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November 19, 2012

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**VIA FEDERAL EXPRESS FILING**

Rosemary Chiavetta, Secretary  
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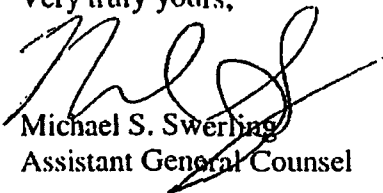
Re: **Comments of PECO Energy Company on the Commission's Proposed Rulemaking Order; Docket No. L-2012-2294746**

Dear Secretary Chiavetta:

Enclosed please find a copy of PECO Energy Company's ("PECO's") Comments in the above-referenced docket.

If you have any questions, feel free to contact me directly at (215) 841-4220.

Very truly yours,

  
Michael S. Swerling  
Assistant General Counsel

Enclosures

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BEFORE THE

PENNSYLVANIA PUBLIC UTILITY COMMISSION

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ESTABLISHING A UNIFORM  
DEFINITION AND METRICS FOR  
UNACCOUNTED-FOR-GAS

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Docket No. L-2012-2294746

**COMMENTS OF PECO ENERGY COMPANY  
ON THE COMMISSION'S PROPOSED RULEMAKING ORDER**

**I. INTRODUCTION**

On June 7, 2012, the Commission entered a Proposed Rulemaking Order ("Proposed Order") in Docket No. L-2012-229474. If it became final, the Proposed Order would establish uniform definitions and metrics for measuring Lost and Unaccounted For Gas ("UFG")<sup>1</sup> and would establish cost recovery targets for UFG.<sup>2</sup> In the Proposed Order, the Commission stated that it was seeking to achieve uniformity in the measurement and reporting of UFG because the available evidence suggests that natural gas distribution companies ("NGDCs") are not currently consistent in how they define and measure UFG, which can lead to inconsistencies in how UFG is addressed in their respective rate proceedings.<sup>3</sup> In the Proposed Order, the Commission recognized that there will always be some measure of gas lost on each NGDC's' distribution system and, therefore, stated that the goal of the Proposed Order is to minimize the financial impact on customers of UFG to the extent practical.

<sup>1</sup> As the Proposed Order states, "UFG is the difference between the amount of gas delivered to the NGDC [by interstate pipeline companies] and that used [by] or sold [to]...the NGDC's customers." (Proposed Order at 1).

<sup>2</sup> The Proposed Order established a UFG cost recovery cap that decreases by a pre-determined amount each year over a period of five years. The cap starts at 5% in year one and ends at 3% in year five. If an NGDC's UFG level exceeds the applicable cap level in a year, it cannot recover from ratepayers the cost of gas for UFG in excess of the cap.

<sup>3</sup> The Commission has found that "NGDCs often report [L]UFG based upon their own definition, which vary from company to company, resulting in inconsistent reporting. See *Unaccounted-for-Gas in the Commonwealth of Pennsylvania Report*, p. 6.

Interested parties were invited to file comments within 30 days after publication of the Tentative Order in the *Pennsylvania Bulletin*. Accordingly, comments are due no later than November 19, 2012. PECO Energy Company (“PECO” or “the Company”) commends the Commission for taking steps to help NGDCs proactively address UFG. In that regard, it should be noted that PECO developed its own comprehensive Lost and Unaccounted For Gas Plan and Report (“UFG Plan and Report”) in order to proactively deal with UFG.<sup>4</sup> PECO supports the Commission’s efforts to establish uniform definitions and metrics for measuring UFG, and offers the following comments for the Commission’s consideration.

## II. COMMENTS

PECO agrees with the Commission that it is important to try to achieve, to the maximum practical extent, industry-wide uniformity in measuring, defining and calculating UFG. The data collected in Table 1 on page 9 of the Proposed Order exhibit a degree of variability from company to company that raises concerns about the how NGDCs are measuring and reporting UFG, even considering the differences among the various types of distribution companies within the Commonwealth. For example, PECO agrees with the Commission that negative UFG levels should not exist.<sup>5</sup> However, the Proposed Order raises some important concerns for PECO, which arise, at least in part, from the lessons PECO learned from developing its UFG Plan and Report in 2011 and 2012. Specifically, PECO is concerned that:

- 1) The Commission is setting cost recovery targets based on industry information that, as the Commission has found, is, or very likely may be, inaccurate and/or measured and reported inconsistently from company to company, which makes it very likely that the “targets” the Commission proposes to establish

---

<sup>4</sup> A copy of PECO’s UFG Plan and Report is attached to these Comments as Exhibit A.

<sup>5</sup> Table 1 on page 9 shows that certain NGDCs (Columbia Gas of Pennsylvania, Natural Fuel Gas Distribution Company, UGI Utilities and UGI – Penn Natural Gas) have reported negative levels of UFG in some years, which would appear not to be possible because distribution systems cannot generate more gas than is received from the interstate pipeline companies. Even allowing for a degree of “meter slippage,” one would not expect to see a full annual measurement of UFG to be negative.

are themselves inaccurate and inconsistent with properly measured and reported levels of UFG;

- 2) The Commission proposes to calculate UFG over a 12-month period ending December 30 (i.e., in the middle of the heating season), which PECO believes introduces unacceptable volatility to the annual calculation due to weather and billing variables;
- 3) The Commission has not spelled out in sufficient detail how the limits on cost recovery for UFG above the specified targets will operate in light of its acknowledgment that it will have authority and discretion to approve the recovery of gas costs in excess of the specified "targets." See (proposed) 52 Pa. Code § 59.111(c)(3); and
- 4) The definition for *adjustments* does not provide NGDCs with flexibility to include adjustments that reflect appropriate uses of gas but are not specifically delineated in the definition.

To address these concerns, PECO makes the following recommendations:

- 1) The Commission should gather consistently reported information on UFG measured on the basis of the proposed new uniform metrics and definitions before attempting to set any recovery "targets" because the currently proposed targets, which the Commission derived from currently-reported LGC levels, are, or very likely may be, based upon incorrect information;
- 2) UFG should be calculated over a period of not less than twelve months ending June 30 to eliminate the impact on UFG of weather and billing conditions that introduce unacceptable volatility to data measured for annual periods ending December 31;
- 3) The Commission should clarify that the phrase "unless approved by the Commission" in proposed Section 59.111(c)(3) implements Commission and appellate court precedent that was developed with regard to the recovery of the cost of unaccounted for water and provides that the "target" for what might be considered unacceptable levels of "unaccounted for" establishes a rebuttable presumption that can be overcome by company-specific evidence showing that an NGDC's UFG is "normal and reasonable." See *Pa. P.U.C. v. Dauphin Consolidated Water Co.*, 55 Pa. P.U.C. 202 (1981), upon remand from *Dauphin Consolidated Water Co. v. Pa. P.U.C.*, 423 A.2d 1357 (Pa. Cmwlth. 1980); and
- 4) The definition of *adjustments* should be revised to allow NGDCs to make adjustments for important factors not currently listed in the definition.

**A. Reliable, Consistently Reported Data Are Needed Before Cost Recovery Targets Can Be Established**

The Proposed Order states, in relevant part, as follows:

The inconsistency among definitions has also introduced errors within reported UFG levels. As presented in Table 1 and the discussion on GCR companies below, various NGDCs have reported negative UFG. Since a closed system cannot spontaneously generate gas, the negative UFG suggests a flaw in the measurement, calculation or definition of UFG. (Proposed Order at 7.)

PECO agrees that the data shown on Table 1 raise serious concerns about the variability in measurement and reporting methods being employed by NGDCs in Pennsylvania. Indeed, as the Commission noted, negative annual UFG amounts reported by some NGDCs appear to be *prima facie* evidence that the reported data are either unreliable or reflect reporting metrics that are outside the range of reasonableness. PECO also agrees that uniformity in the definition and calculation of UFG will produce reliable, consistently reported data for the Commission's consideration and use. For that reason, PECO does not agree that the Commission should attempt, as it did in the Proposed Order, to develop "targets" for cost recovery before a reliable data base exists.

While PECO understands that the financial impact of UFG on customers is real, basing recovery caps on facially questionable data would, in PECO's view, only make the problem worse. Accordingly, the Commission should gather reliable, consistently reported information on UFG using the uniform metrics, definitions and methods of calculation outlined in the Proposed Order for a period of at least two years, before attempting to set recovery targets. As the Commission stated in the Proposed Order (p. 12), it derived its proposed multi-year "targets" from the band of UFG percentages set forth in Table 1. At the same time, as discussed above, the Commission acknowledged that the data in Table 1 are, or may be, inaccurate and almost

certainly reflect inconsistent approaches to defining, measuring and reporting UFG percentages. Proposed Order at 7. Developing a data base of reliable, consistently measured and reported UFG percentages before attempting to identify a reasonable range of UFG will provide greater assurance that there is a sound empirical basis for what the Commission is doing. Additionally, developing at least two years of reliable, consistently reported data will provide NGDCs the time they need to identify the actual drivers of their UFG and develop proactive approaches to focus upon those UFG drivers that hold real potential for achieving meaningful reductions in UFG.

This is an important lesson PECO learned from the work it did to develop its UFG Plan and Report, which took approximately a year to complete. If, after reviewing a sound data base of reliable, consistently reported UFG data, the Commission decides to adopt cost-recovery targets, it will have the opportunity to establish targets that take into account the practical limits on UFG mitigation exhibited by sound data and empirical analyses of that data. Additionally, to the extent that that other NGDCs follow PECO's example and proactively address UFG by adopting and implementing a comprehensive UFG plan during the two-year data gathering period, the reported data would likely be purged of high-end outliers, just as consistent reporting will, PECO believes, purge the data of low-end (and negative) outliers.

In summary, PECO recommends that the Commission create a two-year window for NGDCs to implement the new, uniform measurement and reporting requirements, identify major UFG drivers and develop mitigation plans before attempting to establish "targets" to limit cost recovery.

**B. The Calculation of UFG Should Be Based Upon Three Year Periods ending June 30**

The Proposed Order would require NGDCs to calculate UFG over a 12-month period ending December 31. PECO disagrees with this recommendation because it will introduce

unacceptable volatility to UFG measurements and cause large swings in UFG due to weather and other billing variables that NGDCs cannot control. Instead, UFG should be calculated over annual periods or 3 year average periods ending June 30, which would eliminate these concerns. The unacceptable consequences of using reporting periods ending December 31 are demonstrated by the data reported in Table 1 of the Proposed Order. Using the Annual Report and DOT data reported for the years 2005 through 2010, PECO compared the year-to-year changes in UFG rates for each utility. PECO's comparison is attached hereto as Exhibit B. As shown on PECO Exhibit B, the average year-to-year change in UFG rates based on the Annual Report data (which are reported for periods ending December 31), is 1.32 percentage points per year. By contrast, the average year-to-year change in UFG rates based on the DOT data (which are reported for periods ending June 30), is 0.58 percentage points per year.

The higher volatility exhibited by the Annual Report data is driven by higher volumes of through-put in the winter heating seasons, which magnify the difference in timing between the calendar month meter readings for purchases of gas and the meter read cycles for PECO's sale or distribution of gas. In other words, a utility, in any given year, could experience changes in reported UFG of 1.32 percentage points, which could result in a 43% swing in reported UFG in either direction of the proposed 3.00% recovery cap target, simply due to weather and meter read cycles – conditions over which NGDCs have no control.

The better approach to reduce the impact of weather and differential meter reading/billing periods for purchases and sales is to use the DOT approach, which calculates UFG for 12 months ending June 30. An annual period ending June 30 (i.e., when there is not high, weather-driven through-put) eliminates most of the volatility that weather introduces to a measurement based on

periods ending December 31. The DOT method dampens weather-related volatility and provides a more accurate and more stable measurement of UFG.

In addition to changing the end-point of the measurement period, PECO also believes that the best way to calculate UFG is the method that many NGDCs in Pennsylvania have adopted for reporting UFG in their Section 1307(f) purchased gas cost proceedings, namely, using a weighted average for a three-year period ending June 30.<sup>6</sup> Use of a three-year average will also contribute to dampening the volatility exhibited by data for a single year that is attributable due to the effects of weather and meter-read timing. Thus, using multiple-year data for DOT reporting periods would provide the clearest picture of an NGDC's actual performance while also lessening an NGDC's possible exposure to a financial penalty (if cost-recovery "targets" were adopted) that could be attributable solely to the effects of weather and billing-related volatility. Use of a multi-year reporting period will also track the approach for reporting UFG that has already been developed by NGDCs and accepted by stakeholders in various Section 1307(f) proceedings. Therefore, PECO requests that the Commission use a three-year average to assess an NGDC's performance in addressing UFG and, whether a one-year or three-year reporting period is used, have the reporting period end on June 30.

**C. The Commission Should Clarify That Its Proposed UFG Targets Do Not Operate As An Automatic Bar To Recovering Gas Costs For UFG Above The Target, But, Instead Create a Rebuttable Presumption That NGDCs May Overcome By Presenting Evidence In Their Section 1307(f) Proceedings Showing That Their UFG Levels Are Appropriate And Reasonable In Light Of Company-Specific Factors**

Proposed Section 59.111(c)(3) reads as follows:

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<sup>6</sup> A number of NGDCs in the Commonwealth already utilize a 3 year weighted average in calculating UFG as developed in their respective PGC settlements, including Columbia Gas of Pennsylvania, Dominion Peoples, Equitable National Fuel, PECO, Peoples Natural Gas Company, Peoples TW Philips LLC and UGI Utilities Inc.



Amounts of UFG in excess of the standard may not be recovered within the current or a future PGC or GCR filing *unless approved by the Commission.* (Emphasis added.)

It appears that, with the addition of the phrase “unless approved by the Commission,” the Commission has, correctly in PECO’s view, acknowledged that its proposed cost-recovery “targets” should not establish a bright-line test and should not impose automatic cost-disallowance for UFG above the target. Rather, the Commission appears to be embodying an approach similar to what it adopted in its water conservation guidelines, which provide, as to “unaccounted-for water,” as follows:

*Unaccounted-for water.* Levels of unaccounted-for water should be kept within reasonable amounts. Levels above 20% have been considered by the Commission to be excessive. (52 Pa.Code § 65.20(4).)

Section 65.20(4) reflects applicable precedent that was first developed with respect to the water industry but is equally applicable to gas utilities’ UFG. In *Dauphin Consolidated Water Co. v. Pa. P.U.C.*, 423 A.2d 1357 (Pa. Cmwlth. 1980), the Commonwealth Court reviewed a Commission decision that disallowed a portion of Dauphin Consolidated’s operating expenses because its unaccounted-for water percentage was higher than that of other subsidiaries within its parent’s holding company system and, based on that statistical analysis, the Commission decided that Dauphin Consolidated’s level of unaccounted-for water was unreasonable. The Commonwealth Court held it was not proper for the Commission to disallow expenses by reference to a measure of unaccounted-for water that did not consider relevant, system-specific characteristics that might distinguish Dauphin Consolidated from the Commission’s comparison group, such as “divergent service areas, plants in service and operation problems.” Accordingly, the Court vacated the Commission’s Order and sent the case back to the Commission to consider appropriate company-specific factors.

In its 1981 decision on remand, the Commission considered the specific guidelines the Court had laid down and explained how, consistent with the Court's mandate, it would assess unaccounted-for water in subsequent rate cases for Dauphin Consolidated and other water utilities:

The question that must be answered in each case is whether a given utility's percentage is as low as possible consistent with sound operations practices and industry practice. We are cognizant of the fact that there is no science of unaccounted for water management, and that the benefit of reduction must be weighed against the costs of additional maintenance and system surveillance to achieve such reductions.

\* \* \*

In the future, water companies with experienced unaccounted-for water of more than 20% should be prepared to demonstrate that their experience is both normal and reasonable. Such evidence may be a combination of engineering, operations, or historical testimony and data, but should consist of something more than unsupported or conclusory opinions by company witnesses.

The *Dauphin* case makes it clear that when water companies have experienced unaccounted-for water levels of more than 20%, they would be expected to provide credible evidence demonstrating that their unaccounted-for water levels are normal and reasonable for them or, failing to present such evidence, would not be permitted to recover the cost of producing the excess unaccounted-for water. Thus, the Commission created a rebuttable presumption regarding the reasonableness of unaccounted for water levels based on its 20% benchmark.

The way in which a water utility could successfully rebut the Commission-created presumption was demonstrated in *Pa. P.U.C. v. Fawn Lake Forest Water Company*, Docket No. R-912117 (Order issued August 31, 1992). In that case, the utility's unaccounted-for water was

38.4%, and the Office of Trial Staff (“OTS”) proposed an adjustment that would have disallowed the production cost of unaccounted-for water above 20%. After referring to its Policy Statement and the *Dauphin* case, the Commission rejected the OTS adjustment finding that the 38.4% was reasonable for Fawn Lake Forest Water Company:

Our review of the record in the instant proceeding indicates that the Respondent has provided substantial and credible evidence concerning the Company’s significant efforts to control unaccounted-for-water levels and the reasons for the Respondent’s actions.

\* \* \*

Accordingly, we shall grant the Company’s exception wherein it asserts that there is no justification for penalizing the Company for having an unaccounted-for-water level in excess of 20%.

PECO believes that the best course of action for dealing with UFG is to follow the approach the Commission adopted to comply with the Commonwealth Court’s directives in *Dauphin Consolidated, supra*. Once the Commission determines what the appropriate UFG target(s) should be for each year in the five-year transition to its end-state UFG target, then proposed 52 Pa.Code § 59.111(c)(3) should be revised to read:

Unaccounted-for gas should be kept within reasonable levels. Levels above the applicable annual targets set forth in Section 52.111(c)(1) will be presumed to be excessive absent evidence to the contrary. If an NGDC’s actual UFG exceeds such an applicable target, that NGDC should be prepared to demonstrate that its experience is both normal and reasonable for it.

Therefore, PECO respectfully requests that the Commission clarify its proposed Section 52.111(c)(3) by adopting the revision proposed by PECO, above.

**D. The Definition Of Adjustments Should Be More Inclusive And Flexible**

Proposed Section 52.111(a), in laying out the definition of UFG, authorizes certain “adjustments,” which it defines as follows:

All gas used by a NGDC or city natural gas distribution operation for safe and reliable service, such as company use, calculable losses from construction, purging, other temperature and pressure adjustments, and adjustments for heat content of natural gas. Adjustments shall be supported by metered data, sound engineering practices, or other quantifiable results that clearly support the utility’s need for the adjustment and shall be consistent from filing to filing.

The proposed definition does not provide NGDCs necessary flexibility to include adjustments that reflect appropriate uses of gas but are not specifically delineated in the definition. Therefore, to provide the necessary flexibility, PECO recommends that the Commission include the phrase “*and all other adjustments an NGDC considers necessary, subject to approval by the Commission in Section 1307(f) proceedings.*”

Including the phrase proposed by PECO will allow NGDCs to make adjustments for the following important factors not currently listed in the definition:

1. Typographical Errors/Manual Data Entry Controls – If mistakes are made in the actual calculation of UFG, NGDCs should be allowed to make the necessary corrective adjustments.
2. Transportation Imbalances - PECO’s High Volume Transportation (“HVT”) customers, are billed monthly for deliveries. Suppliers purchase and deliver gas to HVT customers in approximate quantities based on the daily and monthly needs of each HVT customer. Because PECO’s tariff allows for certain levels of tolerances/imbalances between gas delivered and gas actually burned by HVT customers, these tolerances/imbalances can impact on UFG. NGDCs should be allowed to make appropriate adjustments for this contributor to UFG.

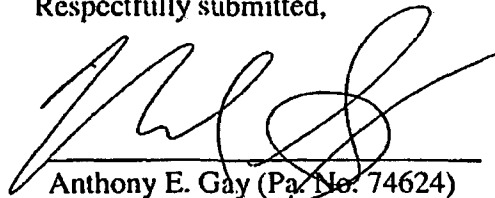
3. **Weather/Temperature Conditions** – To account for weather/temperature differences between billing and calendar periods, PECO believes that UFG should be adjusted to account for unexpected swings in UFG.

Regarding the above-mentioned contributors to UFG, PECO recommends that the Commission include a phrase that affords NGDCs the necessary flexibility to make necessary and appropriate adjustments, subject to the Commission's approval.

### III. CONCLUSION

PECO appreciates the opportunity to comment on this important matter and requests that the Commission favorably consider, and adopt, its comments.

Respectfully submitted,



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November 19, 2012

*For PECO Energy Company*

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**PA PUBLIC UTILITY COMMISSION  
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**EXHIBIT A**

**PECO Energy Company  
Lost and Unaccounted For Gas Plan and Report  
2012**

**Prepared by:  
Carlos P. Thillet  
Manager Gas Supply & Transportation  
June 1, 2012**

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**I. INTRODUCTION**

**A. PECO's System:**

PECO Energy Company ("PECO" or "the Company") serves approximately 1.6 million electric and 494,000 natural gas customers and is one of the largest combination utility companies in Pennsylvania. PECO's gas system consists of 6,703 miles of distribution mains and 31 miles of transmission lines<sup>1</sup>.

PECO's gas system is located in the southeast corner of Pennsylvania and serves the four-county area surrounding the City of Philadelphia and a portion of Lancaster County. Because this is not a gas-producing region, PECO and its natural gas customers depend on the interstate natural gas pipeline system to deliver natural gas into PECO's distribution system. PECO does not have any underground storage facilities in its distribution system. However, it has two on-system peak-shaving facilities (PECO's Liquid Natural Gas ("LNG") facility located in West Conshohocken, Pennsylvania and its propane facility located in Chester, Pennsylvania), which are typically utilized during the winter months to meet high peak demand.

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<sup>1</sup> PECO's gas transmission pipelines transport high pressure natural gas (greater than 100 psig) in pipelines that deliver natural gas to the following locations in PECO's distribution system up to the indicated Maximum Allowable Operating pressures:

- 8 inch Cromby Pipeline (1,467 psig)
- 16 inch Eddystone Pipeline (813 psig)
- 6 inch and 12 inch Merck Pipelines (833 psig and 1,000 psig respectively)
- 16 inch Central Avenue Pipeline to Tilghman Street Gas Plant (800 psig)
- 8 inch and 10 inch USX Pipelines (607 psig and 700 psig respectively)

PECO has 38 gate stations at which it receives natural gas from various interstate pipeline companies. Texas Eastern Transmission, LP ("Texas Eastern"), Transcontinental Gas Pipe Line Corporation ("Transco") and Eastern Shore Natural Gas Company ("Eastern Shore") are the three interstate natural gas pipelines that deliver gas directly to PECO's city gates. In addition, Dominion Transmission, Inc. ("Dominion"), Equitrans, Inc. ("Equitrans") and Panhandle Eastern Pipe Line Company ("PEPL") provide upstream transportation and natural gas storage services, which PECO uses to meet winter daily and peaking requirements. These transportation and storage services require intermediate transportation services from Texas Eastern and Transco to deliver storage gas and other flowing gas supplies to the PECO gas distribution system.

**B. 2011 Joint Petition for Complete Settlement:**

Pursuant to the Joint Petition for Complete Settlement ("Joint Petition") that resolved PECO's Section 1307(f) Purchased Gas Cost rate investigation at Docket No. R-2011-2239263, which was approved by the Commission on October 28, 2011, PECO prepared this Lost and Unaccounted For Gas Plan and Report ("Plan and Report") to identify potential sources of Lost and Unaccounted for Gas ("LUGF") and to address ways in which LUGF may be mitigated.

**C. Existing Programs and Procedures to Control LUGF:**

PECO has in place a number of initiatives to help prevent and control LUGF that predate this Plan and Report. PECO's principal existing LUGF prevention and control programs are outlined below:

**1.) Distribution Integrity Management Plan ("DIMP") - PECO manages all of its natural gas distribution facilities in a safe and responsible manner in order to ensure pipeline reliability and meet the requirements of the U.S. Department of Transportation's pipeline safety regulations at 49 CFR Part 192, including but not limited to Subpart P, which requires gas distribution companies to prepare and implement a Distribution Integrity Management Plan ("DIMP"). PECO's DIMP categorizes and ranks high risk pipes and similar facilities for replacement each year. Specifically, PECO's plan complies fully with the requirements set forth at 49 CFR § 192.1007 to:**

- 1. Demonstrate knowledge of the distribution system;**
- 2. Consider threats to each pipeline;**
- 3. Evaluate and rank pipeline risks;**
- 4. Address risks and manage leaks;**
- 5. Measure performance, monitor results, and evaluate effectiveness;**
- 6. Re-evaluate threats and risks; and**
- 7. Annually report on measures.**

Through its DIMP, PECO reviews many factors affecting its distribution system to determine an appropriate risk mitigation strategy. This strategy includes, but is not limited to, a review of viable repair techniques in addition to those it already employs, a rerouting of supplies, and other system operational changes. By working in this manner, PECO leverages other system facility strengths to provide a better, safer and more reliable overall gas distribution system.

**2.) Transmission Integrity Management Plan ("TIMP") – PECO manages all of its natural gas transmission facilities in a safe and responsible manner in order to ensure**

pipeline reliability and to meet the requirements of the U.S. Department of Transportation's pipeline safety regulations at 49 CFR Part 192.

Specifically, PECO's Transmission Integrity Management Plan ("TIMP") complies fully with the requirements set forth at 49 CFR § 192.911 to:

1. Identify High Consequence Areas ("HCA");
2. Create a Baseline Assessment Plan;
3. Identify, prioritize and mitigate threats to each covered pipeline segment;
4. Create a direct assessment plan, depending on the threats assessed;
5. Remediate conditions found during integrity assessments;
6. Continuously evaluate risks and conditions;
7. Create a plan for confirmatory direct assessments;
8. Add preventive and mitigative measures to protect HCAs;
9. Develop a performance plan under ASME/ANSI B31.8S, section 9;
10. Perform record keeping;
11. Manage change processes as outlined in ASME/ANSI B31.8S, section 11;
12. Ensure quality assurance processes as outlined in ASME/ANSI B31.8S, section 12;
13. Develop a communication plan that includes the elements of ASME/ANSI B31.8S, section 10;
14. Implement procedures for submitting risk analysis or integrity management programs for review;
15. Ensure that each integrity assessment minimizes environmental and safety risks; and
16. Develop a process for identifying and assessing newly-identified HCAs.

Through its TIMP, PECO designs, constructs, operates, maintains, and manages all of its natural gas transmission pipeline facilities to avoid failures or other incidents that could affect public or employee safety, or which could generate service interruptions.

3.) **Accelerated Gas Infrastructure Modernization Program ("AGIMP")** - In 2011, PECO began accelerating the existing infrastructure modernization program for its gas distribution network, after assessing the age, composition and leak history of its system infrastructure. Prior to that acceleration, PECO replaced approximately thirteen

miles of cast iron and bare steel mains per year. At that rate, it would have taken approximately 82 years for PECO to repair or replace all of its then-existing cast iron and bare steel mains.

PECO's AGIMP accelerates the repair or replacement of targeted gas infrastructure (determined on the basis of pipe material and size, pressure level, and location) to achieve full replacement over approximately the next 30 years. This initiative considers cast iron mains, bare steel mains and bare steel services to be the type of pipes that should be targeted for accelerated replacement. These facilities were installed between the late 1890s and the 1960s, and, while the cast iron and bare steel mains comprise only 14% (in length) of PECO's system, they are responsible for approximately 83% of the gas leaks experienced in a typical year. PECO deems cast iron pipe to be high-risk because cast iron, though relatively strong, is vulnerable to breaks from ground movement, which can occur from cycles of freezing and thawing of the surrounding soil. Bare steel pipe is vulnerable to galvanic corrosion.

To successfully implement this program, PECO will substantially increase its annual capital investment. Prior to the implementation of AGIMP in the second half of 2011, PECO allocated approximately \$14 million of its Gas Division's annual capital budget to the repair and replacement of cast iron and bare steel mains and bare steel services. Under its accelerated plan, the Company has increased that amount by up to \$20 million, so that once the program reaches a steady state in 2012, PECO will be investing approximately \$34 million on replacing these types of facilities on an annual basis.

At this level of investment, PECO estimates that it will be able to replace its highest-priority mains and services in about 10 years.<sup>2</sup> In addition, as previously noted, at this level of investment, PECO estimates that it will be able to repair or replace all of its cast iron and bare steel mains in approximately 30 years. Because PECO's AGIMP program will replace PECO's oldest and riskiest pipes, it is expected to have a positive impact on reducing line losses from leaks and breaks. PECO estimates that it will realize a total 0.04% LUFG reduction over the next 5 years as a result of the AGIMP program.

4.) **Damage Prevention Program** – PECO has in place a Damage Prevention Program that complies with Pennsylvania Act 187 (“PA One Call Law”) and the U.S. Department of Transportation’s regulation 49 CFR § 192.614, which is designed to prevent excavation or demolition work from damaging underground pipelines. The program aims to proactively educate excavators and the general public about the need for safety during excavation projects. Educational efforts focus on the PA One Call Law and PECO’s *Energy Underground Construction Standards*. In addition to educational efforts, PECO also maintains, tracks and analyzes damage data to identify trends that can help reduce damage due to excavation work on the PECO system.

5.) **Leak Detections and Surveys** - PECO is able to better control physical line losses by proactively patrolling pipes for leaks to repair and by responding to gas odor emergency calls quickly (within 1 hour). PECO’s Leak Survey plan complies with 49

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<sup>2</sup> PECO’s highest-priority cast iron is pipe that: (1) is less than eight inches in diameter; (2) operates at elevated pressure; and (3) is located in areas with greater population density and under extensively paved surfaces. Bare-steel services make up our highest priority bare-steel pipes, as they are in the closest proximity to customers’ homes and businesses.

CFR §§ 192.706 and 192.723 and 52 Pa.Code § 59.33. The Leak Survey plan applies to all of PECO's natural gas transmission pipelines, distribution mains, and service lines. Pursuant to the plan, PECO safely classifies, records and remedies leaks that are found. Pipe Inspection/Leak Repair Reports are retained for the life of the facility and aid PECO in determining when the main may need to be replaced. PECO's Gas Odor Response program also ensures timely responses and remedial measures for gas emergency odor calls.

6.) **Response to and Classification of Leaks – PECO's Classification of Leaks** procedure complies with the U.S. Department of Transportation's regulations 49 CFR §§ 192.605, 192.613 and 192.703 and provides guidelines and instructions for qualified personnel charged with responding to and classifying natural gas leaks. Through PECO's concentrated efforts over the past several years, it has significantly improved the gas leak response and repair process. This included significant management focuses involving specific yearly work-down goals with indicators to monitor performance. On average, PECO responds to and repairs 3,500 gas leaks each year.

Pursuant to PECO's existing leak classification procedure, PECO has not experienced any backlogs for its Class 1 and 2 leaks. However, PECO previously experienced a backlog for its Class 3 leaks and its procedure helped reduce that backlog. For instance, PECO reduced its Class 3 Leaks from 1,040 in 2003 to fewer than 200 beginning in 2007. By the end of 2011, PECO had further reduced its Class 3 leaks to 168, which is approximately what PECO considers as a steady state for Class 3 leaks.

7.) **Meter Testing Programs** – PECO currently tests its existing Automatic Meter Reading (“AMR”) meter population through its *Random and Periodic Sampling* programs. Pursuant to these programs, PECO randomly and periodically selects a set amount of meters each year to test for accuracy and viability. The data collected is reviewed and analyzed to verify compliance with 52 Pa. Code § 59.21. If any meters are found to be inaccurately capturing customer usage, a new meter is installed and the billing is corrected in accordance with Commission regulations.

**D. PECO’s LUFG Reduction Plan & Report:**

All of the above-described initiatives are performed year-round and assist PECO in reducing operational losses. However, as with all aspects of its operations, PECO continuously seeks opportunities to improve or optimize its efforts. As such and to comply with the Joint Petition, PECO developed this Plan and Report to identify potential sources of LUFG and determine feasible mitigation strategies.

As part of this Plan and Report, PECO identified the principal potential contributors to LUFG and developed action plans to address each LUFG driver, as warranted. Where appropriate and practicable, PECO also will track and measure its LUFG reduction progress for relevant sources of LUFG. In sum, this Plan and Report contains comprehensive descriptions, mitigation plans and results for each identified LUFG driver.

The comprehensive data contained in this Plan and Report resulted from an investigation of the possible situations in which gas could be physically or numerically<sup>3</sup>

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<sup>3</sup> In this Plan & Report, “numerical” LUFG refers to losses associated with non-physical drivers such as metering and calculation/billing errors that contribute to LUFG.



lost on PECO's distribution system (from pipeline receipt points to customer meters and bills). The Plan and Report stemmed from the efforts of a Company-wide, cross-functional team, which met regularly since last year's 1307(f) settlement to investigate and mitigate all possible LUFG drivers and challenges. The team, headed by PECO's Chief Operating Officer, consisted of members from various Company departments including Gas Supply & Transportation, Gas System and Control, Gas New Business, Gas Asset Management & Performance, Billing, Revenue Protection, Finance, Customer Field Operations, Meter Services, Rates & Regulatory, Information Technology, Process Improvement, and Legal. The results of PECO's investigation will be more fully described in Section II of this Plan and Report.

**E. LUFG on PECO's System:**

Historically, PECO has calculated its LUFG percentage in the following manner:

**Before:**

$$1 \sim \frac{\text{Billed Retail Sales}}{(\text{DPL Sendout} + \text{Plant Sendout}^4) - (\text{Total Transportation Sendout}^5 + \text{Low Volume Transportation Sendout})}$$

In general, as historically calculated, PECO's LUFG percentage was the difference between billed retail sales and retail sendout (not including transportation customers). However pursuant to this Plan and Report, PECO surveyed most of the gas

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<sup>4</sup> Plant Sendout equals High Volume Transportation, Low Volume Transportation shopping and retail non-shopping customers.

<sup>5</sup> Total Transportation Sendout equals High Volume Transportation and Low Volume Transportation shopping customers.

utilities in Pennsylvania and determined that for all surveyed, they include both retail and transportation customers in their LUFG calculations. Therefore to be consistent with other Pennsylvania gas utilities, PECO has revised its LUFG calculation to include both retail and transportation volumes in the following manner:

**After:**

$1 - (\text{Billed Retail Sales} + \text{Billed Transportation Sales})^6 / (\text{DPL Sendout} + \text{Plant Sendout})$

PECO's new LUFG includes transportation sales and sendout. PECO is adjusting its calculation to include transportation volumes so that the LUFG calculation is inclusive of PECO's entire system (retail and transportation), not just the retail side of the business. This helps standardize and align PECO's LUFG with the industry.

**F. Charted Progress of PECO's 2012 LUFG Reduction Plan & Report:**

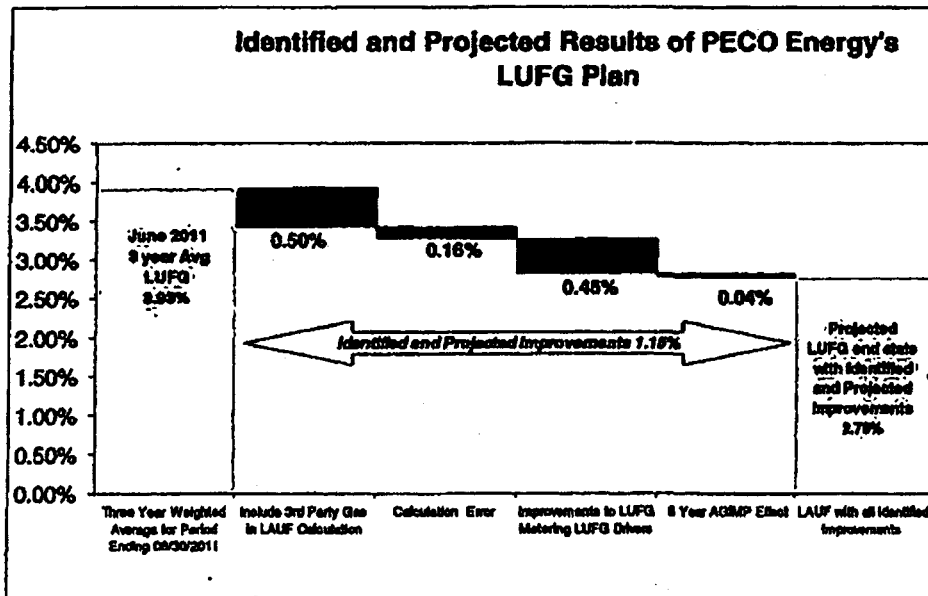
As discussed in more detail below, after identifying various LUFG drivers and developing appropriate mitigation plans in its LUFG investigation, PECO believes that its reported LUFG of approximately 3.93% (the 3-year weighted average ending June 2011) for 2011 would be reduced to approximately 2.80% by 2014 and 2.78% by 2016, all things being equal, due to:

1. Revising the LUFG calculation to include both retail and transportation sendout achieved a 0.50% reduction
2. Correcting an error in how LUFG was previously reported achieved a 0.16% reduction

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<sup>6</sup> Billed Transportation Sales equals High Volume Transportation and Low Volume Transportation shopping customers.

3. Resolving various metering contributors to LUFG achieved an estimated 0.45% reduction (which will be fully realized by 2014)<sup>7</sup>
4. Implementing the new AGIMP program will achieve an anticipated 0.04% reduction over the next five years (which will be fully realized by the end of 2016)



The first bar is the 3-year weighted LUFG percentage as reported in the 2011 PGC Filing. The next four bars show the effect of LUFG mitigation plans or projected improvements based on this Plan and Report. The sixth bar shows the projected steady state by applying the total projected improvements to the 3-year weighted LUFG percentage as reported in the 2011 PGC Filing. (AGIMP assumes five years of program infrastructure replacements applied to the 3 year LUFG rate).

The information contained in the rest of this Plan and Report provides the support for the mitigation efforts described above as well as analyses of other drivers for which

<sup>7</sup> The extent of this estimated improvement is highly dependent on variable factors such as weather conditions. For instance, cold weather can increase the amount of broken meters, as well as the average usage for each meter. Because of such uncertainties, PECO is attributing a range in which the 3 year average percentage for metering drivers may fluctuate. The range predicts that the LUFG percent for these drivers will fluctuate approximately between 0.20% and 0.65% (with a median of 0.45%). Thus, the LUFG range for metering drivers is approximately between = 3.00% (2.78% + 0.25%) and 2.60% (2.78% - 0.20%), all other things being equal. Please note that PECO rounded these percentages.

LUGF reductions are not practicably achievable or for which no further mitigation actions are warranted, such as:

1. Components of Operational Fuel Use
2. Direct Pipe Line Customer Billing Accuracy
3. Intra-Company Gas Use
4. Venting of Gas Mains
5. Transportation Imbalances
6. New Customer Connects/Missing Information to Activate Accounts
7. Delivery/Meter Pressure
8. Potential Theft of Service

**II. LUGF DRIVERS, MITIGATION PLANS AND LUGF IMPACTS:**

The LUGF drivers discussed below stem from the results of PECO's LUGF investigation and would form the basis for future mitigation efforts that are in addition to the previously identified programs and procedures that PECO utilizes on a regular basis to control LUGF.

**A. Excluding Transportation Gas in LUGF Calculation (0.50% Reduction)**

**Description**

In the past, PECO's LUGF calculation only included natural gas for retail sales and deliveries. The calculation did not include any gas for transportation sales and deliveries for PECO's High Volume Transportation ("HVT") customers, which account

for 30% of PECO's total system sendout. PECO's 2011 LUFG calculation is set forth in the table below.

**PECO's 2011 LUFG Calculation (Retail Only)**

**1 Year Average (Retail) Sendout Ending June 2011:**

1 – Historical Retail Sendout (Mcf) between July 2010 and June 2011 / Historical Retail Billed Sales (Mcf) between July 2010 and June 2011 = LUFG for Retail Customers for the 12 months ending June 2011

$$1 - 61,228,456 \text{ Mcf} / 59,283,606 \text{ Mcf} = 3.2\%$$

**3 Year Average (Retail) Sendout Ending June 2011:**

1 – Historical Retail Sendout (Mcf) between July 2008 and June 2011 / Historical Retail Billed Sales (Mcf) between July 2008 and June 2011 = LUFG for Retail Customers for the 36 months ending June 2011

$$1 - 61,468,506 \text{ Mcf} + 57,670,538 \text{ Mcf} + 61,228,456 \text{ Mcf} / 58,878,795 \text{ Mcf} + 55,111,171 \text{ Mcf} + 59,283,606 \text{ Mcf} = 3.93\%$$

**Mitigation Plan**

As part of its LUFG investigation, PECO surveyed how other Pennsylvania Natural Gas Distribution Companies ("NGDC") calculated their LUFG percentages and determined that they included total billed volumes (retail and transportation) in their LUFG calculations.

Accordingly, PECO decided that beginning with its Section 1307(f) filing in 2012, it would include both retail and transportation sendout to calculate LUFG as follows.

**PECO's 2011 LUGF Calculation (Combined Retail & Transportation)**

**1 Year Combined Average (Retail & Transportation) Sendout Ending June 2011**

1 – Historical Combined Sendout (Mcf) between July 2010 and June 2011 /  
Historical Combined Billed Sales (Mcf) between July 2010 and June 2011 =  
Combined LUGF for Retail & Transportation Customers for the 12 Months ending  
June 2011

$$1 - 93,509,913 \text{ Mcf} / 91,488,499 \text{ Mcf} = 2.2\%$$

**3 Year Combined Average (Retail & Transportation) Sendout Ending June 2011**

1 – Historical Combined Sendout (Mcf) between July 2008 and June 2011 /  
Historical Combined Billed Sales (Mcf) between July 2008 and June 2011 =  
Combined LUGF for Retail & Transportation Customers for the 36 Months ending  
June 2011

$$1 - 89,370,238 \text{ Mcf} + 86,371,414 \text{ Mcf} + 93,509,913 \text{ Mcf} / 86,307,582 \text{ Mcf} + 82,212,388 \text{ Mcf} + 91,488,499 \text{ Mcf} = 3.43\%$$

**Impact on LUGF**

By combining both Retail and Transportation sendout, PECO's LUGF percentage is reduced by 0.50% for its 3 year weighted average reported in the 2011 filing (LUGF percentage dropped from 3.93% to 3.43% as calculated in the table below).

**Difference between PECO's 2011 Retail Only Calculation and the Combined Retail & Transportation Calculation**

**3 Year Average (Retail) Sendout Ending June 2011:**

1 – Historical Retail Sendout (Mcf) between July 2008 and June 2011 / Historical Retail Billed Sales (Mcf) between July 2008 and June 2011 = LUFG for Retail Customers for the 36 months ending June 2011

$$1 - 61,468,506 \text{ Mcf} + 57,670,538 \text{ Mcf} + 61,228,456 \text{ Mcf} / 58,878,795 \text{ Mcf} + 55,111,171 \text{ Mcf} + 59,283,606 \text{ Mcf} = 3.93\%$$

Versus

**3 Year Combined Average (Retail & Transportation) Sendout Ending June 2011**

1 – Historical Combined Sendout (Mcf) between July 2008 and June 2011 / Historical Combined Billed Sales (Mcf) between July 2008 and June 2011 = Combined LUFG for Retail & Transportation Customers for the 36 Months ending June 2011

$$1 - 89,370,238 \text{ Mcf} + 86,371,414 \text{ Mcf} + 93,509,913 \text{ Mcf} / 86,307,582 \text{ Mcf} + 82,212,388 \text{ Mcf} + 91,488,499 \text{ Mcf} = 3.43\%$$

$$3.93\% - 3.43\% = 0.50\%$$

**B. Typographical Error/ Manual Data Entry Controls (0.16% Reduction)**

**Description**

In addition to reviewing the components of its LUFG calculation, PECO also reviewed its previously reported LUFG numbers and found that, due to an inadvertent typographical error made in its Produced and Purchased Report ("P&P Report")<sup>8</sup>, it had incorrectly reported its 2009-2011 LUFG as a higher percentage than actual. The

<sup>8</sup> The P&P Report aggregates all distribution system receipts into a single report. The sendout data contained in the report composes the denominator of PECO's LUFG calculation.

discrepancy resulted in PECO overstating volumes received from the pipeline by 450,277 Mcf.

**Mitigation Plan**

Although this was a singular event, PECO has implemented certain controls (in addition to existing calculation checks and reviews that PECO performs in the normal course) to ensure that such errors do not repeat. For instance, PECO plans to review its calculation (including all monthly components involved in the 3 year average) a second time prior to including it in each future PGC filing. More specifically, PECO has implemented the following controls.

1. PECO's Gas System Operations department, which is responsible for inputting the volume of gas purchased from the pipelines into PECO's P&P Report, will review and validate the data entered into the report an additional time before finalizing the report and sending it to the Finance department.
2. PECO's Finance department will review historical patterns of the P&P Report to see if any figures seem unreasonable and should be rechecked prior to final submittal of the report to Gas Supply & Transportation who is responsible for gathering the relevant data from the P&P Report to calculate the LUGF percent included in each PGC filing.
3. If any corrections are warranted, Finance will note them in the P&P Report with explanations for the corrections.
4. Gas Supply & Transportation will also perform a separate validation check of the LUGF percent before inclusion in the annual PGC filing.



**Impact on LUFG**

The reported error caused PECO to overstate its LUFG between 2009 and 2011 by an additional 0.3%. Although PECO overstated the LUFG rate, the error did not cause PECO to over-recover revenues from any customers. The amount of gas purchased for, provided to, and billed to customers was not impacted by the error. This was simply a reporting error.

To determine the impact to LUFG by correcting this error PECO made the following adjustment to last year's 3 year average calculation:

**PECO's Reported 2011 3 Year LUFG Average<sup>9</sup>:**

2009 –	4.23%
2010 –	4.51%
2011 –	3.93%
3 Year Avg. –	4.22%

**PECO's Corrected 2011 3 Year LUFG Average:**

2009 –	4.23%
2010 –	4.27%
2011 –	3.69%
3 Year Avg. –	4.06%

Variance –  $4.22\% - 4.06\% = 0.16\%$

This correction reduced PECO's 3 Year LUFG average by 0.16%.

**C. Customer Metering Drivers (0.45% Reduction):**

PECO has an aggressive meter maintenance program to address all facets of LUFG attributed to metering drivers. The specific contributors for which PECO was able

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<sup>9</sup> These figures were the as-reported figures from PECO's past 1307(f) filings between 2009 and 2011 and do not include transportation volumes.

to reduce the impact on LUFG were Zero Registration/No Read and Consumption on Inactive Meter situations. PECO has made significant progress over the last three years in reducing its Zero Registration/No Reads and Consumption on Inactive Meter drivers. PECO is also investigating how Meter Constant/Pulse situations contribute to LUFG and how LUFG attributed to this driver can be reduced.

#### **1. Zero Registration/No Reads**

##### **Description**

##### **Zero Registration:**

PECO uses AMR technology to remotely track and transmit customer usage readings to PECO's billing system through a "module" (attached to the meter). The module interfaces with a cellular network to transmit customer readings to PECO's billing system. AMR devices can experience "zero registration" readings because the meter breaks and does not measure any energy consumption. This contributes to LUFG because customers are using gas that PECO cannot track or bill.

##### **No Reads:**

PECO can also receive "no reads" from its AMR meters - monthly readings without any increase in Ccf from the previous monthly reading. This happens when the module breaks or its battery runs out and readings are estimated. Impediments may also arise that block the module signal from transmitting readings, which result in estimated bills. Estimated bills do not have a permanent impact on LUFG because PECO eventually receives actual readings and later adjusts the estimated readings to an actual reading. However, no-read situations can contribute to LUFG calculations in any given

year to the extent that there are some no-read accounts that will not have been remedied by the time that the LUFG calculation is performed. It should also be noted that even with the most aggressive meter maintenance program, no-read situations cannot be eliminated and will take time to resolve based on the circumstances involved such as access issues.

### Mitigation Plan

#### Zero Registration:

PECO utilizes a computer program to help identify zero registration situations. At the beginning of 2009, PECO determined that it had 5,600 meters with zero registration that could be remedied by field visits. By the end of 2010, PECO remedied 5,278 of these meters, which has improved the impact on LUFG. PECO currently has approximately 435 zero registration meters left to resolve (and plans to complete these by the end of the year). The 435 meters also represent a steady-state population for zero registration given the size of PECO's customer base. To further control this driver and its impact on LUFG, PECO is working to advance the program it uses to identify zero registration meters to prioritize large commercial and industrial zero-registration meter situations.

#### No Reads:

To address its no-read meter situations, PECO will continue to adjust customer bills after obtaining actual readings. PECO has also determined that its estimates, based on historical usage, are reasonably accurate. Therefore, customers normally do not experience a material impact from estimated readings. For the last several years, PECO

has implemented an aggressive maintenance and hard to access program, which resulted in significant reductions to consecutive 6-month no read situations. This reduction is identified in the Commission's annual *Customer Service Performance Reports* between 2008 and 2010. According to the Commission's reports between 2008 and 2010, PECO's no-read reduction statistics are as follows:

2008 – Residential Meters Not Read by Company or Customer in 6 Months: 285  
2008 – Residential Meters Not Read by Company or Customer in 12 months: 66  
2009 – Residential Meters Not Read by Company or Customer in 6 Months: 139  
2009 – Residential Meters Not Read by Company or Customer in 12 Months: 36  
2010 – Residential Meters Not Read by Company or Customer in 6 Months: 4  
2010 – Residential Meters Not Read by Company or Customer in 12 months: 0  
2011 – Residential Meters Not Read by Company or Customer in 6 Months: 2  
2011 – Residential Meters Not Read by Company or Customer in 12 months: 0

*Impact on LUFG*

The impact of these metering drivers on LUFG over last three years is as follows:

2008-2009 –	1.18%
2009-2010 –	0.95%
2010-2011 –	0.39%
3 Year Avg. –	0.84%

The 3-year average ending June 2011 was 0.84%. The 0.39% achieved between 2010 and 2011 represents a steady state for these drivers as a result of PECO's aggressive meter maintenance program. Therefore, it is expected that by 2014, the 3 year average of 0.84% will reduce down to a steady state of approximately 0.39% - an improvement of 0.45%. However, the extent of this estimated improvement is highly dependent on variable factors such as weather conditions. For instance, cold weather can increase the amount of broken meters, as well as the average usage for each meter. Because of such uncertainties, PECO is attributing a range in which the 3 year average percentage for

metering drivers may fluctuate. The range predicts that the LUFG percent for these drivers will fluctuate approximately between 0.20% and 0.65% (with a median of 0.45%). Thus, the LUFG range for metering drivers is approximately between 3.00% (2.78% + 0.25%) and 2.60% (2.78% - 0.20%), all other things being equal.<sup>10</sup>

## **2. Consumption on Inactive Meters**

### **Description**

A consumption on inactive meter exists when a meter registers usage because individuals are consuming service at a particular location, but there is no customer of record or active account for billing purposes. For instance, this may occur if PECO is not granted access to shut off a gas meter located inside a property after an account is issued its final bill and another resident moves in without requesting that service be placed in his or her name. Although this usage can be tracked, it is difficult to bill due to: 1) new customers not placing service in their names, 2) access being denied to terminate/discontinue service, and 3) the transient nature of squatters.

### **Mitigation Plan**

As of 2010, PECO found approximately 1,000 instances of consumption on inactive meters. By 2011, PECO reduced this amount to approximately 100 instances. PECO implemented more aggressive measures to gain access to its metering equipment in an attempt to lessen the impact on LUFG. For instance, PECO now attempts to contact property owners, landlords, building maintenance personnel, and other tenants to gain access to the meters.

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<sup>10</sup> Please note that PECO has rounded these percentages.

Impact on LUGF

Because PECO experiences so few instances of this driver, it is attributing no impact to LUGF.

**3. Meter Constant/Pulse Issues**

Description

PECO has a specific type of meter (Metretek meters) that captures data for its large commercial and industrial customers that take service under PECO's Transportation Service Interruptible ("TSI"), Transportation Service Firm ("TSF") and Temperature Controlled Service ("TCS") rates. These Metretek meters do not transmit usage readings back to PECO for billing purposes. Instead, they transmit a number of pulses, which are multiplied by a meter constant. The pulses are relevant to usage, while the constant accounts for the pressure of gas passing through the meter. This process allows PECO to use the data it receives to determine usage for proper billing. If the pulses or meter constants are not properly programmed into the Metretek meter, the data received will be incorrect and the customer will not be accurately billed. In some circumstances, PECO has determined that incorrect constant and/or pulse values have been programmed into some meters due to human error when the meters were set or programmed.

Mitigation Plan

To remedy these errors, PECO recently developed the following action items.

- a. Investigate all 1,119 Metretek meters for constant and pulse inaccuracies and remedy incorrect billings by the end of the first quarter of 2013.

- b. Develop and implement a more robust checklist for analyzing customer inquiries/complaints to improve the meter investigation process for large gas accounts.
- c. Utilize guidance from PECO's high bill investigation process for improved escalation and management review triggers.
- d. Formalize timeline expectations for resolving or completing investigations.
- e. Develop a process for auditing purposes to document adjustments to current and previous billing issues and clarify the reason and method used to apply any adjustments.
- f. Develop a process to review the customer's usage for several billing cycles for billing accuracy as warranted.

**Impact on LUFG**

PECO is currently investigating this situation and its impact to LUFG, and it projects that this investigation should be complete by the end of the first quarter of 2013. After PECO has an opportunity to analyze this data, it can determine the LUFG percentage attributable to this driver.

**D. Actual Physical Leakage (0.04% Reduction)**

PECO reviewed its actual physical leakage and verified that it is accurately calculating the loss attributable to this driver, which is 0.47186%. To quantify physical leakage, PECO uses the Environmental Protection Agency's ("EPA") estimate of methane emissions calculation. Natural gas is composed primarily of methane, which is a greenhouse gas that impacts global warming. As such, the EPA has an interest in quantifying and controlling "fugitive emissions" (unintentional leaks of natural gas from sealed surfaces) of natural gas. To verify the accuracy of the EPA calculation, PECO

performed a more detailed calculation and compared its results to the EPA calculation's results.

**1. Comparison of the EPA's Leak Calculation to PECO's Pipeline Leaks and Breaks Calculation**

**Description**

To estimate the total amount of LUGF attributable to pipeline leaks and breaks, PECO currently uses the following leak calculation, which was developed by the EPA.

The EPA's leak calculation is as follows:

**EPA's Leak Calculation:**

**1. Miles of Main Type x Leak Rate = Amount of Mains Loss**

820 Miles of Cast Iron x 239 Mcf/Mile/Year = 195,980 Mcf

489 Miles of Bare Steel x 110 Mcf/Mile/Year = 53,790 Mcf

2,736 Miles of Coated Steel x 3 Mcf/Mile/Year = 8,208 Mcf

2,586 Miles of Plastic x 12 Mcf/Mile/Year = 31,032 Mcf

**Total = 289,010 Mcf/yr.**

**2. Miles of Services Type x Leak Rate = Amount of Services Loss**

53,894 Miles of Bare Steel x 1.7 Mcf/Mile/Year = 91,620 Mcf

9,450 Miles of Coated Steel x 0.2 Mcf/Mile/Year = 1,890 Mcf

359,148 Miles of Plastic x 0.01 Mcf/Mile/Year = 3,591 Mcf

2,734 Miles of Copper x 0.3 Mcf/Mile/Year = 820 Mcf

**Total = 97,921 Mcf/yr**



**3. Total Mains + Services Loss / Annual Sendout = LUG**

$$289,010 \text{ Mcf} + 97,921 \text{ Mcf} = 386,931 \text{ Mcf/yr}$$

$$386,931 \text{ Mcf/yr} / 82,000,000^{11} \text{ Mcf} = 0.0047186 \text{ or } 0.47186\% \text{ LUG}$$

**Mitigation Plan**

PECO wanted to know if it could determine the amount of LUG attributable to leaks and breaks with any more specificity than the EPA's calculation currently provides. If PECO determined that it could provide more specificity, then it would consider calculating this driver differently. PECO's calculation is as follows:

**PECO's Leak Calculation:**

**Equation Components:**

- 0.015625 in<sup>2</sup> – Pipe Diameter
- 60 psig – Inlet Pressure of Turbine
- 14.2 psig – Absolute Outlet Pressure
- 0 psig – Outlet Pressure
- 0.014648 – Mcf/hr – Gas Leakage Rate per Hour
- 8,760 hrs – Time of Gas Flow During Venting
- 3,000<sup>12</sup> Leaks – Number of leaks per Year
- 384,949.44 Mcf/yr – Total Amount of Gas Lost per Year
- 82,000,000 Mcf - Annual Sendout

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<sup>11</sup> Please note that the 82,000,000 Mcf figure represents a sample/average of Total Annual Sendout; it does not represent an actual Total Annual Sendout for any particular year.

<sup>12</sup> This is an estimated number of leaks per year.

Equation:

Gas Leakage Rate = Pipe Diameter<sup>2</sup> x (Inlet Pressure of Turbine + Absolute Outlet Pressure) – (Outlet Pressure + Absolute Outlet Pressure)

Total Amount of Gas Lost per Year = Gas Leakage Rate x Time of Gas Flow During Venting x Number of Leaks per Year

Total Amount of Gas Lost per Year / Annual Sendout = LUFG

Application of Components to Equation:

$0.015625 \text{ in}^2 \times (60 \text{ psig} + 14.2 \text{ psig}) \times (0 \text{ psig} + 14.2 \text{ psig}) = 0.014648 \text{ Mcf/hr}$

$0.014648 \text{ Mcf/hr} \times 8,760 \text{ hrs} \times 3,000 \text{ leaks/yr} = 384,949.44 \text{ Mcf/yr}$

$384,949.44 \text{ Mcf/yr} / 82,000,000 \text{ Mcf} = 0.004694 \text{ or } 0.469\%$

Impact on LUFG

Comparing the results of both calculations (PECO's LUFG of 0.469% versus EPA's LUFG of 0.47186%) demonstrated very little difference between the results of both calculations - a difference of only 1,982 Mcf (386,931 Mcf - 384,949 Mcf) or 0.00286%. The closeness between calculations provides PECO with adequate assurance that it can continue using the EPA's calculation to determine LUFG attributable to leaks and breaks. Therefore, PECO will continue to use the EPA's calculation.

Although PECO has verified that it is adequately measuring physical leakage, PECO projects that it will be able to reduce leakage by 0.04% (over the next 5 years) by implementing the AGIMP program.

**E. Drivers for Which LUGF Reductions are Not Practicably Achievable or for Which No Further Mitigation Actions are Warranted:**

As stated at the beginning of this Plan and Report (pages 10-11), PECO performed a complete system review of all potential drivers/contributors to LUGF. Until now, the Plan and Report focused on drivers for which PECO was able to reduce the LUGF impact. The remainder of the Plan and Report will focus on other drivers for which PECO thoroughly investigated, but determined that neither reductions to LUGF nor further mitigation actions were practicably achievable because the costs involved with such reductions would not be in the public interest. These drivers include: 1) the components of operational fuel use; 2) direct pipe line customer billing accuracy; 3) intra-company use gas; 4) venting of gas mains; 5) transportation imbalances; 6) new customer connects/missing information to activate new accounts; 7) delivery/meter pressure; and 8) theft of service.

**1. Operational Fuel Calculation:**

As a result of this investigation, PECO realized that the operational fuel component of its LUGF calculation was incomplete. PECO was not including LNG liquefaction turbine starting fuel or propane vaporization fuel use in its operational fuel calculation. Instead, these components were included in PECO's undetermined LUGF category. Therefore, PECO will revise its operational fuel calculation to include these components as follows:

**Total Operational Fuel = Gate Station Preheater Fuel Use + Gate Station Usage  
(Venting) + LNG Liquefaction Turbine Starting Fuel + LNG Liquefaction  
Compression Fuel Use + LNG Vaporization Fuel Use + Propane Vaporization Fuel  
Use**

**a. Gate Station Preheater Fuel Use Calculation**

**Description**

All of PECO's distribution system gate stations are designed to maintain a gas temperature above freezing to prevent damage to the pipes and the ground or roadway surrounding the pipes. To accomplish this, PECO must take temperature and pressure variations into consideration at each of its gate stations. For instance, every time the pressure of natural gas from an interstate transmission line is lowered by 100 psig, the temperature of the gas drops 7° Fahrenheit. These pressure drops can cause condensation around the pipes to freeze resulting in damage to the pipe or heaving of the ground/road over the pipe. PECO uses preheaters at each of its distribution system gate stations to keep the temperature of gas above freezing at all times. While natural gas is used to fuel the preheaters, PECO does not track its preheater fuel usage with meters, but instead utilizes a calculation to account for the natural gas used at each gate station.

PECO's Preheater Fuel Usage Calculation has four components<sup>13</sup>: 1) the total Quantity of Gas Subject to Pressure/Temperature Drops on an Annual Basis, 2) the Quantity of Gas that Passes Through Preheaters on an Annual Basis, 3) the Quantity of

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<sup>13</sup> Please note that this calculation is a representative example. The results will vary slightly based on variable attributes at each gate station, such as total volume of gas passing through the station, pressure and temperature variations and size of the gate station. However, as explained in the "Mitigation Plan" section that follows, the average of preheater fuel use for all of PECO's 38 gate stations (approximately 0.12% LUFG) is confirmed by usage at a sample of individual gate stations.

Gas Required to Fuel Preheaters on an Annual Basis; and 4) Fuel Gas as a Percentage of Total Sendout on an Annual Basis. The calculation is as follows.

1) **Total Quantity of Gas Subject to Pressure/Temperature Drops on an Annual Basis:**

Quantity of Gas Subject to Pressure/Temperature Drops Equation Components:

- 1,805,171 Mcf/day – total daily amount of gas received at the inlet
- 700 psig – average inlet pressure of gas received from the pipeline at 45°
- 80 psig – the pressure level that PECO needs to drop down to so that the gas can pass into and through its distribution system
- 0.07 (F/psig) – the ratio of temperature drop to pressure drop
- 43.57 (lb/Mcf) – the density of gas
- 0.52 (BTU/(lb°F)) – the heat capacity of feed gas

Quantity of Gas Subject to Pressure/Temperature Drops Equation:

Amount of Gas Received at the Inlet x Density of Gas x Temperature/Pressure Ratio Drop x Specific Heat of Gas

Application of Components to Equation:

1,570,508,919 Btu = 1,597,201.73777 Mcf x 43.57 (lb/MCF) x 0.07 (F/psig) x 700-80 psig x 0.52 (Btu/(lb°F))

2) **Total Quantity of Gas that Passes Through Preheaters on an Annual Basis:**

Quantity of Gas that Passes Through Preheaters Equation Components:

- 1,570,508,919 Btu - Quantity of Gas Subject to Pressure/Temperature Drops on an Annual Basis
- 70% - Thermal Efficiency of Preheaters

Quantity of Gas Passing Through Preheaters Equation:

Quantity of Gas Subject to Pressure/Temperature Drops on an Annual Basis / Thermal Efficiency of the Preheater

Application of Components to Equation:

$$2,243,584,170 \text{ Btu} = 1,570,508,919 \text{ Btu} / 0.7$$

3) **Quantity of Gas Required to Fuel Preheaters on an Annual Basis:**

Quantity of Gas Required to Fuel Preheaters Equation Components:

- 2,243,584,170 Btu - Quantity of Gas Passing Through Preheaters
- 1,035 (Btu/Mcf) – Heat of Combustion of Fuel Gas

Quantity of Gas Required to Fuel Preheaters Equation:

Quantity of Gas that Passes Through Preheaters on an Annual Basis / Heat of Combustion of Fuel Gas

Application of Components to Equation:

$$2,168 \text{ Mcf} = 2,243,584,170 \text{ Btu} / 1,035 \text{ (Btu/Mcf)}$$

4) **Fuel Gas as a Percentage of Total Sendout on an Annual Basis:**

Fuel Gas Percentage of Sendout Components:

- 2,168 Mcf – Quantity of Gas Required to Fuel Preheaters
- 1,802,721 Mcf – Total Average Annual Amount of Gas at Sendout

Fuel Gas as a Percentage of Sendout Equation:

Quantity of Gas Required to Fuel Preheaters / Total Average Annual Amount of Gas at Sendout

Application of Components to Equation:

$$0.12\% = 2,168 \text{ Mcf} / 1,802,721 \text{ Mcf}$$

Based on the equation above, PECO has calculated a factor of 0.12% for LUFG from preheater fuel use at each of its gate stations. This standard percentage was set in 2004.

**Mitigation Plan**

PECO checked the LUGF calculation used to account for preheater fuel at each gate station and verified that it was accurate. PECO verified its 0.12% LUGF calculation result by comparing it to an average of preheater fuel use at specific PECO gate stations, which are set forth below. The average preheater fuel use at the gate stations listed below was 0.112%, which is virtually identical to the results of PECO's calculation considering that there are minor variables specific to each gate station such as the total volume of gas passing through the station, pressure and temperature variations and size of the gate station. This demonstrates that PECO's calculation is accurate and reliable and that PECO should continue to attribute 0.12% of LUGF to total preheater fuel usage.

**Preheater Fuel Use Average for Specified PECO Gate Stations**

<b>Gate Station</b>	<b>Line Pressure</b>	<b>Sendout Pressure</b>	<b>Preheater Fuel %</b>
Coateeville	558	66	0.092%
Concord	730	62	0.131%
Dollington	645	58	0.113%
Ivyland	712	61	0.127%
Kennett Square	568	56	0.097%
Morrisville	558	58	0.093%
Oreland	643	59	0.112%
Parkeburg	591	72	0.098%
Pottstown	678	61	0.120%
West Conshy Transco	687	62	0.121%
West Conshy Texas	674	62	0.118%
Brookhaven	575	61	0.097%
Buckingham	619	62	0.106%
Center Point	648	59	0.113%
Eagle	638	60	0.111%
East Greenville	1019	55	0.196%
East Pikeland	628	59	0.109%

Flower Street	569	240	0.056%
Hatfield	624	64	0.107%
Hershey Mill	635	59	0.111%
Planebrook	636	62	0.110%
Skippack	624	58	0.108%
Upper Providence	628	58	0.109%
Jennersville	563	62	0.094%
<b>Average</b>	<b>644</b>	<b>68</b>	<b>0.112%</b>

**Impact on LUFG**

PECO determined that the standard percentage of 0.12% is still accurate to measure preheater fuel use at every gate station. The value of 0.12% is a function of temperature levels. Because the average temperature of gas received at all of PECO's gate station inlets is normally 45° Fahrenheit, the pressure drops and resulting fuel needed to compensate for these pressure drops should be approximately 0.12%. Although the amount of energy needed to preheat the gas may vary from station-to-station depending on pipe conditions (such as upstream pressure changes), these variations are not large enough to warrant changing or attempting to refine the calculation, based upon the check that PECO performed, which verified that the average amount of energy used at specifically-studied PECO gate stations was approximately 0.12%.

**b. Miscellaneous Gate Station Usage (Venting)**

**Description**

Natural gas is used, but not measured, for the pneumatic operation, ventilation, calibration and maintenance of equipment at PECO gate stations. These mechanical



devices must vent gas to accommodate changes in pipeline pressure. PECO accounts for the natural gas vented at these gate stations in the following manner.

**1. West Conshohocken Gate Station Devices that Vent Gas:**

- 2 Bristol Pneumatic Controllers
- 2 Fisher I/P Transducers
- 6 Kimray Temperature Controllers
- 1 YZ Station Odorizer

**Equation Components to Determine Amounts of Gas Vented by These Devices:**

- 8,760 hrs/yr - total hours in a year<sup>14</sup>
- 13.102 SCFH – average estimated gas consumption
- 3.288 SCF/MMCF of gas usage is attributed to odorizer consumption

**Equation to Determine Amounts of Gas Vented by These Devices:**

- Total Hours in a Year x Average Estimated Gas Consumption x Standard Amount of Odorization Usage = Average Annual Amount of Gas Vented at the West Conshohocken Gate Station

**Application of Components to Equation:**

- 8,760 hrs/yr x 13.102 SCFH = 115 Mcf/yr
- 115 Mcf/yr x 0.0003288% = 37.73 Mcf/yr
- 115 Mcf/yr + 37.74 Mcf/yr = 152.74 Mcf/yr

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<sup>14</sup> Please note that this calculation is based on the assumption that these devices vented gas constantly throughout the entire year, which is not reflective of actual operating conditions. Nonetheless, as explained in this section, the calculations show that, even with the assumption of constant venting, the impact on LUPG from this source is approximately 0.00187%.

**2. Tilghman Street Gate Station Devices that Vent Gas:**

- 2 Moore Product I/P Transducers
- 6 Kimray Temperature Controllers
- 1 YZ Station Odorizer

**Equation Components to Determine Amounts of Gas Vented by These Devices:**

- 8,760 hrs/yr - total hours in a year
- 30 SCFH – average estimated gas consumption
- 3.288 SCF/MMCF of gas usage is attributed to odorizer consumption

**Equation to Determine Amount of Gas Vented by These Devices:**

- Total Hours in a Year x Average Estimated Gas Consumption x Standard Amount of Odorizer Usage = Average Annual Amount of Gas Vented at the Tilghman Street Gate Station

**Application of Components to Equation:**

- $8,760 \text{ hrs/yr} \times 30 \text{ SCFH} = 263 \text{ Mcf/yr}$
- $263 \text{ Mcf/yr} \times 0.0003288\% = 86.43 \text{ Mcf/yr}$
- $263 \text{ Mcf/yr} + 86.43 = 349.44 \text{ Mcf/yr}$

**3. Fifteen Gate Stations with IDF Preheaters:**

- 1 Bristol Controller
- 3 Kimray Temperature Controllers
- 1 YZ Station Odorizer

**Equation Components to Determine Amounts of Gas Vented by These Devices:**

- 8,760 hrs/yr - total hours in a year
- 0.471 SCFH – average estimated gas consumption
- 15 gate stations

- 3.288 SCF/MMCF of gas usage is attributed to odorizer consumption

**Equation to Determine Amount of Gas Vented by These Devices:**

- Total Hours in a Year x Average Estimated Gas Consumption x 15 Gate Stations x Standard Amount of Odorization Usage = Average Annual Amount of Gas Vented at the Fifteen Gate Stations with IDF Preheaters

**Application of Components to Equation:**

- $8,760 \text{ hrs/yr} \times 0.471 \text{ SCFH} = 4.12 \text{ Mcf/yr}$
- $4.12 \text{ Mcf/yr} \times 15 \text{ gate stations} = 60 \text{ Mcf/yr}$
- $60 \text{ Mcf/yr} \times 0.0003288\% = 1.97 \text{ Mcf/yr}$
- $60 \text{ Mcf/yr} + 1.97 \text{ Mcf/yr} = 61.97 \text{ Mcf/yr}$

**4. Fifteen Gate Stations with Boiler Type Preheaters:**

- 1 Bristol Controller
- 3 Fisher Valve Positioners
- 1 Fisher Wizard Temperature Controller
- 1 YZ Station Odorizer

**Equation Components to Determine Amounts of Gas Vented by These Devices:**

- 8,760 hrs/yr - total hours in a year
- 20.42 SCFH - average estimated gas consumption
- 3.288 SCF/MMCF of gas usage is attributed to odorizer consumption
- 15 gate stations

**Equation to Determine Amount of Gas Vented by These Devices:**

- Total Hours in a Year x Average Estimated Gas Consumption x 15 Gate Stations x Standard Amount of Odorization Usage = Total Average Annual Amount of Gas Vented at the Fifteen Gate Stations with Boiler Type Preheaters

**Application of Components to Equation:**

- $8,760 \text{ hrs/yr} \times 20.42 \text{ SCFH} = 178 \text{ Mcf/yr}$
- $178 \text{ Mcf/yr} \times 15 \text{ gate stations} = 2,760 \text{ Mcf/yr}$
- $2,760 \text{ Mcf/yr} \times 0.0003288\% = 87.79 \text{ Mcf/yr}$
- $2,760 \text{ Mcf/yr} + 87.79 \text{ Mcf/yr} = 2,758 \text{ Mcf/yr}$

**5. Tyburn Road Gate Station Devices that Vent Gas:**

- 2 Bristol Controllers (run switcher)
- 1 YZ Station Odorizer

**Equation Components to Determine Amounts of Gas Vented by These Devices:**

- 8,760 hrs/yr - total hours in a year
- 6 SCFH - average estimated gas consumption
- 3.288 SCF/MMCF of gas usage is attributed to odorizer consumption

**Equation to Determine Amount of Gas Vented by These Devices:**

- $\text{Total Hours in a Year} \times \text{Average Estimated Gas Consumption} \times \text{Standard Amount of Odorization Usage} = \text{Average Annual Amount of Gas Vented at the Tyburn Road Gate Station}$

**Application of Components to Equation:**

- $8,760 \text{ hrs/yr} \times 6 \text{ SCFH} = 52 \text{ Mcf/yr}$
- $52 \text{ Mcf/yr} \times 0.0003288\% = 1.71 \text{ Mcf/yr}$
- $52 \text{ Mcf/yr} + 1.71 \text{ Mcf/yr} = 53.71 \text{ Mcf/yr}$

**6. Eddystone Gate Station Devices that Vent Gas:**

- 2 Bristol Controllers (run switcher)
- 1 YZ Station Odorizer

**Equation Components to Determine Amounts of Gas Vented by These Devices:**

- 8,760 hrs/yr - total hours in a year
- 0.102 SCFH -- average estimated gas consumption
- 3.288 SCF/MMCF of gas usage is attributed to odorizer consumption

**Equation to Determine Amount of Gas Vented by These Devices:**

- Total Hours in a Year x Average Estimated Gas Consumption x Standard Amount of Odorization Usage = Average Annual Amount of Gas Vented at the Eddystone Gate Station

**Application of Components to Equation:**

- 8,760 hrs/yr x 0.102 SCFH = 893 Mcf/yr
- 893 Mcf/yr x 0.0003288% = 29.36 Mcf/yr
- 893 Mcf/yr + 29.36 Mcf/yr = 922.36 Mcf/yr

$$\text{TOTAL} = 152.74 \text{ Mcf/yr} + 349.44 \text{ Mcf/yr} + 61.97 \text{ Mcf/yr} + 53.71 \text{ Mcf/yr} + 922.36 \text{ Mcf/yr} = 1,540.22 \text{ Mcf/yr}$$

**Mitigation Plan**

PECO reviewed all equipment at each gate station that uses gas for operation, ventilation, calibration and maintenance purposes. According to manufacturer specifications, the total amount of gas vented annually, would be: 152.74 Mcf/yr + 349.44 Mcf/yr + 61.97 Mcf/yr + 53.71 Mcf/yr + 922.36 Mcf/yr = 1,540.22 Mcf/yr.

### Impact on LUG

Gas usage for venting, based on manufacturers' specifications and assuming near constant venting, is  $1,540.22 \text{ Mcf/yr} / 82,000,000^{15} = 0.00187\%$ . However, since gas venting does not occur continuously, the actual impact on LUG is less than the small percentage calculated above.

### **c. LNG Liquefaction Turbine Starting Fuel**

#### Description

As part of its investigation, PECO reviewed its entire LNG process from liquefaction to vaporization and only found one missing component of its operational fuel calculation – the LNG liquefaction turbine starting fuel. This startup fuel is currently not included in PECO's operational fuel calculation and is considered undetermined LUG. Because PECO's LNG liquefaction turbine starting fuel is operational in nature, it will be included in PECO's operational fuel calculation. It will also now be removed from sendout.

Although PECO plans to include LNG liquefaction turbine starting fuel in its operational fuel calculation, it does not meter the amount of natural gas used to operate the turbine. Instead, PECO uses the following calculation to determine the amount of natural used.

#### **Components**

- 4 in<sup>2</sup> - Pipe Diameter
- 239.2 psig – Absolute Inlet Pressure

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<sup>15</sup> Please note that the 82,000,000 Mcf figure represents a sample/average of Total Annual Sendout; it does not represent an actual Total Annual Sendout for any particular year.

- 14.2 psig – Absolute Outlet Pressure
- 0 psig – Outlet Pressure
- 225 psig – Inlet Pressure of Turbine
- 3,600 Mcf/hr – Gas Flow per Hour
- 60 seconds – Time of Gas Flow During Start
- 60 Mcf – Gas Lost per Start
- 3 Starts – Number of Starts per Year
- 180 Mcf – Annual Gas Loss
- 82,000,000<sup>16</sup> Mcf – Annual Sendout

#### Equation

- $\text{Diameter}^2 \times (\text{Absolute Inlet Pressure} + \text{Absolute Outlet Pressure}) - (\text{Outlet Pressure} + \text{Absolute Outlet Pressure}) = \text{Inlet Pressure of Turbine}$
- $\text{Inlet Pressure of Turbine} / \text{Time of Gas Flow During Start} = \text{Gas Lost per Start}$
- $\text{Gas Lost per Start} \times \text{Number of Starts per Year} = \text{Annual Gas Loss}$
- $\text{Annual Gas Loss} / \text{Annual Sendout} = \text{LNG Liquefaction Turbine Starting Fuel Use Percentage Applicable to LUFG}$

#### Application of Components to Equation

- $4 \text{ in}^2 \times 225 \text{ psig} = 3,600 \text{ Mcf/hr}$
- $3,600 \text{ Mcf/hr} / 60 \text{ seconds} = 60 \text{ Mcf}$
- $60 \text{ Mcf} \times 3 \text{ starts/yr} = 180 \text{ Mcf}$
- $180 \text{ Mcf} / 82,000,000 \text{ Mcf} = 0.00022\%$

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<sup>16</sup> Please note that the 82,000,000 Mcf figure represents a sample/average of Total Annual Sendout; it does not represent an actual Total Annual Sendout for any particular year.

**Mitigation Plan**

As the calculation above shows, the starter fuel only flows for about 1 minute and the engine is only started about three times per year based on weather conditions and demand. Therefore, a mitigation plan to reduce this usage is not warranted. However, the relatively small volumes used for starter fuel should nonetheless be included in PECO's operational fuel calculation and will be in the future.

**Impact on LUFG**

PECO calculates the impact of LNG liquefaction turbine starting fuel use to be a percentage of 0.00022%.

**d. Propane Vaporization Fuel Use**

**Description**

PECO found that its propane vaporization fuel use also was not being included in its operational fuel calculation. PECO uses two natural gas fired vaporizers to convert propane into a gaseous state so that it can be flowed through the distribution system. A turbine meter is in place to measure the amount of gas used to fuel the vaporizers. However, it no longer works and the actual fuel usage has not been tracked for several years. As a result of including this in the operational fuel calculation, PECO's propane vaporization fuel usage will now be included in the operational fuel calculation.



**Mitigation Plan**

PECO will replace the turbine meter so that it tracks the vaporizer fuel use for LUGF purposes by next winter. After the meter is in place, the gas used for vaporizing propane will be added to the operational fuel calculation for LUGF purposes.

**Impact on LUGF**

The vaporizers are used at most three times per year for no more than five days straight. If the tank is not used during a particular year, the amount of associated LUGF would be zero. Because the propane and vaporizers are used infrequently, the impact to LUGF is minimal. Therefore, PECO is ascribing a 0% impact to LUGF for this driver.

**2. Direct Pipe Line Customer Billing/Usage Accuracy:**

**Description**

PECO has six large gas Direct Pipe Line ("DPL") customers who receive gas directly from interstate transmission pipelines. PECO verified the accuracy of these meters because they serve PECO's largest customers.

**Mitigation Plan**

PECO obtained meter calibration results for each of the meters serving the six DPL customers and found all to be working within acceptable accuracy standard levels.

The meters were last calibrated as follows:

Eddystone Meter:	Last calibrated on 9/9/10
Cromby Meter:	Last calibrated on 9/9/10
Merck Meter:	Last calibrated on 9/13/10
Lukens/ISG Meter:	Last calibrated on 9/13/10

Fairless/USX: Last calibrated on 9/16/10

**Impact on LUG**

PECO compared the total gas received for these DPL customers at their gate stations against the total billed amounts for these customers and calculated a total annual variance of 89,317 Mcf. PECO divided the total annual variance by last year's total annual sendout of 85,417,124 Mcf and calculated a LUG impact of 0.105%.

**3. Intra-Company Use Gas:**

**a. PECO Facilities**

**Description**

Another area that PECO examined was the accuracy of its accounting and tracking for intra-company gas use. Intra-company gas is used at PECO facilities, but not for operational fuel use purposes. Currently, PECO includes intra-company use gas in its total sendout, but does not include it in the billed volumes portion of the LUG calculation. PECO will adjust its LUG calculation to include intra-company gas use in the billed volume portion of the LUG calculation. Previously, this usage was considered as unidentified LUG.

As a result of this investigation, PECO also uncovered two locations that were not being metered properly. The Company uses gas to run emergency back up generators at PECO's West Conshohocken facility. That usage is metered and tracked only for environmental purposes, not for billing purposes. These generators use approximately 25-30 Mcf per year. This usage is not currently reflected in the LUG calculation, which

means that it is being treated as LUGF when it is not. An appropriate change will be made.

PECO's West Conshohocken Fire School uses gas for training exercises such as simulated gas leakage emergencies. Although the school has a meter to track this usage, it has not been used or maintained. PECO is planning to replace this meter so that it can begin to track and properly account for this gas usage instead of treating it as LUGF. The Fire School has another meter for building heating purposes, which also has not been used or maintained. This meter also will be replaced so that this usage can be tracked and accounted for instead of being attributed to LUGF.

#### **Mitigation Plan**

PECO will review the accuracy of all meters at its facilities by collecting and reviewing the meter testing records. If any meters have not been tested recently, a new accuracy test will be performed. Meters that fail the accuracy test will be replaced. The usage from the two West Conshohocken meters mentioned above will also be accounted for instead of being treated as LUGF. This collective process will allow PECO to verify that its intra-company meters are accurately capturing this usage.

#### **Impact on LUGF**

Although PECO has not been metering this usage, the impact to LUGF is believed to be minor and PECO is attributing 0.029% to this driver pursuant to the following table.

**Intra-Company Use Gas – January 2007-December 2012**

<b>Mcf</b>	<b>CIMS Accounts (34)</b>
16	Phoenixville Service Building (SB)
902	Phoenixville SB
526	Gas System Control King of Prussia
196	Warminster SB
42	Coatesville SB
619	North Wales SB
1,688	Warminster SB
1,357	North Wales SB
515	Warminster SB
402	Baldwin SB
40	Coatesville SB
501	Baldwin SB
158	Coatesville SB
730	Baldwin SB
557	Baldwin SB
394	Baldwin SB
696	Plymouth SB
609	Plymouth SB
216	PECO Energy Co Facilities #1 W Conshohocken
349	Baldwin SB
241	PECO Energy Co Facilities #2 W Conshohocken
17	PECO Energy Co Facilities #3 W Conshohocken
162	Berwyn Transportation
45	PECO Energy Co Facilities #5 W Conshohocken
297	West Chester SB
189	Berwyn Transportation 1050
936	Plymouth SB
5,026	Berwyn Transportation 1050
1,652	Berwyn Transportation 1080
2,601	West Conshohocken 300 Front St
2,095	West Grove SB
138	Kennett Square Sub Station
447	Doylestown SB
153	Phoenixville SB
193	Warminster SB
24,902	TOTAL CIMS ACCOUNTS
21	Total Other Locations not in CIMS - <i>Fire School Burners &amp; Tilghman St</i>
24,923	Total Company Location MCF

85,417,124	Total 2011 Sendout
0.029%	% LAUF

#### **b. Regulator Stations Vented Gas**

Gas can be vented at any of PECO's 370 regulator stations throughout its system to relieve system over-pressurization during emergency situations. For example, weepage can occur going past a regulator on a warm summer day when there is little to no load on the pipes. This could build excess pressure in the pipe, which needs to be vented to relieve the pressure. This scenario could take seconds to resolve. A more major event, such as a regulator malfunction, could take up to a half hour to fix. This type of venting does not occur often (between two and three times over the past six years).

#### **Mitigation Plan**

PECO cannot prevent these situations from occurring. It is also extremely difficult to track the line loss associated with these types of events. These situations happen rarely and do not contribute much to LUGF and PECO's existing maintenance programs adequately address these situations.

#### **Impact on LUGF**

Because this has happened no more than three times in the past six years, PECO attributes 0% to this driver.

**c. BTU Calculation**

**Description**

PECO purchases natural gas from the pipelines in dekatherms. In other words, PECO purchases natural gas based on its heat content (the amount of energy contained in each dekatherm). However, when PECO bills customers for gas consumed, it bills them on a volumetric basis in Ccf units.

PECO investigated the difference between receiving gas in dekatherms and selling it in Mcf as a contributor to LUGF. However, it was determined that because PECO's calculation for LUGF includes Mcf that have been converted from dekatherms (by applying the appropriate daily btu factor), there is no discernable effect on LUGF that would warrant any mitigation effort.

**Mitigation Plan**

To compensate for the difference in heat content between dekatherms and Mcf, PECO converts dekatherms to Mcf at each of its gate stations so that the sendout and billed volumes account for the same heat content levels.

**Impact on LUGF**

Because PECO performs this conversion at its gate stations, the impact to LUGF is minimal. Therefore, PECO believes that the effect of this driver on LUGF is minimal.

#### **4. The Venting of Gas Mains**

##### **Description**

Any time a new pipe is installed, gas is released/purged and mixes with ambient air. Because this mixture is volatile, PECO pushes gas through the pipe to evacuate the air. This usage cannot be metered and is not otherwise accounted for.

##### **Mitigation Plan**

The amount of LUFG attributable to the venting of gas mains will vary depending on the length and diameter of the pipe replaced. Before venting can stop, PECO must first obtain three sample measurements of 99% gas inside the pipe. The time it takes to achieve all three measurements can vary significantly depending on the circumstances involved. PECO quantified the amount of gas vented/purged in the following manner:

##### **Equation Components:**

- 2 in<sup>2</sup> – Pipe Diameter
- 60 psig – Inlet Pressure of Turbine
- 14.2 psig – Absolute Outlet Pressure
- 0 psig – Outlet Pressure
- 240 Mcf/hr – Gas Flow per Hour
- 300 seconds – Time of Gas Flow During Venting
- 20 Mcf – Gas Loss per Vent/Purge
- 3,600 s/hr – Seconds per Hour
- 300 (vents/yr) – Number of Vents/Purges per Year

- 6,000 Mcf – Annual Gas Loss
- 82,000,000<sup>17</sup> Mcf – Annual Sendout

**Equation:**

1.  $\text{Diameter}^2 \times (\text{Inlet Pressure of Turbine} + \text{Absolute Outlet Pressure}) - (\text{Outlet Pressure} + \text{Absolute Outlet Pressure}) = \text{Gas Flow per Hour}$
2.  $\text{Gas Flow per Hour} \times \text{Time of Gas Flow During Venting} / \text{Gas Loss per Vent/Purge} = \text{Gas Loss per Hour During Venting}$
3.  $\text{Gas Flow per Hour} / \text{Gas Loss per Hour During Venting} \times \text{Time of Gas Flow During Venting} \times \text{Number of Vents/Purges per Year} = \text{Annual Gas Loss}$
4.  $\text{Annual Gas Loss} / \text{Annual Sendout} = \text{LUFG Due to Venting of Mains}$

**Application of Components to Equation:**

1.  $2 \text{ in}^2 \times (60 \text{ psig} + 14.2 \text{ psig}) - (0 \text{ psig} + 14.2 \text{ psig}) = 240 \text{ Mcf/hr}$
2.  $240 \text{ Mcf/hr} \times 300 \text{ seconds} / 20 \text{ Mcf} = 3,600 \text{ s}$
3.  $240 \text{ Mcf/hr} / 3,600 \text{ s} \times 300 \text{ s} \times 300 \text{ (vents/yr)} = 6,000 \text{ Mcf}$
4.  $6,000 \text{ Mcf} / 82,000,000 \text{ Mcf} = 0.00731\%$

It should be noted that PECO expects this amount of LUFG to increase during the implementation of PECO's AGIMP program as more mains are replaced each year than in the past.

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<sup>17</sup> Please note that the 82,000,000 Mcf figure represents a sample/average of Total Annual Sendout; it does not represent an actual Total Annual Sendout for any particular year.



### Impact on LUGF

Based on the calculation set forth above, PECO has calculated the overall impact to LUGF to be 0.00731%.

## **5. Transportation Imbalances**

### Description

Pursuant to tariff rules, PECO's HVT customers, including its DPL customers, are billed monthly for deliveries not usage. Suppliers purchase and deliver gas to HVT customers in approximate quantities based on the daily and monthly needs of each HVT customer. Because PECO's tariff allows for certain levels of tolerances/imbalances between gas delivered and gas actually burned by HVT customers, PECO examined the effect these tolerances/imbalances have on LUGF and whether a mitigation plan was warranted.

### Mitigation Plan

Delivery imbalance controls are set forth in the General Terms and Conditions of PECO's Gas Service Tariff, at Page 54 Section 2. Balancing provisions, which states, inter alia, that customers are subject to increased costs (penalties) if they exceed the stated monthly and daily tolerances between deliveries and usage. As the following section illustrates, the tariff language adequately controls the effect these imbalances have on LUGF.

Impact on LUG

Because imbalances can be carried over from month-to-month, there will be an impact to LUG. Therefore, PECO is reporting out its imbalance information from last year and its impact to LUG below.

2011 LUG Attributed to Accumulated Imbalance Deliveries for DPL Customers

	2011 Accumulated Imbalances (Mcf)		Beginning Imbalance (Mcf)	Ending Imbalance (Mcf)	Variance
	Deliveries	Usage			
Fairless Hills	61,441	60,974	971	1,454	483
Cromby	188,244	188,391	26,896	26,550	(146)
Eddystone	2,252,410	2,264,047	31,183	18,012	(13,171)
Lukens	1,178,229	1,178,297	8,492	7,745	(747)
MRK9	4,748,782	4,784,926	3,375	4,438	1,063
USX	788,055	788,778	3,002	2,421	(581)
<b>TOTAL DPL</b>	<b>9,217,161</b>	<b>9,245,413</b>	<b>73,719</b>	<b>60,620</b>	<b>(13,099)</b>
2011 Total Retail & Transportation Sendout	85,417,124	85,417,124	85,417,124	85,417,124	85,417,124
DPL as a % of Total Sendout	10.79%	10.82%	0.086%	0.071%	-0.015%

Total Transportation Deliveries, Usage, imbalance	28,501,891	28,557,396	(83,856)	(55,505)	28,351
Transportation as a % of Total Sendout	33.36%	33.43%	-0.098%	-0.065%	0.033%

For 2011, PECO realized a total volumetric imbalance of 28,351 Mcf for all HVT customers. Dividing that number by the total annual sendout from 2011 of 85,417,124 Mcf, PECO arrived at a LUFG impact of 0.033%.

#### **6. New Customer Connects/Missing Information to Activate New Accounts**

##### **Description**

PECO's Gas New Business department is responsible for the accuracy, timeliness, and completeness of meter and customer account information entered into PECO's billing system during account creation for proper billing purposes. Gas New Business is also responsible for creating commercial and residential accounts in the billing system, coordinating construction, installing gas lines and meters, and activating and monitoring accounts until the first bill with an actual reading is generated. On rare occasion, the paperwork used to activate a new account is lost and as a result, billing can be delayed.

##### **Mitigation Plan**

The Gas New Business department has implemented controls to ensure that:

1. New customer accounts set up by Gas New Business are tracked and monitored through first billing adequately and timely.
2. New customers have 365 days to connect to PECO's newly installed piping. If that does not happen, a letter is sent to the customer requesting payment for the installation work.
3. Customer accounts are created and reviewed for the appropriate rate, customer information, and meter information in order to accurately bill the customer.
4. Meters are properly installed and configured in accordance with customer needs and expectations, and usage is accurately captured in the billing system.

5. Accounts are regularly evaluated to identify errors in meter data, ineffective/damaged meters, inappropriate customer usage, and improper billing.

**Impact on LUG**

Because the paperwork used to activate new accounts is rarely lost, PECO is not attributing any impact to LUG. This driver has occurred only a handful of times over the past 5 years.

**7. Delivery/Meter Pressure**

**Description**

Elevated pressures exist in service lines where the gas pressure is substantially higher than that delivered to a customer's appliances and a service regulator is required. Any elevated service will have a regulator that has a water column setting between 7-8 in/wc, while the meter will be set at 6 in/wc per manufacturer specifications. Because of the difference in water column settings between the regulator and meter, there will be naturally recurring LUG.

**Mitigation Plan**

PECO is still in the process of determining whether a mitigation plan can be developed for this driver.

### **Impact on LUG**

Because this driver could impact any customer that is served by an elevated pressure line (including PECO's largest transportation customers), PECO is attributing a 0.7% LUG impact to this driver.

## **8. Potential Theft of Service**

### **Description**

Theft of service occurs when service is intentionally obtained by deception, threat or tampering with public utility equipment to avoid payment for utility service.

"Reported" theft of service cases occur when members of the public contact PECO about what they believe are occurrences of theft. PECO investigates every reported case.

### **Mitigation Plan**

PECO uses a "Revenue Protection Hotline" to take calls from the public about suspected theft of service incidents. PECO has a dedicated Revenue Protection field team which investigates and remedies theft cases. Theft occurs less in the Gas Division than in the Electric Division of the Company because it is inherently unsafe to tamper with gas service. In fact, most of PECO's electric theft cases happen in Philadelphia, where gas service is provided by PGW. Most gas theft cases occur when modules are removed from PECO's gas meters. These cases are then identified through the no read process. When PECO discovers theft, it will back-bill both residential and commercial customers for up to four years in accordance with the law.

**Impact on LUGF**

While all reported theft cases are addressed immediately, theft cannot be fully prevented or predicted and therefore unreported theft remains a driver for which the impact to LUGF cannot be fully determined or reduced.

**III. CONCLUSION**

PECO has conducted a comprehensive analysis of the possible drivers of its LUGF. As a result of that analysis, PECO has identified a number of factors driving its LUGF percentage reported in prior Section 1307(f) proceedings that were mitigated, or will be mitigated, and, by doing so, has reduced, and may further reduce, its LUGF percentage.

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**EXHIBIT B**

Exhibit

	Annual Report				DOT Report		
	Reported LUDG	LUDG rate	absolute		Reported LLUDG	rate	absolute
	Columbia			Columbia			
2005	1.11%			1.88%			
2006	0.06%	1.05%	1.05%	1.88%	0.00%	0.00%	
2007	-0.05%	0.11%	0.11%	1.30%	0.58%	0.58%	
2008	-0.66%	0.61%	0.61%	1.30%	0.00%	0.00%	
2009	-0.23%	-0.43%	0.43%	1.00%	-0.60%	0.60%	
2010	0.06%	-0.29%	0.29%	2.00%	-0.10%	0.10%	
			0.50%			0.26%	
	NFG			NFG			
2005	0.31%			0.67%			
2006	-1.52%	1.83%	1.83%	0.42%	0.25%	0.25%	
2007	0.02%	-1.54%	1.54%	0.42%	0.00%	0.00%	
2008	-0.52%	0.54%	0.54%	0.41%	0.01%	0.01%	
2009	-0.42%	-0.10%	0.10%	0.31%	0.10%	0.10%	
2010	1.90%	-2.32%	2.32%	0.00%	0.31%	0.31%	
			1.27%			0.13%	
	TW Phillips			TW Phillips			
2005	4.57%			4.50%			
2006	4.11%	0.46%	0.46%	4.21%	0.38%	0.38%	
2007	4.25%	-0.14%	0.14%	4.16%	0.05%	0.05%	
2008	3.74%	0.51%	0.51%	3.15%	1.01%	1.01%	
2009	5.40%	-1.66%	1.66%	5.10%	-1.95%	1.95%	
2010	4.11%	1.29%	1.29%	3.00%	1.20%	1.20%	
			0.81%			0.92%	
	Dominion			Dominion			
2005	5.12%			2.68%			
2006	5.01%	-0.79%	0.79%	3.46%	-0.78%	0.78%	
2007	0.01%	-3.10%	3.10%	3.94%	-0.48%	0.48%	
2008	6.30%	2.62%	2.62%	4.32%	-0.38%	0.38%	
2009	4.55%	1.84%	1.84%	3.20%	1.12%	1.12%	
2010	6.13%	-1.58%	1.58%	2.85%	0.35%	0.35%	
			1.90%			0.62%	
	PECO			PECO			
2005	2.84%			2.40%			
2006	2.10%	0.74%	0.74%	2.90%	-0.50%	0.50%	
2007	3.71%	-1.61%	1.61%	3.80%	-0.70%	0.70%	
2008	4.48%	-0.78%	0.78%	3.58%	0.02%	0.02%	
2009	2.88%	1.51%	1.51%	4.21%	-0.63%	0.63%	
2010	2.80%	0.18%	0.18%	4.44%	-0.23%	0.23%	
			0.96%			0.42%	
	UGI Utilities			UGI Utilities			
2005	-0.40%			0.20%			
2006	0.42%	-0.82%	0.82%	0.20%	0.00%	0.00%	
2007	0.60%	-0.18%	0.18%	0.50%	-0.30%	0.30%	
2008	0.38%	0.22%	0.22%	0.70%	-0.20%	0.20%	
2009	0.47%	-0.09%	0.09%	0.50%	0.20%	0.20%	
2010	0.23%	0.24%	0.24%	0.16%	0.34%	0.34%	
			0.31%			0.21%	
	Equitable			Equitable			
2005	10.23%			5.10%			
2006	11.81%	-1.68%	1.68%	7.60%	-2.50%	2.50%	
2007	0.32%	2.59%	2.59%	5.40%	2.20%	2.20%	
2008	10.01%	-0.69%	0.69%	7.60%	-2.20%	2.20%	
2009	5.01%	5.00%	5.00%	5.00%	2.60%	2.60%	
2010	4.18%	0.83%	0.83%	5.40%	-0.40%	0.40%	
			2.16%			1.98%	
	PGW			PGW			
2005	3.40%			2.80%			
2006	1.89%	1.51%	1.51%	2.00%	0.80%	0.80%	
2007	7.56%	-5.67%	5.67%	2.80%	-0.80%	0.80%	
2008	2.52%	5.04%	5.04%	2.80%	0.00%	0.00%	
2009	2.81%	-0.39%	0.39%	2.20%	0.60%	0.60%	
2010	5.90%	-2.99%	2.99%	2.20%	0.00%	0.00%	
			3.12%			0.44%	
	UGI - Penn Natural Gas			UGI - Penn Natural Gas			
2005	0.25%			0.40%			
2006	-1.03%	1.28%	1.28%	0.40%	0.00%	0.00%	
2007	-0.30%	-0.73%	0.73%	0.50%	-0.10%	0.10%	
2008	0.70%	-1.00%	1.00%	0.68%	-0.18%	0.18%	
2009	0.91%	-0.21%	0.21%	1.08%	-0.40%	0.40%	
2010	0.45%	0.46%	0.46%	0.53%	0.55%	0.55%	
			0.74%			0.25%	
Average all LDCs all years			1.32%	Average all LDCs all years			0.58%