniel, Christopher Peters, Kathryn R. Perry, and Lauren L. Stuart. Louisiana Greenhouse Gas Inventory Project, Task 2 Report. Prepared for the Louisiana Department of Economic Development. Baton Rouge, LA: LSU Center for Energy Studies, 30 pp.

9. *Louisiana Greenhouse Gas Inventory*. (2010). With Michael D. McDaniel, Christopher Peters, Kathryn R. Perry, Lauren L. Stuart, and Jordan L. Gilmore. Louisiana Greenhouse Gas Inventory Project, Task 1 Report. Prepared for the Louisiana Department of Economic Development. Baton Rouge, LA: LSU Center for Energy Studies, 114 pp.

10. *The Benefits of Continued and Expanded Investments in the Port of Venice*. (2009). With Christopher Peters and Kathryn Perry. Baton Rouge, LA: LSU Center for Energy Studies. 83 pp.

11. *Examination of the Development of Liquefied Natural Gas on the Gulf of Mexico*. (2008). U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA OCS Study MMS 2008-017. 106 pp.

12. *Gulf of Mexico OCS Oil and Gas Scenario Examination: Onshore Waste Disposal*. (2007). With Michelle Barnett, Derek Vitrano, and Kristen Strellec. OCS Report, MMS 2007-051. New Orleans, LA: U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico Region.

13. *Economic Impact Analysis of the Proposed Lake Charles Gasification Project*. (2007). Report Prepared on Behalf of Leucadia Corporation.

14. *The Economic Impacts of New Jersey's Proposed Renewable Portfolio Standard.* (2005) Report Prepared on Behalf of the New Jersey Division of Ratepayer Advocate.

15. *The Importance of Energy Production and Infrastructure in Plaquemines Parish*. (2006). Report Prepared on Behalf of Project Rebuild Plaquemines.

16. *Louisiana's Oil and Gas Industry: A Study of the Recent Deterioration in State Drilling Activity*. (2005). With Kristi A.R. Darby, Jeffrey M. Burke, and Robert H. Baumann. Baton Rouge, LA: Louisiana Department of Natural Resources.

17. *Comparison of Methods for Estimating the NO_x Emission Impacts of Energy Efficiency and Renewable Energy Projects Shreveport, Louisiana Case Study*. (2005). With Adam Chambers, David Kline, Laura Vimmerstedt, Art Diem, and Dmitry Mesyanzhinov. Golden, Colorado: National Renewable Energy Laboratory.

18. *Economic Opportunities for a Limited Industrial Retail Choice Plan in Louisiana*. (2004). With Elizabeth A. Downer and Dmitry V. Mesyanzhinov. Baton Rouge, LA: Louisiana State University Center for Energy Studies.

19. *Economic Opportunities for LNG Development in Louisiana*. (2004). With Elizabeth A. Downer and Dmitry V. Mesyanzhinov. Baton Rouge, LA: Louisiana Department of Economic Development and Greater New Orleans, Inc.

20. *Marginal Oil and Gas Production in Louisiana: An Empirical Examination of State Activities and Policy Mechanisms for Stimulating Additional Production*. (2004). With Dmitry V. Mesyanzhinov, Jeffrey M. Burke, Robert H. Baumann. Baton Rouge, LA: Louisiana Department of Natural Resources, Office of Mineral Resources.

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22. *The Power of Generation: The Ongoing Benefits of Independent Power Development in Louisiana.* With Dmitry V. Mesyanzhinov, Jeffrey M. Burke, and Elizabeth A. Downer. Baton Rouge, LA: LSU Center for Energy Studies, 2003.

23. *Modeling the Economic Impact of Offshore Oil and Gas Activities in the Gulf of Mexico: Methods and Application.* (2003). With Williams O. Olatubi, Dmitry V. Mesyanzhinov, and Allan G. Pulsipher. Prepared by the Center for Energy Studies, Louisiana State University, Baton Rouge, LA. OCS Study MMS2000-0XX. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA.

24. *An Analysis of the Economic Impacts Associated with Oil and Gas Activities on State Leases*. (2002) With Robert H. Baumann, Dmitry V. Mesyanzhinov, and Allan G. Pulsipher. Baton Rouge, LA: Louisiana Department of Natural Resources, Office of Mineral Resources.

25. *Alaska In-State Natural Gas Demand Study*. (2002). With Dmitry Mesyanzhinov, et.al. Anchorage, Alaska: Alaska Department of Natural Resources, Division of Oil and Gas.

26. *Moving to the Front of the Lines: The Economic Impacts of Independent Power Plant Development in Louisiana*. (2001). With Dmitry Mesyanzhinov and Williams O. Olatubi. Baton Rouge, LA: Louisiana State University, Center for Energy Studies.

27. *The Economic Impacts of Merchant Power Plant Development in Mississippi.* (2001). Report Prepared on Behalf of the US Oil and Gas Association, Alabama and Mississippi Division. Houston, TX: Econ One Research, Inc.

28. *Energy Conservation and Electric Restructuring In Louisiana*. (2000). With Dmitry Mesyanzhinov, Ritchie D. Priddy, Robert F. Cope III, and Vera Tabakova. Baton Rouge, LA: Louisiana State University, Center for Energy Studies.

29. *Assessing the Environmental and Safety Risks of the Expanded Role of Independents in Oil and Gas E&P Operations on the U.S. Gulf of Mexico OCS.* (1996). With Allan Pulsipher, Omowumi Iledare, Dmitry Mesyanzhinov, William Daniel, and Bob Baumann. Baton Rouge, LA: Louisiana State University, Center for Energy Studies.

30. *Restructuring the Electric Utility Industry: Implications for Louisiana.* (1996). With Allan Pulsipher and Kimberly H. Dismukes. Baton Rouge, LA: Louisiana State University, Center for Energy Studies.

GRANT RESEARCH

1. *Principal Investigator*. "Analysis of the Potential for Combined Heat and Power (CHP) in Louisiana. (2013). Louisiana Department of Natural Resources. Total Project: $90,000. Status: In Progress.

2. *Co-Principal Investigator*. "CNH: A Tale of Two Louisianas: Coupled Natural-Human Dynamics in a Vulnerable Coastal System" (2013) With Nina Lam, Margaret Reams, Kam-Biu Liu, Victor Rivera, and Kelley Pace. National Science Foundation. Total Project: $1.5 million. Status: In Progress (Sept 2012-Feb 2017).

3. *Principal Investigator*. "Examination of Unconventional Natural Gas and Industrial Economic Development" (2012). America's Natural Gas Alliance. Total Project: $48,210. Status: Completed.

4. *Principal Investigator*. "Investigation of the Potential Economic Impacts Associated with Shell's Proposed Gas-To-Liquids Project" (2012). Shell Oil Company, North America. Total Project: $76,708. Status: Completed.

5. *Principal Investigator*. "Analysis of the Federal Wind Energy Production Tax Credit." American Energy Alliance. Total Project: $20,000. Status: Completed.

6. *Principal Investigator*. "Energy Sector Impacts Associated with the Deepwater Horizon Oil Spill." Louisiana Department of Economic Development. Total Project: Open. Status: Completed.

7. *Principal Investigator*. "Economic Contributions and Benefits Support by the Port of Venice." Port of Venice Coalition. Total Project: $20,000. Status: Completed.

8. *Principal Investigator.* "Energy Policy Development in Louisiana." Louisiana Department of Natural Resources. Total Project: $150,000. Status: Completed.

9. *Principal Investigator.* "Preparing Louisiana for the Possible Federal Regulation of Greenhouse Gas Regulation." With Michael D. McDaniel. Louisiana Department of Economic Development. Total Project: $98,543. Status: Completed.

10. *Principal Investigator*. "OCS Studies Review: Louisiana and Texas Oil and Gas Activity and Production Forecast; Pipeline Position Paper; and Geographical Units for Observing and Modeling Socioeconomic Impact of Offshore Activity." (2008). With Mark J. Kaiser and Allan G. Pulsipher. U.S. Department of the Interior, Minerals Management Service. Total Project: $377,917 (3 years). Status: Completed.

11. *Principal Investigator*. "State and Local Level Fiscal Effects of the Offshore Petroleum Industry." (2007). With Loren C. Scott. U.S. Department of the Interior, Minerals Management Service. Total Project: $241,216 (2.5 years). Status: Awarded, In Progress.

12. *Principal Investigator*. "Understanding Current and Projected Gulf OCS Labor and Ports

Needs." (2007). With Allan. G. Pulsipher, Kristi A. R. Darby. U.S. Department of the Interior, Minerals Management Service. Total Project: $169,906. (one year). Status: Awarded, In Progress.

13. *Principal Investigator*. "Structural Shifts and Concentration of Regional Economic Activity Supporting GOM Offshore Oil and Gas Activities." (2007). With Allan. G. Pulsipher, Michelle Barnett. U.S. Department of the Interior, Minerals Management Service. Total Project: $78,374 (one year). Status: Awarded, In Progress.

14. *Principal Investigator*. "Plaquemine Parish's Role in Supporting Critical Energy Infrastructure and Production." (2006). With Seth Cureington. Plaquemines Parish Government, Office of the Parish President and Plaquemines Association of Business and Industry. Total Project: $18,267. Status: Completed.

15. *Principal Investigator*. "Diversifying Energy Industry Risk in the Gulf of Mexico." (2006). With Kristi A. R. Darby. U.S. Department of the Interior, Minerals Management Service. Total Project: $65,302 (two years). Status: Awarded, In Progress.

16. *Principal Investigator*. "Post-Hurricane Assessment of OCS-Related Infrastructure and Communities in the Gulf of Mexico Region." (2006). U.S. Department of the Interior, Minerals Management Service. Total Project Funding: $244,837. Status: In Progress.

17. *Principal Investigator*. "Ultra Deepwater Road Mapping Process." (2005). With Kristi A. R. Darby, Subcontract with the Texas A&M University, Department of Petroleum Engineering. Funded by the Gas Technology Institute. Total Project Funding: $15,000. Status: Completed.

18. *Principal Investigator*. "An Examination of the Opportunities for Drilling Incentives on State Leases." (2004). With Robert H. Baumann and Kristi A. R. Darby. Louisiana Office of Mineral Resources. Total Project Funding: $75,000. Status: Completed.

19. *Principal Investigator*. " An Examination on the Development of Liquefied Natural Gas Facilities on the Gulf of Mexico." (2004). With Dmitry V. Mesyanzhinov and Mark J. Kaiser. U.S. Department of the Interior, Minerals Management Service. Total Project Funding $101,054. Status: Completed.

20. *Principal Investigator*. "Examination of the Economic Impacts Associated with Large Customer, Industrial Retail Choice." (2004). With Dmitry V. Mesyanzhinov. Louisiana Mid-Continent Oil and Gas Association. Total Project Funding: $37,000. Status: Completed.

21. *Principal Investigator*. "Economic Opportunities from LNG Development in Louisiana." (2003). With Dmitry V. Mesyanzhinov. Metrovision/New Orleans Chamber of Commerce and the Louisiana Department of Economic Development. Total Project Funding: $25,000. Status: Completed.

22. *Principal Investigator*. "Marginal Oil and Gas Properties on State Leases in Louisiana: An Empirical Examination and Policy Mechanisms for Stimulating Additional Production." (2002). With Robert H. Baumann and Dmitry V. Mesyanzhinov. Louisiana Office of Mineral

Resources. Total Project Funding: $72,000. Status: Completed.

23. *Principal Investigator*. "A Collaborative Investigation of Baseline and Scenario Information for Environmental Impact Statements." (2002). With Dmitry V. Mesyanzhinov and Williams O. Olatubi. U.S. Department of Interior, Minerals Management Service. Total Project Funding: $557,744. Status: Awarded, In Progress.

24. *Co-Principal Investigator*. "An Analysis of the Economic Impacts of Drilling and Production Activities on State Leases." (2002). With Robert H. Baumann, Allan G. Pulsipher, and Dmitry V. Mesyanzhinov. Louisiana Office of Mineral Resources. Total Project Funding: $8,000. Status: Completed.

25. *Principal Investigator*. "Cost Profiles and Cost Functions for Gulf of Mexico Oil and Gas Development Phases for Input Output Modeling." (1998). With Dmitry Mesyanzhinov and Allan G. Pulsipher. U.S. Department of Interior, Minerals Management Service. Total Project Funding: $244,956. Status: Completed.

26. *Principal Investigator*. "An Economic Impact Analysis of OCS Activities on Coastal Louisiana." (1998). With Dmitry Mesyanzhinov and David Hughes. U.S. Department of Interior, Minerals Management Service. Total Project Funding: $190,166. Status: Completed.

27. *Principal Investigator*. "Energy Conservation and Electric Restructuring in Louisiana." (1997). Louisiana Department of Natural Resources." Petroleum Violation Escrow Program Funds. Total Project Funding: $43,169. Status: Completed.

28. *Principal Investigator*. "The Industrial Supply of Electricity: Commercial Generation, Self-Generation, and Industry Restructuring." (1996). With Andrew Kleit. Louisiana Energy Enhancement Program, LSU Office of Research and Development. Total Project Funding: $19,948. Status: Completed.

29. *Co-Principal Investigator*. "Assessing the Environmental and Safety Risks of the Expanded Role of Independents in Oil and Gas E&P Operations on the U.S. Gulf of Mexico OCS." (1996). With Allan Pulsipher, Omowumi Iledare, Dmitry Mesyanzhinov, William Daniel, and Bob Baumann. U.S. Department of Interior, Minerals Management Service, Grant Number 95-0056. Total Project Funding: $109,361. Status: Completed.

ACADEMIC CONFERENCE PAPERS/PRESENTATIONS

1. "Economies of Scale, Learning Curves, and Offshore Wind Development Costs" (2012). With Gregory Upton. Southern Economic Association Annual Conference, New Orleans, LA November 17.

2. "Analysis of Risk and Post-Hurricane Reaction." (2009). 25th Annual Information Transfer Meeting. U.S. Department of the Interior, Minerals Management Service. January 7.

3. "Legacy Litigation, Regulation, and Other Determinants of Interstate Drilling Activity Differentials." (2008). With Christopher Peters and Mark Kaiser. 28th Annual USAEE/IAEE

North American Conference: Unveiling the Future of Future of Energy Frontiers. New Orleans, LA, December 3, 2008.

4. "Gulf Coast Energy Infrastructure Renaissance: Overview." (2008). 28th Annual USAEE/IAEE North American Conference: Unveiling the Future of Future of Energy Frontiers. New Orleans, LA, December 3, 2008.

5. "Understanding the Impacts of Katrina and Rita on Energy Industry Infrastructure." (2008). American Chemical Society National Meetings, New Orleans, Louisiana. April 7, 2008.

6. "Determining the Economic Value of Coastal Preservation and Restoration on Critical Energy Infrastructure." (2007). With Kristi A. R. Darby and Michelle Barnett. International Association for Energy Economics, Wellington, New Zealand, February 19, 2007.

7. "Regulatory Issues in Rate Design, Incentives, and Energy Efficiency." (2007). 34th Annual Public Utilities Research Center Conference, University of Florida. Gainesville, FL. February 16, 2007.

8. "An Examination of LNG Development on the Gulf of Mexico." (2007). With Kristi A.R. Darby. US Department of the Interior, Minerals Management Service. 24th Annual Information Technology Meeting. New Orleans, LA. January 9.

9. "OCS-Related Infrastructure on the GOM: Update and Summary of Impacts." (2007). US Department of the Interior, Minerals Management Service. 24th Annual Information Technology Meeting. New Orleans, LA. January 10.

10. "The Economic Value of Coastal Preservation and Restoration on Critical Energy Infrastructure." (2006). With Michelle Barnett. Third National Conference on Coastal and Estuarine Habitat Restoration. Restore America's Estuaries. New Orleans, Louisiana, December 11.

11. "The Impact of Implementing a 20 Percent Renewable Portfolio Standard in New Jersey." (2006). With Seth E. Cureington. Mid-Continent Regional Science Association 37th Annual Conference, Purdue University, Lafayette, Indiana, June 9.

12. "The Impacts of Hurricane Katrina and Rita on Energy infrastructure Along the Gulf Coast." (2006). Environment Canada: 2006 Artic and Marine Oilspill Program. Vancouver, British Columbia, Canada.

13. "Hurricanes, Energy Markets, and Energy Infrastructure in the Gulf of Mexico: Experiences and Lessons Learned." (2006). With Kristi A.R. Darby and Seth E. Cureington. 29th Annual IAEE International Conference, Potsdam, Germany, June 9.

14. "An Examination of the Opportunities for Drilling Incentives on State Leases in Louisiana." (2005). With Kristi A.R. Darby. 28th Annual IAEE International Conference, Taipei, Taiwan (June).

15. "Fiscal Mechanisms for Stimulating Oil and Gas Production on Marginal Leases." (2004). With Jeffrey M. Burke. International Association of Energy Economics Annual Conference, Washington, D.C. (July).

16. "GIS and Applied Economic Analysis: The Case of Alaska Residential Natural Gas Demand." (2003). With Dmitry V. Mesyanzhinov. Presented at the Joint Meeting of the East Lakes and West Lakes Divisions of the Association of American Geographers in Kalamazoo, MI, October 16-18.

17. "Are There Any In-State Uses for Alaska Natural Gas?" (2002). With Dmitry V. Mesyanzhinov and William E. Nebesky. IAEE/USAEE 22nd Annual North American Conference: "Energy Markets in Turmoil: Making Sense of It All." Vancouver, British Columbia, Canada. October 7.

18. "The Economic Impact of State Oil and Gas Leases on Louisiana." (2002). With Dmitry V. Mesyanzhinov. 2002 National IMPLAN Users' Conference. New Orleans, Louisiana, September 4-6.

19. "Moving to the Front of the Lines: The Economic Impact of Independent Power Plant Development in Louisiana." (2002). With Dmitry V. Mesyanzhinov and Williams O. Olatubi. 2002 National IMPLAN Users' Conference. New Orleans, Louisiana, September 4-6.

20. "New Consistent Approach to Modeling Regional Economic Impacts of Offshore Oil and Gas Activities in the Gulf of Mexico." (2002). With Vicki Zatarain. 2002 National IMPLAN Users' Conference. New Orleans, Louisiana, September 4-6.

21. "Distributed Energy Resources, Energy Efficiency, and Electric Power Industry Restructuring." (1999). American Society of Environmental Science Fourth Annual Conference. Baton Rouge, Louisiana. December.

22. "Estimating Efficiency Opportunities for Coal Fired Electric Power Generation: A DEA Approach." (1999). With Williams O. Olatubi. Southern Economic Association Sixty-ninth Annual Conference. New Orleans, November.

23. "Applied Approaches to Modeling Regional Power Markets." (1999.) With Robert F. Cope. Southern Economic Association Sixty-ninth Annual Conference. New Orleans, November 1999.

24. "Parametric and Non-Parametric Approaches to Measuring Efficiency Potentials in Electric Power Generation." (1999). With Williams O. Olatubi. International Atlantic Economic Society Annual Conference, Montreal, October.

25. "Asymmetric Choice and Customer Benefits: Lessons from the Natural Gas Industry." (1999). With Rachelle F. Cope and Dmitry Mesyanzhinov. International Association of Energy Economics Annual Conference. Orlando, Florida. August.

26. "Modeling Regional Power Markets and Market Power." (1999). With Robert F. Cope. Western Economic Association Annual Conference. San Diego, California. July.

27. "Economic Impact of Offshore Oil and Gas Activities on Coastal Louisiana" (1999). With Dmitry Mesyanzhinov. Annual Meeting of the Association of American Geographers. Honolulu, Hawaii. March.

28. "Empirical Issues in Electric Power Transmission and Distribution Cost Modeling." (1998). With Robert F. Cope and Dmitry Mesyanzhinov. Southern Economic Association. Sixty-Eighth Annual Conference. Baltimore, Maryland. November.

29. "Modeling Electric Power Markets in a Restructured Environment." (1998). With Robert F. Cope and Dan Rinks. International Association for Energy Economics Annual Conference. Albuquerque, New Mexico. October.

30. "Benchmarking Electric Utility Distribution Performance." (1998) With Robert F. Cope and Dmitry Mesyanzhinov. Western Economic Association, Seventy-sixth Annual Conference. Lake Tahoe, Nevada. June.

31. "Power System Operations, Control, and Environmental Protection in a Restructured Electric Power Industry." (1998). With Fred I. Denny. IEEE Large Engineering Systems Conference on Power Engineering. Nova Scotia, Canada. June.

32. "Benchmarking Electric Utility Transmission Performance." (1997). With Robert F. Cope and Dmitry Mesyanzhinov. Southern Economic Association, Sixty-seventh Annual Conference. Atlanta, Georgia. November 21-24.

33. "A Non-Linear Programming Model to Estimate Stranded Generation Investments in a Deregulated Electric Utility Industry." (1997). With Robert F. Cope and Dan Rinks. Institute for Operations Research and Management Science Annual Conference. Dallas Texas. October 26-29.

34. "New Paradigms for Power Engineering Education." (1997). With Fred I. Denny. International Association of Science and Technology for Development, High Technology in the Power Industry Conference. Orlando, Florida. October 27-30

35. "Cogeneration and Electric Power Industry Restructuring." (1997). With Andrew N. Kleit. Western Economic Association, Seventy-fifth Annual Conference. Seattle, Washington. July 9-13.

36. "The Unintended Consequences of the Public Utilities Regulatory Policies Act of 1978." (1997). National Policy History Conference on the Unintended Consequences of Policy Decisions. Bowling Green State University. Bowling Green, Ohio. June 5-7.

37. "Assessing Environmental and Safety Risks of the Expanding Role of Independents in E&P Operations on the Gulf of Mexico OCS." (1996). With Allan Pulsipher, Omowumi Iledare, Dmitry Mesyanzhinov, and Bob Baumann. U.S. Department of Interior, Minerals Management Service, 16th Annual Information Transfer Meeting. New Orleans, Louisiana.

38. "Empirical Modeling of the Risk of a Petroleum Spill During E&P Operations: A Case Study of the Gulf of Mexico OCS." (1996). With Omowumi Iledare, Allan Pulsipher, and Dmitry Mesyanzhinov. Southern Economic Association, Sixty-Sixth Annual Conference. Washington, D.C.

39. "Input Price Fluctuations, Total Factor Productivity, and Price Cap Regulation in the Telecommunications Industry" (1996). With Farhad Niami. Southern Economic Association, Sixty-Sixth Annual Conference. Washington, D.C.

40. "Recovery of Stranded Investments: Comparing the Electric Utility Industry to Other Recently Deregulated Industries" (1996). With Farhad Niami and Dmitry Mesyanzhinov. Southern Economic Association, Sixty-Sixth Annual Conference. Washington, D.C.

41. "Spatial Perspectives on the Forthcoming Deregulation of the U.S. Electric Utility Industry." (1996) With Dmitry Mesyanzhinov. Southwest Association of American Geographers Annual Meeting. Norman, Oklahoma.

42. "Comparing the Safety and Environmental Performance of Offshore Oil and Gas Operators." (1995). With Allan Pulsipher, Omowumi Iledare, Dmitry Mesyanzhinov, William Daniel, and Bob Baumann. U.S. Department of Interior, Minerals Management Service, 15th Annual Information Transfer Meeting. New Orleans, Louisiana.

43. "Empirical Determinants of Nuclear Power Plant Disallowances." (1995). Southern Economic Association, Sixty-Fifth Annual Conference. New Orleans, Louisiana.

44. "A Cross-Sectional Model of IntraLATA MTS Demand." (1995). Southern Economic Association, Sixty-Fifth Annual Conference. New Orleans, Louisiana.

ACADEMIC SEMINARS AND PRESENTATIONS

1. "Air Emissions Regulation and Policy: The Recently Proposed Cross State Air Pollution Rule and the Implications for Louisiana Power Generation." Lecture before School of the Coast & Environment. November 5, 2011.

2. "Energy Regulation: Overview of Power and Gas Regulation." Lecture before School of the Coast & Environment, Course in Energy Policy and Law. October 5, 2009.

3. "Trends and Issues in Renewable Energy." Presentation before the School of the Coast & Environment, Louisiana State University. Spring Guest Lecture Series. May 4, 2007.

4. "CES Research Projects and Status." Presentation before the U.S. Department of the Interior, Minerals Management Service, Outer Continental Shelf Scientific Committee Meeting, New Orleans, LA May 22, 2007.

5. "Hurricane Impacts on Energy Production and Infrastructure." Presentation Before the 53rd Mineral Law Institute, Louisiana State University. April 7, 2006.

6. "Trends and Issues in the Natural Gas Industry and the Development of LNG: Implications for Louisiana. (2004) 51st Mineral Law Institute, Louisiana State University, Baton Rouge, LA. April 2, 2004.

7. "Electric Restructuring and Conservation." (2001). Presentation before the Department of Electrical Engineering, McNesse State University. Lake Charles, Louisiana. May 2, 2001.

8. "Electric Restructuring and the Environment." (1998). Environment 98: Science, Law, and Public Policy. Tulane University. Tulane Environmental Law Clinic. March 7, New Orleans, Louisiana.

9. "Electric Restructuring and Nuclear Power." (1997). Louisiana State University. Department of Nuclear Science. November 7, Baton Rouge, Louisiana.

10. "The Empirical Determinants of Co-generated Electricity: Implications for Electric Power Industry Restructuring." (1997). With Andrew N. Kleit. Florida State University. Department of Economics: Applied Microeconomics Workshop Series. October 17, Tallahassee, Florida.

PROFESSIONAL AND CIVIC PRESENTATIONS

1. "Natural Gas & Electric Power Coordination Issues and Challenges." (2013). Utilities State Government Organization Conference, Pointe Clear, Alabama. July 9.

2. "Louisiana Unconventional Natural Gas and Industrial Redevelopment." (2013). Risk Management Association Luncheon, March 21.

3. "Unconventional Resources and Louisiana's Manufacturing Development Renaissance." (2013). Baton Rouge Press Club, De La Ronde Hall, Baton Rouge, LA, January 28.

4. "New Industrial Operations Leveraged by Unconventional Natural Gas." (2013) American Petroleum Institute-Louisiana Chapter. Lafayette, LA, Petroleum Club, January 14.

5. "What's Going on with Energy? How Unconventional Oil and Gas Development is Impacting Renewables, Efficiency, Power Markets, and All that Other Stuff." (2012). Atlanta Economics Club Monthly Meeting. Atlanta, GA. December 11.

6. "Trends, Issues, and Market Changes for Crude Oil and Natural Gas." (2012). East Iberville Community Advisory Panel Meeting. St. Gabriel, LA. September 26.

7. "Game Changers in Crude and Natural Gas Markets." (2012). Chevron Community Advisory Panel Meeting. Belle Chase, LA, September 17.

8. "The Outlook for Renewables in a Changing Power and Natural Gas Market." (2012). Louisiana Biofuels and Bioprocessing Summit. Baton Rouge, LA. September 11.

9. "The Changing Dynamics of Crude and Natural Gas Markets." (2012). Chalmette Refining Community Advisory Panel Meeting. Chalmette, LA, September 11.

10. "The Really Big Game Changer: Crude Oil Production from Shale Resources and the Tuscaloosa Marine Shale." (2012). Baton Rouge Chamber of Commerce Board Meeting. Baton Rouge, LA, June 27.

11. "The Impact of Changing Natural Gas Prices on Renewables and Energy Efficiency." (2012). NASUCA Gas Committee Conference Call/Webinar. 12 June 2012.

12. "Issues in Gas-Renewables Coordination: How Changes in Natural Gas Markets Potentially Impact Renewable Development" (2012). Energy Bar Association, Louisiana Chapter, Annual Meeting, New Orleans, LA. April 12, 2012.

13. "Issues in Natural Gas End-Uses: Are We Really Focusing on the Real Opportunities?" (2012). Energy Bar Association, Louisiana Chapter, Annual Meeting, New Orleans, LA. April 12, 2012.

14. "The Impact of Legacy Lawsuits on Conventional Oil and Gas Drilling in Louisiana." (2012). Louisiana Oil and Gas Association Annual Meeting, Lake Charles, LA. February 27, 2012.

15. "The Impact of Legacy Lawsuits on Conventional Oil and Gas Drilling in Louisiana." (2012) Louisiana Oil and Gas Association Annual Meeting. Lake Charles, Louisiana. February 27, 2012.

16. "Louisiana's Unconventional Plays: Economic Opportunities, Policy Challenges. Louisiana Mid-Continent Oil and Gas Association 2012 Annual Meeting. (2012) New Orleans, Louisiana. January 26, 2012.

17. "EPA's Recently Proposed Cross State Air Pollution Rule ("CSAPR") and Its Impacts on Louisiana." (2011). Bossier Chamber of Commerce. November 18, 2011.

18. "Facilitating the Growth of America's Natural Gas Advantage." (2011). BASF U.S. Shale Gas Workshop Management Meeting. Florham Park, New Jersey. November 1, 2011.

19. "CSAPR and EPA Regulations Impacting Louisiana Power Generation." (2011). Air and Waste Management Association (Louisiana Section) Fall Conference. Environmental Focus 2011: a Multi-Media Forum. Baton Rouge, LA. October 25, 2011.

20. "Natural Gas Trends and Impact on Industrial Development." (2011). Central Gulf Coast Industrial Alliance Conference. Arthur R. Outlaw Convention Center. Mobile, AL. September 22, 2011.

21. "Energy Market Changes and Policy Challenges." (2011). Southeast Manpower Tripartite Alliance ("SEMTA") Summer Conference. Nashville, TN September 2, 2011.

22. "EPA Regulations, Rates & Costs: Implications for U.S. Ratepayers." (2011). Workshop: "A Smarter Approach to Improving Our Environment." 38th Annual American Legislative Exchange Council ("ALEC") Meetings. New Orleans, LA. August 5, 2011.

23. Panelist/Moderator. Workshop: "Why Wait? Start Energy Independence Today." 38th Annual American Legislative Exchange Council ("ALEC") Meetings. New Orleans, LA. August 4, 2011.

24. "Facilitating the Growth of America's Natural Gas Advantage." Texas Chemical Council, Board of Directors Summer Meeting. San Antonio, TX. July 28, 2011.

25. "Creating Ratepayer Benefits by Reconciling Recent Gas Supply Opportunities with Past Policy Initiatives." National Association of State Utility Consumer Advocates ("NASUCA"), Monthly Gas Committee Meeting. July 12, 2011.

26. "Energy Market Trends and Policies: Implications for Louisiana." (2011). Lakeshore Lion's Club Monthly Meeting. Baton Rouge, Louisiana. June 20, 2011.

27. "America's Natural Gas Advantage: Securing Benefits for Ratepayers Through Paradigm Shifts in Policy." Southeastern Association of Regulatory Commissioners ("SEARUC") Annual Meeting. Nashville, Tennessee. June 14, 2011.

28. "Learning Together: Building Utility and Clean Energy Industry Partnerships in the Southeast." (2011). American Solar Energy Society National Solar Conference. Raleigh Convention Center, Raleigh, North Carolina. May 20, 2011.

29. "Louisiana Energy Outlook and Trends." (2011). Executive Briefing. Counsul General of Canada. LSU Center for Energy Studies, Baton Rouge, Louisiana. May 24, 2011.

30. "Louisiana's Natural Gas Advantage: Can We Hold It? Grow It? Or Do We Need to be Worrying About Other Problems?" (2011). Louisiana Chemical Association Annual Legislative Conference, Baton Rouge, Louisiana, May 5, 2011.

31. "Energy Outlook and Trends: Implications for Louisiana. (2011). Executive Briefing, Legislative Staff, Congressman William Cassidy. LSU Center for Energy Studies, Baton Rouge, Louisiana. March 25, 2011.

32. "Regulatory Issues in Inflation Adjustment Mechanisms and Allowances." (2011). Gas Committee, National Association of State Utility Consumer Advocates ("NASUCA"). February 15, 2011.

33. "Regulatory Issues in Inflation Adjustment Mechanisms and Allowances." (2010). 2010 Annual Meeting, National Association of State Utility Consumer Advocates ("NASUCA"), Omni at CNN Center, Atlanta, Georgia, November 16, 2010.

34. "How Current and Proposed Energy Policy Impacts Consumers and Ratepayers." (2010). 122nd Annual Meeting, National Association of Regulatory Utility Commissioners

("NARUC"), Omni at CNN Center, Atlanta, Georgia, November 15, 2010.

35. "Energy Outlook: Trends and Policies." (2010). 2010 Tri-State Member Service Conference; Arkansas, Louisiana, and Mississippi Electric Cooperatives. L'Auberge du Lac Casino Resort, Lake Charles, Louisiana, October 14, 2010.

36. "Deepwater Moratorium and Louisiana Impacts." (2010). The Energy Council Annual Meeting. Gulf of Mexico Deepwater Horizon Accident, Response, and Policy. Beau Rivage Conference Center. Biloxi, Mississippi. September 25, 2010.

37. "Overview on Offshore Drilling and Production Activities in the Aftermath of Deepwater Horizon." (2010) Jones Walker Banking Symposium. The Oil Spill: What Will it Mean for Banks in the Region? New Orleans, Louisiana. August 31, 2010.

38. "Long-Term Energy Sector Impacts from the Oil Spill." (2010). Second Annual Louisiana Oil & Gas Symposium. The BP Gulf Oil Spill: Long-Term Impacts and Strategies. Baton Rouge Geological Society. August 16, 2010.

39. "Overview and Issues Associated with the Deepwater Horizon Accident." (2010). Global Interdependence Meeting on Energy Issues. Baton Rouge, LA. August 12, 2010.

40. "Overview and Issues Associated with the Deepwater Horizon Accident." (2010). Regional Roundtable Webinar. National Association for Business Economics. August 10, 2010.

41. "Deepwater Moratorium: Overview of Impacts for Louisiana." Louisiana Association of Business and Industry Meeting. Baton Rouge, LA. June 25, 2010.

42. Moderator. Senior Executive Roundtable on Industrial Energy Efficiency. U.S. Department of Energy Conference on Industrial Efficiency. Office of Renewable Energy and Energy Efficiency. Royal Sonesta Hotel, New Orleans, LA. May 21, 2010.

43. "The Energy Outlook: Trends and Policies Impacting Southeastern Natural Gas Supply and Demand Growth." Second Annual Local Economic Analysis and Research Network ("LEARN") Conference. Federal Reserve Bank of Atlanta. March 29, 2010.

44. "Natural Gas Supply Issues: Gulf Coast Supply Trends and Implications for Louisiana." Energy Bar Association, New Orleans Chapter Meeting. Jones Walker Law Firm. January 28, 2010, New Orleans, LA.

45. "Potential Impacts of Federal Greenhouse Gas Legislation on Louisiana Industry." LCA Government Affairs Committee Meeting. November 10, 2009. Baton Rouge, LA

46. "Regulatory and Ratemaking Issues Associated with Cost and Revenue Tracker Mechanisms." National Association of State Utility Consumer Advocates ("NASUCA") Annual Meeting. November 10, 2009.

47. "Louisiana's Stakes in the Greenhouse Gas Debate." Louisiana Chemical Association

and Louisiana Chemical Industry Alliance Annual Meeting: The Billing Dollar Budget Crisis: Catastrophe or Change? New Orleans, LA.

48. "Gulf Coast Energy Outlook: Issues and Trends." Women's Energy Network, Louisiana Chapter. September 17, 2009. Baton Rouge, LA.

49. "Gulf Coast Energy Outlook: Issues and Trends." Natchez Area Association of Energy Service Companies. September 15, 2009, Natchez, MS.

50. "The Small Picture: The Cost of Climate Change to Louisiana." Louisiana Association of Business and Industry, U.S. Chamber of Commerce, Louisiana Oil and Gas Association, and LSU Center for Energy Studies Conference: Can Louisiana Make a Buck After Climate Change Legislation? August 21, 2009. Baton Rouge, LA.

51. "Carbon Legislation and Clean Energy Markets: Policy and Impacts." National Association of Conservation Districts, South Central Region Meeting. August 14, 2009. Baton Rouge, LA.

52. "Evolving Carbon and Clean Energy Markets." The Carbon Emissions Continuum: From Production to Consumption." Jones Walker Law Firm and LSU Center for Energy Studies Workshop. June 23, 2009. Baton Rouge, LA

53. "Potential Impacts of Cap and Trade on Louisiana Ratepayers: Preliminary Results." (2009). Briefing before the Louisiana Public Service Commission. Business and Executive Meeting, May 12, 2009. Baton Rouge, LA.

54. "Natural Gas Outlook." (2009). Briefing before the Louisiana Public Service Commission. Business and Executive Meeting, May 12, 2009. Baton Rouge, LA.

55. "Gulf Coast Energy Outlook: Issues and Trends." (2009). ISA-Lafayette Technical Conference & Expo. Cajundome Conference Center. Lafayette, Louisiana. March 12, 2009.

56. "The Cost of Energy Independence, Climate Change, and Clean Energy Initiatives on Utility Ratepayers." (2009). National Association of Business Economists (NABE). 25th Annual Washington Economic Policy Conference: Restoring Financial and Economic Stability. Arlington, VA March 2, 2009.

57. Panelist, "Expanding Exploration of the U.S. OCS" (2009). Deep Offshore Technology International Conference and Exhibition. PennWell. New Orleans, Louisiana. February 4, 2009.

58. "Gulf Coast Energy Outlook." (2008.) Atmos Energy Regional Management Meeting. Louisiana and Mississippi Division. New Orleans, Louisiana. October 8, 2008.

59. "Background, Issues, and Trends in Underground Hydrocarbon Storage." (2008). Presentation before the LSU Center for Energy Studies Industry Advisory Board Meeting. Baton Rouge, Louisiana. August 27, 2008.

60. "Greenhouse Gas Regulations and Policy: Implications for Louisiana." (2008). Presentation before the Praxair Customer Seminar. Houston, Texas, August 14, 2008.

61. "Market and Regulatory Issues in Alternative Energy and Louisiana Initiatives." (2008). Presentation before the 2008 Statewide Clean Cities Coalition Conference: Making Sense of Alternative Fuels and Advanced Technologies. New Orleans, Louisiana, March 27, 2008.

62. "Regulatory Issues in Rate Design, Incentives, and Energy Efficiency." (2007) Presentation before the New Hampshire Public Utilities Commission. Workshop on Energy Efficiency and Revenue Decoupling. November 7, 2007.

63. "Regulatory Issues for Consumer Advocates in Rate Design, Incentives, and Energy Efficiency." (2007). National Association of State Utility Consumer Advocates, Mid-Year Meeting. June 12, 2007.

64. "Regulatory and Policy Issues in Nuclear Power Plant Development." (2007). LSU Center for Energy Studies Industry Advisory Council Meeting. Baton Rouge, LA. March 23, 2007.

65. "Oil and Gas in the Gulf of Mexico: A North American Perspective." (2007). Canadian Consulate, Heads of Mission EnerNet Workshop, Houston, Texas. March 20, 2007.

66. "Regulatory Issues for Consumer Advocates in Rate Design, Incentives & Energy Efficiency. (2007). National Association of State Utility Consumer Advocates ("NASUCA") Gas Committee Monthly Meeting. February 13, 2006.

67. "Recent Trends in Natural Gas Markets." (2006). National Association of Regulatory Utility Commissioners, 118th Annual Convention. Miami, FL November 14, 2006.

68. "Energy Markets: Recent Trends, Issues & Outlook." (2006). Association of Energy Service Companies (AESC) Meeting. Petroleum Club, Lafayette, LA, November 8, 2006.

69. "Energy Outlook" (2006). National Business Economics Issues Council. Quarterly Meeting, Nashville, TN, November 1-2, 2006.

70. "Global and U.S. Energy Outlook." (2006). Energy Virginia Conference. Virginia Military Institute, Lexington, VA October 17, 2006.

71. "Interdependence of Critical Energy Infrastructure Systems." (2006). Cross Border Forum on Energy Issues: Security and Assurance of North American Energy Systems. Woodrow Wilson Center for International Scholars. Washington, DC, October 13, 2006.

72. "Determining the Economic Value of Coastal Preservation and Restoration on Critical Energy Infrastructure." (2006) The Economic and Market Impacts of Coastal Restoration: America's Wetland Economic Forum II. Washington, DC September 28, 2006.

73. "Relationships between Power and Other Critical Energy Infrastructure." (2006). Rebuilding the New Orleans Region: Infrastructure Systems and Technology Innovation Forum. United Engineering Foundation. New Orleans, LA, September 24-25, 2006.

74. "Outlook, Issues, and Trends in Energy Supplies and Prices." (2006.) Presentation to the Southern States Energy Board, Associate Members Meeting. New Orleans, Louisiana. July 14, 2006.

75. "Energy Sector Outlook." (2006). Baton Rouge Country Club Meeting. Baton Rouge, Louisiana. July 11, 2006.

76. "Oil and Gas Industry Post 2005 Storm Events." (2006). American Petroleum Institute, Teche Chapter. Production, Operations, and Regulations Annual Meeting. Lafayette, Louisiana. June 29, 2006.

77. "Concentration of Energy Infrastructure in Hurricane Regions." (2006). Presentation before the National Commission on Energy Policy Forum: Ending the Stalemate on LNG Facility Siting. Washington, DC. June 21, 2006.

78. "LNG—A Premier." (2006). Presentation Given to the U.S. Department of Energy's "LNG Forums." Los Angeles, California. June 1, 2006.

79. "Regional Energy Infrastructure, Production and Outlook." (2006). Executive Briefing for Board of Directors, Louisiana Oil and Gas Plc., Enhanced Exploration, Inc. and Energy Self-Service, Inc. Covington, Louisiana, May 12, 2006.

80. "The Impacts of the Recent Hurricane Season on Energy Production and Infrastructure and Future Outlook." Presentation before the Industrial Energy Technology Conference 2006. New Orleans, Louisiana, May 9, 2006.

81. "Update on Regional Energy Infrastructure and Production." (2006). Executive Briefing for Delegation Participating in U.S. Department of Commerce Gulf Coast Business Investment Mission. Baton Rouge, Louisiana May 5, 2006.

82. "Hurricane Impacts on Energy Production and Infrastructure." (2006). Presentation before the Interstate Natural Gas Association of America Mid-Year Meeting. Hyatt Regency Hill Country. April 21, 2006.

83. "LNG—A Premier." Presentation Given to the U.S. Department of Energy's "LNG Forums." Astoria, Washington. April 28, 2006.

84. Natural Gas Market Outlook. Invited Presentation Given to the Georgia Public Service Commission and Staff. Georgia Institute of Technology, Atlanta, Georgia. March 10, 2006.

85. The Impacts of Hurricanes Katrina and Rita on Louisiana's Energy Industry. Presentation to the Louisiana Economic Development Council. Baton Rouge, Louisiana. March 8, 2006.

86. Energy Markets: Hurricane Impacts and Outlook. Presentation to the 2006 Louisiana Independent Oil and Gas Association Annual Conference. L'Auberge du Lac Resort and Casino. Lake Charles, Louisiana. March 6, 2006

87. Energy Market Outlook and Update on Hurricane Damage to Energy Infrastructure. Presentation to the Energy Council 2005 Global Energy and Environmental Issues Conference. Santa Fe, New Mexico, December 10, 2005.

88. "Putting Our Energy Infrastructure Back Together Again." Presentation Before the 117th Annual Convention of the National Association of Regulatory Utility Commissioners (NARUC). November 15, 2005. Palm Springs, CA

89. "Hurricanes and the Outlook for Energy Markets." Presentation before the Baton Rouge Rotary Club. November 9, 2005, Baton Rouge, LA.

90. "Hurricanes, Energy Supplies and Prices." Presentation before the Louisiana Department of Natural Resources and Atchafalaya Basin Committee Meeting. November 8, 2005. Baton Rouge, LA.

91. "The Impact of the Recent Hurricane's on Louisiana's Energy Industry." Presentation before the Louisiana Independent Oil and Gas Association Board of Directors Meeting. November 8, 2005. Baton Rouge, LA.

92. "The Impact of the Recent Hurricanes on Louisiana's Infrastructure and National Energy Markets." Presentation before the Baton Rouge City Club Distinguished Speaker Series. October 13, 2005. Baton Rouge, LA.

93. "The Impact of the Recent Hurricanes on Louisiana's Infrastructure and National Energy Markets." Presentation before Powering Up: A Discussion About the Future of Louisiana's Energy Industry. Special Lecture Series Sponsored by the Kean Miller Law Firm. October 13, 2005. Baton Rouge, LA.

94. "The Impact of Hurricane Katrina on Louisiana's Energy Infrastructure and National Energy Markets." Special Lecture on Hurricane Impacts, LSU Center for Energy Studies, September 29, 2005.

95. "Louisiana Power Industry Overview." Presentation before the Clean Air Interstate Rule Implementation Stakeholders Meeting. August 11, 2005. Louisiana Department of Environmental Quality.

96. "CES 2005 Legislative Support and Outlook for Energy Markets and Policy." Presentation before the LMOGA/LCA Annual Post-Session Legislative Committee Meeting. August 10-13, 2005. Perdido Key, Florida.

97. "Electric Restructuring: Past, Present, and Future." Presentation to the Southeastern Association of Tax Administrators Annual Conference. Sheraton Hotel and Conference Facility. New Orleans, LA July 12, 2005.

98. "The Outlook for Energy." Lagniappe Studies Continuing Education Course. Baton Rouge, LA. July 11, 2005.

99. "The Outlook for Energy." Sunshine Rotary Club. Baton Rouge, LA. April 27, 2005.

100. "Background and Overview of LNG Development." Energy Council Workshop on LNG/CNG. Biloxi, Ms: Beau Rivage Resort and Hotel, April 9, 2005.

101. "Natural Gas Supply, Prices, and LNG: Implications for Louisiana Industry." Cytec Corporation Community Advisory Panel. Fortier, LA January 14, 2005.

102. "The Economic Opportunities for a Limited Industrial Retail Choice Plan." Louisiana Department of Economic Development. Baton Rouge, Louisiana. November 19, 2004.

103. "Energy Issues for Industrial Customers of Gas and Power." Louisiana Association of Business and Industry, Energy Council Meeting. Baton Rouge, Louisiana. October 11, 2004.

104. "Energy Issues for Industrial Customers of Gas and Power." Annual Meeting of the Louisiana Chemical Association and the Louisiana Chemical Industry Alliance. Point Clear, Alabama. October 8, 2004.

105. "Energy Issues for Industrial Customers of Gas and Power." American Institute of Chemical Engineers – New Orleans Section. New Orleans, LA. September 22, 2004.

106. "Natural Gas Supply, Prices and LNG: Implications for Louisiana Industry." Dow Chemical Company Community Advisory Panel Meeting. Plaquemine, LA. August 9, 2004.

107. "Energy Issues for Industrial Customers of Gas and Power." Louisiana Chemical Association Post-Legislative Meeting. Springfield, LA. August 9, 2004.

108. "LNG In Louisiana." Joint Meeting of the Louisiana Economic Development Council and the Governors Cabinet Advisory Council. Baton Rouge, LA. August 5, 2004.

109. "Louisiana Energy Issues." Louisiana Mid-Continent Oil and Gas Association Post Legislative Meetings. Sandestin, Florida. July 28, 2004.

110. "The Gulf South: Economic Opportunities Related to LNG." Presentation before the Energy Council's 2004 State and Provincial Energy and Environmental Trends Conference. Point Clear, AL, June 26, 2004.

111. "Natural Gas and LNG Issues for Louisiana." Presentation before the Rhodia Community Advisory Panel. May 20, 2004, Baton Rouge, LA.

112. "The Economic Opportunities for LNG Development in Louisiana." Presentation before the Louisiana Chemical Association Plant Managers Meeting. May 27, 2004. Baton Rouge, LA.

113. "The Economic Opportunities for LNG Development in Louisiana." Presentation before the Louisiana Chemical Association/Louisiana Chemical Industry Alliance Legislative Conference. May 26, 2004. Baton Rouge, LA.

114. "The Economic Opportunities for LNG Development in Louisiana." Presentation before the Petrochemical Industry Cluster, Greater New Orleans, Inc. May 19, 2004, Destrehan, LA.

115. "Industry Development Issues for Louisiana: LNG, Retail Choice, and Energy." Presentation before the LSU Center for Energy Studies Industry Associates. May 14, 2004, Baton Rouge, LA.

116. "The Economic Opportunities for LNG Development in Louisiana." Presentation before the Board of Directors, Greater New Orleans, Inc. May 13, 2004, New Orleans, LA.

117. "Natural Gas Outlook: Trends and Issues for Louisiana." Presentation before the Louisiana Joint Agricultural Association Meetings. January 14, 2004, Hotel Acadiana, Lafayette, Louisiana.

118. "Natural Gas Outlook" Presentation before the St. James Parish Community Advisory Panel Meeting. January 7, 2004, IMC Production Facility, Convent, Louisiana.

119. "Competitive Bidding in the Electric Power Industry." Presentation before the Association of Energy Engineers. Business Energy Solutions Expo. December 11-12, 2003, New Orleans, Louisiana.

120. "Regional Transmission Organization in the South: The Demise of SeTrans" Presentation before the LSU Center for Energy Studies Industry Associates Advisory Council Meeting. December 9, 2003. Baton Rouge, Louisiana.

121. "Affordable Energy: The Key Component to a Strong Economy." Presentation before the National Association of Regulatory Utility Commissioners ("NARUC"), November 18, 2003, Atlanta, Georgia.

122. "Natural Gas Outlook." Presentation before the Louisiana Chemical Association, October 17, 2003, Pointe Clear, Alabama.

123. "Issues and Opportunities with Distributed Energy Resources." Presentation before the Louisiana Biomass Council. April 17, 2003, Baton Rouge, Louisiana.

124. "What's Happened to the Merchant Energy Industry? Issues, Challenges, and Outlook" Presentation before the LSU Center for Energy Studies Industry Associates Advisory Council Meeting. November 12, 2002. Baton Rouge, Louisiana.

125. "An Introduction to Distributed Energy Resources." Presentation before the U.S. Department of Energy, Office of Renewable Energy and Energy Efficiency, State Energy Program/Rebuild America Conference, August 1, 2002, New Orleans, Louisiana.

126. "Merchant Energy Development Issues in Louisiana." Presentation before the Program Committee of the Center for Legislative, Energy, and Environmental Research (CLEER), Energy Council. April 19, 2002.

127. "Power Plant Siting Issues in Louisiana." Presentation before 24th Annual Conference on Waste and the Environment. Sponsored by the Louisiana Department of Environmental Quality. Lafayette, Louisiana, Cajundome. March 12, 2002.

128. "Merchant Power and Deregulation: Issues and Impacts." Presentation before the Air and Waste Management Association Annual Meeting. Baton Rouge, LA, November 15, 2001.

129. "Moving to the Front of the Lines: The Economic Impact of Independent Power Production in Louisiana." Presentation before the LSU Center for Energy Studies Merchant Power Generation and Transmission Conference, Baton Rouge, LA. October 11, 2001.

130. "Economic Impacts of Merchant Power Plant Development in Mississippi." Presentation before the U.S. Oil and Gas Association Annual Oil and Gas Forum. Jackson, Mississippi. October 10, 2001.

131. "Economic Opportunities for Merchant Power Development in the South." Presentation before the Southern Governor's Association/Southern State Energy Board Meetings. Lexington, KY. September 9, 2001.

132. "The Changing Nature of the Electric Power Business in Louisiana." Presentation before the Louisiana Department of Environmental Quality. Baton Rouge, LA, August 27, 2001.

133. "Power Business in Louisiana: Background and Issues." Presentation before the Louisiana Interagency Group on Merchant Power Development . Baton Rouge, LA, July 16, 2001.

134. "The Changing Nature of the Electric Power Business in Louisiana: Background and Issues." Presentation before the Louisiana Office of the Governor. Baton Rouge, LA, July 16, 2001.

135. "The Changing Nature of the Electric Power Business in Louisiana: Background and Issues." Presentation before the Louisiana Department of Economic Development. Baton Rouge, LA, July 3, 2001.

136. "The Economic Impacts of Merchant Power Plant Development In Mississippi." Presentation before the Mississippi Public Service Commission. Jackson, Mississippi, March 20, 2001.

137. "Energy Conservation and Electric Restructuring." With Ritchie D. Priddy. Presentation before the Louisiana Department of Natural Resources. Baton Rouge, Louisiana, October 23, 2000.

138. "Pricing and Regulatory Issues Associated with Distributed Energy." Joint Conference by Econ One Research, Inc., the Louisiana State University Distributed Energy Resources Initiative, and the University of Houston Energy Institute: "Is the Window Closing for Distributed Energy?" Houston, Texas, October 13, 2000.

139. "Electric Reliability and Merchant Power Development Issues." Technical Meetings of the Louisiana Public Service Commission. Baton Rouge, LA. August 29, 2000.

140. "A Introduction to Distributed Energy Resources." Summer Meetings, Southeastern Association of Regulatory Utility Commissioners (SEARUC). New Orleans, LA. June 27, 2000.

141. Roundtable Moderator/Discussant. Mid-South Electric Reliability Summit. U.S. Department of Energy. New Orleans, Louisiana. April 24, 2000.

142. "Electricity 101: Definitions, Precedents, and Issues." Energy Council's 2000 Federal Energy and Environmental Matters Conference. Loews L'Enfant Plaza Hotel, Washington, D.C. March 11-13, 2000.

143. "LSU/CES Distributed Energy Resources Initiatives." Los Alamos National Laboratories. Office of Energy and Sustainable Systems. Los Alamos, New Mexico. February 16, 2000.

144. "Distributed Energy Resources Initiatives." Louisiana State University, Center for Energy Studies Industry Associates Meeting. Baton Rouge, Louisiana. December 15, 1999.

145. "Merchant Power Opportunities in Louisiana." Louisiana Mid-Continent Oil and Gas Association (LMOGA) Power Generation Committee Meetings. Baton Rouge, Louisiana. November 10, 1999.

146. Roundtable Discussant. "Environmental Regulation in a Restructured Market" The Big E: How to Successfully Manage the Environment in the Era of Competitive Energy. PUR Conference. New Orleans, Louisiana. May 24, 1999.

147. "The Political Economy of Electric Restructuring In the South" Southeastern Electric Exchange, Rate Section Annual Conference. New Orleans, Louisiana. May 7, 1999.

148. "The Dynamics of Electric Restructuring in Louisiana." Joint Meeting of the American Association of Energy Engineers and the International Association of Facilities Managers. Metairie, Louisiana. April 29, 1999.

149. "The Implications of Electric Restructuring on Independent Oil and Gas Operations." Petroleum Technology Transfer Council Workshop: Electrical Power Cost Reduction Methods in Oil and Gas Field Operations. Lafayette, Louisiana, March 24, 1999.

150. "What's Happened to Electricity Restructuring in Louisiana?" Louisiana State University, Center for Energy Studies Industry Associates Meeting. March 22, 1999.

151. "A Short Course on Electric Restructuring." Central Louisiana Electric Company. Sales and Marketing Division. Mandeville, Louisiana, October 22, 1998.

152. "The Implications of Electric Restructuring on Independent Oil and Gas Operations." Petroleum Technology Transfer Council Workshop: Electrical Power Cost Reduction Methods in Oil and Gas Field Operations. Shreveport, Louisiana, October 13, 1998.

153. "How Will Utility Deregulation Affect Tourism." Louisiana Travel Promotion Association Annual Meeting, Alexandria, Louisiana. January 15, 1998.

154. "Reflections and Predictions on Electric Utility Restructuring in Louisiana." With Fred I. Denny. Louisiana State University, Center for Energy Studies Industry Associates Meeting. November 20, 1997.

155. "Electric Utility Restructuring in Louisiana." Hammond Chamber of Commerce, Hammond, Louisiana. October 30, 1997.

156. "Electric Utility Restructuring." Louisiana Association of Energy Engineers. Baton Rouge, Louisiana. September 11, 1997.

157. "Electric Utility Restructuring: Issues and Trends for Louisiana." Opelousas Chamber of Commerce, Opelousas, Louisiana. June 24, 1997.

158. "The Electric Utility Restructuring Debate In Louisiana: An Overview of the Issues." Annual Conference of the Public Affairs Research Council of Louisiana. Baton Rouge, Louisiana. March 25, 1997.

159. "Electric Restructuring: Louisiana Issues and Outlook for 1997." Louisiana State University, Center for Energy Studies Industry Associates Meeting, Baton Rouge, Louisiana, January 15, 1997.

160. "Restructuring the Electric Utility Industry." Louisiana Propane Gas Association Annual Meeting, Alexandria, Louisiana, December 12, 1996.

161. "Deregulating the Electric Utility Industry." Eighth Annual Economic Development Summit, Baton Rouge, Louisiana, November 21, 1996.

162. "Electric Utility Restructuring in Louisiana." Jennings Rotary Club, Jennings, Louisiana, November 19, 1996.

163. "Electric Utility Restructuring in Louisiana." Entergy Services, Transmission and Distribution Division, Energy Centre, New Orleans, Louisiana, September 12, 1996

164. "Electric Utility Restructuring" Louisiana Electric Cooperative Association, Baton Rouge, Louisiana, August 27, 1996.

165. "Electric Utility Restructuring -- Background and Overview." Louisiana Public Service Commission, Baton Rouge, Louisiana, August 14, 1996.

166. "Electric Utility Restructuring." Sunshine Rotary Club Meetings, Baton Rouge, Louisiana, August 8, 1996.

167. Roundtable Moderator, "Stakeholder Perspectives on Electric Utility Stranded Costs." Louisiana State University, Center for Energy Studies Seminar on Electric Utility Restructuring in Louisiana, Baton Rouge, May 29, 1996.

168. Panelist, "Deregulation and Competition." American Nuclear Society: Second Annual Joint Louisiana and Mississippi Section Meetings, Baton Rouge, Louisiana, April 20, 1996.

EXPERT WITNESS, LEGISLATIVE, AND PUBLIC TESTIMONY; EXPERT REPORTS, RECOMMENDATIONS, AND AFFIDAVITS

1. Expert Testimony. D.P.U. 13-75 (2013). Before the Massachusetts Department of Public Utilities. Investigation by the Department of Public Utilities on its Own Motion as to the Propriety of the Rates and Charges by Bay State Gas Company d/b/a Columbia Gas of Massachusetts set forth in Tariffs M.D.P.U. Nos. 140 through 173, and Approval of an Increase in Base Distribution Rates for Gas Service Pursuant to G.L. c. 164, § 94 and 220 C.M.R. § 5.00 et seq., filed with the Department on April 16, 2013, to be effective May 1, 2013. On the Behalf of the Office of the Attorney General, Office of Ratepayer Advocacy. Issues: Target infrastructure replacement program rider, pipeline replacement, and leak rate comparisons; environmental benefits analysis; O&M offset; and cost benchmarking analysis.

2. Expert Testimony. PSC Docket No. 13-115 (2013). Before the Delaware Public Service Commission. In the Matter of the Application of Delmarva Power & Light Company for an Increase in Electric Base Rates and Miscellaneous Tariff Changes (Filed March 22, 2013). On the Behalf of the Division of the Public Advocate. Issues: Delmarva's proposed reliability pro forma adjustment; class cost of service study; and rate design.

3. Expert Testimony. Case No. 9326 (2013). Before the Public Service Commission of Maryland. In the Matter of the Application of Baltimore Gas and Electric Company for Adjustments to its Electric and Gas Base Rates. Issues: Electric Reliability Investment ("ERI") initiatives, pro forma gas infrastructure proposal, tracker mechanisms, class cost of service study, revenue distribution, and rate design

4. Rulemaking Testimony. (2013). Before the Louisiana Tax Commission. Examination of Louisiana Assessors' Association Well Diameter Analysis, economic development policies regarding midstream assets and industrial development.

5. Expert Testimony. Case No. 9317 (2013). Before the Public Service Commission of

Maryland. In the Matter of the Application of Delmarva Power & Light Company for Adjustments to its Retail Rates for the Distribution of Electric Energy. Direct, and Surrebuttal. Issues: Grid Resiliency Charge, tracker mechanisms, pipeline replacement, class cost of service study, revenue distribution, and rate design.

6. Expert Testimony. Case No. 9311 (2013). Before the Public Service Commission of Maryland. In the Matter of the Application of Potomac Electric Power Company for an Increase in its Retail Rates for the Distribution of Electric Energy. Direct, and Surrebuttal. Issues: Grid Resiliency Charge, tracker mechanisms, pipeline replacement, class cost of service study, revenue distribution, and rate design.

7. Expert Testimony. Docket No. 12AL-1268G (2013). Before the Public Utilities Commission of the State of Colorado. In the Matter of the Tariff Sheets Filed by Public Service Company of Colorado with Advice No. 830 – Gas. Answer. Issues: Pipeline System Integrity Adjustment, tracker mechanisms, pipeline replacement and leak rate comparisons.

8. Expert Testimony. BPU Docket No. EO12080721 (2013). Before the New Jersey Board of Public Utilities. In the Matter of the Public Service Electric & Gas Company for Approval of an Extension of Solar Generation Program. On the Behalf of the New Jersey Division of Rate Counsel. Direct, Rebuttal, Surrebuttal. Issues: solar energy market design, solar energy market conditions, solar energy program design and net economic benefits.

9. Expert Testimony. BPU Docket No. EO12080726 (2013). Before the New Jersey Board of Public Utilities. In the Matter of the Petition of Public Service Electric & Gas Company for Approval of a Solar Loan III Program. On the Behalf of the New Jersey Division of Rate Counsel. Direct, Rebuttal and Surrebuttal. Issues: solar energy market design, solar energy market conditions, solar energy program design.

10. Expert Testimony. BPU Docket No. EO11050314V. (2012). Before the New Jersey Board of Public Utilities. In the Matter of the Petition of Fishermen's Atlantic City Windfarm, LLC for the Approval of the State Waters Project and Authorizing Offshore Wind Renewable Energy Certificates. On the Behalf of the New Jersey Division of Rate Counsel. December 17, 2012. Issues: approval of offshore wind project and ratepayer financial support for the proposed project.

11. Expert Testimony. D.P.U. 12-25. (2012). Before the Massachusetts Department of Public Utilities. In the Matter of Bay State Gas Company d/b/a/ Columbia Gas Company of Massachusetts Request for Increase in Rates. On the Behalf of the Office of the Attorney General, Office of Ratepayer Advocacy. Issues: Target infrastructure replacement program rider, pipeline replacement and leak rate comparisons.

12. Expert Testimony. Docket Nos. UE-120436, et.al. (consolidated). (2012). Before the Washington Utilities and Transportation Commission. Washington Utilities and Transportation Commission v. Avista Corporation D/B/A Avista Utilities. On the Behalf of the Washington Attorney General, Office of the Public Counsel. Issues: Revenue Decoupling, lost revenues, tracker mechanisms, attrition adjustments.

13. Expert Testimony. Case No. 9286. (2012) Before the Public Service Commission of Maryland. In Re: Potomac Electric Power Company ("Pepco") General Rate Case. On the Behalf of the Maryland Office of the People's Counsel. Issues: Capital tracker mechanisms/reliability investment mechanisms, reliability issues, regulatory lag, class cost of service, revenue distribution, rate design.

14. Expert Testimony. Case No 9285. (2012) Before the Public Service Commission of Maryland. In Re: the Delmarva Power and Light Company General Rate Case. On the Behalf of the Maryland Office of the People's Counsel. Issues: Capital tracker mechanisms/reliability investment mechanisms, reliability issues, regulatory lag, class cost of service, revenue distribution, rate design.

15. Expert Testimony. Docket Nos. UE-110876 and UG-110877 (consolidated). (2012). Before the Washington Utilities and Transportation Commission. Washington Utilities and Transportation Commission v. Avista Corporation D/B/A Avista Utilities. On the Behalf of the Washington Attorney General, Office of the Public Counsel. Issues: Revenue Decoupling, lost revenues, tracker mechanisms.

16. Expert Testimony. BPU Docket No. EO11050314V. (2012). Before the New Jersey Board of Public Utilities. In the Matter of the Petition of Fishermen's Atlantic City Windfarm, LLC for the Approval of the State Waters Project and Authorizing Offshore Wind Renewable Energy Certificates. On the Behalf of the New Jersey Division of Rate Counsel. February 3, 2012. Issues: approval of offshore wind project and ratepayer financial support for the proposed project.

17. Expert Testimony. Docket No. NG 0067. (2012). Before the Public Service Commission of Nebraska. In the Matter of the Application of SourceGas Distribution, LLC Approval of a General Rate Increase. On the Behalf of the Public Advocate. January 31, 2012. Issues: Revenue Decoupling, Customer Adjustments, Weather Normalization Adjustments, Class Cost of Service Study, Rate Design.

18. Expert Testimony. Docket No. G-04204A-11-0158. (2011). Before the Arizona Corporation Commission. On the Behalf of the Arizona Corporation Commission Staff. In the Matter of the Application of UNS Gas, Inc. for the Establishment of Just and Reasonable Rates and Charges Designed to Realize a Reasonable Rate of Return on the Fair Value of Its Arizona Properties. Issues: Revenue Decoupling; Class Cost of Service Modeling; Revenue Distribution; Rate Design.

19. Expert Testimony. Formal Case Number 1087. (2011). Before the Public Service Commission of the District of Columbia. On the Behalf of the Office of the People's Counsel of the District of Columbia. In the Matter of the Application of Potomac Electric Power Company for Authority to Increase Existing Retail Rates and Charges for Electric Distribution Service. Issues: Regulatory lag, ratemaking principles, reliability-related capital expenditure tracker proposals.

20. Expert Affidavit. Case No. 11-1364. (2011). *The State of Louisiana, the Louisiana Department of Environmental Quality, and the Louisiana Public Service Commission v.*

United States Environmental Protection Agency and Lisa P. Jackson. Before the United States Court of Appeals for the District of Columbia Circuit. On the behalf of the State of Louisiana, the Louisiana Department of Environmental Quality, and the Louisiana Public Service Commission. Issues: Impacts of environmental costs on electric utilities, compliance requirements, investment cost of mitigation equipment, multi-area dispatch modeling and plant retirements.

21. Expert Affidavit. Docket No. EPA-HQ-OAR-2009-0491. (2011). Before the U.S. Environmental Protection Agency. Federal Implementation Plans: Interstate Transport of Fine Particulate Matter and Ozone and Correction of SIP Approvals. On the Behalf of the Louisiana Public Service Commission. Issues: Impacts of environmental costs on electric utilities, compliance requirements, investment cost of mitigation equipment, multi-area dispatch modeling and plant retirements.

22. Expert Testimony. Case No. 9296. (2011). Before the Maryland Public Service Commission. On the Behalf of the Maryland Office of People's Counsel. In the Matter of the Application of Washington Gas Light Company for Authority to Increase Existing Rates and Charges and Revise its Terms and Conditions for Gas Service. Issues: Infrastructure Cost Recovery Rider; Class Cost of Service Modeling; Revenue Distribution; Rate Design.

23. Expert Testimony. Docket No. G-01551A-10-0458. (2011). Before the Arizona Corporation Commission. On the Behalf of the Arizona Corporation Commission Staff. In the Matter of the Application of Southwest Gas Corporation for the Establishment of Just and Reasonable Rates and Charges Designed to Realize A Reasonable Rate of Return on the Fair Value of its Properties throughout Arizona. Issues: Revenue Decoupling; Class Cost of Service Modeling; Revenue Distribution; Rate Design.

24. Expert Testimony. Docket No. 11-0280 and 11-0281. (2011). Before the Illinois Commerce Commission. On the Behalf of the Illinois Attorney General, the Citizens Utility Board, and the City of Chicago, Illinois. In re: Peoples Gas Light and Coke Company and North Shore Natural Gas Company. Issues: Revenue Decoupling and Rate Design. (Direct and Rebuttal)

25. Expert Testimony. D.P.U. 11-01. (2011). Before the Massachusetts Department of Public Utilities. On the Behalf of the Office of the Attorney General, Office of Ratepayer Advocacy. Petition of the Fitchburg Electric and Gas Company (Electric Division) for Approval of A General Increase in Electric Distribution Rates and Approval of a Revenue Decoupling Mechanism. Issues: Capital Cost Rider, Revenue Decoupling.

26. Expert Testimony. D.P.U. 11-02. (2011). Before the Massachusetts Department of Public Utilities. On the Behalf of the Office of the Attorney General, Office of Ratepayer Advocacy. Petition of the Fitchburg Electric and Gas Company (Gas Division) for Approval of A General Increase in Electric Distribution Rates and Approval of a Revenue Decoupling Mechanism. Issues: Pipeline Replacement Rider, Revenue Decoupling.

27. Expert Affidavit. Docket No. EL-11-13 (2011). Before the Federal Energy Regulatory Commission. Petition for Preliminary Ruling, Atlantic Grid Operations. On the Behalf of

the New Jersey Division of Rate Counsel. Issues: Offshore wind generation development, offshore wind transmission development, ratemaking treatment of development costs, transmission development incentives.

28. Expert Opinion. Case No. CI06-195. (2011). Before the District Court of Jefferson County, Nebraska. On the Behalf of the City of Fairbury, Nebraska and Michael Beachler. In re: Endicott Clay Products Co. vs. City of Fairbury, Nebraska and Michael Beachler. Issues: rate design and ratemaking, time of use and time differentiated rate structures, empirical analysis of demand and usage trends for tariff eligibility requirements.

29. Expert Testimony. D.P.U. 10-114. (2010). Before the Massachusetts Department of Public Utilities. On the Behalf of the Office of the Attorney General, Office of Ratepayer Advocacy. Petition of the New England Gas Company for Approval of A General Increase in Electric Distribution Rates and Approval of a Revenue Decoupling Mechanism. Issues: infrastructure replacement rider.

30. Expert Testimony. D.P.U. 10-70. (2010). Before the Massachusetts Department of Public Utilities. Petition of the Western Massachusetts Electric Company for Approval of A General Increase in Electric Distribution Rates and Approval of a Revenue Decoupling Mechanism. On the Behalf of the Office of the Attorney General, Office of Ratepayer Advocacy. Issues: Revenue decoupling; infrastructure replacement rider; performance-based regulation; inflation adjustment mechanisms; and rate design.

31. Expert Testimony. G.U.D. Nos. 998 & 9992. (2010). Before the Texas Railroad Commission. In the Matter of the Rate Case Petition of Texas Gas Services, Inc. On the Behalf of the City of El Paso, Texas. Issues: Cost of service, revenue distribution, rate design, and weather normalization.

32. Expert Testimony. B.P.U Docket No. GR10030225. (2010). Before the New Jersey Board of Public Utilities. In the Matter of the Petition of New Jersey Natural Gas Company for Approval of Regional Greenhouse Gas Initiative Programs and Associated Cost Recovery Mechanisms Pursuant to N.J.S.A. 48:3-98.1. On the Behalf of the Department of the Public Advocate, Division of Rate Counsel. Issues: solar energy proposals, solar securitization issues, solar energy policy issues.

33. Expert Testimony. D.P.U. 10-55. (2010). Before the Massachusetts Department of Public Utilities. Investigation Into the Propriety of Proposed Tariff Changes for Boston Gas Company, Essex Gas Company, and Colonial Gas Company. (d./b./a. National Grid). On the Behalf of the Office of the Attorney General, Office of Ratepayer Advocacy. Issues: Revenue decoupling; pipeline-replacement rider; performance-based regulation; partial productivity factor estimates, inflation adjustment mechanisms; and rate design.

34. Expert Testimony. Cause No.43839. (2010). Before the Indiana Utility Regulatory Commission. In the Matter of Southern Indiana Gas and Electric Company d/b/a/ Vectren Energy Delivery of Indiana, Inc. (Vectren South-Electric). On the behalf of the Indiana Office of Utility Consumer Counselor (OUCC). Issues: revenue decoupling,

variable production cost riders, gains on off-system sales, transmission cost riders.

35. Congressional Testimony. Before the United States Congress. (2010). U.S. House of Representatives, Committee on Natural Resources. Hearing on the Consolidated Land, Energy, and Aquatic Resources Act. June 30, 2010.

36. Expert Testimony. Before the City Counsel of El Paso, Texas; Public Utility Regulatory Board. (2010). On the Behalf of the City of El Paso. In Re: Rate Application of Texas Gas Services, Inc. Issues: class cost of service study (minimum system and zero intercept analysis), rate design proposals, weather normalization adjustment, and its cost of service adjustment clause, conservation adjustment clause proposals, and other cost tracker policy issues.

37. Expert Testimony. Docket 09-00183. (2010). Before the Tennessee Regulatory Authority. In the Matter of the Petition of Chattanooga Gas Company for a General Rate Increase, Implementation of the EnergySMART Conservation Programs, and Implementation of a Revenue Decoupling Mechanism. On the Behalf of Tennessee Attorney General, Consumer Advocate & Protection Division. Issues: revenue decoupling and energy efficiency program review and cost effectiveness analysis.

38. Expert Testimony and Exhibits. Docket No. 10-240. (2010). Before the Louisiana Office of Conservation. In Re: Cadeville Gas Storage, LLC. On the Behalf of Cardinal Gas Storage, LLC. Issues: alternative uses and relative economic benefits of conversion of depleted hydrocarbon reservoir for natural gas storage purposes.

39. Expert Testimony. Docket No. 09505-EI. (2010). Before the Florida Public Service Commission. In Re: Review of Replacement Fuel Costs Associated with the February 26, 2008 outage on Florida Power & Light's Electrical System. On the Behalf of the Florida Office of Public Counsel for the Citizens of the State of Florida. Issues: Replacement costs for power outage, regulatory policy/generation development incentives, renewable and energy efficiency incentives.

40. Expert Testimony. Docket 09-00104. (2009). Before the Tennessee Regulatory Authority. In the Matter of the Petition of Piedmont Natural Gas Company, Inc. to Implement a Margin Decoupling Tracker Rider and Related Energy Efficiency and Conservation Programs. On the Behalf of the Tennessee Attorney General, Consumer Advocate & Protection Division. Issues: revenue decoupling, energy efficiency program review, weather normalization.

41. Expert Testimony. Docket Number NG-0060. (2009). Before the Nebraska Public Service Commission. In the Matter of SourceGas Distribution, LLC Approval for a General Rate Increase. On the Behalf of the Nebraska Public Advocate. October 29, 2009. Issues: revenue decoupling, inflation trackers, infrastructure replacement riders, customer adjustment rider, weather normalization rider, weather normalization adjustments, estimation of normal weather for ratemaking purposes.

42. Expert Report and Deposition. Before the 23rd Judicial District Court, Parish of Assumption, State of Louisiana. On the Behalf of Dow Hydrocarbons and Resources,

Inc. September 1, 2009. (Deposition, November 23-24, 2009). Issues: replacement and repair costs for underground salt cavern hydrocarbon storage.

43. Expert Testimony. D.P.U. 09-39. Before the Massachusetts Department of Public Utilities. (2009). Investigation Into the Propriety of Proposed Tariff Changes for Massachusetts Electric Company and Nantucket Electric Company (d./b./a. National Grid). On the Behalf of the Office of the Attorney General, Office of Ratepayer Advocacy. Issues: Revenue decoupling; infrastructure rider; performance-based regulation; inflation adjustment mechanisms; revenue distribution; and rate design.

44. Expert Testimony. D.P.U. 09-30. Before the Massachusetts Department of Public Utilities. (2009). In the Matter of Bay State Gas Company Request for Increase in Rates. On the Behalf of the Office of the Attorney General, Office of Ratepayer Advocacy. Issues: Revenue decoupling; target infrastructure replacement program rider; revenue distribution; and rate design.

45. Expert Testimony. Docket EO09030249. (2009). Before the New Jersey Board of Public Utilities. In the Matter of the Petition of Public Service Electric and Gas Company for Approval of a Solar Loan II Program and An Associated Cost Recovery Mechanism. On the Behalf of the Department of the Public Advocate, Division of Rate Counsel. Issues: solar energy market design, renewable portfolio standards, solar energy, and renewable financing/loan program design.

46. Expert Testimony. Docket EO0920097. (2009). Before the New Jersey Board of Public Utilities. In the Matter of the Verified Petition of Rockland Electric Company for Approval of an SREC-Based Financing Program and An Associated Cost Recovery Mechanism. On the Behalf of the Department of the Public Advocate, Division of Rate Counsel. Issues: solar energy market design; renewable energy portfolio standards; solar energy.

47. Expert Rebuttal Report. Civil Action No.: 2:07-CV-2165. (2009). Before the U.S. District Court, Western Division of Louisiana, Lake Charles Division. Prepared on the Behalf of the Transcontinental Pipeline Corporation. Issues: expropriation and industrial use of property.

48. Expert Testimony. Docket EO06100744. (2008). Before the New Jersey Board of Public Utilities. In the Matter of the Renewable Portfolio Standard – Amendments to the Minimum filing Requirements for Energy Efficiency, Renewable Energy, and Conservation Programs and For Electric Distribution Company Submittals of Filings in connection with Solar Financing (Atlantic City Electric Company). On the Behalf of the Department of the Public Advocate, Division of Rate Counsel. Issues: Solar energy market design; renewable energy portfolio standards; solar energy. (Rebuttal and Surrebuttal)

49. Expert Testimony. Docket EO08090840. (2008). Before the New Jersey Board of Public Utilities. In the Matter of the Renewable Portfolio Standard – Amendments to the Minimum filing Requirements for Energy Efficiency, Renewable Energy, and Conservation Programs and For Electric Distribution Company Submittals of Filings in connection with Solar Financing (Jersey Central Power & Light Company). On the

Behalf of the Department of the Public Advocate, Division of Rate Counsel. Issues: Solar energy market design; renewable energy portfolio standards; solar energy. (Rebuttal and Surrebuttal)

50. Expert Testimony. Docket UG-080546. (2008). Before the Washington Utilities and Transportation Commission. On the Behalf of the Washington Attorney General (Public Counsel Section). Issues: Rate Design, Cost of Service, Revenue Decoupling, Weather Normalization.

51. Congressional Testimony. (2008). Senate Republican Conference: Panel on Offshore Drilling in the Restricted Areas of the Outer Continental Shelf. September 18, 2008.

52. Expert Testimony. Appeal Number 2007-125 and 2007-299. (2008). Before the Louisiana Tax Commission. On the Behalf of Jefferson Island Storage and Hub, LLC (AGL Resources). Issues: Valuation Methodologies, Underground Storage Valuation, LTC Guidelines and Policies, Public Purpose of Natural Gas Storage. July 15, 2008 and August 20, 2008.

53. Expert Testimony. Docket Number 07-057-13. (2008). Before the Utah Public Service Commission. In the Matter of the Application of Questar Gas Company to File a General Rate Case. On the Behalf of the Utah Committee of Consumer Services. Issues: Cost of Service, Rate Design. August 18, 2008 (Direct, Rebuttal, Surrebuttal).

54. Rulemaking Testimony. (2008). Before the Louisiana Tax Commission. Examination of Replacement Cost Tables, Depreciation and Useful Lives for Oil and Gas Properties. Chapter 9 (Oil and Gas Properties) Section. August 5, 2008.

55. Legislative Testimony. (2008). Examination of Proposal to Change Offshore Natural Gas Severance Taxes (HB 326 and Amendments). Joint Finance and Appropriations Committee of the Alabama Legislature. March 13, 2008.

56. Public Testimony. (2007). Issues in Environmental Regulation. Testimony before Gubernatorial Transition Committee on Environmental Regulation (Governor-Elect Bobby Jindal). December 17, 2007.

57. Public Testimony. (2007). Trends and Issues in Alternative Energy: Opportunities for Louisiana. Testimony before Gubernatorial Transition Committee on Natural Resources (Governor-Elect Bobby Jindal). December 13, 2007.

58. Expert Report and Recommendation: Docket Number S-30336 (2007). Before the Louisiana Public Service Commission. In re: Entergy Gulf States, Inc. Application for Approval of Advanced Metering Pilot Program. Issues: pilot program for demand response programs and advanced metering systems.

59. Expert Testimony. Docket EO07040278 (2007). Before the New Jersey Board of Public Utilities. In the Matter of the Petition of Public Service Electric & Gas Company for Approval of a Solar Energy Program and An Associated Cost Recovery Mechanism. On the Behalf of the Department of the Public Advocate, Division of Rate Counsel. Issues:

renewable energy market development, solar energy development, SREC markets, rate impact analysis, cost recovery issues.

60. Expert Testimony: Docket Number 05-057-T01 (2007). Before the Utah Public Service Commission. In the Matter of: Joint Application of Questar Gas Company, the Division of Public Utilities, and Utah Clean Energy for Approval of the Conservation Enabling Tariff Adjustment Options and Accounting Orders. On the behalf of the Utah Committee of Consumer Services. Issues: Revenue Decoupling, Demand-side Management; Energy Efficiency policies. (Direct, Rebuttal, and Surrebuttal Testimony)

61. Expert Testimony (Non-sworn rulemaking testimony) Docket Number RR-2008, (2007). Before the Louisiana Tax Commission. In re: Commission Consideration of Amendment and/or Adoption of Tax Commission Real/Personal Property Rules and Regulations. Issues: Louisiana oil and natural gas production trends, appropriate cost measures for wells and subsurface property, economic lives and production decline curve trends.

62. Expert Report, Recommendation, and Proposed Rule: Docket Number R-29213 & 29213-A, ex parte, (2007). Before the Louisiana Public Service Commission. In re: In re: Investigation to determine if it is appropriate for LPSC jurisdictional electric utilities to provide and install time-based meters and communication devices for each of their customers which enable such customers to participate in time-based pricing rate schedules and other demand response programs. On the behalf of the Louisiana Public Service Commission Staff. Report and Recommendation. Issues: demand response programs, advanced meter systems, cost recovery issues, energy efficiency issues, regulatory issues.

63. Expert Report, Recommendation, and Proposed Rule: Docket Number R-29712, ex parte, (2007) Before the Louisiana Public Service Commission. In re: Investigation into the ratemaking and generation planning implications of nuclear construction in Louisiana. On the behalf of the Louisiana Public Service Commission Staff. Report and Recommendation. Issues: nuclear cost power plant development, generation planning issues, and cost recovery issues.

64. Expert Testimony, Case Number U-14893, (2006). Before the Michigan Public Service Commission. In the Matter of SEMCO Energy Gas Company for Authority to Redesign and Increase Its Rates for the Sale and Transportation of Natural Gas In its MPSC Division and for Other Relief. On the behalf of the Michigan Attorney General. Issues: Rate Design, revenue decoupling, financial analysis, demand-side management program and energy efficiency policy. (Direct and Rebuttal Testimony).

65. Expert Report, Recommendation, and Proposed Rule: Docket Number R-29380, ex parte, (2006). Before the Louisiana Public Service Commission. In re: An Investigation Into the Ratemaking and Generation Planning Implications of the U.S. EPA Clean Air Interstate Rule. On the behalf of the Louisiana Public Service Commission Staff. Report and Recommendation. Issues: environmental regulation and cost recovery; allowance allocations and air credit markets; ratepayer impacts of new environmental regulations.

66. Expert Affidavit Before the Louisiana Tax Commission (2006). On behalf of ANR

Pipeline, Tennessee Gas Transmission and Southern Natural Gas Company. Issues: Competitive nature of interstate and intrastate transportation services.

67. Expert Affidavit Before the 19th Judicial District Court (2006). Suit Number 491, 453 Section 26. On behalf of Transcontinental Pipeline Corporation, et.al. Issues: Competitive nature of interstate and intrastate transportation services.

68. Expert Testimony: Docket Number 05-057-T01 (2006). Before the Utah Public Service Commission. In the Matter of: Joint Application of Questar Gas Company, the Division of Public Utilities, and Utah Clean Energy for Approval of the Conservation Enabling Tariff Adjustment Options and Accounting Orders. On the behalf of the Utah Committee of Consumer Services. Issues: Revenue Decoupling, Demand-side Management; Energy Efficiency policies. (Rebuttal and Supplemental Rebuttal Testimony)

69. Legislative Testimony (2006). Senate Committee on Natural Resources. Senate Bill 655 Regarding Remediation of Oil and Gas Sites, Legacy Lawsuits, and the Deterioration of State Drilling.

70. Expert Report: Rulemaking Docket (2005). Before the New Jersey Bureau of Public Utilities. In re: Proposed Rulemaking Changes Associated with New Jersey's Renewable Portfolio Standard. Expert Report. The Economic Impacts of New Jersey's Proposed Renewable Portfolio Standard. On behalf of the New Jersey Office of Ratepayer Advocate. Issues: Renewable Portfolio Standards, rate impacts, economic impacts, technology cost forecasts.

71. Expert Testimony: Docket Number 2005-191-E. (2005). Before the South Carolina Public Service Commission. On behalf of NewSouth Energy LLC. In re: General Investigation Examining the Development of RFP Rules for Electric Utilities. Issues: Competitive bidding; merchant development. (Direct and Rebuttal Testimony).

72. Expert Testimony: Docket No. 05-UA-323. (2005). Before the Mississippi Public Service Commission. On the behalf of Calpine Corporation. In re: Entergy Mississippi's Proposed Acquisition of the Attala Generation Facility. Issues: Asset acquisition; merchant power development; competitive bidding.

73. Expert Testimony: Docket Number 050045-EI and 050188-EI. (2005). Before the Florida Public Service Commission. On the behalf of the Citizens of the State of Florida. In re: Petition for Rate Increase by Florida Power & Light Company. Issues: Load forecasting; O&M forecasting and benchmarking; incentive returns/regulation.

74. Expert Testimony (non-sworn, rulemaking): Comments on Decreased Drilling Activities in Louisiana and the Role of Incentives. (2005). Louisiana Mineral Board Monthly Docket and Lease Sale. July 13, 2005

75. Legislative Testimony (2005). Background and Impact of LNG Facilities on Louisiana. Joint Meeting of Senate and House Natural Resources Committee. Louisiana Legislature. May 19, 2005.

76. Public Testimony. Docket No. U-21453. (2005). Technical Conference before the Louisiana Public Service Commission on an Investigation for a Limited Industrial Retail Choice Plan.

77. Expert Testimony: Docket No. 2003-K-1876. (2005). On Behalf of Columbia Gas Transmission. Expert Testimony on the Competitive Market Structure for Gas Transportation Service in Ohio. Before the Ohio Board of Tax Appeals.

78. Expert Report and Testimony: Docket No. 99-4490-J, *Lafayette City-Parish Consolidated Government, et. al. v. Entergy Gulf States Utilities, Inc. et. al*. (2005, 2006). On behalf of the City of Lafayette, Louisiana and the Lafayette Utilities Services. Expert Rebuttal Report of the Harborfront Consulting Group Valuation Analysis of the LUS Expropriation. Filed before 15th Judicial District Court, Lafayette, Louisiana.

79. Expert Testimony: ANR Pipeline Company v. Louisiana Tax Commission (2005), Number 468,417 Section 22, 19th Judicial District Court, Parish of East Baton Rouge, State of Louisiana Consolidated with Docket Numbers: 480,159; 489,776;480,160; 480,161; 480,162; 480,163; 480,373; 489,776; 489,777; 489,778;489,779; 489,780; 489,803; 491,530; 491,744; 491,745; 491,746; 491,912;503,466; 503,468; 503,469; 503,470; 515,414; 515,415; and 515,416. In re: Market structure issues and competitive implications of tax differentials and valuation methods in natural gas transportation markets for interstate and intrastate pipelines.

80. Expert Report and Recommendation: Docket No. U-27159. (2004). On Behalf of the Louisiana Public Service Commission Staff. Expert Report on Overcharges Assessed by Network Operator Services, Inc. Before the Louisiana Public Service Commission.

81. Expert Testimony: Docket Number 2004-178-E. (2004). Before the South Carolina Public Service Commission. On behalf of Columbia Energy LLC. In re: Rate Increase Request of South Carolina Electric and Gas. (Direct and Surrebuttal Testimony)

82. Expert Testimony: Docket Number 040001-EI. (2004). Before the Florida Public Service Commission. On behalf of Power Manufacturing Systems LLC, Thomas K. Churbuck, and the Florida Industrial Power Users Group. In re: Fuel Adjustment Proceedings; Request for Approval of New Purchase Power Agreements. Company examined: Florida Power & Light Company.

83. Expert Affidavit: Docket Number 27363. (2004). Before the Public Utilities Commission of Texas. Joint Affidavit on Behalf of the Cities of Texas and the Staff of the Public Utilities Commission of Texas Regarding Certified Issues. In Re: Application of Valor Telecommunications, L.P. For Authority to Establish Extended Local Calling Service (ELCS) Surcharges For Recovery of ELCS Surcharge.

84. Expert Report and Testimony. Docket 1997-4665-PV, 1998-4206-PV, 1999-7380-PV, 2000-5958-PV, 2001-6039-PV, 2002-64680-PV, 2003-6231-PV. (2003) Before the Kansas Board of Tax Appeals. (2003). In the Matter of the Appeals of CIG Field Services Company from orders of the Division of Property Valuation. On the Behalf of CIG Field Services. Issues: the competitive nature of natural gas gathering in Kansas.

85. Expert Report and Testimony: Docket Number U-22407. Before the Louisiana Public Service Commission (2002). On the Behalf of the Louisiana Public Service Commission Staff. Company examined: Louisiana Gas Services, Inc. Issues: Purchased Gas Acquisition audit, fuel procurement and planning practices.

86. Expert Testimony: Docket Number 000824-EI. Before the Florida Public Service Commission. (2002). On the Behalf of the Citizens of the State of Florida. Company examined: Florida Power Corporation. Issues: Load Forecasts and Billing Determinants for the Projected Test Year.

87. Public Testimony: Louisiana Board of Commerce and Industry (2001). Testimony on the Economic Impacts of Merchant Power Generation.

88. Expert Testimony: Docket Number 24468. (2001). On the Behalf of the Texas Office of Public Utility Counsel. Public Utility Commission of Texas Staff's Petition to Determine Readiness for Retail Competition in the Portion of Texas Within the Southwest Power Pool. Company examined: AEP-SWEPCO.

89. Expert Report. (2001) On Behalf of David Liou and Pacific Richland Products, Inc. to Review Cogeneration Issues Associated with Dupont Dow Elastomers, L.L.C. (DDE) and the Dow Chemical Company (Dow).

90. Expert Testimony: Docket Number 01-1049, Docket Number 01-3001. (2001) On behalf the Nevada Office of Attorney General, Bureau of Consumer Protection. Petition of Central Telephone Company-Nevada D/b/a Sprint of Nevada and Sprint Communications L.P. for Review and Approval of Proposed Revised Performance Measures and Review and Approval of Performance Measurement Incentive Plans. Before the Public Utilities Commission of Nevada.

91. Expert Affidavit: Multiple Dockets (2001). Before the Louisiana Tax Commission. On the Behalf of Louisiana Interstate Pipeline Companies. Testimony on the Competitive Nature of Natural Gas Transportation Services in Louisiana.

92. Expert Affidavit before the Federal District Court, Middle District of Louisiana (2001). Issues: Competitive Nature of the Natural Gas Transportation Market in Louisiana. On behalf of a Consortium of Interstate Natural Gas Transportation Companies.

93. Public Testimony: Louisiana Board of Commerce and Industry (2001). Testimony on the Economic and Ratepayer Benefits of Merchant Power Generation and Issues Associated with Tax Incentives on Merchant Power Generation and Transmission.

94. Expert Testimony: Docket Number 01-1048 (2001). Before the Public Utilities Commission of Nevada. On the Behalf of the Nevada Office of the Attorney General, Bureau of Consumer Protection. Company analyzed: Nevada Bell Telephone Company. Issues: Statistical Issues Associated with Performance Incentive Plans.

95. Expert Testimony: Docket 22351 (2001). Before the Public Utility Commission of

Texas. On the Behalf of the City of Amarillo. Company analyzed: Southwestern Public Service Company. Issues: Unbundled cost of service, affiliate transactions, load forecasting.

96. Expert Testimony: Docket 991779-EI (2000). Before the Florida Public Service Commission. On the Behalf of the Citizens of the State of Florida. Companies analyzed: Florida Power & Light Company; Florida Power Corporation; Tampa Electric Company; and Gulf Power Company. Issues: Competitive Nature of Wholesale Markets, Regional Power Markets, and Regulatory Treatment of Incentive Returns on Gains from Economic Energy Sales.

97. Expert Testimony: Docket 990001-EI (1999). Before the Florida Public Service Commission. On the Behalf of the Citizens of the State of Florida. Companies analyzed: Florida Power & Light Company; Florida Power Corporation; Tampa Electric Company; and Gulf Power Company. Issues: Regulatory Treatment of Incentive Returns on Gains from Economic Energy Sales.

98. Expert Testimony: Docket 950495-WS (1996). Before the Florida Public Service Commission. On the Behalf of the Citizens of the State of Florida. Company analyzed: Southern States Utilities, Inc. Issues: Revenue Repression Adjustment, Residential and Commercial Demand for Water Service.

99. Legislative Testimony. Louisiana House of Representatives, Special Subcommittee on Utility Deregulation. (1997). On Behalf of the Louisiana Public Service Commission Staff. Issue: Electric Restructuring.

100. Expert Testimony: Docket 940448-EG -- 940551-EG (1994). Before the Florida Public Service Commission. On the Behalf of the Legal Environmental Assistance Foundation. Companies analyzed: Florida Power & Light Company; Florida Power Corporation; Tampa Electric Company; and Gulf Power Company. Issues: Comparison of Forecasted Cost-Effective Conservation Potentials for Florida.

101. Expert Testimony: Docket 920260-TL, (1993). Before the Florida Public Service Commission. On the Behalf of the Florida Public Service Commission Staff. Company analyzed: BellSouth Communications, Inc. Issues: Telephone Demand Forecasts and Empirical Estimates of the Price Elasticity of Demand for Telecommunication Services.

102. Expert Testimony: Docket 920188-TL, (1992). Before the Florida Public Service Commission. On the Behalf of the Florida Public Service Commission Staff. Company analyzed: GTE-Florida. Issues: Telephone Demand Forecasts and Empirical Estimates of the Price Elasticity of Demand for Telecommunication Services.

REFEREE AND EDITORIAL APPOINTMENTS

Referee, 2010-Current, *Economics of Energy & Environmental Policy*
Referee, 1995-Current, *Energy Journal*
Contributing Editor, 2000-2005, *Oil, Gas and Energy Quarterly*
Referee, 2005, *Energy Policy*

Referee, 2004, *Southern Economic Journal*
Referee, 2002, *Resource & Energy Economics*
Committee Member, IAEE/USAEE Student Paper Scholarship Award Committee, 2003

PROPOSAL TECHNICAL REVIEWER

California Energy Commission, Public Interest Energy Research (PIER) Program (1999).

PROFESSIONAL ASSOCIATIONS

American Economic Association, American Statistical Association, Southern Economic Association, Western Economic Association, International Association of Energy Economists (IAEE), Unites States Association of Energy Economics and the National Association for Business Economics (NABE).

HONORS AND AWARDS

National Association of Regulatory Utility Commissioners (NARUC). Best Paper Award for papers published in the *Journal of Applied Regulation* (2004).

Baton Rouge Business Report, Selected as "Top 40 Under 40" (2003).

Omicron Delta Epsilon (1992-Current)

Interstate Oil and Gas Compact Commission (IOGCC) "Best Practice" Award for Research on the Economic Impact of Oil and Gas Activities on State Leases for the Louisiana Department of Natural Resources (2003).

Distinguished Research Award, Academy of Legal, Ethical and Regulatory Issues, Allied Academics (2002).

Florida Public Service Commission, Staff Excellence Award for Assistance in the Analysis of Local Exchange Competition Legislation (1995).

TEACHING EXPERIENCE

Energy and the Environment (Survey Course)
Principles of Microeconomic Theory
Principles of Macroeconomic Theory

Lecturer, Environmental Management and Permitting. Lecture in Natural Gas Industry, LNG and Markets.

Lecturer, Electric Power Industry Environmental Issues, Field Course on Energy and the Environment. (Dept of Environmental Studies).

Lecturer, Electric Power Industry Trends, Principles Course in Power Engineering (Dept. of Electric Engineering).

Lecturer, LSU Honors College, Senior Course on “Society and the Coast.”

Continuing Education. Electric Power Industry Restructuring for Energy Professionals.

“The Gulf Coast Energy Situation: Outlook for Production and Consumption.” Educational Course and Lecture Prepared for the Foundation for American Communications and the Society for Professional Journalists, New Orleans, LA, December 2, 2004

“The Impact of Hurricane Katrina on Louisiana’s Energy Infrastructure and National Energy Markets.” Educational Course and Lecture Prepared for the Foundation for American Communications and the Society for Professional Journalists, Houston, TX, September 13, 2005.

“Forecasting for Regulators: Current Issues and Trends in the Use of Forecasts, Statistical, and Empirical Analyses in Energy Regulation.” Instructional Course for State Regulatory Commission Staff. Institute of Public Utilities, Kellogg Center, Michigan State University. July 8-9, 2010.

“Regulatory and Ratemaking Issues with Cost and Revenue Trackers.” Michigan State University, Institute of Public Utilities. Advanced Regulatory Studies Program. September 29, 2010.

“Demand Modeling and Forecasting for Regulators.” Michigan State University, Institute of Public Utilities. Advanced Regulatory Studies Program. September 30, 2010.

“Demand Modeling and Forecasting for Regulators.” Michigan State University, Institute of Public Utilities, Forecasting Workshop, Charleston, SC. March 7-9, 2011.

“Regulatory and Cost Recovery Approaches for Smart Grid Applications.” Michigan State University, Institute of Public Utilities, Smart Grid Workshop for Regulators. Charleston, SC. March 7-11, 2011.

“Regulatory and Ratemaking Issues Associated with Cost and Expense Adjustment Mechanisms.” Michigan State University, Institute of Public Utilities, Advanced Regulatory Studies Program. Lansing, Michigan. September 28, 2011.

“Utility Incentives, Decoupling, and Renewable Energy Programs.” Michigan State University, Institute of Public Utilities, Advanced Regulatory Studies Program. Lansing, Michigan. September 29, 2011.

“Regulatory and Cost Recovery Approaches for Smart Grid Applications.” Michigan State University, Institute of Public Utilities, Smart Grid Workshop for Regulators. Charleston, SC. March 6-8, 2012.

“Traditional and Incentive Ratemaking Workshop.” New Mexico Public Utilities Commission Staff. Santa Fe, NM October 18, 2012.

"Traditional and Incentive Ratemaking Workshop." New Jersey Board of Public Utilities Staff. Newark, NJ. March 1, 2013.

THESIS/DISSERTATIONS COMMITTEES

Active:
2 Thesis Committee Memberships (Environmental Studies)
1 Ph.D. Dissertation Committee (Economics)

Completed:
6 Thesis Committee Memberships (Environmental Studies, Geography)
4 Doctoral Committee Memberships (Information Systems & Decision Sciences, Agricultural and Resource Economics, Economics, Education and Workforce Development).
2 Doctoral Examination Committee Membership (Information Systems & Decision Sciences, Education and Workforce Development)
1 Senior Honors Thesis (Journalism, Loyola University)

LSU SERVICE AND COMMITTEE MEMBERSHIPS

Co-Director/Steering Committee Member, LSU Coastal Marine Institute (2009-Current).

CES Promotion Committee, Division of Radiation Safety (2006).

Search Committee Chair (2006), Research Associate 4 Position.

Search Committee Member (2005), Research Associate 4 Position.

Search Committee Member (2005), CES Communications Manager.

LSU Graduate Research Faculty, Associate Member (1997-2004); Full Member (2004-2010); Affiliate Member with Full Directional Rights (2011-current).

LSU Faculty Senate (2003-2006).

Conference Coordinator. (2005-Current) Center for Energy Studies Conference on Alternative Energy.

LSU CES/SCE Public Art Selection Committee (2003-2005).

Conference Coordinator. Center for Energy Studies Annual Energy Conference/Summit. (2003-Current).

Conference Coordinator. Center for Energy Studies Seminar Series on Electric Utility Restructuring and Wholesale Competition. (1996-2003).

Co-Chairman, Review Committee, Louisiana Port Construction and Development Priority Program Rules and Regulations, On Behalf of the LSU Ports and Waterways Institute. (1997).

LSU Main Campus Cogeneration/Turbine Project, (1999-2000).

LSU InterCollege Environmental Cooperative. (1999-2001).

LSU Faculty Senate Committee on Public Relations (1997-1999).

LSU Faculty Senate Committee on Student Retention and Recruitment (1999-2003).

PROFESSIONAL SERVICE

Advisor (2008). National Association of Regulatory Utility Commissioners ("NARUC"). Study Committee on the Impact of Executive Drilling Moratoria on Federal Lands.

Steering Committee Member, Louisiana Representative (2008-Current). Southeast Agriculture & Forestry Energy Resources Alliance. Southern Policies Growth Board.

Advisor (2007-Current). National Association of State Utility Consumer Advocates ("NASUCA"), Natural Gas Committee.

Program Committee Chairman (2007-2008). U.S. Association of Energy Economics ("USAEE") Annual Conference, New Orleans, LA

Finance Committee Chairman (2007-2008). USAEE Annual Conference, New Orleans, LA

Committee Member (2006), International Association for Energy Economics ("IAEE") Nominating Committee.

Founding President (2005-2007) Louisiana Chapter, USAEE.

Secretary (2001) Houston Chapter, USAEE.

Advisor, Louisiana LNG Buyers/Developers Summit, Office of the Governor/Louisiana Department of Economic Development/Louisiana Department of Natural Resources, and Greater New Orleans, Inc. (2004).

SCHEDULES DED-1 through DED-28

Public Service Electric & Gas Energy Strong Program
Distribution Infrastructure Investments

	Infrastructure Investment Cost	
	First Five Years (million $)	Total Cost
Electric Delivery Infrastructure Hardening		
1. Station Flood and Storm Surge Mitigation	$ 819	$ 1,678
2. Outside Plant Higher Design and Construction Standards	$ 135	$ 135
3. Strengthening Pole Infrastructure	$ 105	$ 105
4. Rebuilding Backyard Pole Lines	$ 100	$ 100
5. Targeted Undergrounding to Mitigate Storm Impacts	$ 76	$ 76
6. Relocate Operations Center and Emergency Response Center	$ 15	$ 15
Total Electric Delivery Infrastructure Hardening	**$ 1,250**	**$ 2,109**
Electric Delivery Infrastructure Resilience		
1. Advanced Technologies		
System Visibility	$ 144	$ 300
Improvements to Communication Network	$ 38	$ 76
Storm Damage Assessment	$ 69	$ 75
2. Contingency Reconfiguration Strategies	$ 200	$ 200
3. Supplemental Investments		
Emergency Backup Generator / Quick Connect Stockpile	$ 2	$ 2
Municipal Pilot Program	n.a.	n.a.
Total Electric Delivery Infrastructure Resilience	**$ 453**	**$ 653**
Gas Delivery Infrastructure Hardening		
1. Metering and Regulating Station Flood and Storm Surge Mitigation	$ 76	$ 140
2. Replacement of Utilization Pressure Cast Iron and Associated Services	$ 830	$ 1,040
Total Gas Delivery Infrastructure Hardening	**$ 906**	**$ 1,180**

Source: Company Petition, Attachment 1.

Public Service Electric & Gas Energy Strong Program
Annual Revenue Requirement

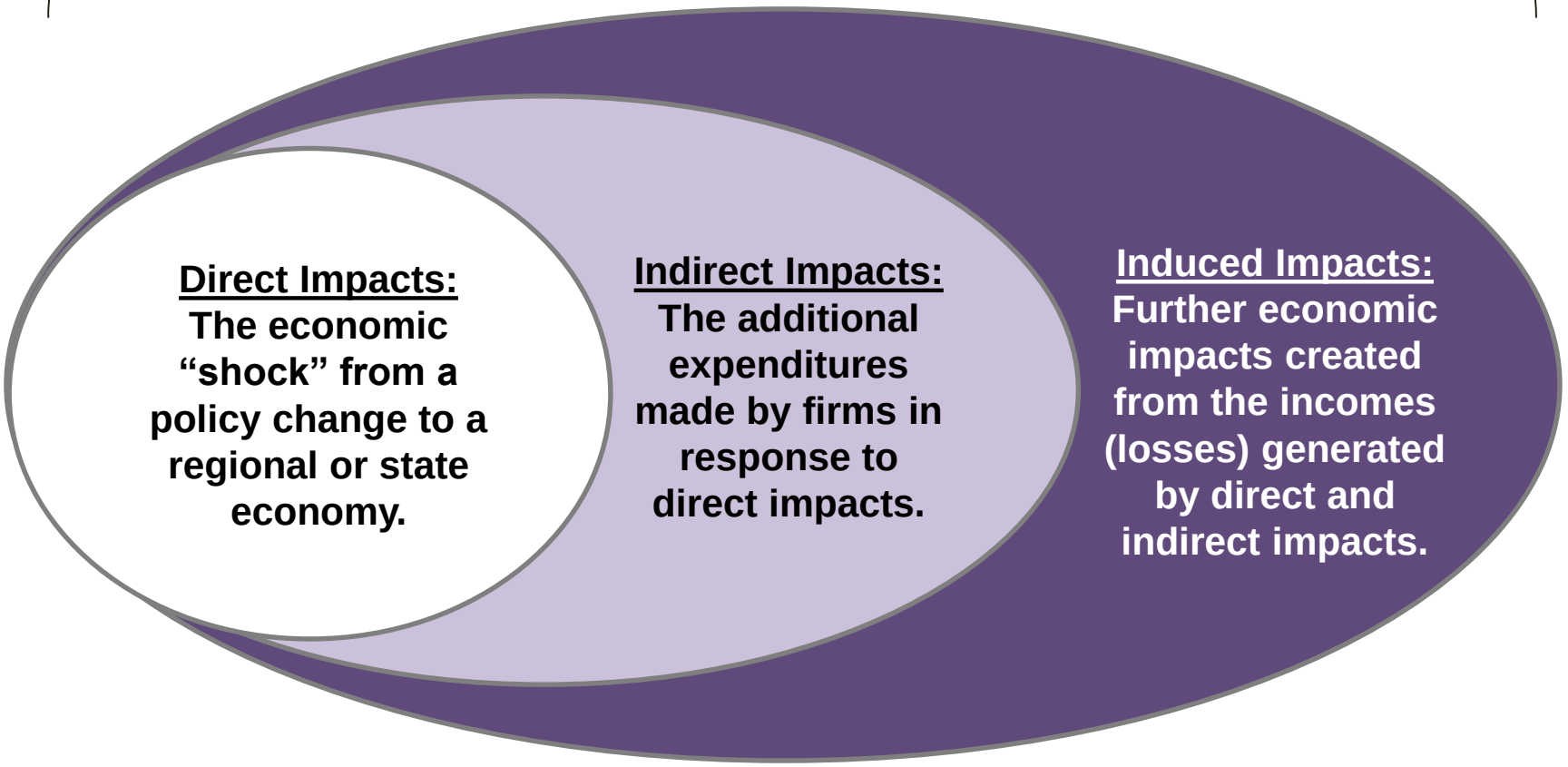
	PSE&G Energy Strong Program Revenue Requirement		
	Electric	Gas	Total
	---------- (thousand $) ----------		
2014	$ 16,533	$ 12,970	$ 29,503
2015	$ 59,023	$ 35,564	$ 94,587
2016	$ 121,368	$ 60,019	$ 181,387
2017	$ 176,661	$ 84,838	$ 261,499
2018	$ 218,264	$ 108,973	$ 327,237
2019	$ 219,665	$ 110,032	$ 329,697

Source: Direct Testimony of Stephen Swetz, Schedules SS-ES-3E, SS-ES-3G Schedule SS-ES-5..

Net Economic Impacts Analysis

Economic impacts are estimated to be the sum of the direct, indirect and induced effects that an investment or policy change has on a regional or state economy.

Total Economic Impact



Net Economic Impacts Analysis

Net benefits calculation must include the direct, indirect and induced impacts from both the rate impacts and project development and operation.

Net Economic Benefits

Direct, Indirect & Induced Impacts

Rate Impacts (cost)

Net Project Rate Impacts (Cost)

Direct, Indirect & Induced Impacts

Construction, O&M (benefit)

Project Development and Operations Impacts (Benefits)

Impact of Energy Strong Program on New Jersey Economic Output

Year	Impact of Energy Strong Program on New Jersey Economic Output											
	Impact of Construction Projects				Impact of Increased Rates				Total Net Economic Impact			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
	(million $)											
2014	$ 203.2	$ 53.2	$ 84.9	$ 341.3	$ (12.7)	$ (4.6)	$ (20.5)	$ (37.9)	$ 190.5	$ 48.6	$ 64.4	$ 303.4
2015	336.4	80.7	145.6	562.8	(42.0)	(15.1)	(65.6)	(122.8)	294.4	65.6	80.0	440.0
2016	375.4	90.6	166.2	632.2	(82.5)	(29.4)	(125.6)	(237.4)	292.9	61.2	40.7	394.8
2017	367.7	88.2	162.3	618.2	(119.2)	(42.4)	(181.0)	(342.6)	248.5	45.8	(18.7)	275.6
2018	308.5	76.7	137.3	522.5	(148.6)	(52.9)	(226.6)	(428.1)	160.0	23.8	(89.3)	94.4
2019	228.8	58.5	114.7	402.0	(149.7)	(53.3)	(228.3)	(431.4)	79.1	5.1	(113.6)	(29.4)
2020	173.9	42.5	92.6	308.9	(144.9)	(51.6)	(221.0)	(417.6)	28.9	(9.2)	(128.4)	(108.6)
2021	164.3	40.1	87.5	291.9	(140.3)	(50.0)	(213.9)	(404.1)	24.0	(9.9)	(126.4)	(112.2)
2022	157.9	38.5	84.1	280.5	(132.9)	(47.4)	(203.3)	(383.7)	25.0	(8.9)	(119.2)	(103.2)
2023	157.9	38.5	84.1	280.6	(126.9)	(45.3)	(194.5)	(366.6)	31.1	(6.8)	(110.4)	(86.1)
2024	-	-	-	-	(121.5)	(43.4)	(186.6)	(351.5)	(121.5)	(43.4)	(186.6)	(351.5)
2025	-	-	-	-	(116.8)	(41.8)	(179.6)	(338.2)	(116.8)	(41.8)	(179.6)	(338.2)
2026	-	-	-	-	(112.7)	(40.3)	(173.3)	(326.3)	(112.7)	(40.3)	(173.3)	(326.3)
2027	-	-	-	-	(108.6)	(38.8)	(167.1)	(314.5)	(108.6)	(38.8)	(167.1)	(314.5)
2028	-	-	-	-	(104.5)	(37.4)	(160.9)	(302.7)	(104.5)	(37.4)	(160.9)	(302.7)
2029	-	-	-	-	(100.0)	(35.8)	(154.1)	(290.0)	(100.0)	(35.8)	(154.1)	(290.0)
2030	-	-	-	-	(95.0)	(34.0)	(146.7)	(275.8)	(95.0)	(34.0)	(146.7)	(275.8)
2031	-	-	-	-	(90.1)	(32.3)	(139.3)	(261.6)	(90.1)	(32.3)	(139.3)	(261.6)
2032	-	-	-	-	(85.0)	(30.5)	(131.9)	(247.4)	(85.0)	(30.5)	(131.9)	(247.4)
2033	-	-	-	-	(80.3)	(28.8)	(124.8)	(233.9)	(80.3)	(28.8)	(124.8)	(233.9)
2034	-	-	-	-	(76.5)	(27.5)	(119.0)	(223.0)	(76.5)	(27.5)	(119.0)	(223.0)
2035	-	-	-	-	(73.1)	(26.2)	(113.9)	(213.2)	(73.1)	(26.2)	(113.9)	(213.2)
2036	-	-	-	-	(70.2)	(25.2)	(109.4)	(204.7)	(70.2)	(25.2)	(109.4)	(204.7)
2037	-	-	-	-	(67.8)	(24.3)	(105.8)	(197.9)	(67.8)	(24.3)	(105.8)	(197.9)
2038	-	-	-	-	(65.8)	(23.7)	(102.8)	(192.3)	(65.8)	(23.7)	(102.8)	(192.3)
2039	-	-	-	-	(64.1)	(23.1)	(100.3)	(187.5)	(64.1)	(23.1)	(100.3)	(187.5)
2040	-	-	-	-	(62.5)	(22.5)	(97.9)	(182.8)	(62.5)	(22.5)	(97.9)	(182.8)
2041-2050	-	-	-	-	(535.4)	(193.1)	(844.3)	(1,572.8)	(535.4)	(193.1)	(844.3)	(1,572.8)
2051-2060	-	-	-	-	(290.1)	(107.4)	(490.2)	(887.7)	(290.1)	(107.4)	(490.2)	(887.7)
2061-2070	-	-	-	-	(87.3)	(36.4)	(196.1)	(319.8)	(87.3)	(36.4)	(196.1)	(319.8)
2071-2080	-	-	-	-	(46.1)	(19.2)	(103.4)	(168.7)	(46.1)	(19.2)	(103.4)	(168.7)
NPV	**$ 1,740.7**	**$ 427.6**	**$ 802.4**	**$ 2,970.8**	**$ (1,142.6)**	**$ (408.4)**	**$ (1,758.1)**	**$ (3,309.2)**	**$ 598.1**	**$ 19.2**	**$ (955.8)**	**$ (338.4)**
Total	**$ 2,474.1**	**$ 607.5**	**$ 1,159.3**	**$ 4,240.9**	**$ (3,553.1)**	**$ (1,283.5)**	**$ (5,627.8)**	**$ (10,464.5)**	**$ (1,079.0)**	**$ (676.0)**	**$ (4,468.5)**	**$ (6,223.6)**

Impact of Energy Strong Program on New Jersey Economic Employment

Year	Impact of Energy Strong Program on New Jersey Economic Employment											
	Impact of Construction Projects				Impact of Increased Rates				Total Net Economic Impact			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
	(jobs)											
2014	849.1	224.5	555.1	1,631.0	(67.1)	(26.8)	(130.4)	(223.4)	781.9	197.7	424.7	1,407.6
2015	1,477.2	362.5	952.8	2,794.9	(228.9)	(88.0)	(416.7)	(730.4)	1,248.2	274.5	536.1	2,064.5
2016	1,697.6	412.5	1,087.7	3,200.5	(457.8)	(171.9)	(796.9)	(1,420.0)	1,239.7	240.6	290.8	1,780.5
2017	1,665.0	400.5	1,062.0	3,129.9	(663.7)	(248.3)	(1,148.5)	(2,050.9)	1,001.3	152.2	(86.5)	1,079.0
2018	1,433.3	341.2	898.3	2,674.9	(824.1)	(309.7)	(1,438.0)	(2,559.9)	609.2	31.6	(539.7)	115.0
2019	1,261.3	275.5	750.5	2,288.8	(830.2)	(312.1)	(1,448.6)	(2,579.0)	431.1	(36.6)	(698.1)	(290.2)
2020	1,032.1	214.1	606.1	1,853.0	(803.7)	(302.1)	(1,402.3)	(2,496.6)	228.4	(88.1)	(796.2)	(643.6)
2021	975.0	202.3	572.7	1,750.6	(777.7)	(292.4)	(1,357.1)	(2,416.0)	197.2	(90.1)	(784.4)	(665.4)
2022	938.1	194.2	550.5	1,683.4	(735.1)	(277.3)	(1,290.4)	(2,292.2)	202.9	(83.0)	(739.9)	(608.8)
2023	938.1	194.3	550.6	1,683.5	(700.1)	(264.7)	(1,234.2)	(2,189.0)	238.0	(70.4)	(683.7)	(505.5)
2024	-	-	-	-	(669.5)	(253.6)	(1,184.1)	(2,097.6)	(669.5)	(253.6)	(1,184.1)	(2,097.6)
2025	-	-	-	-	(643.4)	(243.9)	(1,140.1)	(2,018.1)	(643.4)	(243.9)	(1,140.1)	(2,018.1)
2026	-	-	-	-	(620.3)	(235.3)	(1,100.1)	(1,946.8)	(620.3)	(235.3)	(1,100.1)	(1,946.8)
2027	-	-	-	-	(597.6)	(226.8)	(1,060.6)	(1,876.3)	(597.6)	(226.8)	(1,060.6)	(1,876.3)
2028	-	-	-	-	(574.9)	(218.2)	(1,021.0)	(1,805.9)	(574.9)	(218.2)	(1,021.0)	(1,805.9)
2029	-	-	-	-	(549.8)	(208.9)	(978.4)	(1,729.2)	(549.8)	(208.9)	(978.4)	(1,729.2)
2030	-	-	-	-	(521.4)	(198.6)	(931.4)	(1,643.9)	(521.4)	(198.6)	(931.4)	(1,643.9)
2031	-	-	-	-	(493.0)	(188.2)	(884.5)	(1,558.7)	(493.0)	(188.2)	(884.5)	(1,558.7)
2032	-	-	-	-	(464.4)	(177.8)	(837.2)	(1,472.7)	(464.4)	(177.8)	(837.2)	(1,472.7)
2033	-	-	-	-	(437.6)	(167.9)	(792.5)	(1,391.8)	(437.6)	(167.9)	(792.5)	(1,391.8)
2034	-	-	-	-	(416.6)	(160.1)	(755.8)	(1,326.6)	(416.6)	(160.1)	(755.8)	(1,326.6)
2035	-	-	-	-	(397.8)	(153.0)	(722.9)	(1,267.9)	(397.8)	(153.0)	(722.9)	(1,267.9)
2036	-	-	-	-	(381.4)	(146.8)	(694.6)	(1,217.4)	(381.4)	(146.8)	(694.6)	(1,217.4)
2037	-	-	-	-	(368.1)	(141.8)	(671.6)	(1,176.2)	(368.1)	(141.8)	(671.6)	(1,176.2)
2038	-	-	-	-	(357.2)	(137.8)	(653.0)	(1,142.9)	(357.2)	(137.8)	(653.0)	(1,142.9)
2039	-	-	-	-	(347.7)	(134.3)	(636.9)	(1,113.9)	(347.7)	(134.3)	(636.9)	(1,113.9)
2040	-	-	-	-	(338.5)	(130.9)	(621.4)	(1,086.0)	(338.5)	(130.9)	(621.4)	(1,086.0)
2041-2050	-	-	-	-	(2,881.6)	(1,123.0)	(5,362.9)	(9,326.3)	(2,881.6)	(1,123.0)	(5,362.9)	(9,326.3)
2051-2060	-	-	-	-	(1,458.8)	(616.4)	(3,120.1)	(5,175.1)	(1,458.8)	(616.4)	(3,120.1)	(5,175.1)
2061-2070	-	-	-	-	(287.9)	(197.5)	(1,256.8)	(1,739.2)	(287.9)	(197.5)	(1,256.8)	(1,739.2)
2071-2080	-	-	-	-	(151.8)	(104.2)	(662.8)	(917.3)	(151.8)	(104.2)	(662.8)	(917.3)
Total	**12,266.6**	**2,821.6**	**7,586.3**	**22,690.5**	**(19,047.9)**	**(7,458.4)**	**(35,751.7)**	**(61,987.1)**	**(6,781.2)**	**(4,636.8)**	**(28,165.4)**	**(39,296.6)**

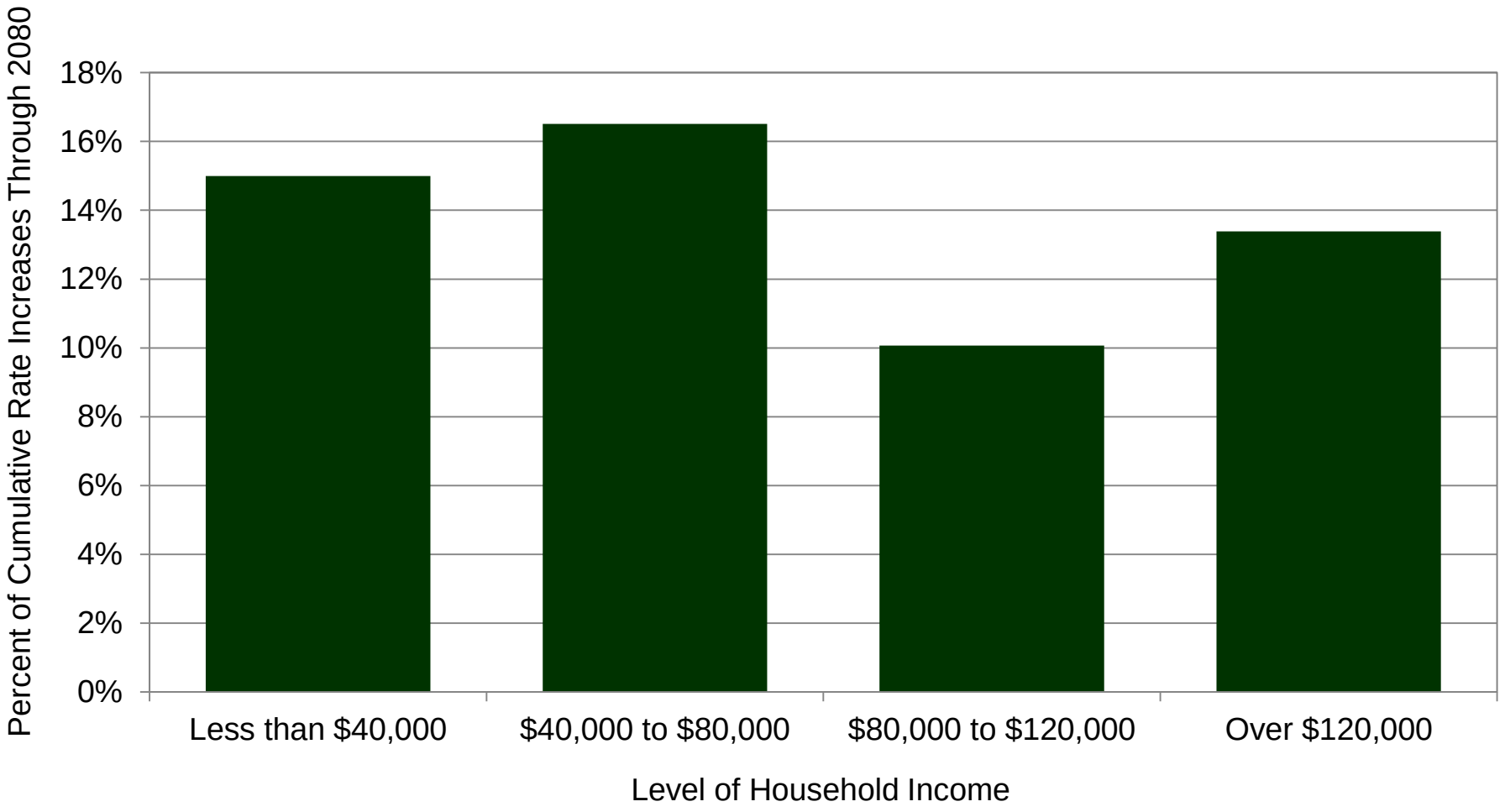
Impact of Energy Strong Program on New Jersey Economic Labor Income

Year	Impact of Energy Strong Program on New Jersey Economic Labor Income											
	Impact of Construction Projects				Impact of Increased Rates				Total Net Economic Impact			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
	(million $)											
2014	$ 68.3	$ 17.2	$ 30.8	$ 116.4	$ (4.3)	$ (1.7)	$ (7.5)	$ (13.5)	$ 64.0	$ 15.5	$ 23.3	$ 102.8
2015	119.0	27.7	52.9	199.6	(14.6)	(5.5)	(24.1)	(44.2)	104.4	22.2	28.8	155.4
2016	135.9	31.5	60.4	227.8	(29.0)	(10.7)	(46.2)	(85.9)	106.9	20.8	14.2	141.9
2017	132.8	30.6	59.0	222.4	(42.1)	(15.5)	(66.6)	(124.1)	90.7	15.2	(7.6)	98.3
2018	112.0	26.3	49.9	188.2	(52.3)	(19.3)	(83.4)	(154.9)	59.7	7.0	(33.5)	33.2
2019	94.0	21.4	41.7	157.2	(52.7)	(19.4)	(84.0)	(156.1)	41.4	2.0	(42.3)	1.1
2020	76.6	16.6	33.7	126.9	(51.0)	(18.8)	(81.3)	(151.1)	25.6	(2.2)	(47.6)	(24.2)
2021	72.4	15.7	31.8	119.9	(49.4)	(18.2)	(78.7)	(146.2)	23.0	(2.5)	(46.9)	(26.4)
2022	69.6	15.1	30.6	115.2	(46.7)	(17.3)	(74.8)	(138.7)	22.9	(2.2)	(44.2)	(23.5)
2023	69.6	15.1	30.6	115.2	(44.5)	(16.5)	(71.5)	(132.5)	25.1	(1.4)	(41.0)	(17.3)
2024	-	-	-	-	(42.6)	(15.8)	(68.6)	(127.0)	(42.6)	(15.8)	(68.6)	(127.0)
2025	-	-	-	-	(40.9)	(15.2)	(66.1)	(122.2)	(40.9)	(15.2)	(66.1)	(122.2)
2026	-	-	-	-	(39.4)	(14.7)	(63.7)	(117.8)	(39.4)	(14.7)	(63.7)	(117.8)
2027	-	-	-	-	(38.0)	(14.1)	(61.4)	(113.6)	(38.0)	(14.1)	(61.4)	(113.6)
2028	-	-	-	-	(36.6)	(13.6)	(59.2)	(109.3)	(36.6)	(13.6)	(59.2)	(109.3)
2029	-	-	-	-	(35.0)	(13.0)	(56.7)	(104.7)	(35.0)	(13.0)	(56.7)	(104.7)
2030	-	-	-	-	(33.2)	(12.4)	(54.0)	(99.5)	(33.2)	(12.4)	(54.0)	(99.5)
2031	-	-	-	-	(31.4)	(11.7)	(51.2)	(94.4)	(31.4)	(11.7)	(51.2)	(94.4)
2032	-	-	-	-	(29.6)	(11.1)	(48.5)	(89.2)	(29.6)	(11.1)	(48.5)	(89.2)
2033	-	-	-	-	(27.9)	(10.5)	(45.9)	(84.3)	(27.9)	(10.5)	(45.9)	(84.3)
2034	-	-	-	-	(26.6)	(10.0)	(43.8)	(80.3)	(26.6)	(10.0)	(43.8)	(80.3)
2035	-	-	-	-	(25.4)	(9.5)	(41.9)	(76.8)	(25.4)	(9.5)	(41.9)	(76.8)
2036	-	-	-	-	(24.3)	(9.2)	(40.2)	(73.7)	(24.3)	(9.2)	(40.2)	(73.7)
2037	-	-	-	-	(23.5)	(8.8)	(38.9)	(71.2)	(23.5)	(8.8)	(38.9)	(71.2)
2038	-	-	-	-	(22.8)	(8.6)	(37.8)	(69.2)	(22.8)	(8.6)	(37.8)	(69.2)
2039	-	-	-	-	(22.2)	(8.4)	(36.9)	(67.5)	(22.2)	(8.4)	(36.9)	(67.5)
2040	-	-	-	-	(21.6)	(8.2)	(36.0)	(65.8)	(21.6)	(8.2)	(36.0)	(65.8)
2041-2050	-	-	-	-	(184.5)	(70.1)	(310.4)	(564.9)	(184.5)	(70.1)	(310.4)	(564.9)
2051-2060	-	-	-	-	(95.3)	(38.6)	(180.0)	(313.9)	(95.3)	(38.6)	(180.0)	(313.9)
2061-2070	-	-	-	-	(21.9)	(12.6)	(71.7)	(106.2)	(21.9)	(12.6)	(71.7)	(106.2)
2071-2080	-	-	-	-	(11.5)	(6.6)	(37.8)	(56.0)	(11.5)	(6.6)	(37.8)	(56.0)
NPV	**$ 656.8**	**$ 151.3**	**$ 291.6**	**$ 1,099.6**	**$ (399.9)**	**$ (148.6)**	**$ (646.6)**	**$ (1,195.1)**	**$ 256.9**	**$ 2.6**	**$ (355.0)**	**$ (95.4)**
Total	**$ 950.1**	**$ 217.3**	**$ 421.3**	**$ 1,588.7**	**$ (1,220.8)**	**$ (465.4)**	**$ (2,068.6)**	**$ (3,754.8)**	**$ (270.7)**	**$ (248.1)**	**$ (1,647.3)**	**$ (2,166.0)**

Impact of Energy Strong Program on New Jersey Economic Value Added

Year	Impact of Energy Strong Program on New Jersey Economic Value Added											
	Impact of Construction Projects				Impact of Increased Rates				Total Net Economic Impact			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
	(million $)											
2014	$ 103.5	$ 27.9	$ 55.4	$ 186.8	$ (7.5)	$ (2.9)	$ (13.2)	$ (23.6)	$ 96.0	$ 25.0	$ 42.2	$ 163.2
2015	185.7	44.1	95.1	324.8	(25.3)	(9.3)	(42.3)	(76.9)	160.4	34.7	52.7	247.8
2016	205.7	50.2	108.5	364.4	(50.1)	(18.2)	(80.9)	(149.3)	155.6	32.0	27.6	215.2
2017	202.2	48.6	105.9	356.8	(72.5)	(26.3)	(116.7)	(215.5)	129.7	22.3	(10.7)	141.3
2018	163.4	41.7	89.6	294.8	(90.2)	(32.8)	(146.1)	(269.1)	73.2	8.9	(56.5)	25.7
2019	115.9	33.7	74.9	224.5	(90.9)	(33.1)	(147.1)	(271.1)	25.0	0.7	(72.3)	(46.6)
2020	91.6	25.9	60.4	177.9	(88.0)	(32.0)	(142.4)	(262.5)	3.6	(6.1)	(82.0)	(84.5)
2021	86.5	24.5	57.1	168.1	(85.2)	(31.0)	(137.9)	(254.0)	1.3	(6.5)	(80.7)	(85.9)
2022	83.2	23.5	54.9	161.6	(80.6)	(29.4)	(131.1)	(241.1)	2.6	(5.9)	(76.2)	(79.5)
2023	83.2	23.5	54.9	161.6	(76.8)	(28.1)	(125.4)	(230.3)	6.4	(4.5)	(70.5)	(68.6)
2024	-	-	-	-	(73.5)	(26.9)	(120.3)	(220.7)	(73.5)	(26.9)	(120.3)	(220.7)
2025	-	-	-	-	(70.7)	(25.9)	(115.8)	(212.3)	(70.7)	(25.9)	(115.8)	(212.3)
2026	-	-	-	-	(68.2)	(25.0)	(111.7)	(204.8)	(68.2)	(25.0)	(111.7)	(204.8)
2027	-	-	-	-	(65.7)	(24.0)	(107.7)	(197.4)	(65.7)	(24.0)	(107.7)	(197.4)
2028	-	-	-	-	(63.2)	(23.1)	(103.7)	(190.0)	(63.2)	(23.1)	(103.7)	(190.0)
2029	-	-	-	-	(60.5)	(22.2)	(99.4)	(182.0)	(60.5)	(22.2)	(99.4)	(182.0)
2030	-	-	-	-	(57.4)	(21.1)	(94.6)	(173.0)	(57.4)	(21.1)	(94.6)	(173.0)
2031	-	-	-	-	(54.3)	(20.0)	(89.8)	(164.1)	(54.3)	(20.0)	(89.8)	(164.1)
2032	-	-	-	-	(51.2)	(18.9)	(85.0)	(155.1)	(51.2)	(18.9)	(85.0)	(155.1)
2033	-	-	-	-	(48.3)	(17.8)	(80.5)	(146.6)	(48.3)	(17.8)	(80.5)	(146.6)
2034	-	-	-	-	(46.0)	(17.0)	(76.7)	(139.7)	(46.0)	(17.0)	(76.7)	(139.7)
2035	-	-	-	-	(43.9)	(16.2)	(73.4)	(133.6)	(43.9)	(16.2)	(73.4)	(133.6)
2036	-	-	-	-	(42.1)	(15.6)	(70.5)	(128.3)	(42.1)	(15.6)	(70.5)	(128.3)
2037	-	-	-	-	(40.7)	(15.1)	(68.2)	(123.9)	(40.7)	(15.1)	(68.2)	(123.9)
2038	-	-	-	-	(39.5)	(14.6)	(66.3)	(120.4)	(39.5)	(14.6)	(66.3)	(120.4)
2039	-	-	-	-	(38.5)	(14.3)	(64.7)	(117.4)	(38.5)	(14.3)	(64.7)	(117.4)
2040	-	-	-	-	(37.5)	(13.9)	(63.1)	(114.5)	(37.5)	(13.9)	(63.1)	(114.5)
2041-2050	-	-	-	-	(320.0)	(119.3)	(544.3)	(983.6)	(320.0)	(119.3)	(544.3)	(983.6)
2051-2060	-	-	-	-	(167.3)	(65.9)	(316.2)	(549.4)	(167.3)	(65.9)	(316.2)	(549.4)
2061-2070	-	-	-	-	(41.5)	(21.7)	(126.7)	(189.9)	(41.5)	(21.7)	(126.7)	(189.9)
2071-2080	-	-	-	-	(21.9)	(11.4)	(66.8)	(100.1)	(21.9)	(11.4)	(66.8)	(100.1)
NPV	**$ 931.2**	**$ 239.8**	**$ 523.7**	**$ 1,694.7**	**$ (690.9)**	**$ (253.0)**	**$ (1,133.3)**	**$ (2,077.2)**	**$ 240.3**	**$ (13.2)**	**$ (609.6)**	**$ (382.5)**
Total	**$ 1,320.9**	**$ 343.7**	**$ 756.7**	**$ 2,421.4**	**$ (2,118.9)**	**$ (792.9)**	**$ (3,628.4)**	**$ (6,540.2)**	**$ (798.0)**	**$ (449.2)**	**$ (2,871.7)**	**$ (4,118.9)**

Rate Impact Payment Burden by Residential Income Category

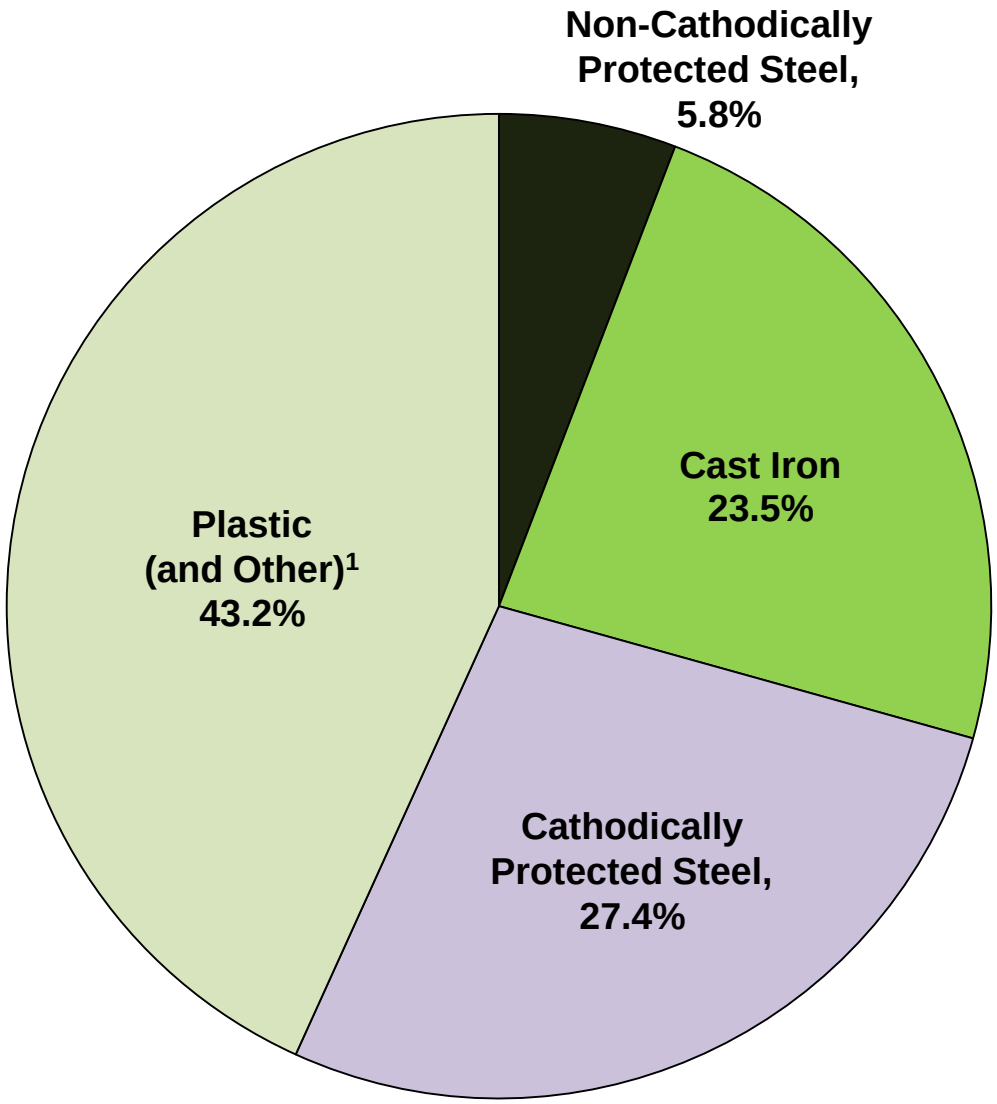


Regional Utility Comparison Group

	Total Customers	Percent of Total Customers			Total Sales (Mcf)	Percent of Total Sales		
		Residential	Commercial	Industrial		Residential	Commercial	Industrial
		(%)				(%)		
Public Service Electric and Gas	1,779,088	90.9%	8.7%	0.4%	302,932,319	43.3%	50.4%	6.3%
Regional Utilities:								
NY State Electric & Gas (NY)	260,899	88.6%	11.2%	0.2%	53,572,837	41.2%	35.2%	23.6%
South Jersey Gas (NJ)	348,866	93.3%	6.6%	0.1%	47,666,166	46.4%	23.4%	30.1%
Rochester Gas & Electric (NY)	303,038	92.4%	7.3%	0.2%	47,360,102	52.3%	33.0%	14.7%
UGI Utilities (PA)	350,799	90.0%	9.6%	0.4%	74,939,861	27.9%	31.0%	41.2%
Peoples Natural Gas (PA)	357,852	92.2%	7.8%	0.0%	61,985,470	47.0%	25.0%	28.0%
Columbia Gas Distribution (PA)	415,716	90.4%	9.4%	0.1%	73,925,234	43.3%	27.0%	29.6%
Peco Energy (PA)	493,608	91.4%	8.4%	0.2%	79,905,414	44.4%	26.4%	29.2%
Washington Gas Light (MD)	445,030	94.2%	5.8%	0.0%	64,532,979	55.8%	44.2%	0.0%
Philadelphia Gas Works (PA)	498,888	94.6%	5.3%	0.2%	61,094,169	59.9%	28.6%	11.4%
Baltimore Gas & Electric (MD)	653,147	93.2%	6.6%	0.2%	89,711,839	42.8%	37.9%	19.2%
New Jersey Natural Gas (NJ)	497,750	92.9%	7.1%	0.0%	58,427,662	69.1%	25.9%	5.0%
National Fuel Gas (NY)	517,375	93.4%	6.5%	0.1%	86,983,750	55.6%	27.0%	17.4%
Niagara Mohawk (NY)	585,740	92.3%	7.6%	0.0%	105,301,975	46.7%	30.1%	23.2%
Consolidated Edison (NY)	1,064,951	88.5%	11.5%	0.0%	187,207,200	36.1%	62.9%	0.9%
National Grid (NY)	1,764,392	94.1%	5.7%	0.2%	226,915,908	70.6%	27.8%	1.6%

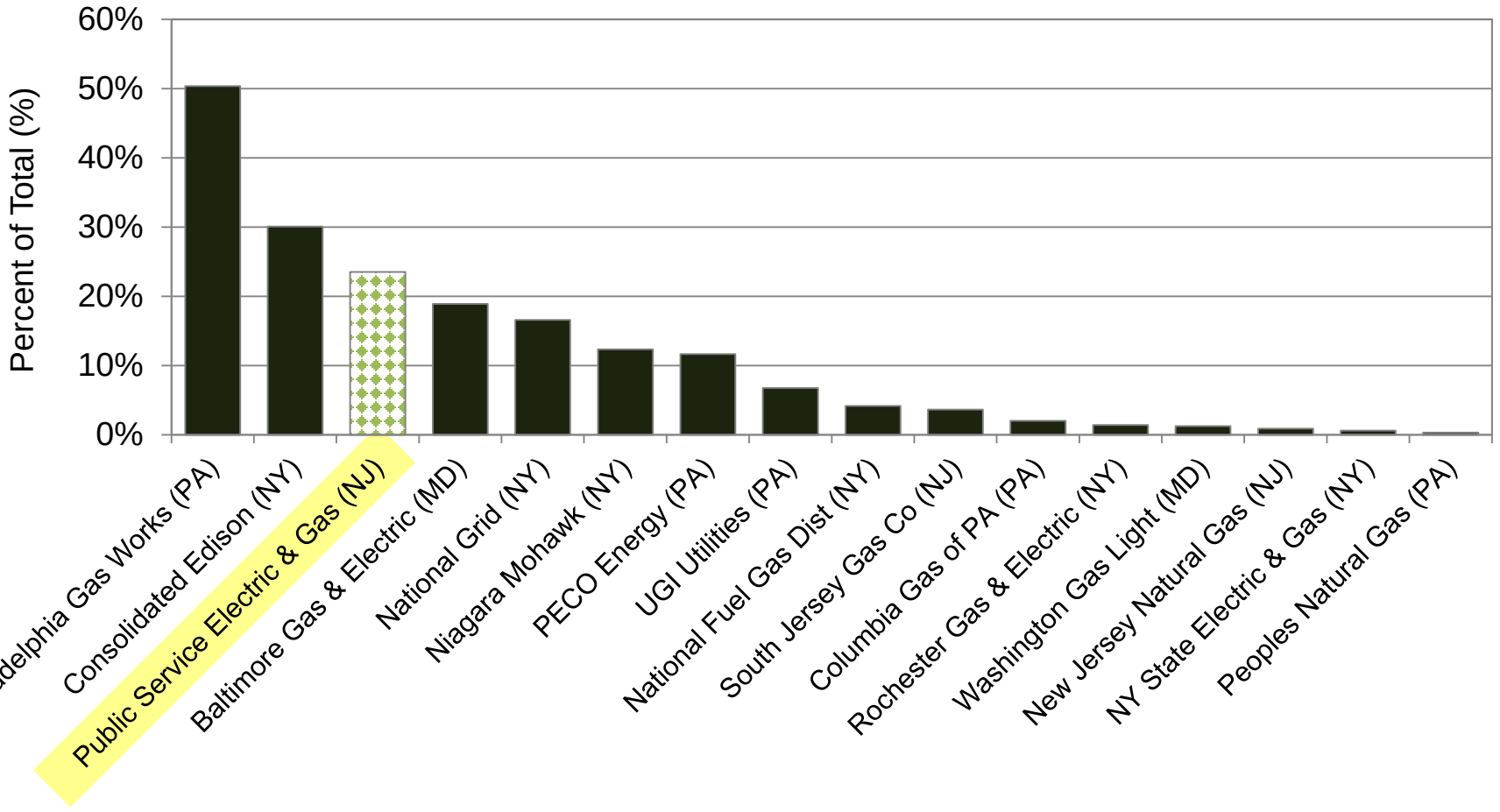
Source: Energy Information Administration, U.S. Department of Energy.

Composition of Public Service Electric & Gas Distribution Mains, 2012



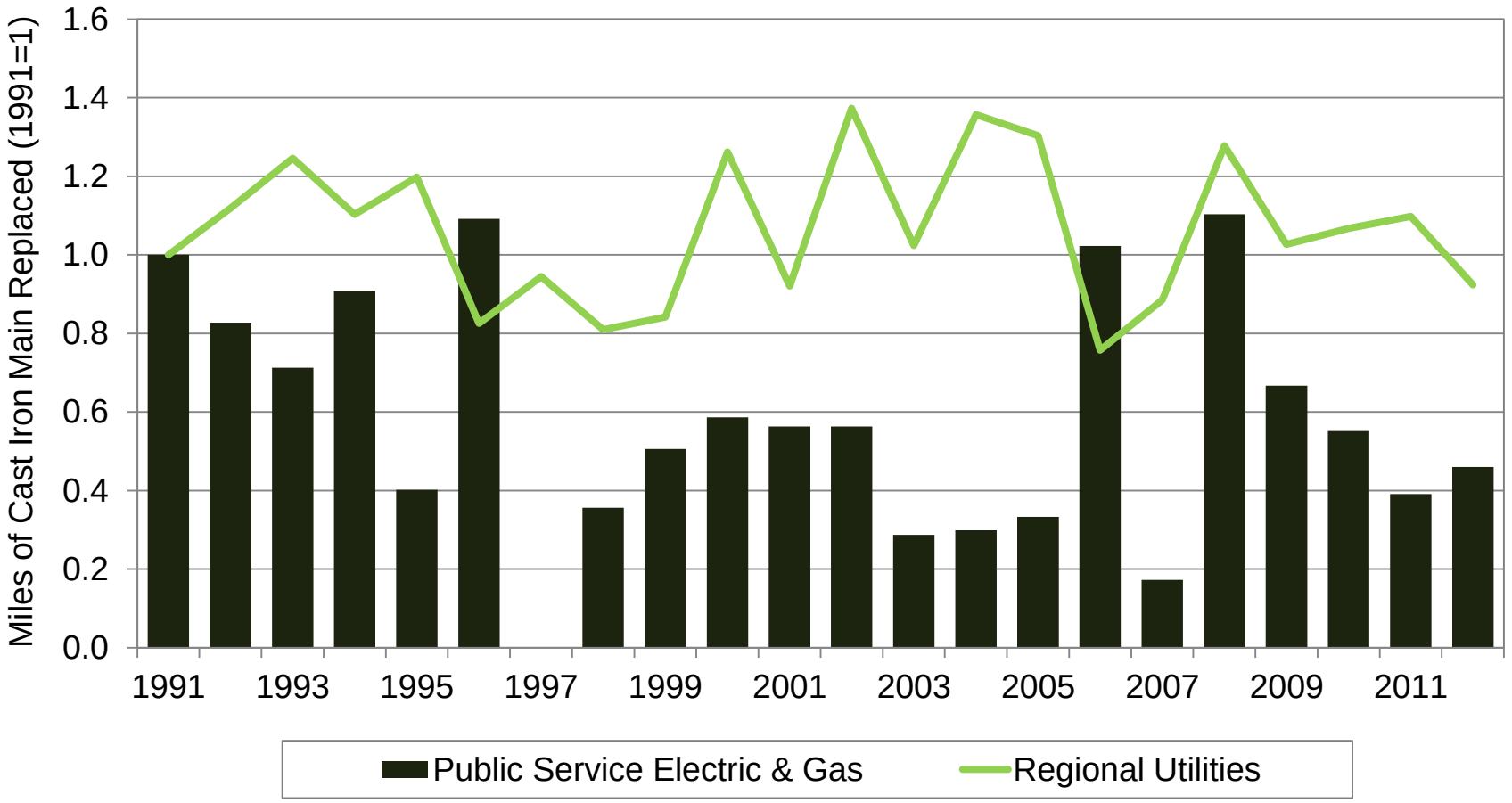
Note: [1] Other includes one mile of "Copper" main and five miles of "Other" main.
Source: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety.

Cast Iron Main as a Percent of Total
Public Service Electric & Gas and Regional Utilities



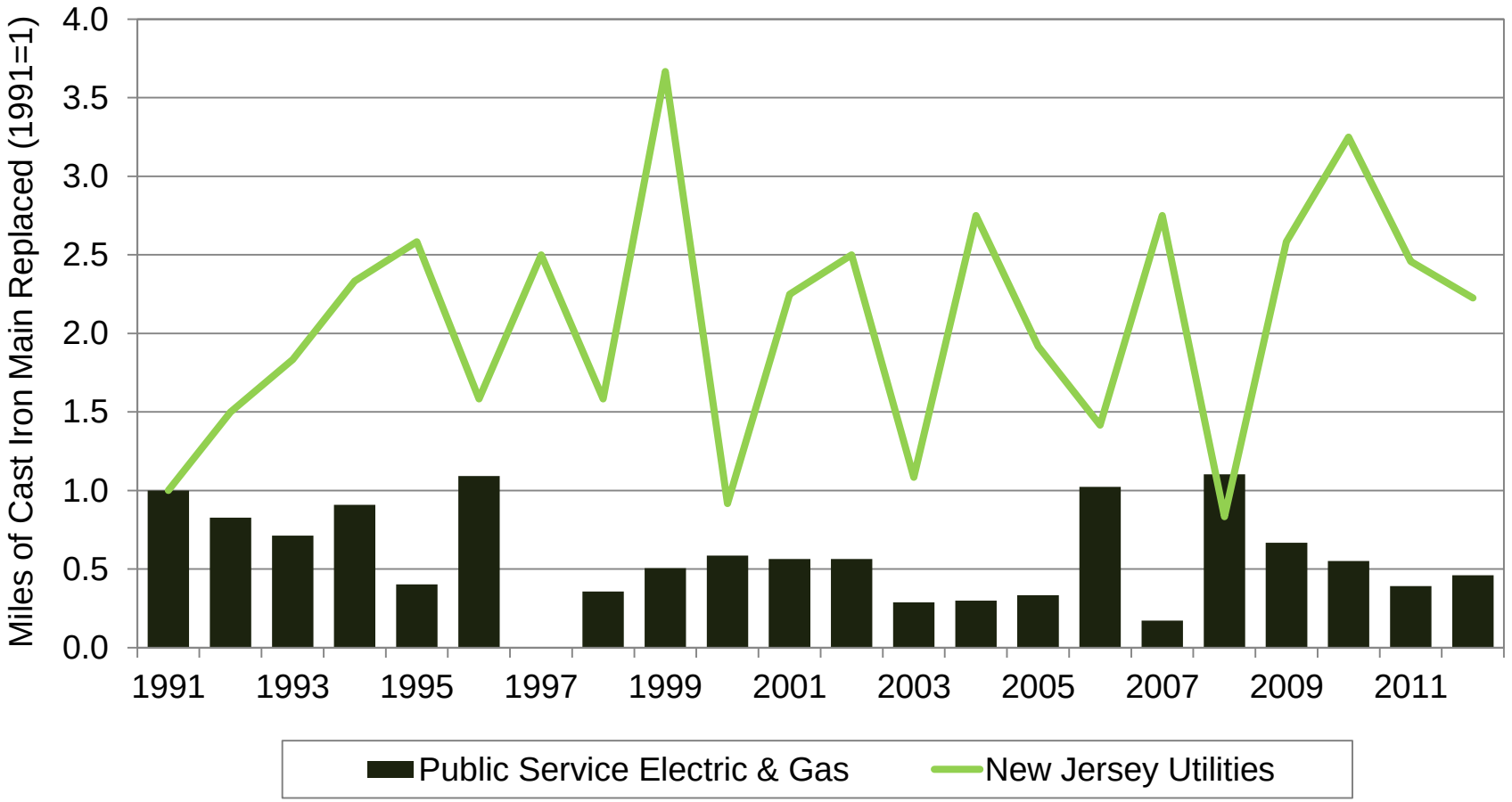
Source: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety.

Replacement of Cast Iron Mains
Public Service Electric & Gas and Regional Utilities



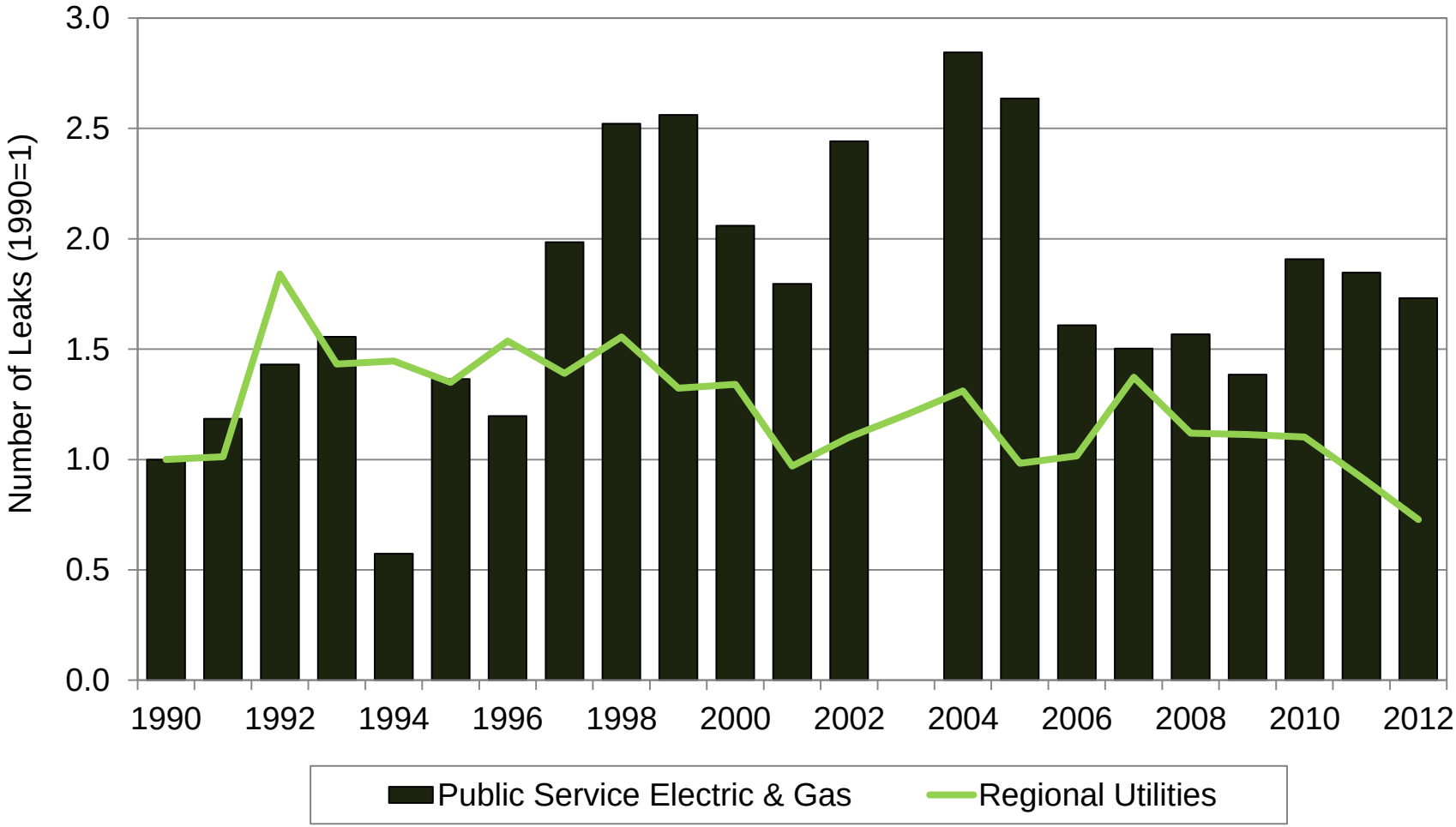
Note: There was no reported change in Public Service Electric & Gas miles of cast iron main between 1996 and 1997; therefore there were no replacements. The statistics included in this chart are indexed to a common year, 1991 (i.e., replacement levels for all utilities equal 1.0 in that year). Source: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety.

Replacement of Cast Iron Mains
Public Service Electric & Gas and New Jersey Utilities



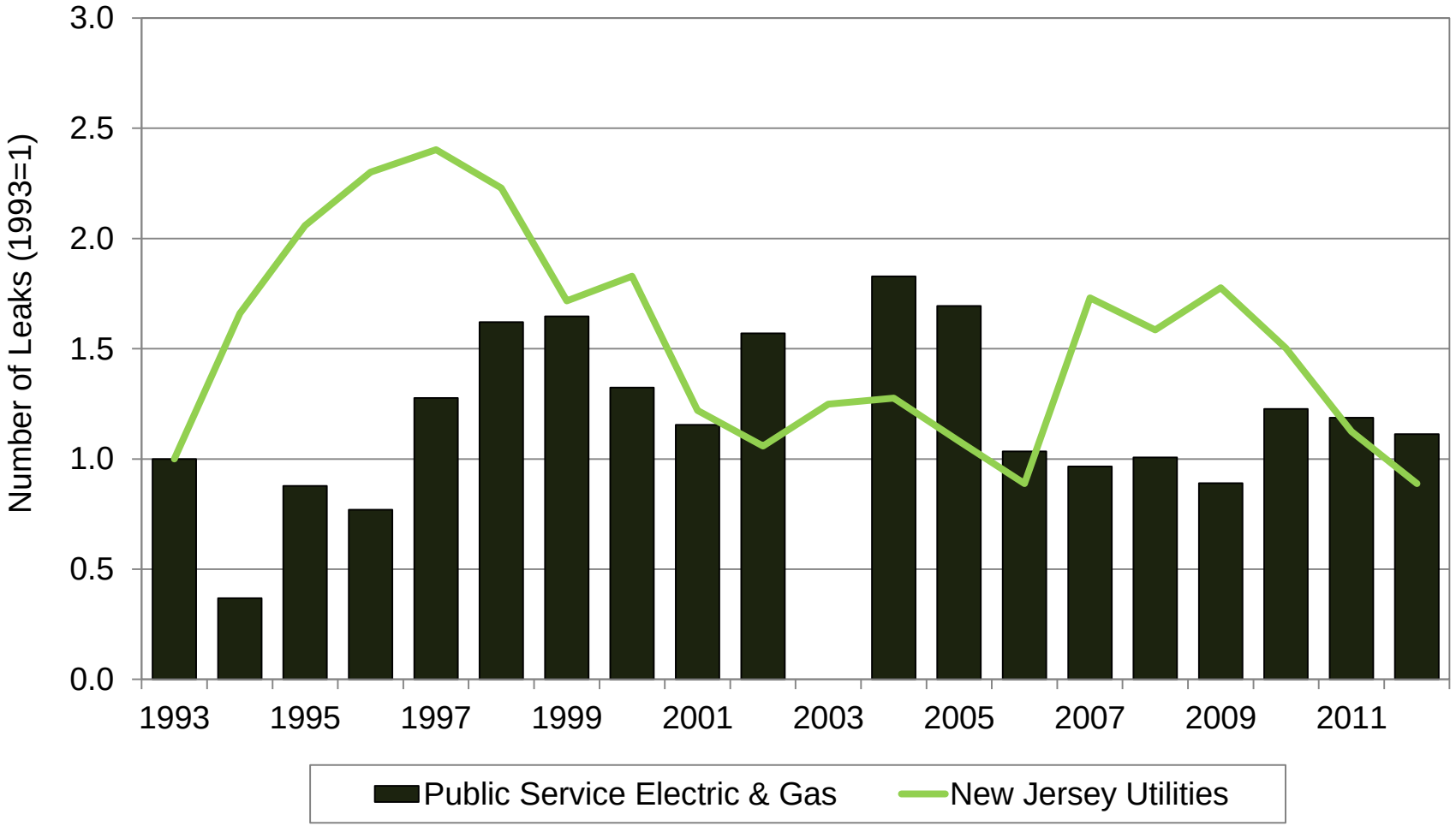
Note: New Jersey utilities include South Jersey Gas, New Jersey Natural Gas and Elizabethtown Gas. There was no reported change in Public Service Electric & Gas miles of cast iron main between 1996 and 1997; therefore there were no replacements. The statistics included in this chart are indexed to a common year, 1991 (i.e., replacement levels for all utilities equal 1.0 in that year). Source: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety.

Number of Known System Leaks at End of Year
Public Service Electric & Gas and Regional Utilities



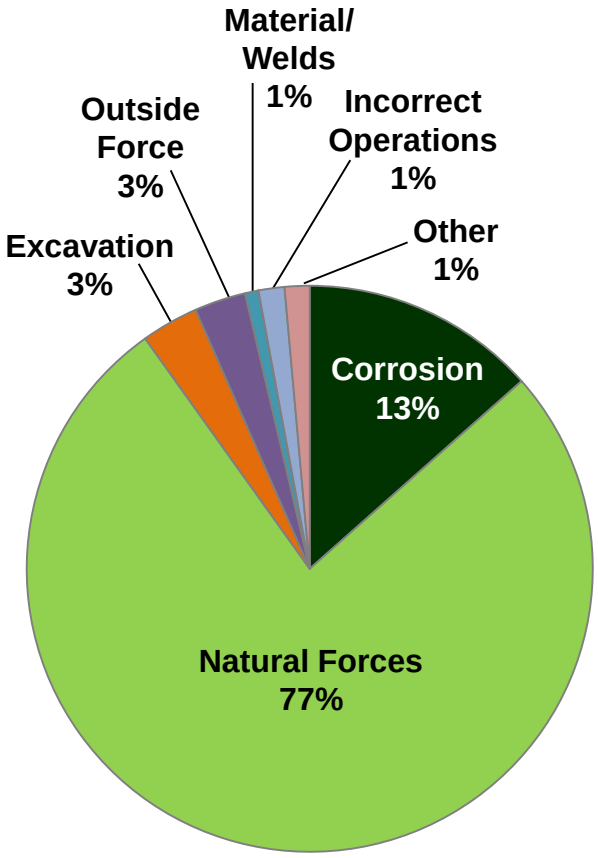
Note: Leak data for Public Service Electric & Gas was not reported in 2003. The statistics included in this chart are indexed to a common year, 1990 (i.e., replacement levels for all utilities equal 1.0 in that year). Source: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety.

Number of Known System Leaks at End of Year
Public Service Electric & Gas and New Jersey Utilities

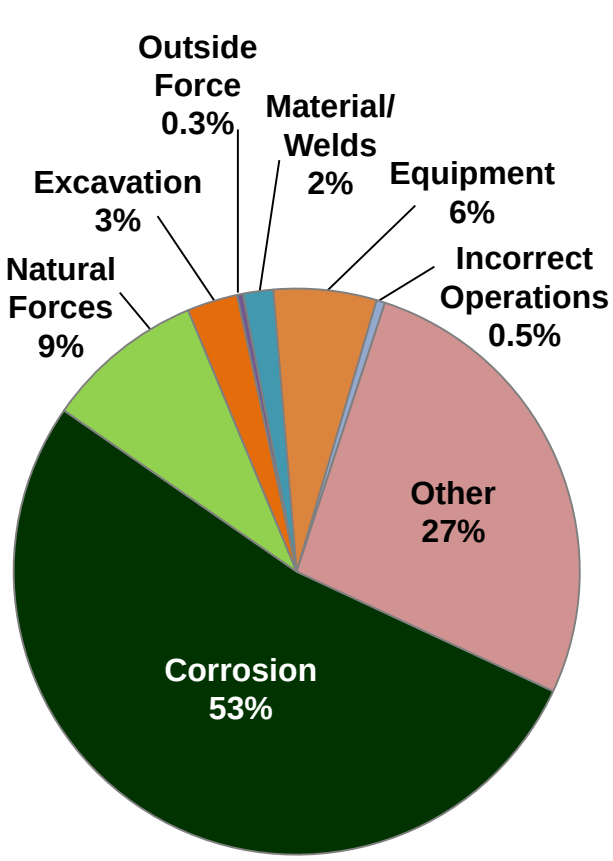


Note: 1993 was used as the starting index date for this schedule. New Jersey utilities include South Jersey Gas, New Jersey Natural Gas and Elizabethtown Gas. Leak data for Public Service Electric & Gas was not reported in 2003. The statistics included in this chart are indexed to a common year, 1993 (i.e., replacement levels for all utilities equal 1.0 in that year). Source: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety.

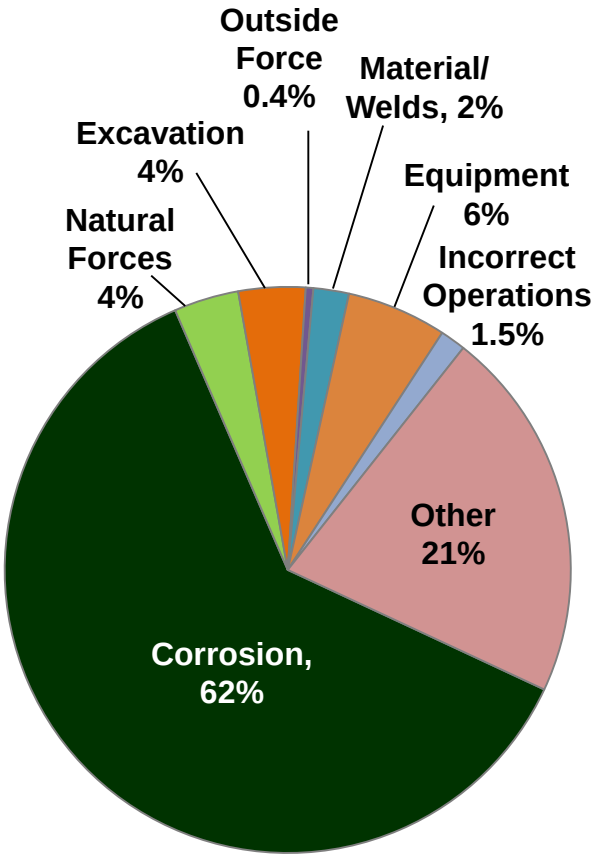
Comparison of Mains Leak Repairs by Type, 2012



Public Service Electric & Gas



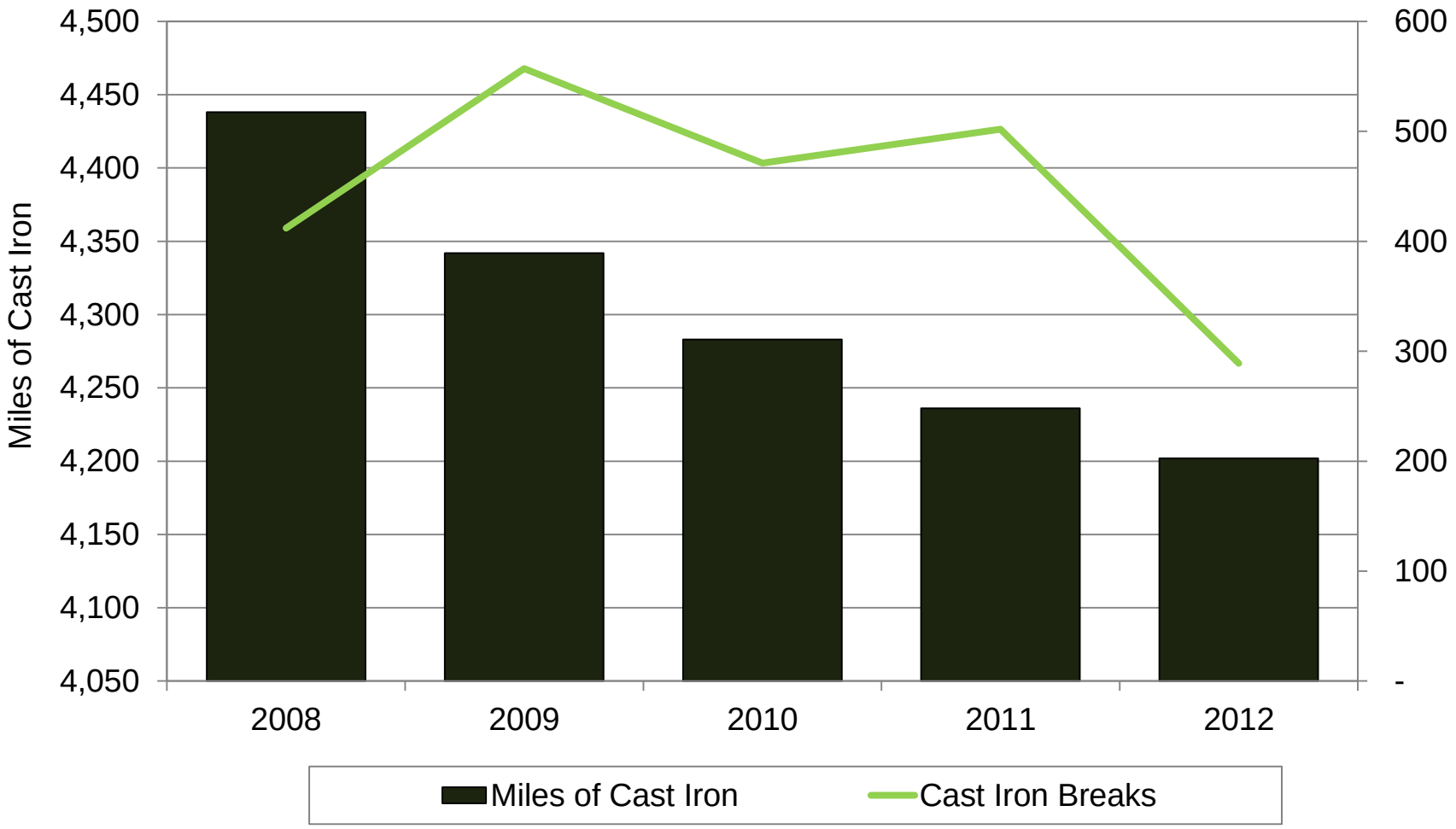
Regional Utilities



New Jersey Utilities

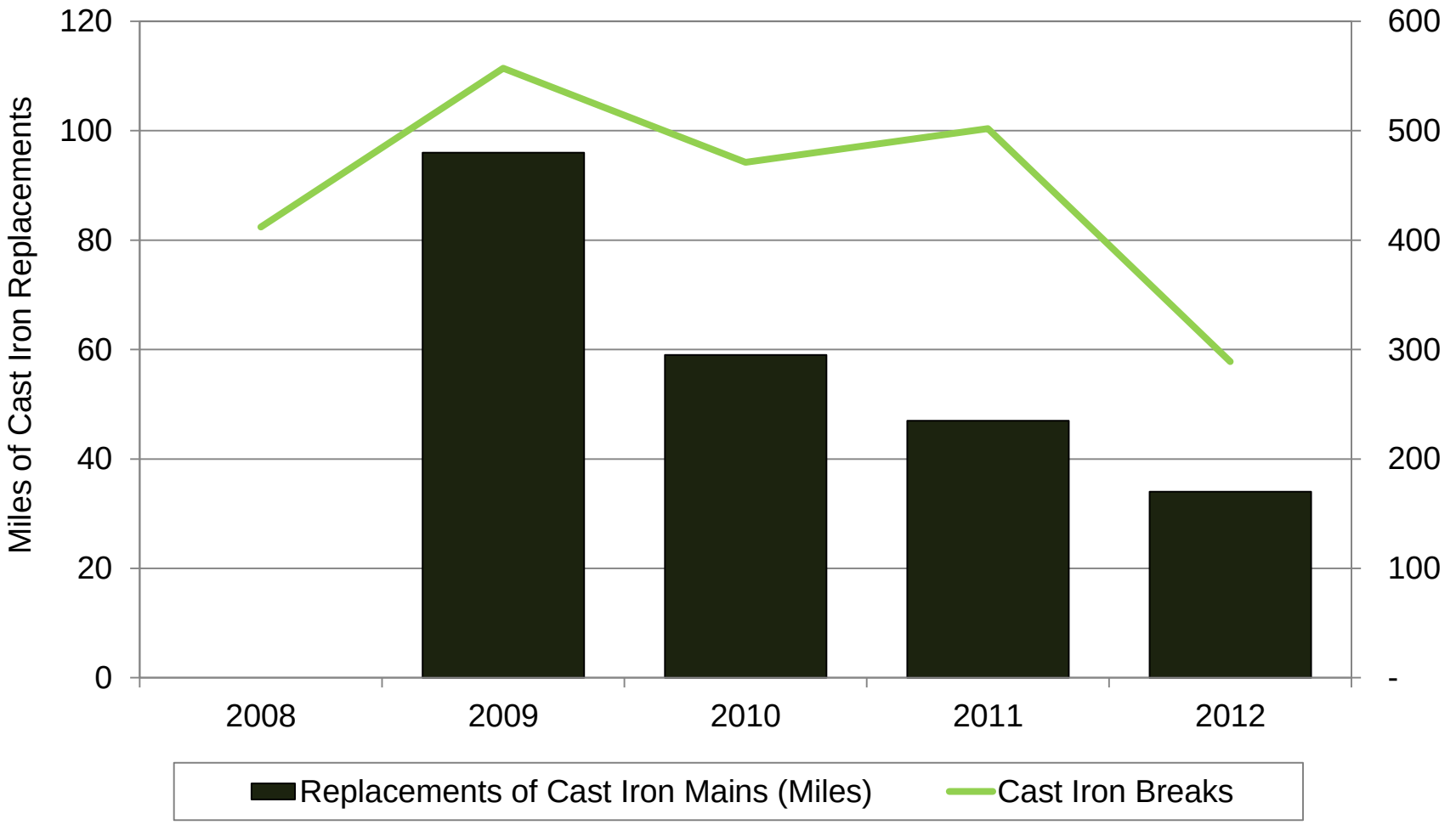
Note: Totals may not sum to 100% due to rounding. New Jersey Utilities include New Jersey Natural Gas, South Jersey Gas, and Elizabethtown Gas.
Source: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety.

Miles of Cast Iron and Cast Iron Breaks
Public Service Electric & Gas



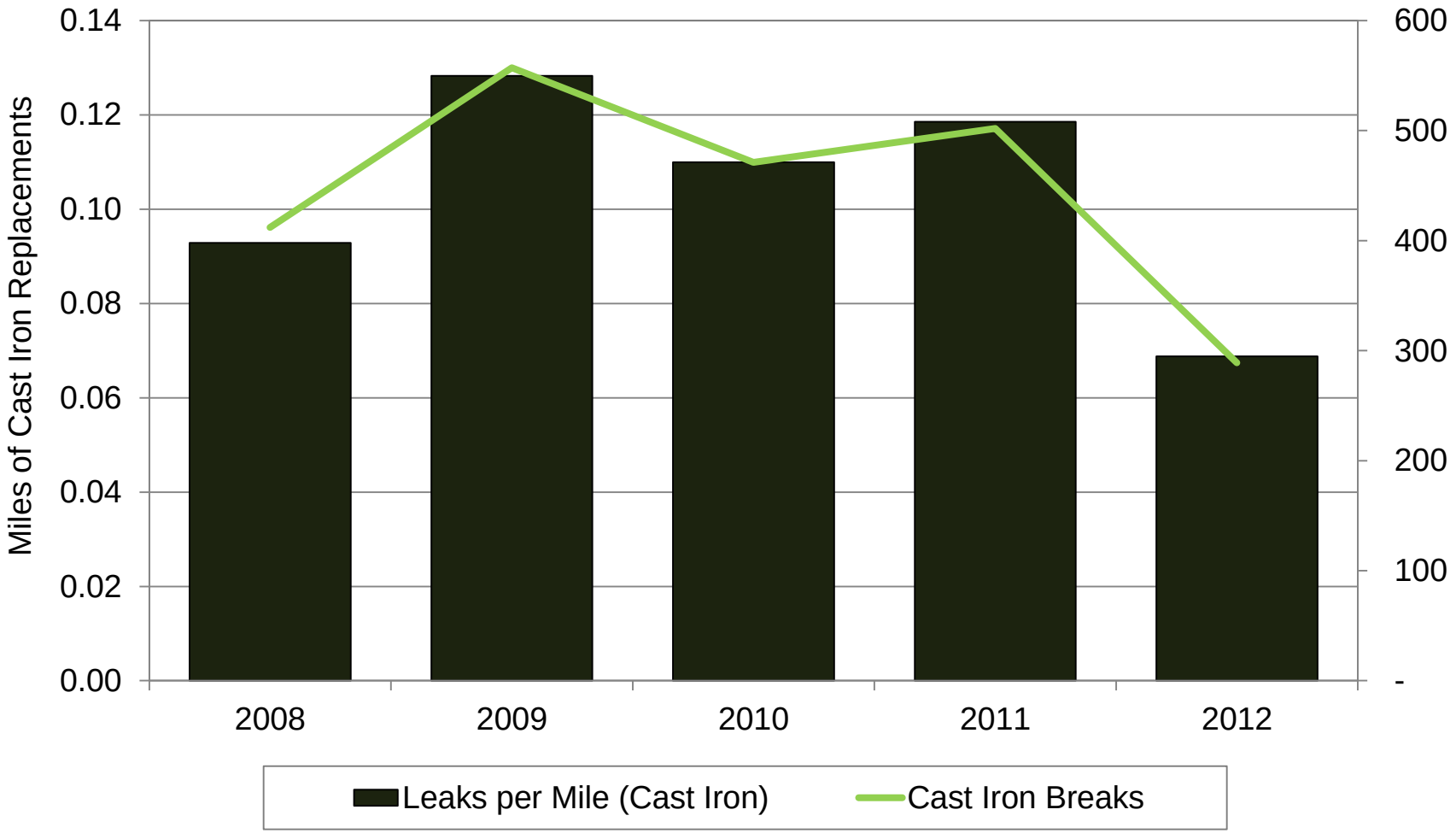
Source: Response to Request RCR-G-POL-3.

Cast Iron Replacements and Cast Iron Breaks
Public Service Electric & Gas



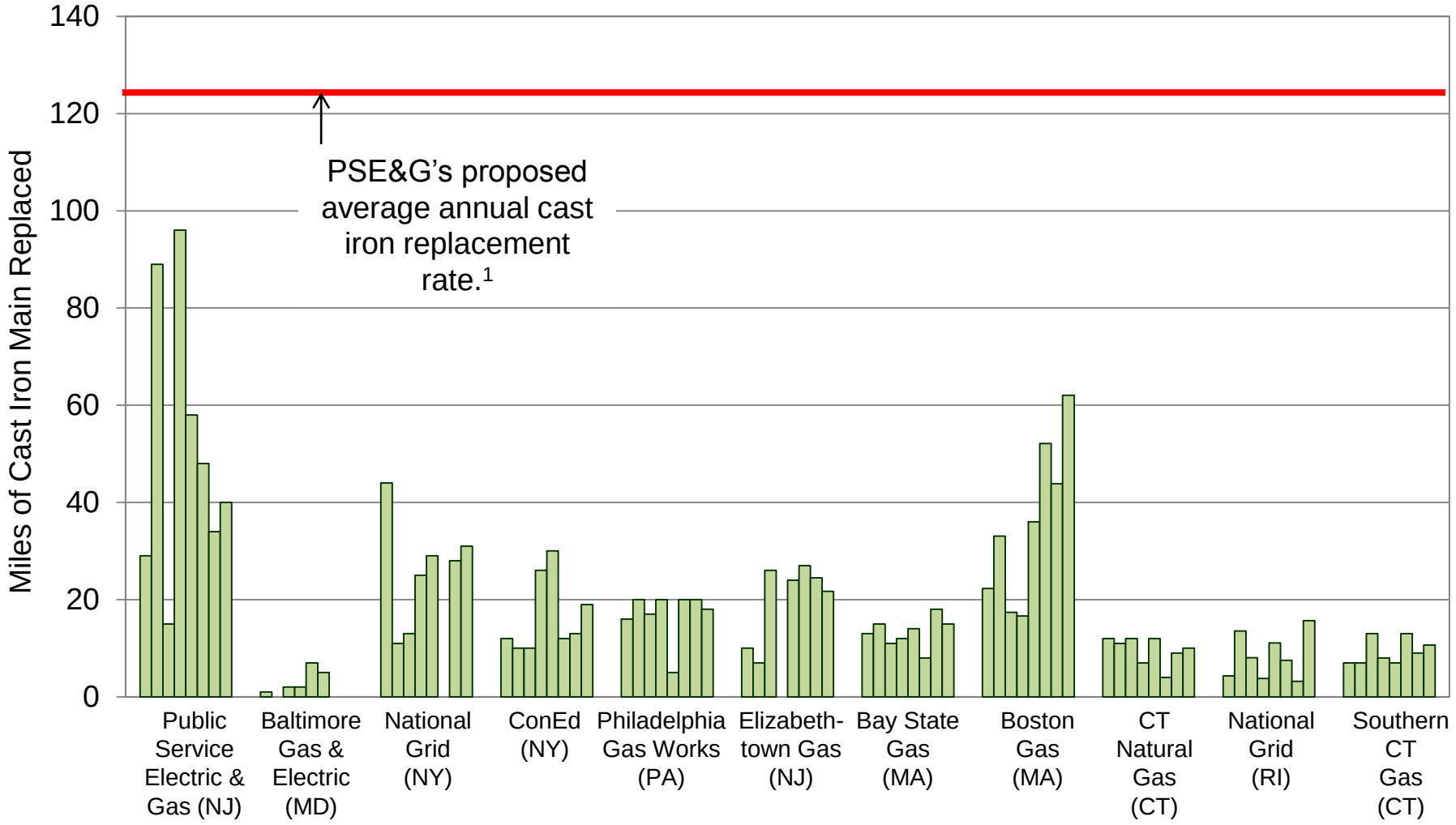
Source: Response to Request RCR-G-POL-3.

Leaks per Mile of Cast Iron Main
Public Service Electric & Gas



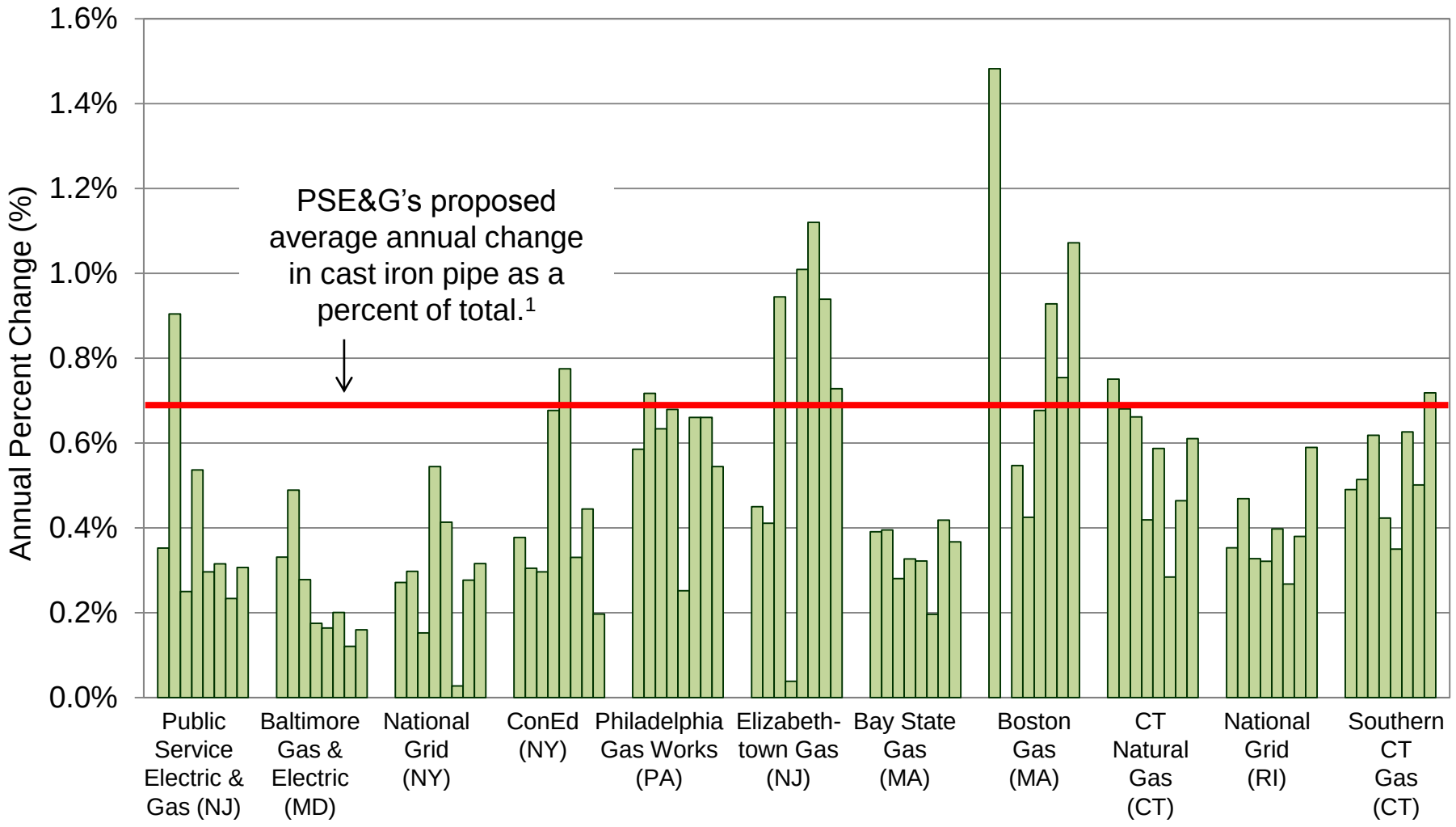
Source: Response to Request RCR-G-POL-3.

Comparison of Cast Iron Replacements, 2005-2012



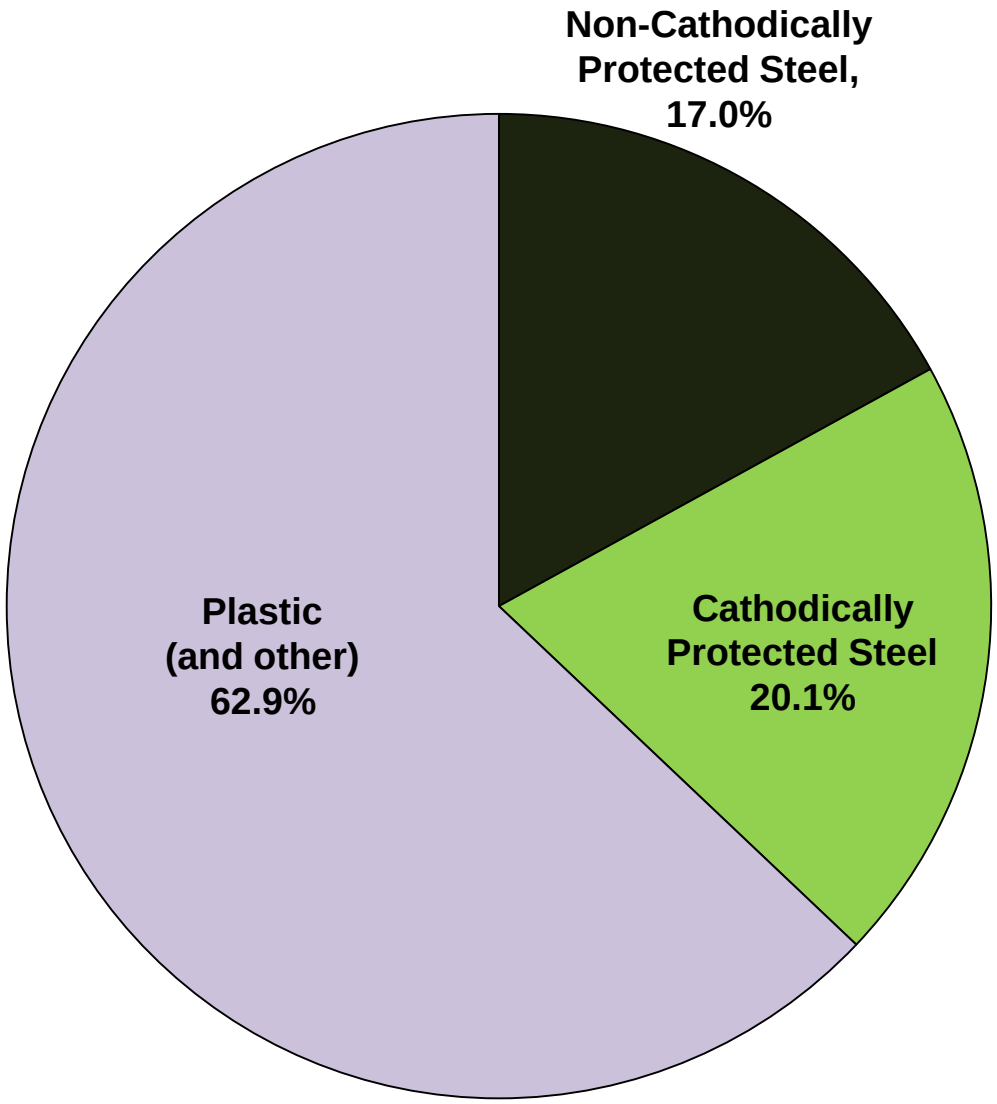
Note: [1] Assumes an average annual cast iron replacement rate of 125 miles calculated as 750 miles divided by six years.
Source: Office of Pipeline Safety, U.S. Department of Transportation.

Annual Change in Cast Iron Pipe as a Percent of Total, 2005-2012



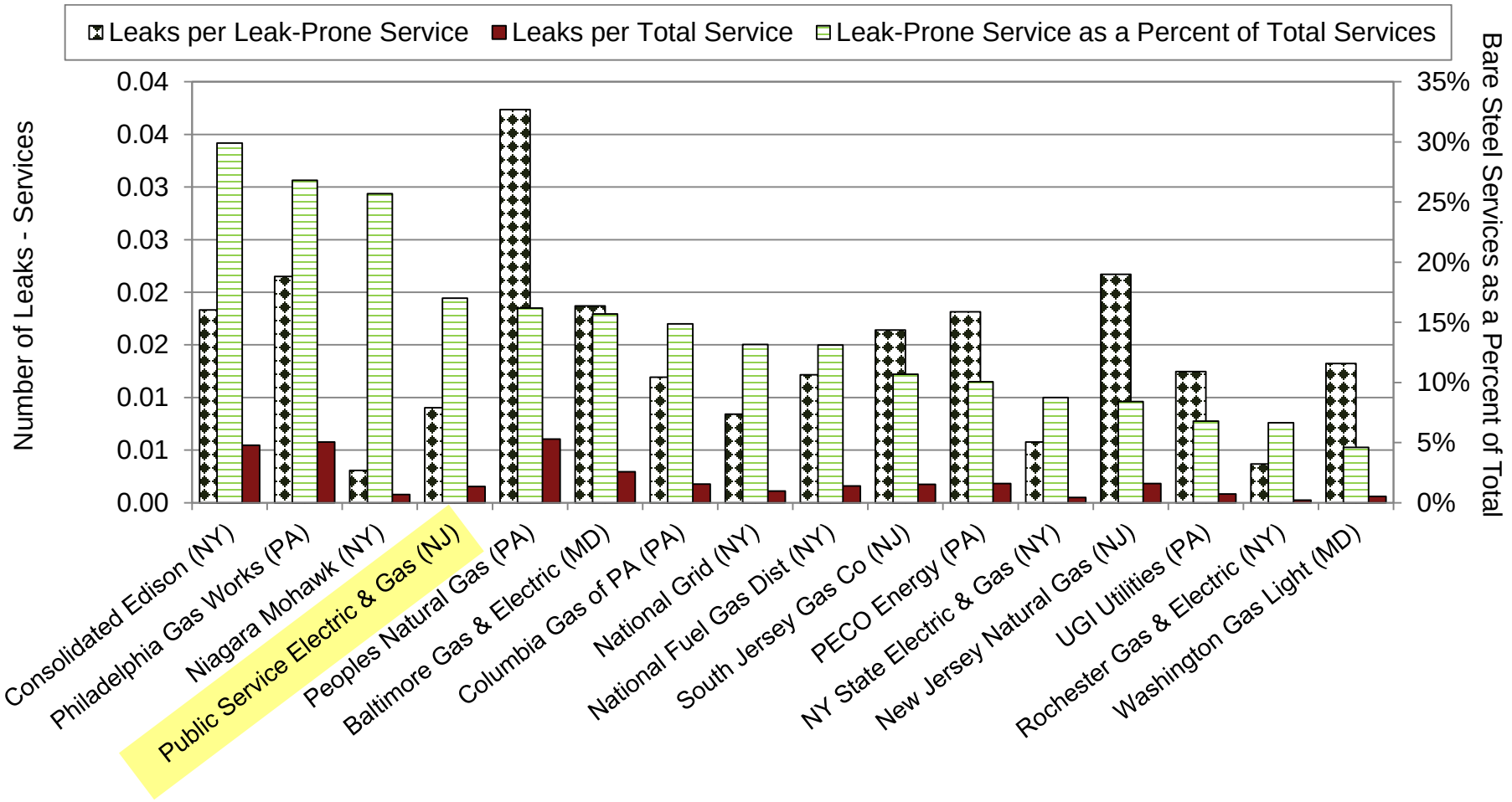
Note: [1] Assumes an constant total miles of pipe based on 2012 inventory; and average annual cast iron replacement rate of 125 miles calculated as 750 miles divided by six years. Source: Office of Pipeline Safety, U.S. Department of Transportation.

Composition of Public Service Electric & Gas Distribution Services



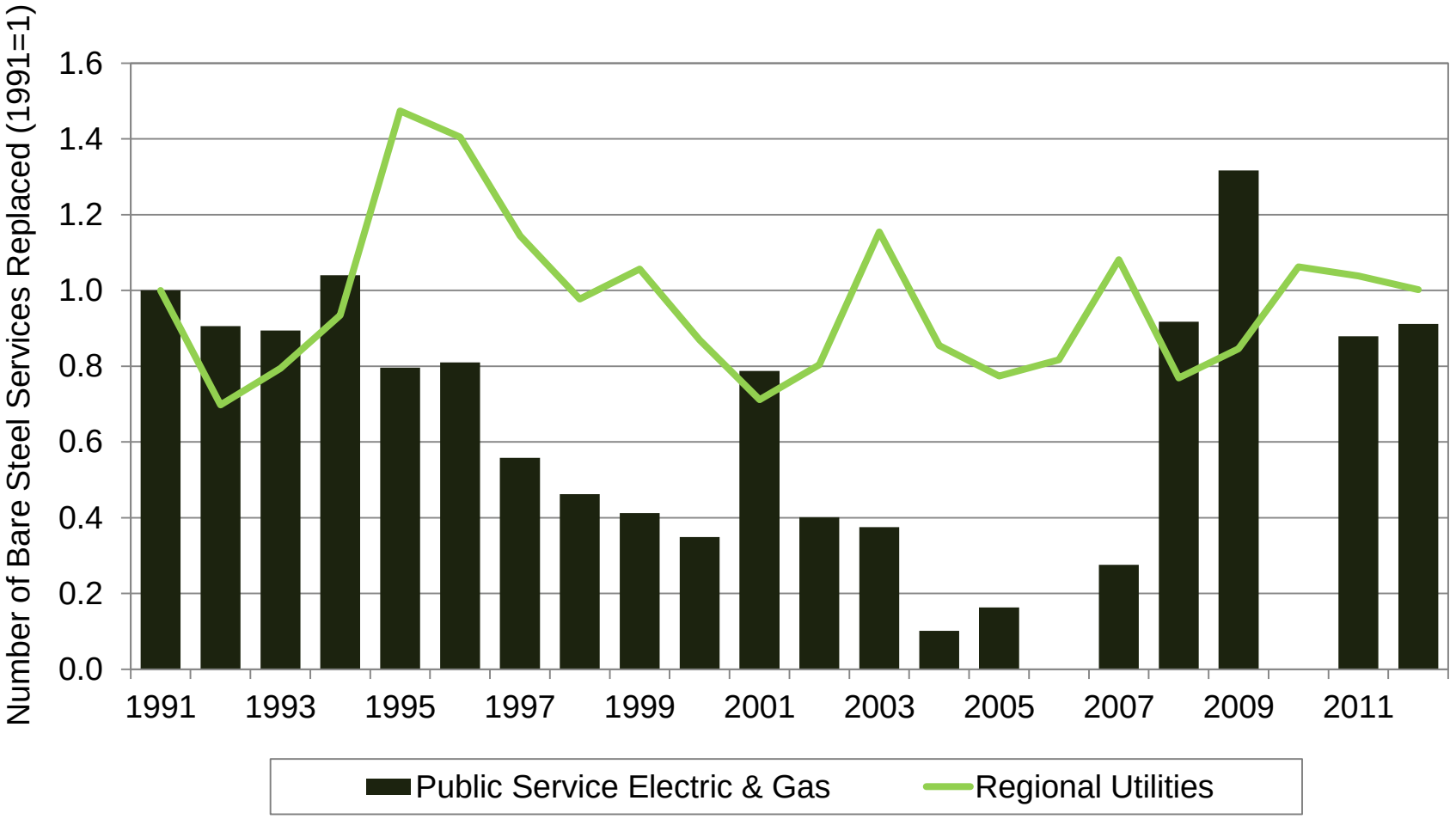
Source: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety.

Number of Leaks per Service Line and Bare Steel Services as a Percent of Total Public Service Electric & Gas and Regional Utilities, 2012



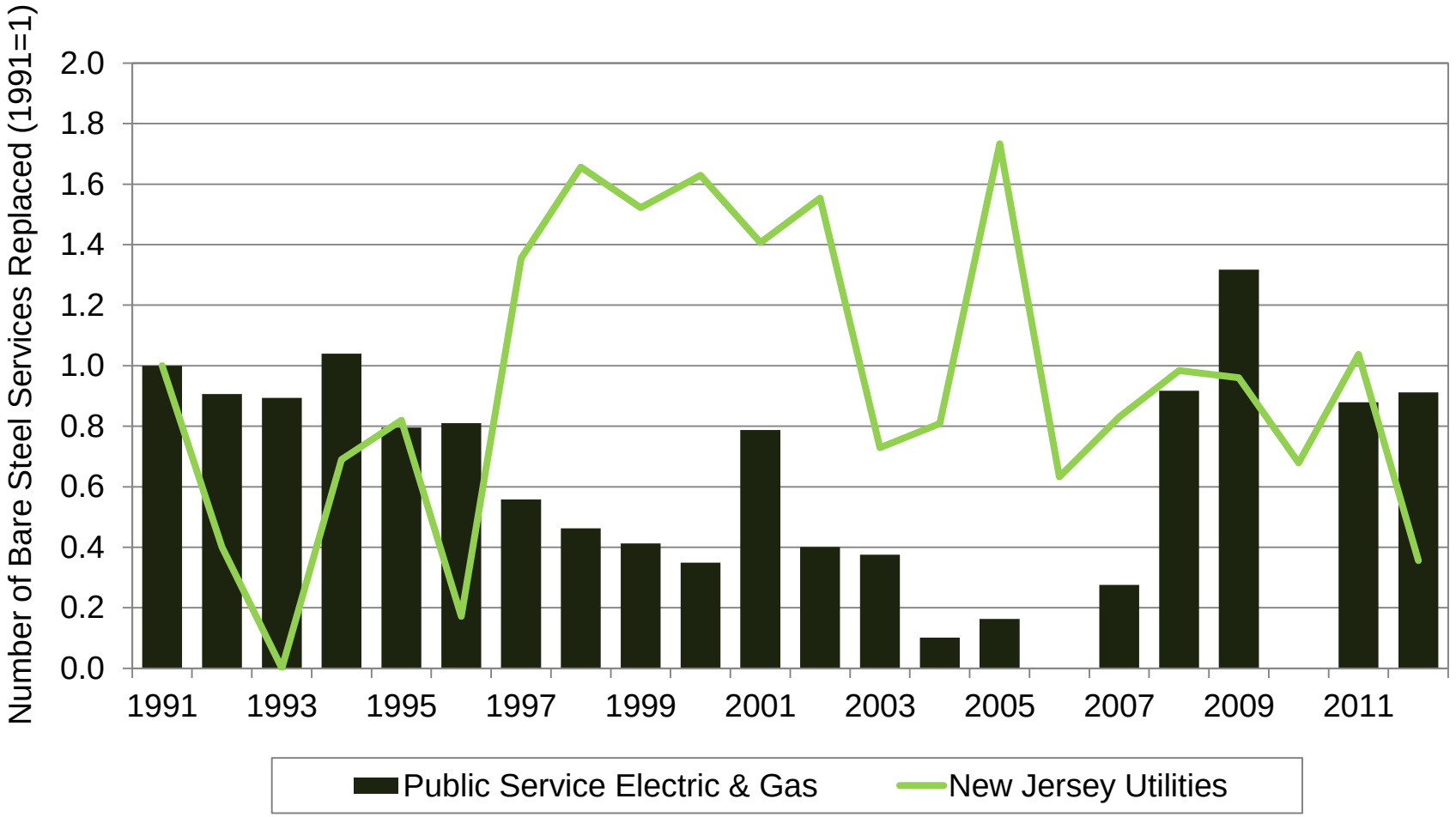
Note: Companies in the graph are ranked by "Bare Steel Service as a Percent of Total Services." Leaks are defined as corrosion-related only.
Source: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety.

Replacement of Unprotected Steel Services
Public Service Electric & Gas and Regional Utilities



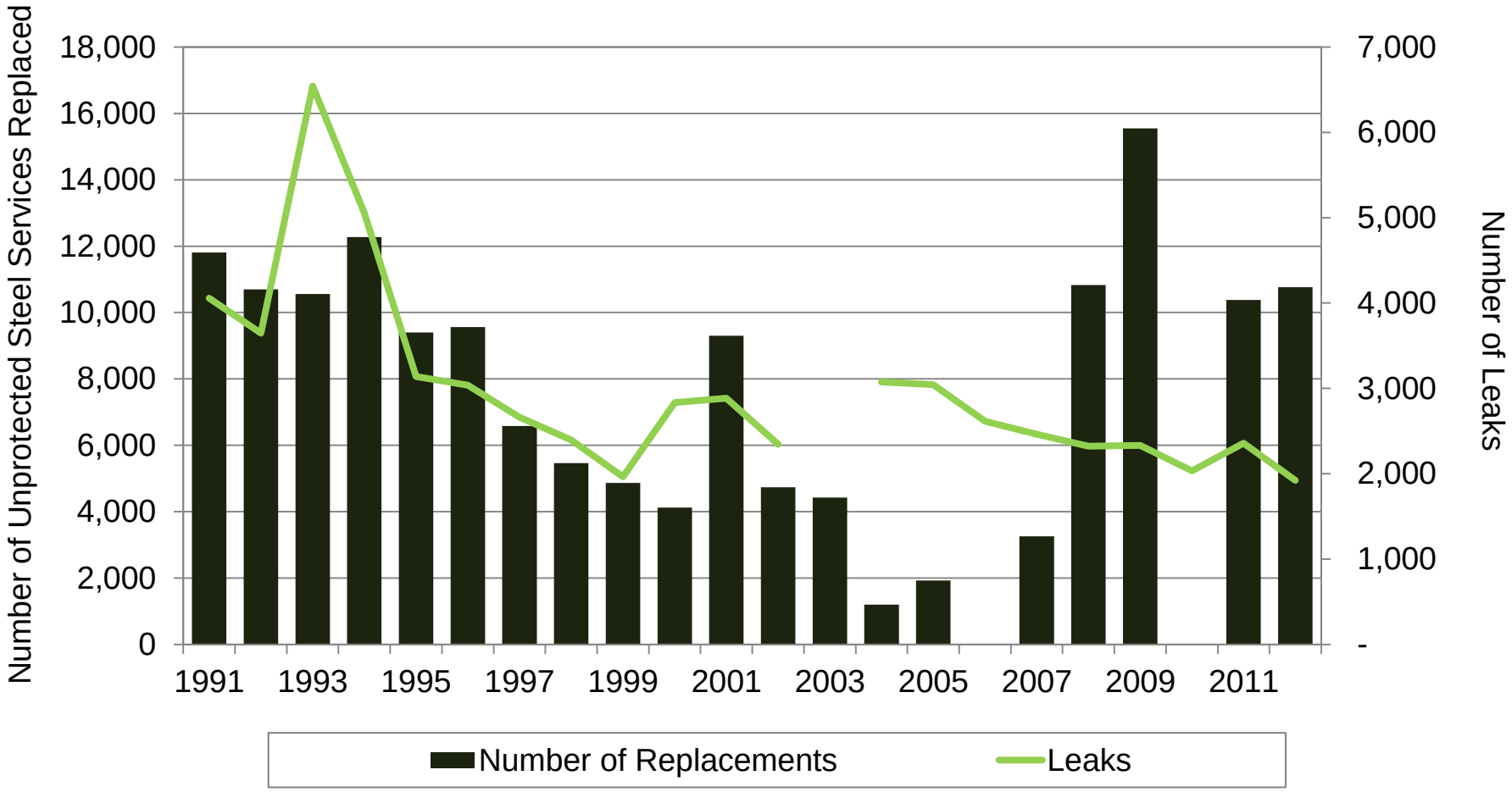
Note: There was no reported change in Public Service Electric & Gas' number of bare steel services between 2005 and 2006; and between 2009 and 2010; therefore there were no replacements. The statistics included in this chart are indexed to a common year, 1991 (i.e., replacement levels for all utilities equal 1.0 in that year). Source: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety.

Replacement of Unprotected Steel Services
Public Service Electric & Gas and New Jersey Utilities



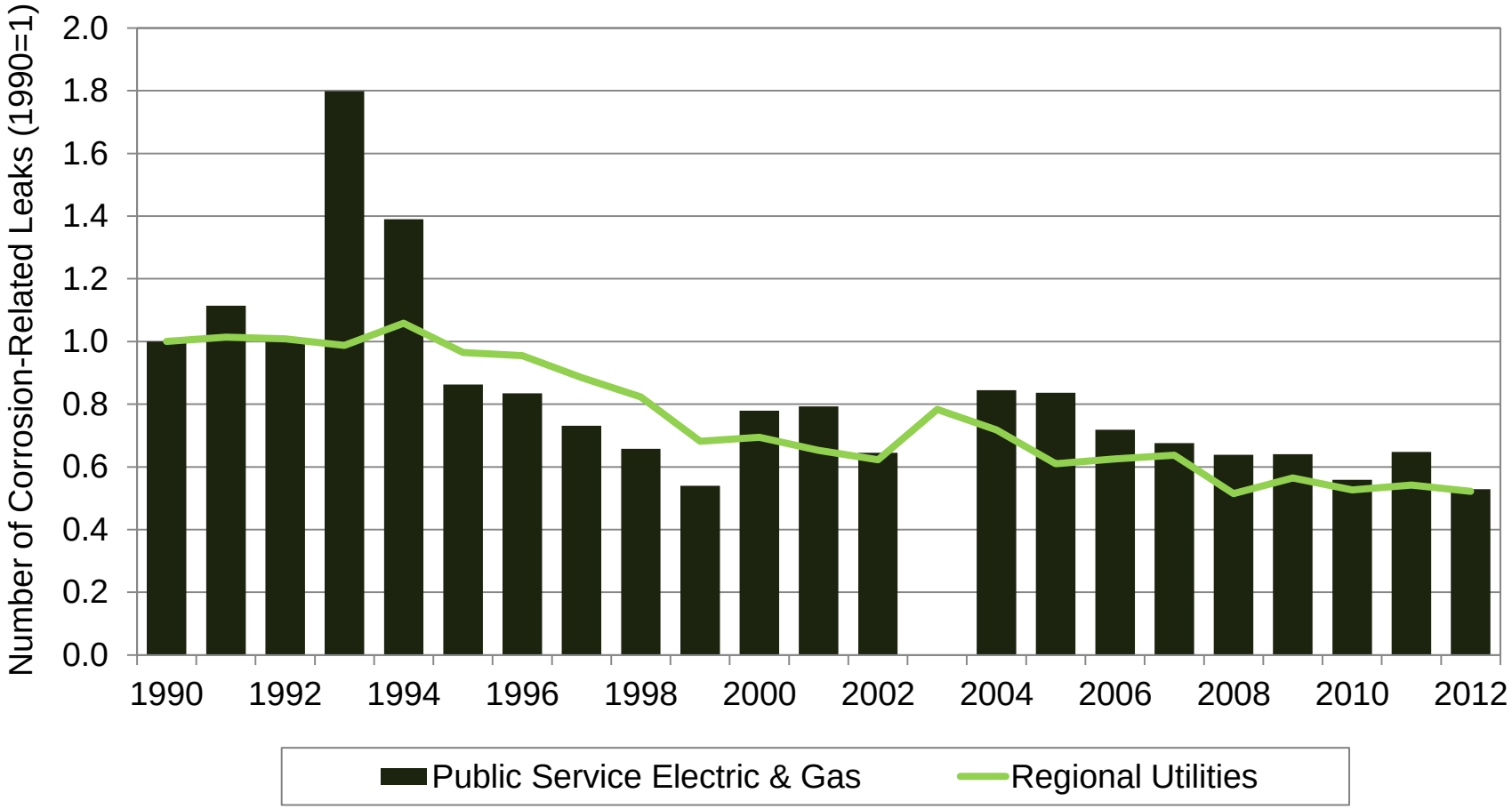
Note: There was no reported change in Public Service Electric & Gas' number of bare steel services between 2005 and 2006; and between 2009 and 2010; therefore there were no replacements. The statistics included in this chart are indexed to a common year, 1991 (i.e., replacement levels for all utilities equal 1.0 in that year). Source: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety.

Replacement of Unprotected Steel Services and Leaks
Public Service Electric & Gas



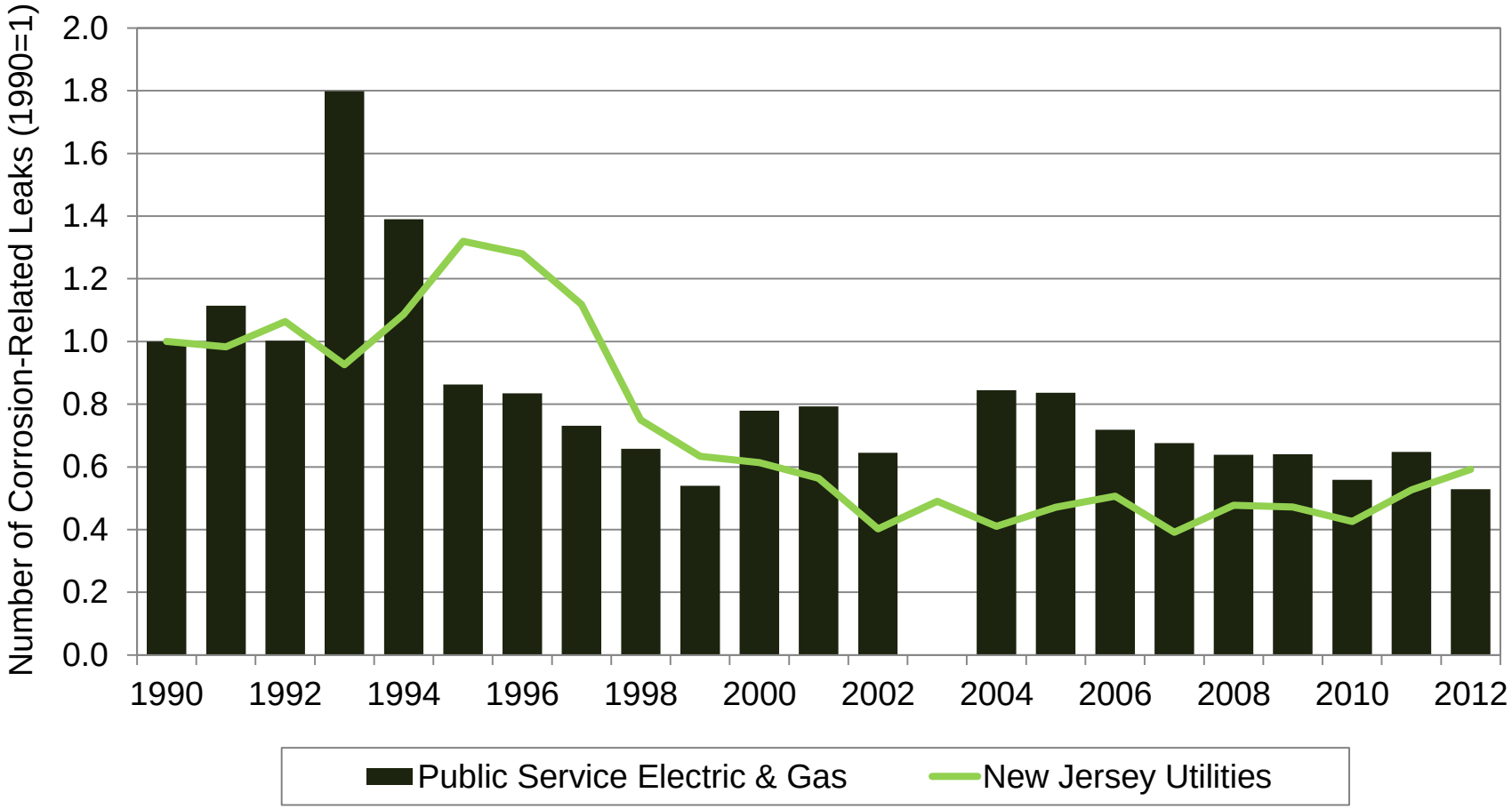
Note: There was no reported change in Public Service Electric & Gas' number of bare steel services between 2005 and 2006; and between 2009 and 2010; therefore there were no replacements. Leaks are defined as corrosion-related only. Public Service Electric & Gas did not report any leaks in 2003.
Source: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety.

Number of Service Leaks due to Corrosion
Public Service Electric & Gas and Regional Utilities



Note: Leaks are defined as corrosion-related only. Public Service Electric & Gas did not report any leaks in 2003. The statistics included in this chart are indexed to a common year, 1990 (i.e., replacement levels for all utilities equal 1.0 in that year). Source: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety.

Number of Service Leaks due to Corrosion
Public Service Electric & Gas and New Jersey Utilities

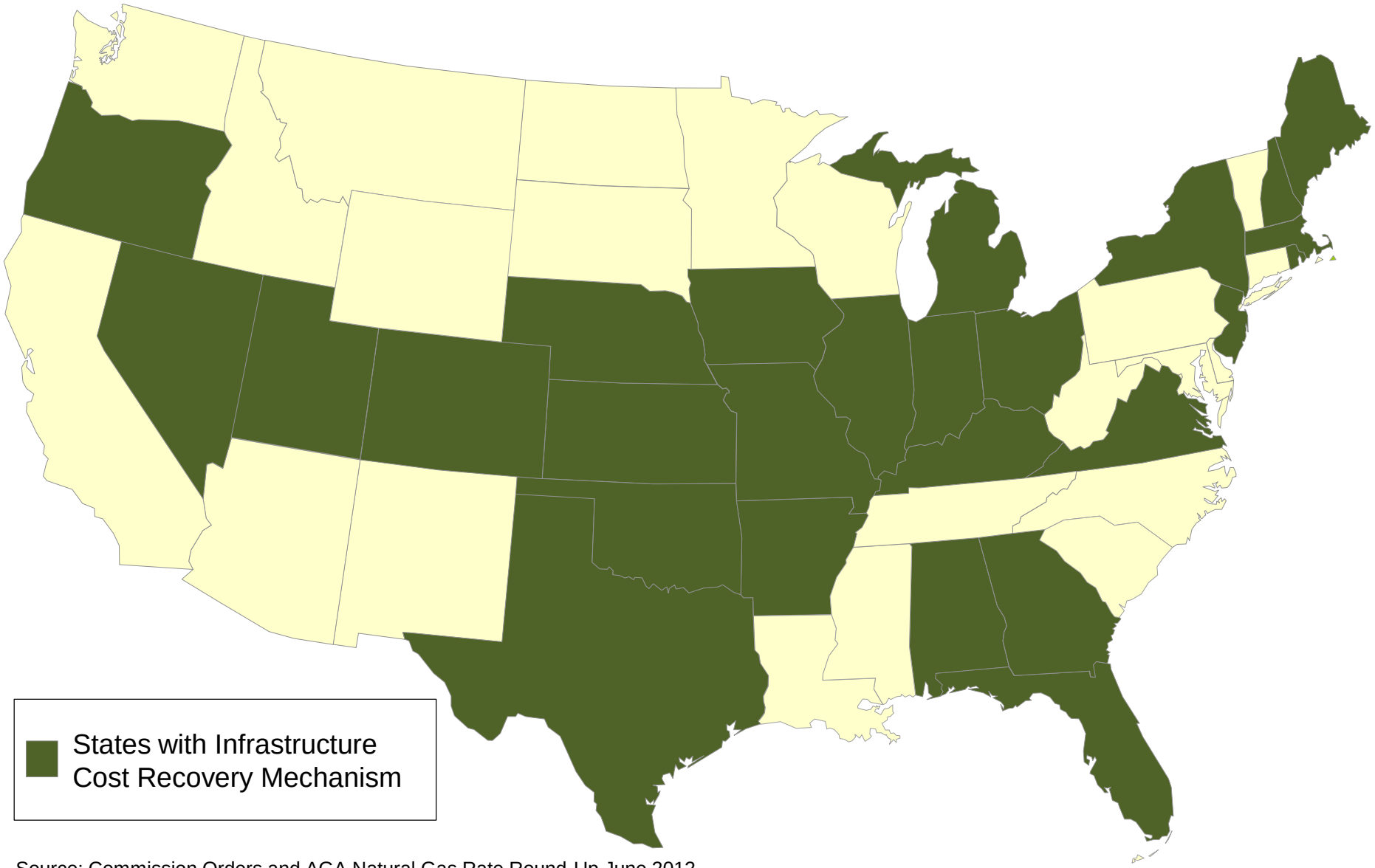


Leaks are defined as corrosion-related only. Public Service Electric & Gas did not report any leaks in 2004. New Jersey Utilities include New Jersey Natural Gas, South Jersey Gas, and Elizabethtown Gas. The statistics included in this chart are indexed to a common year, 1990 (i.e., replacement levels for all utilities equal 1.0 in that year). Source: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety.

Cost-Benefit Analysis of NGD Replacement Program

		Energy Strong
Replacement of Cast Iron Main (miles)		750.0
Replacement of Services (number)		40,000
Avoided Gas Losses (Mcf)		236,301
Program Benefits		
Rate Decrease for Reduced O&M		
O&M Offset per Mile ($/mile)	**$**	**778.84**
O&M Offset per Service ($/service)	**$**	**2.22**
Reduction for O&M Offset ($)	**$**	**672,913**
Rate Decrease for Gas Pass Through		
Natural Gas Price ($/Mcf)	$	6.96
Reduction for Gas Pass Through ($)	**$**	**1,643,599**
Reduction in GHG		
Global Warming Potential of Methane (tons)		111,156
RGGI 2011 Short Term Auction Price ($/ton)	$	1.89
Reduction in GHG ($)	**$**	**210,085**
Total Program Benefits	**$**	**2,526,597**
Program Cost		
Rate Increase for Infrastructure Replacement Spending	**$**	**97,003,797**
Program Cost Effectiveness		
Net Program Benefits	**$**	**(94,477,200)**
Benefit/Cost Ratio		**0.03**

States with Gas Infrastructure Cost Recovery Rate Mechanisms



Source: Commission Orders and AGA Natural Gas Rate Round-Up June 2012.

State Priority Main Shares

Region/State	Priority Main: Cast Iron	Priority Main: Unprotected Steel: Bare	Priority Main: Unprotected Steel: Coated	Total Miles of Main	Priority Main as a Percent of Total
	(miles)				(%)
Northeast					
CT	1,487.9	187.3	50.0	7,559.1	22.8%
MA	3,719.4	1,704.5	1,159.4	20,312.7	32.4%
ME	59.5	2.3	14.1	523.2	14.5%
NH	128.2	37.5	22.2	1,832.3	10.3%
NY	4,540.9	6,702.9	1,379.3	46,818.2	27.0%
RI	874.6	392.2	187.9	3,163.2	46.0%
VT	-	-	-	687.5	0.0%
Total Northeast	**10,810.4**	**9,026.6**	**2,812.9**	**80,896.3**	**28.0%**
Mid-Atlantic					
NJ	**5,137.5**	**1,732.0**	**786.7**	**33,646.1**	**22.8%**
PA	3,234.7	7,516.8	1,340.3	46,627.0	25.9%
MD	1,418.0	316.0	131.0	13,503.0	13.8%
DC	425.0	28.0	68.0	1,190.0	43.8%
DE	96.0	19.6	25.0	2,775.8	5.1%
WV	-	2,759.7	137.8	8,781.8	33.0%
VA	108.2	362.8	497.1	17,927.1	5.4%
Total Mid-Atlantic	**10,419.4**	**12,734.8**	**2,985.9**	**124,450.8**	**21.0%**
Southeast					
AL	1,106.5	337.2	516.8	13,240.5	14.8%
FL	116.1	696.9	3.4	13,890.8	5.9%
GA	17.0	141.6	-	32,369.5	0.5%
KY	89.2	734.9	-	13,722.9	6.0%
MS	-	-	-	10,866.6	0.0%
NC	-	-	-	25,375.2	0.0%
SC	-	-	-	12,094.7	0.0%
TN	20.9	74.3	-	8,017.8	1.2%
Total Southeast	**1,349.7**	**1,984.9**	**520.2**	**129,578.0**	**3.0%**

State Priority Main Shares

Region/State	Priority Main: Cast Iron	Priority Main: Unprotected Steel: Bare	Priority Main: Unprotected Steel: Coated	Total Miles of Main	Priority Main as a Percent of Total
	(miles)				(%)
Midwest					
IL	1,832.3	173.1	5.5	57,971.6	3.5%
IN	321.5	819.3	173.8	38,223.9	3.4%
MI	3,152.8	591.7	1,926.2	54,533.9	10.4%
MN	65.0	517.9	196.0	27,024.4	2.9%
OH	687.2	7,427.7	2,814.8	53,293.2	20.5%
WI	-	-	-	36,551.0	0.0%
Total Midwest	**6,058.9**	**9,529.6**	**5,116.3**	**267,598.0**	**7.7%**
Southwest					
AR	166.0	809.1	26.0	19,796.1	5.1%
LA	441.0	9.0	-	19,593.0	2.3%
NM	-	12.0	1.0	11,373.1	0.1%
OK	-	1,283.9	12.3	22,186.7	5.8%
TX	927.0	4,274.0	155.2	80,798.3	6.6%
Total Southwest	**1,534.0**	**6,388.0**	**194.5**	**153,747.2**	**5.3%**
Central					
CO	46.6	139.4	646.3	32,849.6	2.5%
IA	17.9	76.4	120.6	16,402.6	1.3%
KS	106.8	705.8	0.3	20,414.6	4.0%
MO	1,180.3	5.0	-	24,088.6	4.9%
MT	-	9.4	-	6,673.3	0.1%
NE	26.0	141.0	-	8,892.7	1.9%
ND	-	-	-	2,965.9	0.0%
SD	21.6	7.0	1.2	4,271.4	0.7%
UT	-	-	-	16,255.2	0.0%
WY	-	-	-	3,959.3	0.0%
Total Central	**1,399.1**	**1,084.0**	**768.4**	**136,773.3**	**2.4%**
Western					
AZ	-	-	-	22,046.6	0.0%
CA	115.0	5,567.0	2,464.0	102,840.3	7.9%
ID	-	-	-	7,921.7	0.0%
NV	-	-	1.0	9,763.5	0.0%
OR	-	16.0	-	15,306.0	0.1%
WA	28.0	30.0	14.0	21,433.7	0.3%
Total Western	**143.0**	**5,613.0**	**2,479.0**	**179,311.7**	**4.6%**

Source: U.S Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety.

Infrastructure Cost Recovery Mechanisms

State	Company	Recovery Mechanism - Gas/ Electric	Date of Decision	Decision Type	Mechanism	Term/ Period	Limited Recovery / Revenue Cap	Expenditures Limited / Capped	Deferrals	Carrying Charges on Investment	Carrying Charges on Deferrals	Deferral-Based Cost Recovery	O&M Offset	Reduced Rate of Return	Reliability Benchmarks
Electric/Gas Utilities															
FL	Florida Public Utilities Company	Gas	9/24/2012	Order	Gas Reliability Infrastructure Program	2013-2023									
KS	Midwest Energy	Gas	5/28/2009	Order	Gas System Reliability Surcharge	n.a.	XXX								
KY	Louisville Gas and Electric Company	Gas	12/20/2012	Order	Gas Line Tracker	2013-2017									
MO	Union Electric Company/AmerenUE	Gas	2/26/2008	Order	Infrastructure System Replacement Surcharge	n.a.	XXX								
NH	Northern Utilities, Inc./Unitil	Gas	7/21/1992	Settlement	Bare Steel Replacement Program	1992-2017									
NJ	Public Service Electric & Gas	Electric/Gas	4/28/2009 & 7/14/2011	Settlement	Capital Infrastructure Investment Program	2009-2013			XXX	XXX					
NY	National Grid - Niagara Mohawk	Gas	9/17/2007	Order	Capital Tracker	2008-2012		XXX	XXX	XXX					XXX
OR	Avista	Gas	3/10/2011	Settlement	Incremental Rate Adjustment	2012-2013				XXX		XXX			
RI	National Grid	Gas	9/12/2011	Order	Infrastructure, Safety, and Reliability Provision/ Distribution Adjustment Clause	Annually									
Gas-Only Utilities															
AL	Mobile Gas Service Corporation	Gas	11/27/1995	Order	Cast Iron Main Replacement Factor	30 years									
AR	CenterPoint Energy Arkla	Gas	5/31/2006	Settlement	Main Replacement Program Rider	2006-2026							XXX		
CO	Colorado Natural Gas, Inc.	Gas	3/18/2011	Settlement	Capital Expenditure Rider	2011-2014		XXX						XXX	
CO	Public Service Co. of Colorado	Gas	7/8/2011	Settlement	Pipeline System Integrity Adjustment	2012-2014		XXX	XXX	XXX					
DC	Washington Gas Light	Gas	12/16/2009	Settlement	Vintage Coupling Replacement and Encapsulation Program	7 years		XXX							
FL	Peoples Gas System	Gas	9/18/2012	Order	Cast Iron/Bare Steel Pipe Replacement Rider	2013-2023									
FL	Florida Division of Chesapeake Utilities Corporation	Gas	9/24/2012	Order	Gas Reliability Infrastructure Program	2013-2023									
GA	Atmos Energy	Gas	12/14/2000	Order	Accelerated Pipe Replacement Program	15-20 years							XXX		

Infrastructure Cost Recovery Mechanisms

State	Company	Recovery Mechanism - Gas/ Electric	Date of Decision	Decision Type	Mechanism	Term/ Period	Limited Recovery / Revenue Cap	Expenditures Limited / Capped	Deferrals	Carrying Charges on Investment	Carrying Charges on Deferrals	Deferral-Based Cost Recovery	O&M Offset	Reduced Rate of Return	Reliability Benchmarks
GA	Atlanta Gas Light	Gas	9/3/1998 & 10/6/2009	Settlement & Order	Pipeline Replacement Program Cost Recovery Rider/STRIDE	2009-2022							XXX		
IA	Black Hills Energy	Gas	3/15/2013	Order	Capital Infrastructure Investment Automatic Adjustment Mechanism	n.a.				XXX					
IL	Peoples Gas Light and Coke Company	Gas	1/21/2010	Order	Infrastructure Cost Recovery Rider	2010-2030	XXX						XXX		
IN	Vectren North - Indiana Gas	Gas	2/13/2008	Settlement	Distribution Replacement Adjustment	20 years		XXX	XXX	XXX		XXX			
IN	Vectren South - SIGECO	Gas	8/1/2007	Settlement	Distribution Replacement Adjustment	20 years		XXX	XXX	XXX		XXX			
KS	Atmos Energy	Gas	5/12/2008 & 12/11/2009	Settlement	Gas System Reliability Surcharge	n.a.	XXX								
KS	Black Hills (formerly Aquila Networks)	Gas	7/15/2008	Settlement	Gas System Reliability Surcharge	n.a.	XXX								
KS	Kansas Gas Service	Gas	12/18/2008	Order	Gas System Reliability Surcharge	n.a.	XXX								
KY	Atmos Energy	Gas	5/28/2010	Settlement	Pipe Replacement Program Rider	n.a.							XXX		
KY	Columbia Gas	Gas	10/26/2009	Settlement	Accelerated Main Replacement Program Rider	n.a.							XXX		
KY	Delta Natural Gas	Gas	10/21/2010 & 8/24/2012	Order	Pipe Replacement Program Surcharge	n.a.							XXX		
MA	Bay State Gas	Gas	10/30/2009	Order	Targeted Infrastructure Recovery Factor	15-20 years	XXX		XXX				XXX		XXX
MA	National Grid Gas	Gas	11/2/2010	Order	Targeted Infrastructure Recovery Factor	10 years	XXX		XXX				XXX		
MA	New England Gas	Gas	3/31/2011	Order	Targeted Infrastructure Recovery Factor	15 years	XXX		XXX				XXX		
ME	Northern Utilities, Inc./Unitil	Gas	7/30/2010	Settlement	Cast Iron Replacement Program	2011-2027	XXX		XXX		XXX		XXX		XXX
MI	DTE Gas Company (formerly Michigan Consolidated Gas Company)	Gas	4/16/2013	Order	Infrastructure Recovery Mechanism	2013-2017							XXX		
MI	Semco Energy	Gas	12/22/2011	Settlement	Main Replacement Program Rider	2012-2017				XXX			XXX		
MO	Atmos Energy	Gas	10/31/2008	Order	Infrastructure System Replacement Surcharge	n.a.	XXX								
MO	Laclede Gas	Gas	6/4/2004 & 7/19/2007	Settlement	Infrastructure System Replacement Surcharge	n.a.	XXX								
MO	Missouri Gas Energy	Gas	2/26/2004	Order	Infrastructure System Replacement Surcharge	n.a.	XXX								
NE	SourceGas Distribution LLC	Gas	6/25/2013	Order	Pipeline Replacement Charge	n.a.	XXX								

Infrastructure Cost Recovery Mechanisms

State	Company	Recovery Mechanism - Gas/ Electric	Date of Decision	Decision Type	Mechanism	Term/ Period	Limited Recovery / Revenue Cap	Expenditures Limited / Capped	Deferrals	Carrying Charges on Investment	Carrying Charges on Deferrals	Deferral-Based Cost Recovery	O&M Offset	Reduced Rate of Return	Reliability Benchmarks
NH	EnergyNorth	Gas	7/12/2007	Settlement	Cast Iron Bare Steel Replacement Program	n.a.									
NJ	Elizabethtown Gas	Gas	4/28/2009 & 5/16/2011	Settlement	Utility Infrastructure Enhancement Program	2009-2012				XXX		XXX			
NJ	Elizabethtown Gas	Gas	8/21/2013	Settlement	Accelerated Infrastructure Replacement Program	2013-2017		XXX		XXX		XXX			XXX
NJ	New Jersey Natural	Gas	4/28/2009 & 3/30/2011	Settlement	Accelerated Energy Infrastructure Investment Program	2009-2012				XXX		XXX			
NJ	New Jersey Natural	Gas	10/23/2012	Settlement	Safety Acceleration and Facility Enhancement Program	2013-2017		XXX		XXX		XXX			XXX
NJ	South Jersey Gas	Gas	4/28/2009 & 5/1/2012	Settlement	Capital Investment Recovery Tracker	2009-2012				XXX		XXX			
NJ	South Jersey Gas	Gas	2/20/2013	Settlement	Accelerated Infrastructure Replacement Program	2013-2017		XXX		XXX		XXX			XXX
NV	Southwest Gas Corporation	Gas	9/7/2011	Settlement	Strip Reliability Plan	n.a.				XXX		XXX			
NY	Corning Natural Gas	Gas	1/25/2011	Order	Limited Pipeline Replacement Cost Recovery Mechanism	10-15 years from 2012						XXX			XXX
OH	Dominion Energy	Gas	10/15/2008	Order	Pipeline Infrastructure Replacement Program	5 years							XXX		
OH	Duke Energy	Gas	5/30/2002	Settlement	Accelerated Main Replacement Program	Annually	XXX			XXX		XXX	XXX		
OH	Columbia Gas of Ohio	Gas	12/3/2008	Settlement	Infrastructure Replacement Program Rider	5 years	XXX		XXX	XXX	XXX		XXX		
OH	Vectren Ohio	Gas	1/7/2009	Settlement	Distribution Replacement Rider	5 years	XXX			XXX			XXX		
OK	Oklahoma Natural Gas	Gas	8/31/2007	Settlement	Integrity Management Program	Annually						XXX			
OR	NW Natural	Gas	3/1/2009	Settlement	System Integrity Program	2009-2021		XXX	XXX				XXX		
TX	Atmos Energy	Gas	2003	Statute	Gas Reliability Infrastructure Program	n.a.						XXX			
TX	CenterPoint Energy	Gas	2003	Statute	Gas Reliability Infrastructure Program	n.a.									
TX	Texas Gas Service	Gas	2003	Statute	Gas Reliability Infrastructure Program	n.a.									
UT	Questar Gas	Gas	6/3/2010	Settlement	Infrastructure Replacement Adjustment	3 years		XXX		XXX		XXX			
VA	Washington Gas Light	Gas	4/21/2011	Order	SAVE Plan/Rider	2011-2014		XXX		XXX					
VA	Columbia Gas of Virginia	Gas	11/28/2011	Order	SAVE Plan/Rider	2012-2016		XXX		XXX					
VA	Virginia Natural Gas, Inc.	Gas	6/25/2012	Order	SAVE Plan/Rider	2012-2016		XXX		XXX					

Source: Commission Orders and AGA Natural Gas Rate Round-Up June 2012.