Lost and Unaccounted-for Gas: Practices of State Utility Commissions

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Executive Summary

Customers of gas utilities pay for more natural gas than they actually consume. The explanation for this discrepancy is what gas utilities and state utility commissions ("state commissions") call "lost and unaccounted-for" (LAUF) gas. LAUF gas, broadly defined, is the difference between the gas injected into a distribution system and the gas measured at customers' meters. Various sources account for LAUF gas, including measurement and accounting errors, stolen gas, and pipe leaks. LAUF gas therefore has both a physical and a nominal component. The cost range of LAUF gas for a typical utility is 2 to 5 percent.

The loss of physical gas (e.g., from leaky pipes) poses a real cost to a utility. The utility, after all, has to purchase additional gas to satisfy the demands of its customers. The nominal component, caused by measurement and accounting error, affects the amounts customers pay for gas relative to the cost of purchased gas for utilities. Accurate LAUF-gas measurements require considerable effort by a utility. State commissions can expect a margin of error in any calculation. They should therefore view a utility's measure of LAUF gas as an estimate rather than an absolute number. This has implications for how state commissions should interpret LAUF gas for taking action.

As part of their obligation, state commissions strive to protect customers by ensuring that utilities control LAUF gas to a reasonable (i.e., prudent) level. Excessive LAUF gas means that customers are paying too much for gas. The Pennsylvania Public Utility Commission estimated that gas customers may be paying as much as $131 million annually for LAUF gas.

Perhaps more important, a high level of LAUF gas may also signal utility negligence in repairing pipes or replacing them, resulting in excessive leaks that could jeopardize safety in addition to inflating costs. Cast-iron and steel piping installed without corrosion-protective measures and certain types of vintage plastic piping are especially prone to leaks from either corrosion or cracking. Gas leaks most frequently do not pose a safety threat because they normally dissipate quickly. Over time, however, aging pipes increase leaks, leading to a possible safety threat. As the NRRI survey showed, commissions have particular concerns regarding upward trends in LAUF gas, since they might signal a pipeline safety threat. Other factors may account for this trend, but it is hard for a utility to discern whether the problem is gas leakage or an increase in measurement error. It seems that utilities, with a push from commissions, should make more effort to locate the specific sources of any increase in LAUF gas.

As a secondary benefit, and one that has gained increased attention, society may also gain environmentally from producing and transporting less gas to meet a fixed level of end-use demand. Overall, LAUF gas has safety, economic, and environmental repercussions for society's welfare.

Challenges for state utility commissions

Commissions face several challenges when interpreting actual LAUF-gas levels. First, some commissions have no single definition of LAUF gas across utilities. A broad definition is the difference between gas delivered to a distribution gas system and gas sold to customers. A more precise and useful definition for commission decision making adjusts the difference for measurable factors, such as company use, temperature and pressure adjustments, and cycle billing.

Second, it is not a straightforward task to measure LAUF gas. Even after adjusting for measurable factors, uncertainty prevails over the precision of those measurements. LAUF gas has a "black box" element that makes it difficult for state commissions to quantify the effect of individual sources. One of these factors is pipe leaks; another is stolen gas. This paper recommends that commissions consider requiring utilities to quantify the effects of different causes of LAUF gas. Although any measurement would fall short of perfect accuracy, it would give most commissions more information than they receive presently from utilities.

Third, different causes account for LAUF gas, including measurement error, accounting error, stolen gas, pipe leaks, third-party damages, line pack, and consumption on an inactive meter. Some of these causes are within a utility's control, while others are exogenous to its influence. The general impression conveyed by some utilities is that they have no or little control over the level of LAUF gas. To the contrary, state commissions need to monitor LAUF gas and not assume that all LAUF gas is uncontrollable and reflects only measurement and accounting errors that pose no real problem requiring corrective action.

Especially important for both state commissions and federal safety regulators is measuring LAUF gas caused by leaky pipes. For various reasons, utilities rarely make this measurement, which admittedly is hard to do. Yet many gas utilities, through the Natural Gas STAR program, are initiating efforts toward reducing gas leakage. These efforts include replacement of bare-steel pipe and replacement or relining of cast-iron pipe.

This study reported on the survey responses of 41 state utility commissions to 14 questions on their policies and practices relating to LAUF gas. These responses cover their ratemaking treatment, oversight activities, evaluation criteria, and incentives for utilities. Part IV highlights the responses, noting that commissions differ as to:

(1) the incentive they give utilities to manage their LAUF gas;

(2) the importance they place on LAUF gas;

(3) their perceptions of the effectiveness of utilities in managing LAUF gas; and

(4) how they evaluate LAUF-gas levels and what criteria they use.

The survey responses show that state commissions do not consider LAUF gas a top priority. Nevertheless, LAUF gas does enter their decisions in rate cases, PGA filings, and safety matters. A number of states—Delaware, Georgia, New York, Pennsylvania, and Texas—have taken proactive positions on LAUF gas. No single reason exists for their actions other than the apparent importance they place on preventing levels of LAUF gas from rising excessively.

This paper reviews current regulatory treatment of LAUF gas. One potential problem is utilities evading responsibility by passing through to their customers the costs of LAUF gas with minimal regulatory oversight. Based on survey responses, several state commissions investigate LAUF-gas percentages only when they exhibit an upward trend or exceed some predetermined level. Otherwise, most commissions seem to assume that all LAUF-gas costs are reasonable. Commissions may consider reevaluating this position.

This paper then identifies alternate regulatory actions to mitigate LAUF gas. Mitigation per se may not serve customer interests if it fails to pass a cost–benefit test. For instance, replacing meters can have a substantial cost that could exceed the benefits from more accurate meter reading and billing. Another example is accelerated pipeline replacement, whose high cost may exceed the economic, safety, and environmental benefits from fewer leaks. Yet, by giving utilities stronger motivation—for example, through explicit incentives, a cap, or systematic monitoring—a commission can help to steer utilities toward a level of LAUF gas that is net beneficial.

This paper also outlines a multi-step regulatory procedure for assessing utility LAUF performance. This general construct draws heavily from a 2010 NRRI paper on the regulatory application of performance measurement and assessment. The procedure involves (1) monitoring LAUF levels, (2) establishing a benchmark, (3) evaluating the utility's performance subsequent to a more detailed inquiry, and (4) taking appropriate action.

Recommendations

This paper provides specific recommendations to state utility commissions on LAUF actions. The major ones are as follows:

1. It would seem inappropriate to compare LAUF-gas percentages across utilities at a given point in time for determining cost recovery and utility prudence.

2. The best benchmark would seem to come from tracking an individual utility's LAUF-gas percentage over time.

3. Utilities can influence LAUF-gas levels in different ways.

4. Commissions may want to be proactive in assessing the performance of utilities in managing LAUF gas, especially for assuring gas customers that utilities are exploiting all prudent actions to manage LAUF gas.

5. Commissions may want to require utilities to compile better information on the individual sources of LAUF gas.

6. Commissions may want to exercise caution in executing an incentive mechanism for LAUF gas.

7. Commissions' most effective tool might be monitoring and assessing utilities' LAUF-gas levels.

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Lost and Unaccounted-for Gas: Practices of State Utility Commissions

I. Purpose of Paper

Lost and unaccounted-for (LAUF) gas is one of those regulatory concepts that draws little attention but has broad implications for regulatory practices. LAUF gas has a multi-dimensional effect: It affects costs and rates, safety, reliability, and the environment. The cost effect is relatively small, but a large volume of LAUF gas can signal a serious safety problem (which, as discussed later, is the biggest concern of state commissions). LAUF gas can also result in methane (CH_4) leakage, posing a greenhouse gas threat, and higher gas losses mean additional gas production to meet a given demand.[1] The U.S. EPA and some environmentalists increasingly have expressed concern over the greenhouse gas effect from LAUF gas.[2] As summarized in a staff report by the Pennsylvania Public Utility Commission:

> Staff conservatively estimates that the total cost of lost natural gas for the companies…is between $25.5 million and $131.5 million per year. The cost of [LAUF] gas is ultimately borne by the ratepayer. Although no distribution system will be able to eliminate all [LAUF gas], it should be minimized. In addition, any natural gas that actually escapes from the system can be a substantial liability to the utility in the form of gas explosions, property damage, and/or loss of life. Safety and reliability go hand-in-hand;[3] methane leakage can pose a serious

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[1] According to the estimates obtained from the latest U.S. EPA report, total methane emissions throughout the natural gas system as a percentage of total domestic gas consumption are less than 1.5 percent. *See* http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2013-ES.pdf.

[2] Methane is over 20 times more potent as a greenhouse gas than carbon dioxide. The largest source of methane emissions is the natural gas industry. Emissions occur during the production, processing, storage, transmission, and distribution of natural gas. At the distribution level, methane emissions can originate from cast iron and unprotected steel pipes, customer meters, and regulator stations. This paper does not address in any detail the recent concern over the release of fugitive methane throughout the natural gas sector, including distribution. *See*, for example, the U.S. EPA website at http://www.epa.gov/climatechange/ghgemissions/gases/ch4.html; and Tiffany Stecker and ClimateWire, "EPA Should Address Natural Gas Leaks," *Scientific American*, April 4, 2013 at http://www.scientificamerican.com/article.cfm?id=epa-should-address-natural-gas-leaks.

[3] A severe pipe incident, for example, can disrupt gas service for a lengthy period.

greenhouse gas threat, and higher losses mean additional gas production to meet a given demand.[4]

As discussed in the paper, whether a utility should invest large or even incremental sums of money for reducing LAUF gas to achieve economic, safety, or environmental objectives reduces to a cost–benefit question. To say, for example, that a utility should always spend money to achieve environmental benefits, irrespective of the costs, is a nonsensical policy that state commissions should reject out of hand.

LAUF gas also has distributional effects. Utility customers may ask why they should pay for gas they do not consume. This paper attempts to address the following questions in the context of fair and efficient regulation:

1. Should utility shareholders not absorb the costs of LAUF gas, since utilities can control their level?

2. Would fairness, for example, involve both the utility and its customers sharing in the LAUF-gas costs?

3. Would passing through all the costs to customers with minimal scrutiny provide weak incentives for a utility to manage its LAUF gas?

4. Are all LAUF-gas costs beyond the control of a utility, making it fair to pass all of them along to customers?

5. Why should customers not pay for all LAUF gas, since it represents an unavoidable filler between what customers demand and what a utility needs to purchase in meeting that demand (similar to the electric industry, where customer ultimately bear the costs of line losses over transmission and distribution systems)?

As discussed in this paper, commissions should hold utilities accountable for the performance of the distribution systems that they operate and control. Yet, as in other regulatory matters, commissions should balance customer interests with the utility's interest, allowing a utility, for example, to recover all costs that reflect prudent behavior.

Another "fairness" matter relates to LAUF gas caused by measurement error. Assume two customers use the same amount of gas but have different bills. One of them has a temperature-compensating meter while the other does not. Each imposes the same cost on the utility, but the second customer pays more. The second customer surely has a legitimate reason to complain. Bill discrepancies can also result from the two customers having meters of a different vintage—the older meter likely recording gas use with a larger margin of error.

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[4] Pennsylvania Public Utility Commission, *Unaccounted-for-Gas in the Commonwealth of Pennsylvania*, Joint Report by the Bureau of Investigation and Enforcement and the Bureau of Audits, February 2012, 10 at http://www.puc.state.pa.us/transport/gassafe/pdf/UFG_Report_Feb2012.pdf.

Measurement error, in effect, can allocate LAUF-gas costs to all customers, to the benefit of individual customers. As an example, if the utility under-records usage for certain customers, it would calculate a larger system-wide amount of LAUF gas. The costs for this gas typically would flow through to all of the utility's customers. Those certain customers are receiving discounted, or arguably "free," gas at the expense of other customers. If, on the other hand, the utility over-records usage for some customers, those customers are paying excessively for gas relative to other customers.

This paper includes the survey responses from 41 state utility commissions to 14 questions on their policies relating to LAUF gas (see Appendix A). These policies cover commission ratemaking treatment, oversight, and other activities, evaluation criteria and incentives for utilities. Part IV highlights the responses, noting that (among other things) commission policies differ over (1) the incentive they give utilities to manage their LAUF gas and (2) how they evaluate LAUF-gas levels.

This paper reviews commission practices as to their compatibility with good regulation. The paper recommends that commissions act proactively in monitoring LAUF gas. It also encourages commissions to require that utilities, to the extent possible, quantify the volume of LAUF gas segmented by source. Particularly useful for commissions would be a breakdown of LAUF gas by physical gas losses and measurement error. Physical losses can convey a potential safety threat, while measurement error reflects a potential billing problem or revenue loss.

Part V.D outlines a multi-step regulatory procedure for evaluating utility performance in managing LAUF gas. The major steps include benchmarking, monitoring and taking appropriate action. A commission, for example, can use the information from this procedure to determine cost recovery, to investigate further or implement additional incentives, such as a cost-sharing mechanism, or a hard or soft target.

II. What Is Lost and Unaccounted-for (LAUF) Gas?

A generic definition of LAUF gas is "metered gas receipts minus metered consumption of end-use customers"; that is, it is the difference between the gas injected into a distribution system and the gas measured at customers' meters. The routine operation of a gas utility will inevitably result in LAUF gas if only because of measurement errors, company use, and leaking pipes. Customers of gas utilities therefore pay more for natural gas than they actually consume. As in many other businesses, gas utilities have to buy more of a product than their customers demand. One example of this phenomenon is a grocery store, which because of spoilage buys more fresh fruits and vegetables than are sold.

Various reasons account for the existence of LAUF gas, the primary ones being measurement and accounting errors, stolen gas, and pipe leaks.[5] LAUF gas therefore has both a

[5] One commission expert noted that PHMSA identifies at least 17 factors contributing to LAUF gas. *See* Paul Metro, "Technical Losses in Natural Gas Transportation, Distribution, and Storage," presentation to the Energy Agency of the Republic of Serbia, October 2007, 3 at

physical and a nominal component. The composition varies by utility; for example, a utility with cast-iron and bare-steel pipes would tend to lose more physical gas than another utility with polyethylene plastic pipes. LAUF gas is gas that either (1) escapes from the distribution system (e.g., from leaky pipes) or (2) stays in the system but is not reported or measured (e.g., from an accounting error or theft)—thus the term "lost and unaccounted-for gas." The "black box" character of LAUF gas relates to that part which the utility is unable to measure with a tolerable degree of accuracy.

Measurement of LAUF gas is inherently an imperfect estimation process; for example, the utility can only evaluate the accuracy of all meter information within a specified level of tolerance error instead of assuming a definite value. Measurement error causes a discrepancy between measured gas flows and actual flows. The difference can be either positive or negative.[6] The best efforts of a utility can reduce LAUF gas but can never eliminate it. Many gas utilities claim that a large source of LAUF gas is measurement error from the absence of temperature and pressure compensating meters at customer delivery points.[7]

A. Definition of LAUF gas

1. Broad definition

Under this definition, LAUF gas equals R - D, where R equals the volume of gas received by a gas utility ("sendout") and D equals the volume of gas delivered to customers ("disposition"). One definition of disposition is the sum of firm billed sales and company use.[8] A utility may consume gas for compressors, gas processing at storage fields, and gas station heaters. R - D is then the difference between measured quantity of gas entering a gas distribution system and the measured quantity of gas withdrawn by customers, including company use. Another way to express this definition is the "total metered city gate receipts" minus "total metered system deliveries."

This broad definition of LAUF gas makes no adjustments for gas consumed by the utility, pipe leaks, system line pack,[9] measurement and accounting errors, stolen gas, and so forth.

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http://www.naruc.org/international/Documents/Technical_losses_in_natural_gas_transportation_distribution_storage_Paul_Metro.pdf.

[6] Some utilities report their overall LAUF gas as negative, which means that a negative measurement error overwhelms the physical losses from pipe leaks. Such a result shows that the measured gas volumes entering a gas distribution system are less than the gas delivered to end-use customers.

[7] The staff of the Pennsylvania Public Utility Commission estimated that these meters could cost around $100 each.

[8] Many, if not most, gas utilities exclude company use from the definition of LAUF gas and recover separately the costs in their PGA mechanism.

[9] Line pack increases the volume of gas by increasing the operating pressure of a pipe, thus representing stored gas in a pipeline system resulting from heightened compression. It functions as short-

Because it does not segment LAUF gas by source, both utilities and commissions are unable to diagnose specific problems or take appropriate action. They know only that a certain volume of purchased gas delivered to the distribution system is not consumed by end-use customers.

2. More precise definition

The U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PMSA)[10] and several gas utilities[11] use the following definition of LAUF gas:

R – D – adjustment,

where "adjustment" is the volume of the gas differential between R and D (as defined above) that is accountable and measurable (*see* Figure 1).[12]

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term storage to help manage load fluctuations. For example, it represents a temporary source of gas to meet peak demands.

[10] PHMSA requires gas operators in their annual filings to use the following definition:

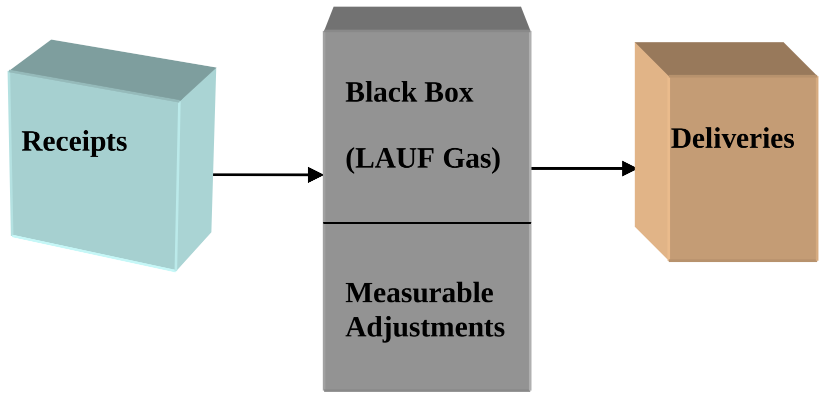
> 'Unaccounted for gas' is gas lost; that is, gas that the distribution system operator cannot account for as usage or through appropriate adjustments. Adjustments are appropriately made for factors as variations in temperature, pressure, meter-reading cycles, or heat content; calculable losses from construction, purging, line breaks, etc., where specific data are available to allow reasonable calculation or estimate; or other similar factors.

(*See* PHMSA - Forms - PHMSA F 7100.1-1 (Instructions for Completing Form.)

[11] A new promulgated rule in Pennsylvania requires a uniform definition of LAUF gas that copies the PHMSA definition (*see* ibid). It defines the LAUF-gas percentage as: [(purchased gas + produced gas) minus (customer use + appropriate adjustments)]/ (purchased gas + produced gas). *See* Pennsylvania Public Utility Commission, Proposed Rulemaking on Establishing a Uniform Definition and Metrics for Unaccounted-for-Gas, October 20, 2012 at http://www.pabulletin.com/secure/data/vol42/42-42/2028.html.

[12] Under this definition, LAUF-gas percentage = $\{[R - (D + \text{adjustment})]/R\}\cdot 100\%$. This paper later uses this definition when referring to targets or standards as regulatory tools for evaluating a utility's performance.

Figure 1: Gas Flows from Receipts to Deliveries



Receipts – (LAUF Gas + Adjustments) = Deliveries,
or
LAUF Gas = (Receipts – Deliveries) – Adjustments
LAUF% = LAUF Gas/Receipts

The major factors affecting LAUF gas are:

1. **Company Use:** Company use includes gas consumed at utility offices and other buildings for space conditioning, water heating, and other purposes. Utilities also use gas as a fuel for compressors, line heaters, and power generation. Typically, a utility will treat company use as "disposition" or similar to gas sales.

2. **Pipe Leakage:** A utility can estimate gas leakage based on (a) known leaks, (2) estimated undetected leaks, and (3) leakage factor per leak. Utilities find it difficult to determine how long a leak has existed and any changes in the leak rate from initial detection to repair. Leakage as a major cause of LAUF gas may translate into an abrupt change in reported LAUF-gas statistics and signal integrity issues on the system. Most utilities verify leakage by detailed leak surveys.

3. **Heat Content:** All gas meters measure volume (e.g., Mcf). The heat content of gas volume measured at the customer's meter usually differs from heat content at the city gates. The reason is that a typical utility has multiple city gates that receive gas from different sources (e.g., pipelines, LNG, waste gas, storage) with differing heat content. The heating value can vary with the quality of gas that enters a distribution system, on a daily basis and among locations. The utility commingles these gas supplies, so the heat content measured at the customer's meter differs from the heat content at the city gates. The heat content for a given measured volume of gas depends on several factors, including the air temperature, atmospheric pressure, and the elevation of the meter. Using a constant heat content to calculate the volume of gas inevitably leads to a measurement error.

4. **Consumption on Inactive Meters:** A utility may fail to turn off a meter once a customer has moved from a house or business.

5. **Temperature and Pressure Adjustment:** Temperature and air pressure affect measured volumes of natural gas. The utility corrects the gas volume at a gate station to a temperature of 60°F at a base pressure of 4 ounces. If the utility fails to make the same correction for gas sold, unaccounted-for gas would result. For every 5°F above or below 60°F, the gas volume will change by about 1 percent. If the average winter temperature is 20°F, for example, unaccounted-for gas would be 8 percent over this period. Temperature-compensated meters can correct the volume.[13]

6. **Billing Inaccuracies:** Without automated metering-reading devices, a utility normally estimates readings every other month.[14] These estimates will not precisely measure actual energy consumption.

7. **Accounting Errors:** One cause is the processing error when the gas accounting department incorrectly measures meter readings. It includes inaccurate calculations, misinterpretation of meter data, and improper accounting for gas receipts and deliveries. The problem lies with a flawed information system.

8. **Third-Party Line Breaks:** The major reason for pipeline incidents is excavation damage by third parties. Constructors or others may dig without first contacting the gas utility to locate pipes. The utility has to repair the facilities in addition to replacing the gas released as a result of the line break.

9. **Theft:** Stolen gas is gas that the utility delivers and customers use but that is not recorded as sales. In other words, stolen gas is gas consumed by an end user but not paid for. Other customers are, in effect, subsidizing delinquent customers. Customers tampering with meters also pose a safety threat to the neighborhood.[15] For most U.S. utilities, stolen gas is trivial in terms of both quantity and revenue losses.

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[13] Air pressure affects unaccounted-for gas in the following way: A utility purchases gas at four ounces of pressure or the utility corrects the volume to four ounces. As the pressure increases above the four-ounce base, the volume of gas becomes smaller. For every two-ounce change above four ounces, the utility expects a loss of about 1 percent. Therefore, if the service regulators are delivering eight ounces of gas through the end-use meters, the utility can expect around 2 percent unaccounted-for gas; at 10 ounces, the utility can expect around three percent unaccounted-for gas. *See PHMSA - Guides and Manuals - Guidance Manual for Operators of Small Natural Gas Systems* (June 2002 Edition).

[14] Automated meters are expensive, so decision making comes down to a cost–benefit question of whether to install them. One source of LAUF gas is inaccurate gas meters. Determining the overall accuracy of the meters requires testing a random sample of meters. The utility can then extrapolate the average accuracy of the sample meters to all of the meters in its distribution system.

[15] The reader might note, in comparison, that the cost of LAUF gas recovered by a utility represents gas paid for by end users but not consumed (just the opposite of stolen gas) Placed in this light, one might ask why a utility should have its customers pay for LAUF gas. One persuasive answer is that gas losses can be an inevitable part of the gas business, reflecting a legitimate cost of service.

10. **Blowdown:** This practice releases gas into the atmosphere during maintenance, inspections, or emergency procedures. It can pose a safety and environmental problem in addition to wasting gas that the utility has to replace.

11. **Cycle Billing:** This source of LAUF gas derives from gas volumes purchased by a utility not billed to customers over the same accounting period. Cycle billing causes a mismatch between when gas enters the distribution system and when the utility bills it to end-use customers. The utility, for example, might not account for gas purchases and gas deliveries on a common month-end closing date.

12. **Other Measurement Errors:** For example, the distance of straight pipe before an orifice meter can change the measurement accuracy of the orifice-meter device.

A more precise definition of LAUF gas better tracks the sources of gas-volume differentials and thereby gives both utilities and commissions more useful information for interpretation and decision making. For example, estimating the magnitude of gas losses from pipeline leaks requires subtracting total LAUF losses from other sources.

This definition also separates the difference between system "gas input" and system "gas output" into three components: (1) gas used by the utility, (2) accounted-for gas, and (3) unaccounted-for gas. A pertinent question is whether a utility can measure some sources with enough precision for decision making. Gas losses from pipe breaks, for example, are easier to measure than gas losses from pipe leaks, some of which are difficult to locate, let alone measure the gas losses from.[16]

B. The inevitability of LAUF gas

According to PHMSA, pressure and temperature errors in gas measurement rank second to pipe leaks as a contributing factor to LAUF gas. By calculating LAUF gas as a percentage of the total gas purchased, PHMSA claims that the utility can determine whether losses result from leaks or gas-measurement error. Some industry experts dispute this claim, contending that PHMSA's definition of "appropriate adjustment" fails to specify what factors utilities should include in their filings, making it difficult to separate out the effect of pipe leakage. A report by the American Gas Foundation (AGF), for example, argues that:

> Past studies have shown that unaccounted for gas statistics are primarily a result of accounting and measurement errors. Gas lost through leakage to the atmosphere is a comparatively small amount. Also, since the instructions for RSPA Form F 7100.1-1 do not specify what should be included under the 'appropriate adjustments' factor in the percent unaccounted for gas formula, it becomes impossible to extract from the data the amount of gas lost through

[16] Leaks generally involve a slow release of gas over a small area, which can go undetected over long periods. Once a utility detects a leak, it can take additional time to confirm the exact location.

> leakage to the atmosphere. [17]…[Thus] unaccounted-for gas information in the [PHMSA] database could not be used as an indicator of the level of integrity, as the data typically contain a heavy proportion of accounting and measurement errors and do not provide reliable information on gas lost through leakage to the atmosphere.[18]

Testimony before the Georgia Public Service paints a different, more optimistic view on measuring the effects of different sources on LAUF gas:

> With the breakdown of measurement losses into the errors or parts that I have described above, a large part of the reason for errors and level of gas loss from each source of error can be estimated with some degree of accuracy. This will allow the corresponding gas loss to be assigned to a specific source. The end result of such assignment of gas loss to specific sources or reasons is to allow [Atlantic Gas Light Company or AGLC] to address these items and to act to reduce the level of [LAUF] on its system.[19]

The residual, or immeasurable, sources constitute truly LAUF gas, as the term implies. They might include only pipe leaks that are difficult to detect and measure, and stolen gas.

C. Utility actions to mitigate LAUF gas

Contrary to the belief of some industry observers, a utility can take a number of actions to manage its LAUF gas:

- Increase measurement accuracy for heat content, and temperature and air pressure adjustments
- Monitor meter accuracy and replace bad meters[20]

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[17] American Gas Foundation, *Safety Performance and Integrity of the Natural Gas Distribution Infrastructure*, January 2005, 7-2 at http://www.gasfoundation.org/ResearchStudies/CompleteStudy.pdf.Ibid.

[18] Ibid., 8-2.

[19] John W. Mallinckrodt, Direct Testimony, Docket No. 15527, before the Georgia Public Service Commission, July 25, 2002, 8 at http://www.psc.state.ga.us/factsv2/Document.aspx?documentNumber=57096.

[20] Utilities can take a number of actions to minimize the discrepancy between what customers actually consume and what meters record. They include randomly testing and calibrating meters for accuracy, replacing meters when appropriate, maintaining meters and accurately reading meters. Most states have regulations requiring periodic testing of meters. These requirements provide a continuous and systematic check on the veracity of meter reads, which not only produces more “just and reasonable” billings for customers, but also continuously places downward pressure on LAUF-gas percentages.

- Reduce leaks by pipe repair, maintenance and pipe replacement

- Reduce third-party damages by disseminating information to the public of the dangers from digging without first contacting the gas utility to locate pipes[21]

- Reduce "blowdown" during normal maintenance[22]

- Reduce theft

- Match in time the recording of receipts and deliveries

Table 1 lists individual sources of LAUF gas, the problems they cause, and mitigative actions. A utility might find some of these actions not cost-beneficial. Regulators might want to consider requiring utilities to report which of these actions would not pass a cost–benefit test. "Best practices" differ across utilities because each utility faces unique conditions that would change the economics of specific actions to reduce LAUF gas. Thus, what one utility finds tenable, another utility might not.

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[21] Typically, state officials have "dig-safe" compliance authority and can impose fines on contractors and others who dig first without notifying utilities through "one call" or "dig safe" notification programs.

[22] As mentioned above, "blowdown" is gas released to the atmosphere from pipe depressurization due to maintenance, inspections, or emergency procedures.

Table 1: Sources of LAUF Gas, Their Problems, and Mitigative Actions

Source	Problem	Mitigative Action
Pipe leaks	▪ High levels or dramatic change in LAUF gas might indicate a safety threat	▪ Continuous monitoring of leaks ▪ Detailed leak surveys ▪ Repair or replace at-risk pipes in a timely fashion
Measurement error ▪ Temperature and pressure difference ▪ Heat value conversion ▪ Meter inaccuracies	▪ Inaccurate gas volumes at customer meters	▪ Testing and calibration of meter accuracy ▪ Replacement or maintenance of malfunctioning meters ▪ Installation of automated meter-reading devices to compensate for temperature and pressure differences ▪ Improved quality of data
Accounting error	▪ Inaccurate calculations and misinterpretation of meter data ▪ Improper accounting for gas receipts and deliveries	▪ Periodic internal audits ▪ Proper staff training ▪ Well-defined standard practices
Company use	▪ Measurable, so it really should fall outside the definition of LAUF gas	▪ Exclusion from LAUF gas and addition to sales
Third-party damage	▪ All customers paying for gas losses and repairs ▪ Safety threat leading to incidents	▪ Proactive program that informs the public of the dangers of digging and calling 811 before digging ▪ Strict penalties (usually imposed by a state agency) for the guilty party ▪ Charges to the guilty party for gas losses and repairs
Cycle billing	▪ Timing mismatch between gas receipts and deliveries	▪ More frequent meter reads (e.g., monthly) ▪ Less accounting lag
Consumption on inactive meters	▪ Waste of gas	▪ Installation of automated meters ▪ Turning off a meter once a customer has moved from a house or business
Stolen gas	▪ All customers subsidizing delinquent customers ▪ Safety threat for local community	▪ Inspection of meters for signs of tampering ▪ Follow-up investigation ▪ Strict penalties for delinquent customers
"Blowdown"	▪ Released gas into the atmosphere during maintenance, inspections or emergency procedures ▪ Potential safety problem	▪ Inject "blowdown" gas into low-pressure mains by adding piping from compressors to the mains

III. Regulatory Concerns and Questions

A. The incentive problem

One concern of commissions is that utilities may have a weak incentive for managing LAUF gas. This problem especially exists whenever a utility is able to pass through LAUF-gas costs to their customers with minimal regulatory scrutiny. As discussed in Part IV, several survey respondents stated that utilities have little or even no incentive to mitigate LAUF gas. Whether or not these observations are valid or even represent a commission's position, the responses do indicate the perception of an incentive problem. Some commissions have tried to elicit better utility performance through explicit incentive mechanisms or the capping of LAUF-gas costs recoverable from customers. Most commissions implicitly have taken the position that it is easier to spread the costs of LAUF gas across all customers than to burden utility shareholders with those costs. The outcome creates little motivation for utilities to control LAUF gas. It also raises a "fairness" question of why utility customers should fully shoulder the burden of costs that are difficult to justify, let alone measure with reasonable accuracy.

The combination of poor incentive for managing LAUF gas and a utility's ability to control LAUF-gas levels seems disjointed from sound regulatory policy. The incentive problem arises from the ease of cost recovery by utilities. Yet, because utilities have some control over LAUF-gas levels, it seems likely that existing levels are above socially optimal levels: Most utilities are not held accountable for poor management of LAUF gas; accentuating this problem is the fact that most utilities also do not benefit when they manage LAUF gas exceptionally well. They might benefit indirectly, however, if a lower level of LAUF gas results in a safer pipeline network or less likelihood of commission scrutiny.

In this environment, the utility's objective would be to minimize risk, or to minimize non-recovery of costs. That is, the major utility motivator is to minimize regulatory risk premised on the fact that it would not benefit from higher performance, even if its customers do. Without the possibility of profit, utilities would therefore have as its major objective the minimization of cost disallowances.

B. Higher purchased gas costs for customers

LAUF gas is one area of regulatory interest in a utility's recovery of purchased gas costs. The others include gas purchasing practices, gas-cost incentives and reconciliation of actual gas costs with cost recovery. Commissions typically consider LAUF-gas costs as part of a utility's cost of service. As with other utility costs, commissions have a duty to customers to evaluate the prudence of utility actions or non-actions in determining whether customers should pay for those costs.

The effect of LAUF gas on purchased gas cost is the product of the average commodity gas cost and the additional level of purchased gas. For example, if the average commodity cost is $5 per Mcf and the utility's "physical" LAUF gas is 1 million Mcf, the additional cost is $5 million.[23] Assuming that the aggregated customer demand is 50 million Mcf of gas, LAUF gas as a portion of total sales is 2 percent; if, instead, the LAUF gas is 3 percent, the additional gas-purchase cost would increase to $7.5 million.

The following relationship illustrates the effect of "physical" LAUF gas on the price that customers pay:

$$\mathbf{P_e = P_w/(1 - lauf\ \%),}$$

where P_e represents the price that customers pay for gas, assuming that the utility recovers all LAUF-gas costs; P_w is the wholesale price of gas, or the price of gas at the city gate; and lauf % is the percentage of metered gas entering a distribution system that the utility does not sell to its customers (i.e., that is physically lost). As an example, assume that the metered gas into a distribution system is 300,000 Mcf, the gas sold is 280,000 Mcf, and utility gas use is 10,000 Mcf. (We are excluding utility gas use as part of LAUF gas.) The LAUF-gas percentage is then [300,000 – (280,000 + 10,000)]/ 300,000 or 3.33 percent. With a lauf % of 3.33 percent and if P_w is $5, P_e would equal $5.17; if lauf % equals 5 percent, P_e would increase to $5.26. The price increase appears small, having little apparent effect on individual customers. Yet, if the utility had to absorb the entire costs, its distribution margins (or shareholders' return) would decline by a much larger percentage. This "tariff" effect might partly explain why commissions: (1) find it easier to pass through the costs of LAUF gas to customers than to have utilities bear the costs; and (2) typically do not disallow the costs of LAUF gas to customers without strong evidence that the utility failed to take appropriate action to mitigate LAUF-gas percentages.

Little evidence is available on the total costs for LAUF gas that utility customers pay. The report by the Pennsylvania Public Utility Commission estimated a wide range of such costs, $25.5-$131.5 million annually.[24] A white paper by the New York State Department of Public Service provides information that the reader can use to calculate that New York customers arguably pay an additional $60 million annually for a statewide LAUF-gas percentage average of 2 percent.[25] A paper by the Conservation Law Foundation estimated that LAUF gas adds $40

[23] Some of the measured LAUF gas may result from measurement and accounting error, which does not represent actual physical gas losses that the utility would have to replace for meeting customers' demand.

[24] Pennsylvania Public Utility Commission, *Unaccounted-for-Gas in the Commonwealth of Pennsylvania*.

[25] New York State Department of Public Service, *Staff White Paper on Lost and Unaccounted for (LAUF) Gas* at http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7B0413ECDD-C194-46DE-8B04-AFDB3FBBE404%7D. The paper reported that the state's gas utilities collectively spend around $3 billion for purchased gas (*see* page 6).

million annually to customers' gas bills in Massachusetts.[26]

C. Safety concerns from excessive pipe leaks

Cast-iron and steel piping installed without corrosion-protective measures and certain types of vintage plastic piping are especially prone to leaks from either corrosion or cracking. Utilities often do not consider gas leaks a safety threat because gas from leaks normally dissipates quickly.[27] Over time, however, aging pipes increase leaks, leading to a possible safety threat. As the NRRI survey showed, commissions have particular concerns regarding upward trends in LAUF gas, since they might indicate a pipeline safety threat.

Utilities find it difficult to detect all leaks and measure gas losses. There is no good substitute for detailed leak surveys[28] and follow-up utility actions. These actions include: (1) detecting leaks, (2) repairing leaks, (3) scheduling leaks for future maintenance or pipe replacement (e.g., immediate repair or scheduled longer-term repair), (4) periodic monitoring of leaks, and (5) replacing the highest-risk sections of piping.

Commissions have particular concerns over upward trends in LAUF gas, since they might signal a pipeline safety threat. Other factors may account for this trend, but it is hard for a utility to know if the problem is gas leakage or an increase in measurement error.

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[26] Shanna Cleveland, "Into Thin Air: How Leaking Natural Gas Infrastructure is Harming our Environment and Wasting a Valuable Resource," November 2012 at http://www.clf.org/static/natural-gas-leaks/WhitePaper_Final_lowres.pdf. The paper added that:

> Every day, thousands of methane leaks are actively releasing one of the most potent greenhouse gas emissions into the air in Massachusetts. Under our current regulations, we do not have an accurate accounting of these emissions, ratepayers cannot easily determine how much of their bill is going towards LAUF, and companies have no incentive to repair leaks unless they pose an immediate hazard. Massachusetts can and should take swift, direct action to change this state of affairs and bring fugitive emissions from distribution pipelines under control."

The paper makes several recommendations. They include (1) establishing leak classification and repair scheduling, (2) setting a cap on recovery for LAUF gas, (3) accelerating pipe replacement programs, and (4) increasing monitoring and reporting requirements. A commission should not take some of these recommendations seriously, since the paper omits any cost estimates for executing them. Would good policy include, for example, spending $100 million on accelerating pipe replacement when (1) a utility has cheaper alternatives available or (2) the societal benefits are much lower?

[27] But if gas leaks migrate to enclosed areas in the presence of ignition sources, a safety risk can quickly escalate.

[28] A leak survey can identify problems that could affect the integrity of a pipe or the operation of the gas distribution system. Utilities normally conduct annual leak surveys of their system. Surveys identify those pipes that pose the highest safety risk, require prompt action or continuous monitoring.

As of August 2, 2011, federal regulations require gas utilities to develop a distribution integrity management program (DIMP). Integrity management focuses on the allocation of utility resources to the areas of greatest risk. DIMP requires a gas utility to take seven major steps:

1. Develop and implement a written integrity management plan

2. Acquire knowledge of the distribution system

3. Identify existing and potential threats

4. Analyze, assess, and prioritize risks

5. Mitigate risk by scheduling safety actions

6. Measure, monitor and evaluate performance, and

7. Report the results

Risk assessment, for example, is a systematic method for determining the probability and consequences of pipeline incidents, such as deaths, injuries and property damage. DIMP requires gas utilities to identify, assess, and prioritize safety risks on a system-wide basis. This discussion points to the possible use of a LAUF-gas metric that isolates the effect of pipe leaks as part of a DIMP review. It can supplement the other information compiled in a DIMP analysis. Without measuring the effects of other sources on LAUF gas, however, the metric becomes a gross number devoid of meaningful interpretation for utility or commission action.

D. The major challenges for regulators

The features of LAUF gas as a performance metric limit its regulatory applications. They make it difficult for commissions to establish a benchmark and elicit better utility performance. The difficulties include:

1. **Definition:** There is no single definition of LAUF gas across utilities, even those located in the same state.[29] The different definitions make it almost impossible for commissions to evaluate a single utility's performance by comparing it with a peer group of utilities. It is like mixing apples with oranges.

2. **Measurement:** Experience so far has shown the difficulty of measuring with reasonable accuracy the effects of individual factors on LAUF gas.[30] Even when

[29] Pennsylvania has recently addressed this problem by enacting a rule that requires a uniform definition of LAUF gas. With utilities using the same definition, the commission believes it would have better information to compare levels and movements of LAUF gas across utilities in the state.

[30] One utility official's testimony, for example, stated that "Some of [the sources of LAUF gas] are difficult to quantitatively identify, or at least separately identify. For example, since most leaks and

factors are measurable, they contain an unknown degree of error; other factors are immeasurable. If LAUF gas dramatically increases from one year to the next, it becomes difficult to know what accounted for the increase.

3. **Multiple Causes:** As mentioned earlier, several causes can account for LAUF gas; for example, measurement error, accounting error, cycle billing, stolen gas, pipe leaks, third party damage, inaccurate meters, and consumption on an inactive meter.[31] Another factor is the composition of facilities that a utility operates. These facilities include distribution, transmission, and storage. Customer composition can also be a factor.

4. **Annual Variability**: The high variability from year to year for some utilities gives support to using a multi-year moving average for benchmarking. If a commission were to set a standard, it should look at a utility's past performance for several years.

5. **Unique Determinants:** LAUF gas, as a percentage of sendout, varies widely across utilities, including those utilities in the same state.[32] Even with a uniform definition of LAUF gas, commissions should expect these variations since each utility faces unique conditions—different pipe age and materials, different meters and regulators, and so forth. Variations exhibit both randomness and events beyond a utility's control (e.g., weather, the business and market environment).[33] Commissions should

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theft occur within the distribution system and are not measured, their individual contribution to distribution system losses can only be estimated." (W.C. Hamilton, Direct Testimony, on behalf of MichCon, Case No. U-16999, April 20, 2012, 6 at http://efile.mpsc.state.mi.us/efile/docs/16999/0001.pdf.)

On the other hand, another gas utility, Atlantic Gas Light, quantified the effect of different factors on LAUF gas: (a) consumption on inactive meters – 6 percent, (b) main/meter theft – 1 percent, (c) measurement error – 77.21 percent, (d) construction – 0.02 percent, (e) leak related – 14.44 percent, and (f) third-party damage – 1.33 percent. (John W. Mallinckrodt, Direct Testimony, Docket No. 15527, before the Georgia Public Service Commission, 3.)

[31] Ibid.

[32] In Pennsylvania, for example, in 2009, the percentages across nine gas utilities ranged from 0.6 percent to 6.39 percent, with an average percentage of 2.62 percent. LAUF-gas percentages for the large Texas gas utilities range from 0.56 percent to 3.80 percent. LAUF-gas percentages for 15 Massachusetts utilities in 2008 ranged from zero to 2.82 percent. Finally, LAUF-gas percentages for 22 Northeast utilities in 2008 ranged from close to zero to 4.84 percent.

[33] Theoretically, a commission could conduct a statistical analysis that controls for the different factors affecting LAUF-gas percentages. The analysis could identify and measure the important factors explaining percentage differences across utilities. The commission could then better isolate the effect of management competence. The problem is quantifying the effect of individual factors, among other things, because of variations in LAUF-gas definitions, the difficulty of measuring the factors and expected statistical errors. As far as the author knows, no one has attempted such an analysis.

therefore refrain from establishing a LAUF-gas target based on some well-accepted industry practice.

6. **Degree of Control:** Some factors of LAUF gas are within the control of a utility; others are not. For example, a utility can minimize stolen gas by continually reviewing individual gas consumption for individual customers and comparing the customer's most recent consumption to previous periods' consumption. A utility also can minimize gas losses from gas consumption on inactive meters; and gas losses from pipe breaks caused by a third party.

7. **Recognition of Patterns:** It is difficult to forecast LAUF gas for an individual utility, as year-to year levels can fluctuate widely. Statistically, an analyst might mistake a "noise" for a signal (or vice versa) in forecasting a future value for LAUF gas.[34]

IV. Current Regulatory Practices

A. Highlights from the NRRI Survey

NRRI sent out 14 survey questions to state utility commissions in mid-January 2013 inquiring into their policies and practices involving LAUF gas (*see* Appendix A). They cover (1) the incentive they give utilities to manage their LAUF gas, (2) the importance they place on LAUF gas, (3) their perceptions of the effectiveness of utilities in managing LAUF gas, and (4) how they evaluate LAUF-gas levels and what criteria they apply.

NRRI received responses from 41 states (*see* Appendix B). In almost all instances, the commissions answered the 14 questions. Commissions vary widely in their vigilance toward monitoring LAUF gas. Some commissions, for example, devote little effort to reviewing LAUF gas; they allow recovery of their costs with minimal oversight. Other commissions place a cap on allowed cost recovery or apply an explicit incentive mechanism. A third group of commissions routinely scrutinizes levels of LAUF gas to determine cost recovery or to identify any potential safety or other problems. These commissions tend to act when LAUF-gas levels are abnormal or deviate far from historical averages.

One set of responses identified different ratemaking approaches for LAUF gas. They include:

1. Deferral accounts;[35]

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[34] Noise is something observed in the past that is irrelevant for the future. A signal is also something observed in the past but is a predictor of the future.

[35] One example is for a utility to include LAUF-gas costs in a monthly gas-cost deferral account and then later make an annual true-up. (The commission would authorize the account for tracking gas-cost recoveries.) The utility can base the true-up on the rate-case determined LAUF-gas costs or on the

2. Targeted LAUF-gas percentage in base rates;[36]

3. In-kind gas, especially for transportation customers in which the utility retains a percentage of the gas supplies purchased by the transportation customer;[37]

4. Pass-through costs entirely in the PGA mechanism;[38] and

5. Combined base rate/PGA recovery, which is typical for purchased gas costs.

A recent trend is to shift LAUF-gas costs out of base rates and into the PGA mechanism. Commissions generally allow utilities to include the LAUF-gas costs in their tariffs. Their explanation is that these costs to a significant extent represent a legitimate cost of serving customers.

Highlights of the survey responses follow:

1. **Commissions normally review LAUF gas as part of an audit of a utility's gas-purchasing practices, either in a rate case review or PGA reconciliation.** PHMSA also requires annual reporting of LAUF gas by utilities. Although a topic in various dockets, LAUF gas rarely receives major attention.

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actual LAUF-gas costs over the past 12 months. The latter treatment recognizes that the actual costs for any given year could be greater or smaller than the allowable true-up costs.

[36] An example is a commission allowing a utility to collect all of its LAUF-gas costs as long as the LAUF-gas percentage does not exceed 3 percent. The utility would absorb any LAUF gas above that percentage.

[37] This approach is similar to FERC's for gas consumed by gas pipelines in their operations as fuel and LAUF.

[38] State commissions have traditionally approved cost trackers, such as PGA mechanisms, only under "extraordinary circumstances." Commissions recognize the special treatment given to costs recovered by a tracker; they consider cost trackers an exception to the general rule for cost recovery. Thus, this position places the burden on a utility to demonstrate why certain costs require special treatment.

The "extraordinary circumstances" justifying most of the cost trackers that commissions have historically approved have been for costs that are: (1) largely outside the control of a utility, (2) unpredictable and volatile, and (3) substantial and recurring. Historically, commissions required that all three conditions exist if a utility wanted to have costs recovered through a tracker. Fuel costs were a good candidate because of their influence by factors beyond the control of a utility, their volatility, and their large size. Commissions recently have approved cost trackers when not meeting all three conditions, especially the third (substantial and recurring costs). Recovery of LAUF gas through the PGA or a special tracker appears not to meet all three conditions: Utilities have some control over LAUF-gas costs, and these costs, although recurring, are not substantial.

2. **Several commissions do have concerns when LAUF gas increases from historical levels or exhibits a sudden jump from a previous period.**
   A recent increase can indicate, for example, a greater number and severity of pipe leaks posing a safety threat. Commissions are more likely to scrutinize a utility's LAUF gas because of a dramatic increase rather than the absolute level itself. Observing, for example, a LAUF-gas level of 5 percent conveys little information in the absence of a benchmark or comparison with the utility's previous performance or other utilities' performances.

3. **Few commissions give utilities explicit incentives to control LAUF gas.**
   A few utilities have special incentive mechanisms for LAUF gas; for example, New York gas utilities and Chesapeake Utilities in Delaware. In New York, the commission sets a target that is a fixed percentage above sales.[39] For Chesapeake Utilities, the mechanism provides no explicit rewards and penalties, yet it can trigger further commission review or even a penalty if the utility fails to explain why its LAUF gas has grown. A small number of commissions impose a penalty on a utility for failing to achieve a predetermined target; for example, they impose a cap on a LAUF-gas percentage above which the utility is unable to recover costs.[40] Other commissions provide fixed-cost recovery in base rates. While this treatment gives utilities strong incentives for controlling LAUF, commissions have moved away from it because of a possible large gap between actual and predicted LAUF-gas costs. Several commissions indicate that they would initiate an investigation when LAUF gas reaches "abnormally high" levels.[41] Some respondents also indicated that PHMSA pressures state commissions to act when LAUF-gas percentages exceed certain levels. A few instances occurred in which a high LAUF-gas percentage caused a commission to impose a cap to motivate the utility to repair its pipe leaks or replace its leaky pipes.

4. **The strongest incentive for utilities to manage LAUF appears to lie with the increased likelihood of a pipeline incident if they ineffectively repair or eliminate leaks.**
   A surprisingly large number of survey respondents say that utilities have no incentive to manage their LAUF gas. This may be an overstatement because, even if commissions provide no direct incentives, high LAUF-gas levels may indicate a

[39] New York did not respond to the survey, but this information came from a white paper cited in footnote 24. The target is a hard cap in the form of a range of values outside of which the utility receives either a penalty or reward.

[40] The Texas Railroad Commission, for example, sets a cap of 5 percent. *See* Texas Railroad Commission, *Final Order*, GUD No. 10112, June 6, 2012, 2 at http://www.rrc.state.tx.us/meetings/gspfd/10112-FinalOrder.pdf.

[41] Part V of this paper suggests how a commission can detect abnormally high levels of LAUF gas.

potential safety problem that a utility would want to address. Besides, PHMSA acts as a backstop when LAUF gas seems excessive.[42] Pipeline incidents can have severe financial and public-image repercussions for a utility. Therefore, a utility would likely go to great lengths to avoid an incident.[43]

5. **Several commissions continuously monitor LAUF gas, largely to detect high leakage levels.**
   Their chief concerns are that high levels might reflect a safety threat or customers paying excessively for purchased gas. Typically, commission staff would review historical levels of LAUF gas for a single utility and conduct a more detailed investigation when the most recent level is abnormally high.

6. **More commissions compare a utility's LAUF-gas percentage with its historical levels rather than with other gas utilities' percentages.**
   Commissions seem to recognize, rightly so, that a more meaningful comparison is with a utility's previous performance than with other utilities' LAUF-gas percentages.[44]

7. **LAUF-gas percentages depend heavily on the age and types of pipes.**
   Older plastic pipes, cast-iron pipes, and bare steel tend to have more serious leakage problems. Some respondents noted that utilities in areas with newer pipes have lower LAUF-gas percentages and stricter targets imposed upon them by commissions. A worthwhile study would be to collect empirical evidence on whether the first part of the previous statement is true.

8. **Almost all state commissions allow the recovery of LAUF-gas costs in a PGA mechanism.**
   Similar to purchased gas costs, the base rates of many utilities include historical or projected LAUF-gas costs with any deviations recoverable in a PGA. Utilities, in their PGA mechanisms, generally divide the total gas-purchased costs by the volume of gas sold to customers.[45] As an example, assume that a utility spends $50 million to purchase 10 million Mcf of gas, or $5 per Mcf. Assume also a LAUF-gas percentage of 5 percent. The utility is then recovering $50 million from customers for 9.5

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[42] According to one of the survey responses, after finalizing the RSPA Form F-7100.1 each year, typically PHMSA will request that the commission follow up on the utilities that report above 5-percent lost gas.

[43] On the other hand, a utility might also be in a budget-cutting mode that compromises safety. Another reason is a lax safety culture within the utility that could lead to negligence.

[44] See the discussion in Part III.C.

[45] By calculating the PGA mechanism based on sales, the utility is implicitly building in the LAUF-gas factor.

million Mcf of sales (with 0.5 million Mcf of LAUF gas), or $5.263 per Mcf of gas sold. Customers are, in effect, paying $0.263 more per Mcf of gas (or about 5 percent) to compensate the utility for LAUF gas. The PGA mechanism acts as a true-up mechanism that allows a utility to collect its LAUF-gas costs not recoverable in base rates. The rationale for LAUF-gas cost recovery in the PGA mechanism is that: (a) because LAUF gas is volatile from year-to-year, it is hard to predict, and (b) the commodity costs associated with LAUF gas are beyond the control of a utility.

9. **One topic of interest in a number of states is allocating LAUF-gas costs between different customer groups.**
   These customers include firm sales customers, interruptible customers and transportation customers. Many utilities require transportation customers to compensate them with in-kind gas. These customers would therefore purchase additional gas to offset the lost gas. The utility would then retain the gas.[46]

10. **Several state commissions expect utilities to take reasonable steps—infrequently based on a cost-benefit criterion—to manage LAUF, especially to avoid a public safety threat.**
    This regulatory posture places faith on the judgment and actions of utility management to avoid a pipeline incident.

11. **Many gas utilities have recently embarked on accelerated pipeline-replacement programs that should lower the amount of LAUF gas in the future.**
    These efforts should lower LAUF gas over time but are not necessarily cost-effective. Some commissions consider pipeline infrastructure surcharges[47] as critical in reducing LAUF gas by removing any disincentives for a utility to replace its pipes. A future study should look at whether the accelerated pipeline-replacement programs,

[46] This approach is similar to FERC's treatment of LAUF gas: Transportation customers reimburse most pipelines for in-kind for gas consumed by the pipelines in their operations. Typically, pipelines retain a percentage of the volumes of gas requested by customers for transportation. FERC has a policy of allowing pipelines the option to establish either: (a) a fixed percentage in a rate case that remains in effect until its next rate case, or (b) a percentage that could change on a periodic basis (e.g., annually) along with a true-up mechanism. (*See* ANR Pipeline Co., *110 FERC ¶ 61,069*, 2005.)

[47] Infrastructure surcharges come under different labels: For example, capital expenditure tariff tracker (Rhode Island), utility enhancement infrastructure rider (Michigan, New Jersey), accelerated main-replacement program (Indiana, Kentucky), infrastructure replacement rate surcharge (Georgia, Kansas, Missouri, Nebraska), interim rate adjustments/rate-stabilization tariff (Texas, Virginia), main-replacement program rider (Arkansas), and cast-iron bare-steel replacement program (New Hampshire). A general definition of surcharges is that they represent an adjustment to the customer bill that raises rates by a specified amount for a limited time. *See* Paul Roberti, "Regulatory Efforts to Enhance Pipeline Safety," presentation at the AGA Reauthorization and Transmission Pipeline Design, Construction and Operations Workshop, February 29, 2012, 8.

which have proliferated in recent years,[48] have reduced leaks and the level of LAUF gas.

12. **Unless the level of LAUF gas indicates a safety threat, utilities generally place low priority on LAUF-gas management.**
    Which of the actions that utilities can take to lower LAUF gas would be cost-beneficial is unknown. A few survey responses indicate the use of a cost–benefit criterion but give no further detail.

13. **While the vast majority of survey respondents expect utilities to reasonably manage their LAUF gas, few have an opinion as to whether utilities could do a better job.**
    Most respondents found no fault with their utilities' performance.[49] Some added that their oversight would enable them to detect and remedy any serious problems. A few respondents contend that utilities should have self-motivation to manage their LAUF gas.

14. **Commissions seem to interpret a higher LAUF-gas percentage over time as an indicator of possible excessive leaks.**
    The burden then falls on the utility to take action or provide evidence that the higher LAUF-gas percentage does not indicate growing pipe leaks that pose a public safety risk.

15. **Most commissions reported that utilities in their state use the same definition for LAUF gas and ratemaking treatment of LAUF-gas costs.**
    Exceptions exist, especially for the definition of LAUF gas.

16. **Utilities generally do not break down LAUF gas by source, at least in quantitative form.**
    Much more commonly, utilities provide a litany of possible sources. In other words, frequently utilities will only report to their commission the sources without quantifying their effects or suggesting cost-effective mitigation actions. Sometimes, a utility would report lost gas from third-party damage or gas use for internal operations. Probably the best source for a breakdown of the sources is the annual

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[48] *See* U.S. Department of Transportation, *Pipeline and Hazardous Materials Safety Administration, White Paper on State Pipeline Infrastructure Replacement Programs*, December 2011 at http://opsweb.phmsa.dot.gov/pipelineforum/docs/PHMSA%20111011-002%20NARUC.pdf.; and American Gas Association, "Infrastructure Cost Recovery Update," *Natural Gas Rate Round-Up*, January 2012. The last publication noted that "currently, more than 40 utilities in 19 states serving 20 million residential natural gas customers are using full or limited special rate mechanisms to recover their replacement infrastructure investments, and 6 utilities have such mechanisms pending in 3 other states" (p. 1).

[49] Consequently, these commissions require no incremental actions by utilities to reduce LAUF gas. They presumably perceive utility performance as satisfactory in reflecting prudent utility behavior.

report that utilities must file with PHMSA, namely Form F-7100.1.[50] A commission might speculate from the aggregated level of LAUF gas that leaks are excessively high. If so, the commission might then require additional information from the utility or conduct its own investigation. A key policy question is whether commissions should require utilities to quantify the effect of individual sources on the level of LAUF gas.

17. **Utilities generally report their LAUF gas in different venues.**
    They include PGA filings, audits of a utility's gas procurement practices, supporting evidence in a rate case, EIA-176 filings[51], and the annual report to the commission or PHMSA.

18. **The information necessary to compile LAUF-gas percentages by utility over an historical time frame is publicly accessible.**
    The percentages are sometimes in a summary or tabular form, while in others interested parties can compute percentages from different sources.

19. **Commissions generally do not publicly report the effect of LAUF gas on purchased gas costs.**
    Multiplying the LAUF gas by the average commodity-gas cost can produce the calculation. A few survey respondents mentioned that the additional purchased gas costs from LAUF gas are minimal.

20. **Several commissions monitor LAUF gas in a rate case, or a PGA filing.**
    Often they will compare the most recent LAUF-gas percentages with earlier ones to detect any trends. For example, they might examine whether LAUF gas has grown over the past two or three years.[52]

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[50] 49 CFR Part 191 requires gas operators to annually file *Form F-7100.1* with PHMSA. Failure to report can result in a civil penalty. Part G, Percent of Unaccounted for Gas, states that:

> 'Unaccounted for gas' is gas lost; that is, gas that the operator cannot account for as usage or through appropriate adjustment. Adjustments are appropriately made for such factors as variations in temperature, pressure, meter-reading cycles, or heat content; calculable losses from construction, purging, line breaks, etc., where specific data are available to allow reasonable calculation or estimate; or other similar factors.

[51] The U.S. Department of Energy requires gas utilities to provide annual information in *EIA-176*, which reports by state (a) losses from leaks, damage, accidents or blowdown and (b) unaccounted for gas, defined as the difference between the sum of gas supply and the sum of gas disposition; this difference, as noted by EIA, is mostly attributable to accounting and measurement errors. For several states, the second component is negative. EIA publishes this information in its *Natural Gas Annual,* Appendix A at http://www.eia.gov/naturalgas/annual/.

[52] For one utility, for example, the Idaho Public Utilities Commission retained a cap on LAUF gas until the utility demonstrated its mitigation actions.

B. Examples from selected states

A number of states and utilities stand out in their practices relating to LAUF gas. They are Chesapeake Utilities, Atlanta Gas Light, Idaho, Indiana, Michigan, New York, Ohio, Oklahoma, Pennsylvania and Texas (Table 2 highlights their actions). Other commissions and utilities might want to study them and consider applying them for their own use.

Table 2: Selected Activities and Practices Involving LAUF Gas

State/Utility	Activities/Practices
Chesapeake Utilities	• Unaccounted for Gas Incentive Mechanism, whose purpose is to reduce LAUF gas below a predetermined benchmark. The mechanism provides no explicit rewards or penalties but triggers a commission review if the LAUF-gas percentage exceeds the higher bound of the specified dead band. (Chesapeake Utilities Corporation, Delaware Division, *Rules and Regulations Governing the Distribution and Sale of Gas*, September 2, 2008 at http://www.chpkgas.com/wp-content/uploads/2012/09/DE_Tariff-Nov-5-2012.pdf.)
Atlanta Gas Light	• Minimum LAUF-gas standard of 1.41% to 1.81% for the 16-year rolling average. • The approval of a 16-year rolling average normalizes the effect of year-to-year weather variation on LAUF gas. The commission established 1.61 percent as the benchmark with a tolerance band of +/- 0.20 percent. The commission assesses a performance penalty if the actual percentage exceeds 1.81 percent. If the percentage goes above 2.11 percent, the commission will conduct a special investigation, which could lead to further commission action. If the actual LAUF percentage is below 1.41 percent, the utility can bank the "reward" to offset any future penalties. (Georgia Public Service Commission, *Determination of Contributing Factors And Cost Allocation for Lost and Unaccounted-for Natural Gas on Atlanta Gas Light Company's Natural Gas Distribution System, Order to Accept the Stipulation Agreed by Atlanta Gas Light Company*, Docket No. 15527-U, September 13, 2002.)
Idaho	• Temporary commission cap on LAUF gas because of abnormal increase in LAUF gas • Periodic utility reporting on improvements in LAUF-gas performance. • The Idaho Public Utilities Commission required a gas utility to improve its performance in the future: "IT IS FURTHER ORDERED that Intermountain Gas be permitted to recover a maximum of 0.85% of its total throughput as lost and unaccounted-for gas. In addition, the Company shall submit to the Commission a quarterly report outlining: (1) the Company's framework for how it has tested for, identified, and remediated equipment measurement errors or leaks; and (2) the business process for alleviating measurement errors through its financial accounting of nominations, scheduling, measurements, flow volume allocation, and billing. Intermountain is directed to work with Commission Staff to outline steps toward identifying the sources of lost and unaccounted-for gas and work toward improvement. The Company's first quarterly report is due no later

	than 30 days after the calendar quarterly ending December 31, 2008." (Idaho Public Utilities, *In the Matter of the Application of Intermountain Gas Company for Authority to Change Its Prices (2008 Purchased Gas Cost Adjustment*, Order No. 30649, Case No. INT-G-08-03, September 30, 2008, 9 at http://www.puc.state.id.us/search/orders/dtsearch.html.) • It is also instructive to review the following statement in the same order: "Staff recognized that the percentage of [LAUF] gas is dependent on the complexity of a pipeline distribution system and the flow measurement complexities involved. However, there was some concern as to the increase of 19% over the 2007-2008 PGA, despite Intermountain's historically reasonable loss levels" … Staff also maintained that losses due to errors in faulty meters or measurement control practices should not be recovered in the PGA. In order to evaluate these losses more closely, Staff recommended the Commission order Intermountain to provide a quarterly report outlining the Company's framework for how it has tested for, identified, and remediated equipment measurement errors or leaks… Staff also would like to meet with the Company to outline steps that the Company is taking toward identifying the sources of [LAUF] gas and how these losses may be reduced. Also, because of the significant increase in [LAUF] gas between last year's PGA and this year's PGA, Staff recommended that the Commission place a cap on the amount recovered for [LAUF] gas at 0.85% of throughput, which is the current level proposed for recovery in this case. After the Company has adequately shown its practices to limit the causes of [LAUF] gas and the Company's approach toward reducing it, Staff would then consider recommending removal of the imposed cap (5-7)."
Indiana	• NIPSCO: Cap at 1.04% with all LAUF-gas costs recovered in the PGA mechanism (rationale is that LAUF gas cost is a variable cost that the utility should recover in the PGA mechanism) • Vectren: Change in the recovery of LAUF-gas costs from base rates to the PGA mechanism, in addition to capping cost recovery at LAUF-gas percentage of 0.8%. (Indiana Utility Regulatory Commission, *Final Order*, Cause No. 43894, November 4, 2010 at http://www.in.gov/iurc/files/Order_in_Cause_No.43894(1).pdf; and Indiana Utility Regulatory Commission, *Final Order*, Cause No. 43298, February 13, 2008 at https://myweb.in.gov/IURC/eds/Modules/Ecms/Cases/Docketed_Cases/ViewDocument.aspx?DocID=0900b631800e9795.)
Michigan	• All of LAUF-gas costs recovered in the base rate. • Utilities recover the costs of company use gas and LAUF gas in base rates, not in the separate PGA charges for purchased gas costs. For gas sales customers, utilities report these costs on a test-year basis and thus include them in base rates. For transportation customers, the utility retains gas-in-kind (GIK) as their contribution toward LAUF gas
New York	• White paper on LAUF gas. • Targeted incentive mechanism (New York State Department of Public Service, *Staff White Paper on Lost and Unaccounted for (LAUF) Gas*. The white paper noted that each utility makes unique adjustments to their send outs and total disposition.)

Ohio	• The commission can disallow a portion of the costs if LAUF gas exceeds 5%, pursuant to the Ohio Administrative Code. (Ohio Administrative Code, *Chapter 4901:1-14 Uniform Purchased Gas Adjustment Clause* at http://codes.ohio.gov/oac/4901%3A1-14.)
Oklahoma	• Each utility has a Safe Harbor provision limiting the percentage of LAUF gas recoverable from customers through the PGA mechanism; LAUF gas above the allowed levels triggers a reviews. • Performance Based Tariffs allow the utility to collect a bonus return on equity when the actual LAUF-gas lies below a predetermined percentage; the utility pays a penalty when it exceeds a predetermined cap. (The Oklahoma Corporation Commission's responses to the NRRI survey)
Pennsylvania	• Commission rule on uniform definition of LAUF gas and more stringent LAUF-gas targets over time. • The metrics in the form of targets become increasingly stringent over time, starting at 5 percent and declining to 3 percent by the fifth year. The commission must approve any LAUF-gas above the target for the utility to receive full cost recovery. The commission defines LAUF gas as Gas Received - Gas Delivered - Adjustments, and LAUF-gas percentage as LAUF Gas/(Gas Received) · 100. (Pennsylvania Public Utility Commission, "PUC Finalizes Rulemaking to Establish a Uniform Definition of and Metrics for Unaccounted-For-Gas," *Press Release*, April 4, 2013 at PUC - Press Releases.)
Texas	• 5% cap on LAUF gas with exceptions. • The Texas Railroad's rate handbook states that: Commission substantive rule § 7.5525(b)(1) allows a utility to expense a maximum of 5 percent (5%) of its lost and unaccounted for gas for distribution systems…in a test year. Lost and unaccounted for gas is the difference between the amounts metered in and out of a system…All lost and unaccounted for gas is presumed "lost" unless a utility can provide evidence in a ratemaking proceeding that the unaccounted for gas represented company uses, liquids extraction or meter errors. The Commission may allow greater than 5 percent (5%) lost gas if special circumstances can be shown by the utility. (Railroad Commission of Texas, *Natural Gas Rate Review Handbook*, October 2012, 35 at http://www.rrc.state.tx.us/forms/publications/RateReviewHandbook2012.pdf.)

C. Policy implications

The survey responses show that state commissions differ in (1) the incentive they give utilities to manage their LAUF gas, (2) their ratemaking treatment of LAUF gas, (3) their definition of LAUF gas, (4) their oversight of LAUF gas, (5) their perception of utility performance in managing LAUF gas, and (6) how they evaluate LAUF-gas levels and what criteria they apply. Most commissions have no special incentive mechanisms for LAUF gas.

Utilities generally pass through the LAUF-gas costs as long as the evidence shows that they were not imprudent. In a few states, commissions consider high levels of LAUF gas to be a possible safety threat. Several commissions compare levels of LAUF over different historical periods to determine whether to take any further action.

As part of their obligations to protect customers, state commissions may want to evaluate whether utilities are prudently managing their LAUF gas. Commissions can use different information and approaches in their evaluations.

Although state utility commissions do not assign top priority to LAUF gas, it does affect their decisions in rate cases, PGA filings, and safety matters. LAUF gas is normally an incidental factor in these decisions, but it is significant enough in some states to have received special attention by commission staff and non-utility stakeholders.

The survey responses also show that a chief concern of commissions is utility incentives to manage LAUF gas. One particular worry is a negligent utility tolerating lost gas to the point of jeopardizing safety. Part V looks at options for state commissions to give utilities better incentives. It cautions that while special incentives for utility management of LAUF gas have theoretical appeal, structuring them to elicit better performance is not an easy task. Monitoring and interpreting historical levels of LAUF gas for a single utility, and then taking appropriate action, might offer the best strategy for a commission. Part V discusses the rationale for such a strategy.

V. Regulatory Options to Manage LAUF Gas

A major objective of state utility regulation is to induce high-quality performance from utilities. As a rule, achieving it requires regulators to measure and evaluate utility actions, then inject the evaluation's results into their decisions. Measurement and evaluation can lead to better regulatory incentives and improved utility performance. Improved performance, in turn, can lead to lower utility costs and rates, higher service reliability, and improved safety.

Performance measurement can detect subpar utility management that could spawn further investigation, cost disallowances, or even a change in regulatory incentives.[53] It can also help commissions determine whether utilities are satisfying stated objectives or targets. For example, does a utility's LAUF-gas percentage fall below the targeted 3 percent for any given year? Performance measurement can also give regulators the ability to reward utilities for superior performance that benefits customers. A commission might decide, for example, that a dramatic decline in a utility's LAUF-gas percentage over the past two years deserves a reward (e.g., the utility's earning a higher rate of return).

[53] Commissions might decide that one reason for poor utility performance was the weak or even distorted incentives that they provide utilities. As an example, prompt cost recovery without adequate commission scrutiny could lead to utility indifference in managing costs.

What follows in this section are choices of ways in which commissions can induce utilities to perform acceptably well in managing their LAUF gas. Because utilities have some control over the level of LAUF gas (*see* Part II), and because lowering it has economic, safety, and environmental benefits, commissions should consider ways for utilities to improve their performance. Some stakeholders, notably gas utilities, might disagree with the premise that a utility has some control over the level of LAUF gas. For example, the American Gas Association (AGA) has stated that:

> Most states allow natural gas utilities to track and true-up the costs of lost and unaccounted for (LAUF) natural gas and to recover these costs between rate cases. These costs vary with the gas-commodity costs that utilities pay, with changes in volumes of gas customers consume, and with variations in measured gas volumes into and out of the utilities' gas system. *These fluctuating costs and volumes are outside the control of utilities*[54]*...*Without a method of adjusting rates in response to fluctuating costs associated with meter uncertainty, [LAUF gas] would have a significant negative impact on utilities.[55] [Emphasis added]

This paper disputes the assertion that utilities have minimal or no control over the level of LAUF gas. The AGA statement also implies that commissions should simply pass through to utility customers LAUF-gas costs with minimal oversight or scrutiny. This paper recommends against such a practice, as it fails to protect customers and hold utilities accountable.

A. Guiding principles on performance measurement and evaluation

1. Two distinct factors

Utility performance derives from two distinct factors: *internal efficiencies and external conditions.* The first factor encompasses management competence in combining and deploying labor, capital, and other resources to manage LAUF gas. The second factor accounts for market, operational, business, and other conditions over which an individual utility has minimal control. As previously shown in Table 1, a utility can take various actions to mitigate the level of LAUF gas.

2. How commissions can apply performance measures

Appropriate use of performance measures—namely, the LAUF-gas percentage in the context of this paper—depends on a commission's ability to separate out the effects of external and internal factors on performance. For LAUF gas, several factors influence its level, some internal to a utility's control, others outside its control. The challenge for commissions is to separate out the effects of these distinct factors. Without this separation, applying performance measures for decision making becomes more difficult and even counterproductive. Specifically, commissions should exercise caution in using performance measures mechanically or as the sole

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[54] American Gas Association, *Lost and Unaccounted for Gas Cost Recovery Mechanism*, 1.

[55] Ibid., 2.

source of information for evaluating a utility's performance. For example, assume that a commission observes LAUF-gas percentages across utilities and identifies those utilities with the highest levels. Because each utility faces different conditions, the commission should not judge, without further information, those utilities as least competent. It should pay special attention, however, to those utilities exhibiting abnormal or "outlier" performance, which might lead to a more detailed inquiry.[56] In other words, the percentages can act as a guide to future regulatory scrutiny and remedial actions. They function best as a gross metric signaling a potential problem that warrants further inquiry.

3. *Ex post* and *ex ante* performance measures

Commissions can use either *ex post* or *ex ante* measures of performance, or both in a particular situation. They can apply the former measure for prudence reviews or to compare a utility's actual performance with the expected outcome.[57] One prime example of an *ex post* review is the PGA annual reconciliation that includes a "reasonableness" determination. The evaluation of utility performance often links to the concept of "prudence." A common interpretation of prudence is decisions consistent with what a "reasonable person" would do, given the available information at the time of those decisions. The prudence standard focuses on actions, not outcomes.[58] Thus, a performance measure, such as the LAUF-gas percentage, conveys no information on a utility's prudence by itself.

In other applications, commissions can use both kinds of performance measures, with the *ex ante* measure acting as a prospective standard for benchmarking a utility's performance. Assume, for example, that a commission sets a LAUF-gas standard of 3 percent.[59] After observing the utility's actual performance, the commission can compare the 3 percent with the standard to help judge whether the utility was prudent. It could even establish the standard as the cap for cost recovery. If the utility's LAUF gas increases to 4 percent, for example, the commission could require it to absorb the costs of LAUF gas that exceed the three-percent threshold. In another application, a benchmark of three-percent can "red flag" a potential

[56] "Abnormal" implies that the regulator has an idea of what level or range of performance a utility should achieve.

[57] *See*, for example, William E. Encinosa, III and David E. M. Sappington, "Toward a Benchmark for Optimal Prudency Policy," *Journal of Regulatory Economics* 7 (1995): 111-130.

[58] One criticism of the prudence standard is that a utility can satisfy it without performing at an above-average level. It establishes a threshold of minimum acceptable performance; it does not distinguish acceptable performance from exceptional performance. A commission in effect grades and evaluates utility performance dichotomously: The utility's behavior is either acceptable or unacceptable; there are no intermediary levels of utility-management competence.

[59] The three-percentage standard could also determine the level of LAUF-gas costs that the commission would allow in base rates. If the commission permits no change in cost recovery between rate cases, the utility would have to absorb any additional costs. On the plus side, if the utility achieves lower costs, it retains those, at least until the next rate case.

problem when the actual percentage falls short of this expectation. The commission could then conduct a more detailed review to evaluate whether the utility was prudent.

4. Standard for performance

A standard for LAUF-gas performance can take on different meanings. It can represent "average" or "exceptional" performance.[60] In evaluating a utility's performance, the analyst should measure "reference" or "baseline" performance. Average performance can sometimes represent the "mean" performance for a sample of comparable utilities. As already noted, it becomes difficult to interpret differences in LAUF-gas percentages across utilities as a reflection of utility-management competence. Some commissions might interpret average performance as the average historical LAUF-gas percentage over (say) the past five years. Other commissions might view average performance as subpar performance if they deem past performance as unacceptable. They might instead set a more stringent standard for future performance.

Commissions should consider whether they want to define "standard" performance for LAUF gas as a moving target, or as a static concept that remains constant over time. They should expect technology advances and the availability of better management practices to reduce LAUF gas in the future. As measurement techniques become more accurate and utilities replace old meters and pipes, for example, commissions should set more stringent standards over time.

A good regulatory practice is to evaluate a utility's performance by combining quantifiable information and judgment. Performance metrics, such as LAUF-gas percentages, in conjunction with other information can enable commissions to take consequential actions. These actions might include cost-recovery approval, a detailed investigation triggered by preliminary evidence of suspect utility performance, or penalties or rewards for subpar or exceptionally good performance.

In sum, commissions face challenges in interpreting differences in LAUF-gas percentages across utilities or for an individual utility over time. The limitations on isolating the effect of management competence on the differences, even when commissions apply the most sophisticated techniques, are evident.

B. Benchmarking

The generic definition of *benchmarking* is the comparison of an individual utility's performance against some predefined reference (e.g., peer group). This definition focuses on

[60] Exceptional performance might include the performance of the first quartile of utilities or, more stringently, those utilities lying on or close to the efficiency frontier measured by statistical or non-statistical approaches. Commissions can designate "standard performance" as a target for a utility to achieve or surpass. The standard itself can reflect the average performance of a sample of utilities or the performance of the leading comparable utilities. Although perhaps appropriate for other operational areas, commissions should not use this standard for LAUF gas, for the reasons given earlier.

outcomes, for instance the services provided by a utility per unit of labor or capital, or the level of gas losses. An alternate definition of benchmarking would center on a utility's practices and uses of different technologies: Has the utility adopted "best practices" in the form of state-of-the-art technologies and management processes? As discussed earlier, utilities have discretion over how they manage LAUF gas. They can, for example, (1) improve the accuracy of their measurement techniques and accounting procedures and their operation and maintenance, (2) replace or repair leaky pipes and auxiliary components, (3) carry out a more aggressive leak-survey strategy, (4) minimize accidental losses through line breaks by aggressively publicizing the dangers of digging before calling 811, and (5) execute systematic meter testing on a random and periodic basis.

Benchmarking normally involves comparing one utility's performance with a peer group of utilities with similar characteristics. But, as discussed earlier, this comparison would be inappropriate for LAUF gas; it is infeasible to control for all the factors that affect LAUF-gas percentages and explain the differences across utilities. The analyst would find it challenging to identify the factors, let alone try to measure their effects. He would find it less cumbersome to control for changes in factors that affect an individual utility from year to year. Even in this instance, he would not find this task easy.

Traditional regulation provides the utility with a weak incentive to prudently manage LAUF gas. The responses to the NRRI survey bear out this sentiment. Benchmarking is a tool that gives commissions a context in quantitative form for better evaluating a utility's performance.

1. Addressing information asymmetry

Benchmarking lessens the information-asymmetry problem inherent in public utility regulation. The commission is at a disadvantage relative to the utility in interpreting and evaluating the utility's performance. Do the actual LAUF-gas levels reflect competent utility management, or do they reflect imprudent management? A utility generally would defend its performance as reflecting its best effort under the circumstances. A utility might tend to provide misleading information about its managerial efforts and opportunities to manage LAUF gas.[61] It may defend a high LAUF-gas percentage, compared with other utilities or its own prior-period percentages, because of unfavorable conditions and other factors outside its control.

Under existing incentives, utilities may act rationally by exerting little effort toward reducing their LAUF gas. A commission might judge those incentives as inadequate for motivating utilities to perform exceptionally or even prudently. Performance indicators for LAUF gas can offer commissions a diagnostic tool to lessen the information asymmetry or handicap they face in their evaluation of utility performance. If commissions had good information about how utilities *should* perform, they could readily set performance standards that utilities would have to meet or suffer financially. In the real world, however, commissions lack

[61] As stated earlier, some utilities might want to give the impression that they have little control over LAUF gas or that, whatever control they might have, they have done their best in managing it.

access to this information. This problem is never more evident than in the case of LAUF gas.

In sum, information asymmetry has two important implications. First, utilities can misrepresent their performance to commissions. Second, commissions need to exercise caution in interpreting performance outcomes. For example, they could wrongly penalize utilities for prudent actions because their LAUF-gas percentages appear excessive. Problematic on the opposite end of the spectrum, utilities could recover all of their LAUF-gas costs even when they acted imprudently. Either of these outcomes is undesirable and can happen when commissions look only at outcomes, to the exclusion of other information that could provide a more accurate picture.

2. Criteria for benchmarking

The major criteria for selecting a utility's area of operation for benchmarking include:

- The effect of a functional area on a utility's total cost or on customer well-being in general;
- The ease of measurement;
- The effort required to interpret a performance measure; and
- The influence of utility management in affecting performance.

Benchmarking LAUF gas would seem to get a mixed review in terms of these four criteria. First, as a percentage of a utility's total costs, LAUF gas is minimal for the vast majority of utilities. Probably of greater significance, if a utility allows its LAUF gas to increase because of negligence in repairing or replacing old pipes, a potential safety threat can arise. Second, while measuring LAUF gas itself is relatively easy,[62] although not without controversy, how commissions should interpret the data is a difficult task. The absolute value of LAUF gas, even expressed as a percentage of sendout, conveys little information. Although comparing it with other utilities or a single utility's performance over similar timeframes is more meaningful, commissions are hard pressed to know whether the utility was prudent or not. They would have to undertake a more detailed inquiry to evaluate the utility's performance. Third, as argued in this paper on several occasions, the utility can influence the level of LAUF gas, making incentives or benchmarking an important factor in affecting outcomes.

3. Summary

Six major points on benchmarking are the following:

1. **A benchmark can establish a point of reference for measuring and judging the performance of an individual utility.**
   Commissions, however, should have additional information before making a decision

[62] The presumption is that stakeholders agree on its definition, which might take some effort.

that would affect the financial condition of a utility. Thus, they should not use benchmarking in a mechanical way or as the sole information in evaluating a utility's performance. To say, for example, that a LAUF-gas percentage below some certain level reflects prudent safety practices by a utility is unconvincing; several factors affect performance and, in this instance, it would be hard to isolate the effect of pipe leaks on LAUF gas.

2. **Benchmarking is generally best applied in "red flagging" potential problems and as a supplemental source of information in determining a utility's performance.**
   Commissions can ask utilities, "Why has your performance declined over time?" The onus is then on the utility to defend its falling performance.

3. **A lax benchmark for a utility can have a perverse effect (i.e., reducing economic welfare) or produce a zero-sum outcome.**
   If a benchmark is too easy for a utility to achieve, commissions might reward it for simply "average" performance. The result is a windfall gain to the utility at customers' expense. The utility, to put it differently, can increase its profits without achieving real efficiency or performance gains. This outcome would undermine the purpose of a benchmark, which is to improve the performance of a utility so that customers would benefit.

4. **An overly stringent benchmark can unfairly penalize a utility for prudent behavior.**
   A good benchmark needs to walk a fine line between being fair to the utility (i.e., not setting a standard that is unrealistic or out of reasonable reach) and not too easy for the utility to achieve. The baseline that a commission sets for acceptable performance must recognize the environment within which the utility operates and the opportunities for a utility to achieve that level of performance.

5. **Benchmarking quantifies past performance and establishes a baseline for gauging improvements and making comparisons across utilities.**
   For example, commissions can expect parallel improvements in LAUF-gas levels over time because of the dissemination of new technologies (e.g., advanced meters) and accelerated pipeline programs.

6. **The nature of LAUF gas makes it difficult to allow for setting a cap that is compatible with well-accepted industry practices.**
   Definitions vary across utilities, each utility faces unique conditions that affect the level of LAUF gas, and several factors affect the level of LAUF gas—some physical, others nominal, like measurement and accounting error. For these reasons, specifying a single standard for all utilities could easily lead to counterproductive outcomes.

C. Regulatory tools to manage LAUF gas

Commissions observe outcomes, such as the level of LAUF gas, but they do not have adequate knowledge to assess how utility management affected those outcomes. Because they lack the required information to identify a hypothetical optimal performance, commissions must rely on alternative actions, such as special incentives, performance caps, or monitoring utility performance. These second-best approaches readily pertain to LAUF gas.

Commissions might require a management audit of a utility or establish future targets for the utility to meet or else suffer a penalty. In pursuing any action that directly affects a utility's financial condition, commissions should have good evidence that a utility's poor performance actually reflects incompetent or imprudent management. In other words, commissions should know why the utility's performance has fallen before taking any action that affects its financial condition.

Lowering LAUF-gas quantities can improve utility performance by decreasing purchased gas costs, increasing pipeline safety (e.g., from repairing or replacing aging, cast-iron, bare-steel, or old plastic pipes), and reducing environmental harm. This part of the paper centers on three broad tools that commissions can apply to LAUF gas:

1. **Monitoring of utility performance**; for example, the utility reporting to commissions, commissions reviewing the information, and commissions then taking appropriate action;

2. **Setting targets** that when unmet penalize utilities, lead to a detailed inquiry, or require utilities to explain their "subpar" performance; and

3. **Designing and executing an incentive mechanism** that rewards or penalizes utilities.

Before applying these tools, commissions might want to first assess whether a utility's proposed action to improve its LAUF-gas performance is cost-beneficial. They might also want to judge, after the fact, whether the utility's actual LAUF-gas percentage is satisfactory or requires additional review to evaluate management competence. Commissions can establish targets to compare periodically with the utility's actual performance. Performance below the targeted level can result in a penalty for the utility. Commissions might instead prefer an incentive mechanism that would reward the utility for superior performance and penalize it for poor performance. "Superior performance" might be a LAUF-gas percentage below the lower bound of a dead band around a five-year historical average. As an example, assume that the average LAUF-gas percentage for a utility over the past five years is 2.5 percent and the standard deviation is 0.4. If the bounds of the dead band are two standard deviations, the range of "average performance" would be 1.7 to 3.3 percent. If, in the next year, the utility achieves 1.5 percent, the commission might interpret its performance as superior. At the other extreme, the commission can consider any LAUF-gas percentage exceeding 3.3 percent as subpar.

1. Monitoring

The monitoring of LAUF gas would have four purposes: (1) report and evaluate utility performance in controlling LAUF gas; (2) propose changes to regulatory policies and practices to improve utility performance (e.g., establish a target); (3) determine utility compliance with rules, guidelines, and expectations; and (4) recommend any mitigating actions when justified (e.g., pipes replacement, installation of automated meters).

Monitoring is a form of regulatory oversight that commissions would carry out periodically. They could compile information to identify trends in the level of LAUF gas and use that information to identify sources of changes in past levels.

Monitoring can result in commissions' mandating that utilities explain and justify their actions to manage LAUF gas. Especially when utility performance seems suspect, commissions might exercise this discretion. The Texas Railroad Commission has taken such action, as reported in its responses to the NRRI survey:

> If the [LAUF] exceeds 10 percent for the period under review, the inspector will investigate further through review of the most recent purchase and sales figures available. If the inspector believes the operator has not taken proper measures to determine the cause of the high [LAUF gas], an alleged violation is cited. Through the Pipeline Safety Division review of the operator's Plan of Correction, we monitor the operator's progress to resolve the issue and continue to monitor the situation during the next scheduled inspection.

Monitoring can also entail identifying the sources of LAUF gas, including meter errors, pipe leaks, temperature variance, and pressure differences.[63] If a commission determines, for example, that a high LAUF-gas percentage reflects an abnormal level of pipe leaks, it might require the utility to consider correcting this problem. Utility options, for example, can include: (1) timely detection of leaks, (2) timely repair of pipes, (3) continuous monitoring of leaks, and (4) replacement of cast-iron pipes and other pipes with severe leak problems.

2. Target setting

Commissions can establish a LAUF-gas percentage target to compare periodically with the utility's actual performance. They might want to penalize utilities for falling short of pre-specified standards, but not reward them for superior performance. This policy presumes that utilities should not earn a reward even for managing LAUF gas exceptionally well. The penalty can take the form of a negative revenue adjustment, which translates into a benefit for all customers and a cost to utility shareholders.

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[63] The last two sources occur, for example, when the utility does not correct the volume of sold gas to a temperature of 60°F at a base pressure of 4 ounces.

An acceptable target might be a five-year rolling average with verifiable and reasonably accurate metrics. Another option is for commissions to set targeted reductions in the LAUF percentage over time, such as those recently adopted in rules by the Pennsylvania Public Utility Commission.

Commissions can set either a hard or a soft target. A hard target results in a penalty when the utility fails to meet the predetermined target, without exceptions, no matter the circumstances. As an example, a utility could recover the actual cost of LAUF gas, up to a predetermined LAUF-gas percentage (e.g., 3 percent). One rationale is that any LAUF gas beyond the target poses a serious safety threat or indicates utility imprudence. Setting a target as the threshold for a safe pipeline system or the prudence of a utility, however, conveys a false precision to how commissions should interpret different levels of LAUF gas.

A dubious practice is to hold a utility to a hard standard or target, based, for example, on a peer group of utilities or even on the utility's previous performance. It is presumptuous to conclude that anytime a utility fails to achieve its target, it has acted imprudently. As argued elsewhere in this paper, this policy might be unfair to the utility because an "excessive" LAUF-gas percentage might come from an increase in measurement or accounting error. On the other hand, commissions should assume that utilities have some control over the level of LAUF gas. A perception to the contrary inevitably leads to an open-ended invitation for the utility to pass through all costs to customers with minimal regulatory oversight. Both of these extreme positions make false assumptions that can lead to inefficient and inequitable outcomes.

As a preferred policy, commission approval of a soft target would at least give the utility the opportunity to show why it failed to meet a predetermined target. The LAUF-gas metric functions best as an indicator of a potential problem, but not by itself can it provide commissions with the meaningful information they need to make a well-informed decision or judge a utility's performance.

3. Incentive mechanism

a. Basic elements

A well-structured incentive mechanism would motivate utilities to identify causes of LAUF gas and reduce these volumes when found cost-beneficial. As already noted, several factors can affect LAUF-gas losses. The capability of a utility to control them, as well as the associated costs, helps determine the scope for an incentive mechanism to reduce LAUF gas.

Incentive mechanisms have three basic components: (1) the target or standard (e.g., five-year rolling average); (2) the sizes of the rewards and penalties (e.g., the share of "gains" and "losses" allocated to utility shareholders and customers);[64] and (3) the maximum rewards and

[64] Rewards and penalties should reflect the benefits or costs associated with a specific LAUF-gas percentage that deviates from the "benchmark" level. To the extent quantifiable, they can include safety, economic, and environmental effects.

penalties to the utility. Incentive mechanisms sometimes include a "dead band" (e.g., New York uses two standard deviations from the target level to set the lower and upper bounds). A "dead band" recognizes the inherent uncertainty over identifying a correct benchmark. Incentive mechanisms can also include waivers or exceptions for certain events beyond the control of a utility. Commissions should minimize such exceptions to avoid diluting the incentives underpinning a mechanism.

A poorly structured incentive mechanism can create problems. Specifically, strategic behavior or gaming by a utility can result in a zero-sum outcome or, worse, distortive utility behavior. The former outcome allocates all the benefits to the utility while producing no real gains to its customers. Distortive utility behavior reduces efficiency as the utility over-allocates its resources to reducing LAUF gas, which decreases the overall performance of the utility. An incentive mechanism can also unfairly harm the utility when (1) its design understates the penalties relative to the rewards or (2) the benchmark is set at a value or range of values that makes it overly difficult for the utility to surpass or even achieve them.

Incentive mechanisms focus on outcomes rather than inputs, such as a utility's adoption of the latest technology or "best practice" management tools. The following section illustrates an incentive mechanism for LAUF gas.

b. Example of an incentive mechanism for LAUF gas

Assume that a commission has approved an incentive mechanism for LAUF gas, defined as a percentage of sendout. The mechanism is as follows:

$$\mathbf{laufc_f = laufc_a + s \cdot (laufc_b - laufc_a)}$$

or

$$\mathbf{lauf_a \cdot (1 - s) + lauf_b \cdot s}$$

where $laufc_f$ is the LAUF-gas costs flowed through to customers, $laufc_a$ equals actual LAUF-gas costs incurred by the utility, "s" is the sharing parameter, and $laufc_b$ equals the "benchmark" LAUF-gas cost. A regulator might want to include a "dead band."[65] This provision allows for small deviations of a utility's performance from the benchmark to not affect cost recovery. These deviations may represent "white noise" or randomness of LAUF gas explained by factors beyond a utility's control.

Assume that $laufc_a$ equals \$10 million, $laufc_b$ equals \$12 million, and s is 0.2; $laufc_f$ would then equal \$10.4 million (\$10 million · 0.8 + \$12 million · 0.2). At first glance, the results seem positive: The utility earns \$0.4 million in rewards[66] and customers ostensibly receive benefits of \$1.6 million from lower LAUF-gas costs. (The assumption is that actual

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[65] The "dead band" can represent a "benchmark" range of LAUF gas equal to the five-year moving average plus/minus two standard deviations.

[66] The utility earns \$10.4 million of revenues, while its cost was only \$10 million.

costs would equal \$12 million, namely, the "benchmark" costs, in the absence of the incentive mechanism.) Customers pay the actual costs plus the reward to the utility (when $laufc_b > laufc_a$) or the actual costs minus the penalty to the utility (when $laufc_b < laufc_a$).

Customers benefit only when the reduction in actual LAUF-gas costs exceeds the reward to the utility.[67] So for customers to benefit, $laufc_b - laufc_a$ must be greater than $s \cdot (laufc_b - laufc_a)$.[68] Thus, it seems, at least mathematically, that customers always benefit when the utility beats the benchmark, since "s" is less than one. This condition, however, assumes that $laufc_b - laufc_a$ represents the real cost savings from the incentive mechanism. Actual conditions might differ if $laufc_b$, in fact, does not reflect what the utility's costs would have been in the absence of the incentive mechanism.

When considering incentive mechanisms, commissions need to consider the tradeoff between (1) creating strong incentives for superior performance and (2) achieving a balanced distribution of economic gains between the utility and its customers. Cost-sharing mechanisms, like those for LAUF-gas costs, compromise the benefits from stronger incentives for cost reductions by allocating to utility customers a minimum share of the gains from improved utility performance. Under a typical incentive mechanism, a utility receives additional revenues from improved performance. A relevant question in terms of "equity" is: What benefits do customers receive when utility performance improves? Do these benefits at least cover the additional payment from customers to reward the utility? Although in many instances the benefits to customers may be non-quantifiable, commissions should attempt to determine whether the benefits to customers from improved utility performance correspond to the reward that a utility receives. When customer benefits fall short of a utility reward, the utility receives a windfall gain at the expense of customers.

The "benchmark" LAUF-gas cost becomes pivotal for dividing up the gains between the utility and customers. One tough task for commissions is to set the correct benchmark. The wrong benchmark can derive from (1) gamesmanship by utilities and customer groups; for example, the utility might argue that the "benchmark" cost is consistent with a LAUF-gas percentage of 4 percent, rather than with a more correct 3 percent; and (2) incomplete information. The utility generally will argue for a benchmark that will make it easy to earn a reward and avoid a penalty[69]; customer groups, on the other hand, will attempt to make it hard

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[67] The assumption is that customers' benefits are in the form of lower utility rates. To the extent that a lower level of LAUF gas means a safer distribution system or less methane emitted into the atmosphere, customers and society as a whole would benefit further.

[68] The last term represents the portion of the "measured" cost savings that the utility retains.

[69] A lenient benchmark makes it possible for the utility to engage in strategic behavior or gaming. The utility would be more likely to increase its profits without achieving any real efficiency gains (i.e., lowering of LAUF gas at a cost less than the benefits). In other words, the mechanism rewards the utility for less than superior performance. The outcome is a distribution of money from customers to utility shareholders.

for the utility to earn a reward. The utility might state its ability to reduce LAUF gas as less than it really is; for example, the utility might argue that it faces severe constraints in reducing LAUF gas when, in fact, it has no such constraints. Commissions will find it difficult to know the "true benchmark." They can ask: What level of LAUF-gas costs would correspond to a prudent utility? What costs would the utility incur in the absence of an incentive mechanism? What are reasonable utility actions deserving of neither a reward nor a penalty?

A good benchmark also should not be susceptible to manipulation by a utility. If the utility, through its actions, is able to affect the "benchmark" value, distortive behavior can result. A utility, for example, might be able to inflate its measurement of past LAUF-gas levels to increase its benchmark costs.[70] The "benchmark" is a dynamic metric that should vary over time in response to changed technological conditions.[71] With improved technologies and measurement techniques, the benchmark for LAUF gas should become more stringent over time.[72]

4. The balancing act

Individuals and groups make trade-offs in making a host of decisions. In understanding the behavior of commissions, trade-offs are also commonplace in their decision making. Specifically, commissions weigh different objectives in their decisions so as to advance the public interest. This balancing means that commissions are willing to "trade" some objectives in return for others. One example of a conflict relating to LAUF gas is a commission trying to maximize utility performance while also keeping utilities financially whole. It could promote the first objective by imposing a hard cap on LAUF-gas costs. Yet, as discussed earlier, if the cap is set too stringently, depriving utilities of prudent-cost recovery, it could unfairly jeopardize the utility's financial condition.

Historically, LAUF gas has exhibited high volatility, making it difficult for commissions to understand the underlying drivers and forecast future values or trends. Commissions may have to resort to a second-best approach in evaluating a utility's performance in managing LAUF gas.

One such approach is to include all the LAUF-gas costs in a PGA mechanism or a separate cost tracker. These costs are difficult to predict and fluctuate widely from year to year.

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[70] If the benchmark, for example, derives from the average LAUF-gas percentage over the past five years, by inflating past percentages the utility can more easily beat the benchmark and earn a reward or windfall gain.

[71] *See*, for example, Ken Costello and James F. Wilson, *A Hard Look at Incentive Mechanisms for Natural Gas Procurement*, NRRI Report 06-15, November 2006, at http://www.nrri.org/pubs/gas/06-15.pdf.

[72] *See* Pennsylvania Public Utility Commission, "PUC Finalizes Rulemaking to Establish a Uniform Definition of and Metrics for Unaccounted-For-Gas," *Press Release*.

Utilities prefer this approach, and it is easy to see why. An alternative approach is to incorporate all of the LAUF-gas costs into base rates: (1) A commission calculates them for the test year in a formal rate case, and (2) the utility recovers only those costs until it files a new rate case and the commission makes a subsequent decision. No matter how much the actual utility's LAUF-gas costs deviate from their test-year level, the utility recovers only those costs previously approved by the commission in the last rate case.[73]

One problem with this cost recovery is that when commodity prices increase (which is beyond a utility's control), the utility's margin could materially fall, even if the utility prudently managed its LAUF gas. On the plus side, it provides a stronger utility incentive for managing LAUF gas than including all the costs in a PGA-type tracker.

A third approach could achieve a more *balanced outcome* by avoiding the problems with the above two approaches. It would include all costs in a PGA mechanism but establish a cap on cost recovery from customers.[74] As an example, the commission could set a target for LAUF gas at 3 percent, allowing the utility to recover all of its LAUF costs up to this percentage. In line with our previous discussion, the utility would first have an opportunity to explain why it failed to achieve this target before the commission decides on cost recovery. The utility would have a strong incentive to control LAUF gas to 3 percent,[75] but, at the same time, it could recover any increase in gas commodity costs. The latter feature recognizes that the utility has virtually no control over the price it pays for wholesale gas.[76]

D. A proposed multi-step regulatory procedure

Figure 2 illustrates a general approach for regulators to review a utility's performance in a specific functional area like LAUF gas and then take appropriate action.[77] The major steps are benchmarking, monitoring, and decision making on cost recovery, and determining whether to investigate further or implement additional incentives (e.g., establishing a cost-sharing mechanism, cap, target, or standard). The diagram shows four major elements to this approach.

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[73] An exception is when a commission allows for interim rate relief under highly abnormal conditions that threaten a utility's financial condition.

[74] As discussed in Part IV, some utilities have such mechanisms.

[75] The simple reason is that the utility would suffer a loss in cash flows, as it could not pass through all of its costs to customers.

[76] Although the utility could negotiate prices when signing a contract, it generally pays a price set by market conditions over which it, as a single buyer, has no influence.

[77] The following discussion follows the general approach outlined in Ken Costello, *How Performance Measures Can Improve Regulation*, NRRI 10-09, June 2010 at http://www.nrri.org/documents/317330/a8f18562-f40e-4276-8848-8b904bdbf41f.

1. Recognition of regulatory influence on utility performance

Regulation itself affects utility management behavior. Together with factors that fall outside the control of a utility, management behavior determines a utility's performance. Regulatory rules, policies, and practices directly and indirectly affect utility performance. Utility performance, in turn, can influence regulatory actions. A high LAUF-gas percentage, for example, might induce commissions to provide utilities with stronger incentives or to set standards for future performance. As noted earlier, such actions require careful thought to avoid distorted outcomes.

2. Cursory performance assessment

Commissions should initially assess the utility's performance by comparing actual performance with a pre-specified standard. The standard can correspond to prudent or expected utility performance. Any substantial deviation can reflect exceptionally good or bad performance. Admittedly, the discrepancy is a crude measure that by itself does not infer anything about the competence of utility management. Utilities should have the opportunity to respond to any evidence that at first glance suggests bad performance, with subsequent evaluation by the commission.

The challenge with LAUF gas, as repeated a few times in this paper, is to establish a reasonable standard for individual utilities. Because of unique conditions, standards should differ across utilities and depend largely on a utility's past performance. The problem with this standard is that it might reflect historically subpar performance by the utility, so commissions might continue to approve a utility's performance even though the utility could do better under a more reasonable set of conditions.

3. Post-review action

Based on its review, a commission can take various actions. They can include (a) allowed cost recovery by the utility; (b) a more detailed investigation, such as an audit;[78] (c) setting of a cap or standard for future periods; or (d) establishment of an explicit incentive mechanism that would reward or penalize the utility for exceptional performance.

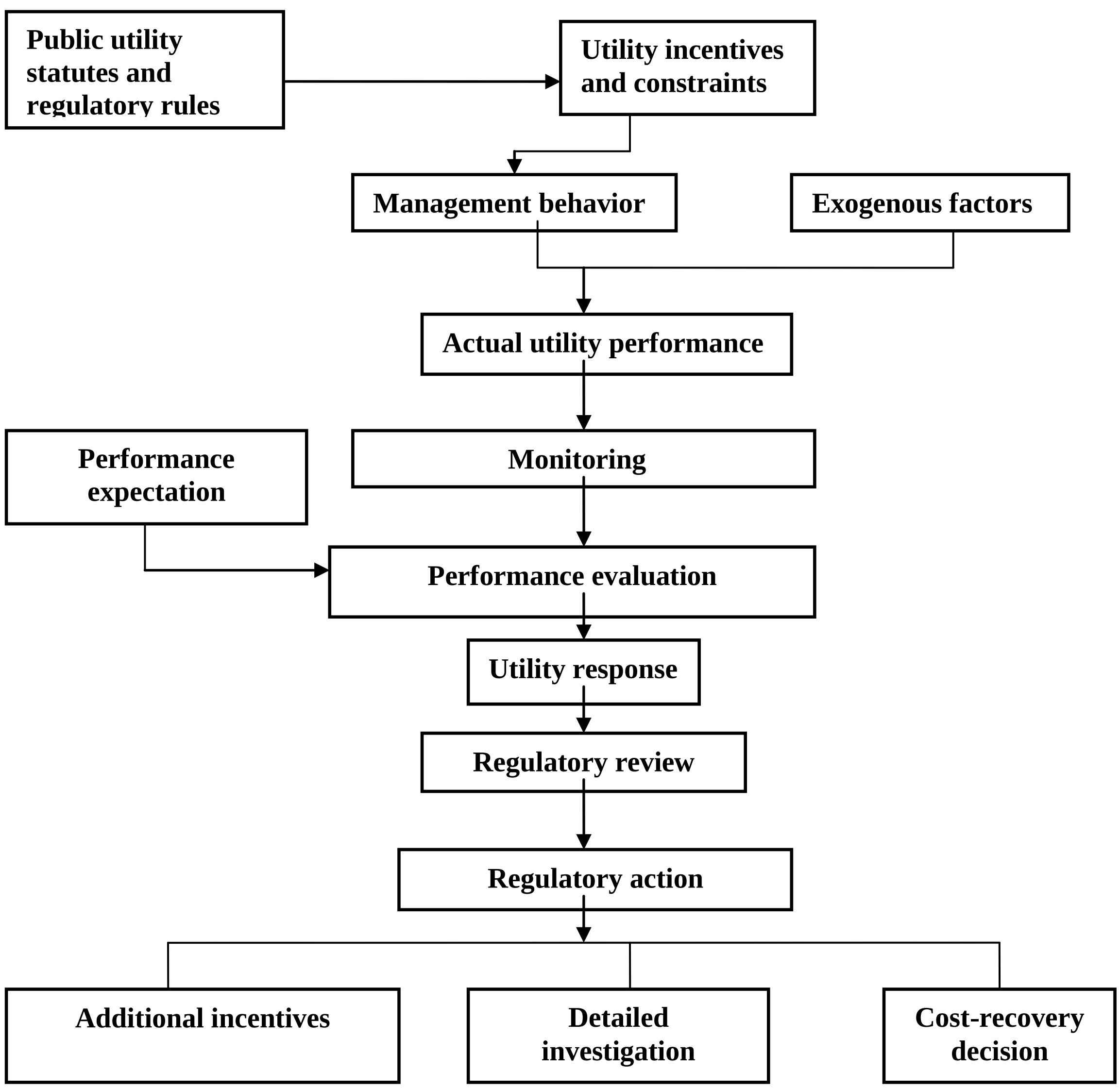
4. The end result of accountable regulation

Performance evaluation can help commissions determine "just and reasonable rates" and make utilities accountable for subpar performance. Accountability requires regulatory assurance that utility costs incorporated into rates reflect prudent actions. Accountability also demands that commissions recognize the financial interests of utilities; namely, to permit a prudent utility a reasonable opportunity to earn a rate of return that attracts capital to serve the long-term interest

[78] The commission can also order the utility to report on any unexplained increase in LAUF gas. The responsibility would then lie with the utility to justify the increase, rather than place the burden on the commission staff or other parties to explain the increase.

of their customers. A systematic monitoring of LAUF gas can assist commissions in attaining those outcomes.

Figure 2: Regulatory Benchmarking, Monitoring and Action



VI. Recommendations for State Utility Commissions

At first sight, a reduction in LAUF gas would seem to lead to a desirable outcome. Yet, like almost everything else, it involves costs. So any assessment of a utility's performance hinges on a cost–benefit assessment of how much customers should pay to lower their utility's LAUF gas: What would be the purchased-gas cost savings? What would be the safety benefits from fewer leaks? What are the positive environmental effects? For fixed dollars spent on reducing LAUF gas, one rule is for the utility to direct those dollars to activities that maximize LAUF-gas reductions.

This paper makes the following recommendations:

1. **It would seem inappropriate to compare LAUF percentages across utilities at a given point in time for determining cost recovery and utility prudence.**
   LAUF percentages depend on the singular conditions of each utility. They include weather, metering and measurement technologies, the age of the pipes, and customer composition. When taking a snapshot of LAUF percentages across utilities, one notices large differences, even within the same state. Although utilities have some control over how these conditions affect the volume of their LAUF gas, it would be difficult to quantify their individual effects. Thus, while a cross-sectional comparison of LAUF-gas percentages may loosely reflect relative utility effectiveness, it is not precise enough to evaluate management competence. Commissions would need additional information to make this determination.

2. **The best benchmark might come from tracking a single utility's LAUF percentage over time.**
   Commissions might want to consider the rolling-average LAUF percentage for a utility over a specified historical period as a benchmark. Historical performance might reveal an upward or downward trend that commissions can use for setting a future benchmark. Trends might reflect a change in utility effectiveness in managing LAUF gas. Any benchmark should be fair and reasonable for both the utility and its customers. Because several factors affect LAUF gas, and because they vary across utilities, inter-utility comparisons are difficult to interpret (*see* the previous recommendation). It would seem ill-advised, then, to judge a utility's performance on this comparison. Because of the erratic and "black box" nature of LAUF gas, it also seems unfair to establish a hard target that unconditionally penalizes a utility for not meeting it. Instead, commissions should consider it more fair and appropriate to use the target as a threshold for triggering further review. The commission itself might compile information for the review or require the utility to provide evidence for why its performance fell below a specified target.

   One caveat with using a single utility's past performance as a benchmark is that historical outcomes might represent less-than-prudent performance. A utility with a stable or even a falling LAUF-gas percentage might still exhibit imprudence, given that its starting-period percentage is excessively high (e.g., 9 percent). Another utility with a low initial percentage, reflecting superior performance, will find it more difficult to improve its performance over time. The latter utility may receive a harsher review from the commission even though it has performed admirably over time. The first utility, in contrast, might invite little scrutiny, or even praise, from its commission, even though it lies farther below the "frontier curve" of optimal performance. Such a regulatory response might violate "fairness" standards by penalizing those utilities that initially made a more concerted effort to manage their LAUF gas.

3. **Utilities can influence LAUF-gas levels in different ways.**
   Different causes account for the level of LAUF gas, including measurement error, accounting error, stolen gas, pipe leaks, third party damages, line pack and consumption on an inactive meter. Some of these are within a utility's control. The general impression conveyed by utilities is that they have minimal influence on the level of LAUF gas. To the contrary, state commissions should presume that utilities do have some control and consider monitoring LAUF gas to identify any serious problems. Since utilities in various ways can influence the level of LAUF gas, with economic, safety and environmental consequences, commissions might want to explore options for improving utility performance.

4. **Commissions may want to be proactive in assessing LAUF performance of utilities, especially in making sure that utilities take all prudent actions to mitigate LAUF gas.**
   Utilities tend to give the impression that LAUF gas is mainly beyond their control; so, from their perspective, the commission should merely pass through the costs with minimal scrutiny (e.g., rubber-stamping the costs). A more realistic view is that utilities can influence LAUF-gas levels, which is a major point made in this paper. The real policy question, then, is whether actions to reduce LAUF-gas levels are cost-beneficial: Do they lower purchased gas costs, achieve higher pipeline safety and produce other benefits that justify the costs?

5. **Commissions may want to acquire better information from utilities on the sources of LAUF gas.**
   To better interpret LAUF-gas levels and their variability over time requires knowing, for example, whether pipe leaks are more important than measurement and accounting errors. Evaluating utility performance and taking appropriate action require that commissions have access to a quantitative breakdown of the sources of LAUF gas. The commission can then judge whether a utility should take additional action and what specific actions they should take to reduce LAUF gas. Admittedly, it is not always easy to quantify the sources of LAUF gas. Because most commissions currently do not require this information from utilities, it is unknown how much effort a utility would have to make to compile it.

6. **Commissions may want to exercise caution in designing and applying an incentive mechanism for LAUF gas.**
   A particular challenge is specifying a benchmark that reflects the expected performance of a prudent utility. An incentive mechanism might include a "dead band" that accounts for the random and uncertain nature of LAUF gas.[79] These features make it difficult for commissions to structure a mechanism that is fair to both utility shareholders and customers. Few commissions have explicit incentive mechanisms to manage LAUF gas, perhaps partially for this reason.

7. **Commissions' most effective tool might be monitoring and assessing utilities' LAUF-gas levels.**
   This paper presents a multi-step monitoring procedure by which regulators can review a utility's performance in managing LAUF gas and then take appropriate action. The major activities are benchmarking, monitoring, and decision making on cost recovery, whether to investigate further, or whether to provide additional incentives for managing LAUF gas (e.g., establishing a cost-sharing mechanism, cap, target, or standard). The monitoring procedure contains four major elements: (a) recognition of regulatory influence on utility performance, (b) cursory performance assessment, (c) post-review action, and (d) the end result of accountable regulation. This approach, for example, places the burden on the utility to report and explain any abnormal increase in LAUF gas.

[79] To the extent that a utility is able to measure with reasonable accuracy the effects of different factors on the level of LAUF gas, the need for a "dead band" diminishes.

Appendix A: Survey Questions

1. Has your commission addressed the topic of lost and unaccounted-for (LAUF) gas in recent rate cases, PGA proceedings or other venues? If so, could you please cite the docket number?
2. Has your commission written a report or other document on LAUF gas?
3. How does your commission treat LAUF gas for ratemaking?
   a. Does it flow through the PGA?
   b. Is it part of base rates?
4. What incentives does your commission provide utilities to manage LAUF gas?
5. What actions do utilities in your state take to reduce LAUF gas? Are these actions based on a cost-benefit criterion?
6. Does your commission feel that utilities could do a better job of managing their LAUF gas?
7. Has LAUF gas become a topic of concern in recent years triggering a commission investigation or other action?
8. Has your commission investigated the relationship between LAUF gas and pipeline safety? Has your commission, for example, ever relied on historical statistics on LAUF gas to encourage or require a utility to reduce its pipe leaks by more prompt detection or repair?
9. Do all the utilities in your state:
   a. Use the same definition for LAUF gas?
   b. Treat LAUF gas the same for ratemaking?
10. Do utilities in your states quantify LAUF gas by source? These sources can include measurement error, pipe leaks, stolen gas, accounting error.
    a. For example, do they calculate the LAUF gas caused by pipe leaks?
    b. Are any of these calculations publicly reported?
11. Does your commission require utilities to report periodically the amount of their LAUF gas?
12. Are there public statistics on LAUF-gas percentages by utility over an historical time frame?
13. Does your commission have estimates of the increase in purchased gas costs attributable to LAUF gas?
14. Does your commission monitor LAUF gas over time? If so, how does it use the information?

Appendix B: State-by-State Survey Responses

State	1. Has your commission addressed the topic of lost and unaccounted-for (LAUF) gas in recent rate cases, PGA proceedings or other venues?
Alabama	No
Alaska	LAUF gas was discussed at the hearing in Docket U-08-142. The Commission was trying to gain a better understanding how the utility calculates LAUF gas. It was discussed for informational purposes only.
Arizona	No, this issue was addressed with a number of gas utilities in the 1990s, but hasn't come up in recent years.
Arkansas	Yes, in Docket No. 09-096-TF, LAUF was a related issue, concerning cost allocation across jurisdictions, in this filing by Arkansas Oklahoma Gas Corp. to revise its Purchased Gas Adjustment clause (PGA).
Colorado	No
Connecticut	Yes, the Authority addressed it in the company's rate case (e.g., Docket Nos. 08-12-06 Application of Connecticut Natural Gas Corporation for a Rate Increase, 08-12-07 Application of The Southern Connecticut Gas Company for a Rate Increase and 10-12-02 Application of Yankee Gas Services Company for Amended Rate Schedules).
Delaware	This topic is addressed in the annual Gas Cost Rate ("GCR") filing of Delmarva Power & Light Company and the Gas Sales Rate ("GSR") filing of Chesapeake Utilities Corporation - Delaware Division; presently these issues are under review in PSC Docket No. 12-419F (Delmarva Power & Light Company) and PSC Docket No. 12-450F (Chesapeake Utilities Corporation – Delaware Division).
Florida	No, LAUF gas has not been an issue in recent rate cases or PGA proceedings.

Georgia	AGL: Yes, in Docket No. 15527 (September 13, 2002)—Determination of Contributing Factors and Cost Allocation for Lost and Unaccounted-for Natural Gas of Atlanta Gas Light Company's Distribution System. This establishes minimum performance standards for LAUF gas of 1.41% to 1.81% for the rolling 16-year average, as reported to PHMSA. Atmos: Yes, in Docket No. 22874 (January 8, 2007)
Idaho	The Commission regularly reviews LAUF gas in PGA proceedings. If significant increases in LAUF gas are identified, the Commission may take action. As an example, in Case No. INT-G-08-03 (Order No. 30649), the Commission ruled that Intermountain Gas only be allowed to recover a maximum of 0.85% of its total throughput as LAUF gas. In addition, the Commission ordered the Company to submit biannual reports (previously, the utility had to submit quarterly reports but this requirement changed when its performance improved) outlining: (1) the Company's framework for how it has tested for, identified, and remediated equipment measurement errors or leaks; and (2) the business process for alleviating measurement errors through its financial accounting of nominations, scheduling, measurements, flow volume allocation, and billing. Intermountain Gas was directed to work with the Staff to outline steps toward identifying the sources of LAUF gas and work toward improvement. The Company is still limited to recovering a maximum of 0.85% of its total throughput as LAUF gas, and continues to file reports on a semi-annual basis.
Indiana	The Commission typically determines actual LAUF gas percentage within the confines of a rate case. Utilities recover their LAUF gas percentage through the gas cost adjustment (GCA) process, which is equivalent to the PGA.
Iowa	It is in the PGA rules; specifically, it is Iowa Administrative Code 199-19.10(1)b.
Kansas	Not recently and not explicitly in rate cases; the last time that the Commission addressed the LAUF gas question generically was in Docket 106,850-U in 1988. In this Docket the Commission set the limit of LAUF gas that can be flowed through the PGA to 4%. This LAUF requirement is still in effect.
Kentucky	LAUF is addressed in PGA applications for cost recovery issues; there is no specific docket number because LAUF treatment for cost recovery is long-standing and consistent except for unique circumstances; the Quarterly Report of Gas Cost Recovery Rate Calculation Word is used by most small LDCs in Kentucky in filing their quarterly PGAs; schedules II and IV contain calculations which limit LAUF recovery to 5 percent.
Louisiana	Yes, in PGA Docket No. U-22407 dated March 24, 1999
Maryland	The issue of LAUF was last reviewed in a Baltimore Gas and Electric Company base rate proceeding (Case No. 9230). In that proceeding, the Company proposed a revision to how LAUF would be calculated. The Commission accepted the Company's proposal.

Massachusetts	No
Michigan	No
Minnesota	Yes, in the following PGA proceedings: Docket No. E,G-999/AA-07-1130; Docket No. E,G-999/AA-09-896; Docket No. G-999/AA-10-885; and Docket No. G-999/AA-12-756.
Mississippi	LAUF is addressed on a case-by-case basis, the most recent being the City of Moss Point in Docket 2011-UA-337. Originally a Sale and Transfer docket, the topic of LAUF gas became a major issue during the Pipeline Safety Division's investigation.
Missouri	The Commission regulates cost recovery for several natural gas utilities, including NorthWestern Energy (NWE), Montana-Dakota Utilities (MDU), Energy West Montana (EWM), and Cut Bank Gas (CBG). Only NWE has regulated transmission service; the others are distribution utilities only. LAUF gas costs are typically recovered as a part of procured gas costs that are tracked and trued-up on a regular basis, rather than as a part of fixed delivery costs recovered in general rate cases. CBG does not have an established LAUF rate. For the others, the established LAUF rates are as follows: NWE (2.46%), MDU (0.72%), and EWM (1.12%). The LAUF rates are designed to include gas used in system operations. The NWE rate includes LAUF gas loss rates on the transmission system as well as the distribution system. The MDU and EWM rates are distribution system only rates. Utilities are also allowed recovery of losses on transported gas using the LAUF rates in effect for the transport system. The NWE LAUF rate of 2.46% is also referred to as a "fuel reimbursement percentage." The NWE fuel reimbursement rate for gas injected into storage is 1.14%. The MDU rate of 0.72% was established in Docket No. D2002.5.59, representing losses incurred in the year ending June 30, 2001. The EWM rate was established as a three-year average in Docket No. 85.7.26, Order 5153a, and is now fixed at 1.12%. In Docket No. D2011.4.32, Final Order No.7150b, the Commission allowed cost recovery of gas losses equaling 15% of total purchases on the CBG system. Cost recovery was allowed under the condition that CBG would act immediately to replace the affected pipe.
Nebraska	No
Nevada	In Southwest Gas Company's ("SWG") annual rate adjustment application (Nevada version of the PGA), the Commission establishes a shrinkage rate to recover a share of the LAUF gas from transportation customers who procure their gas from a third-party supplier. The most recent annual rate adjustment application was Docket No. 12-06013.
New Hampshire	No

New Jersey	The Companies include LAUF in their Basic Gas Supply Service (BGSS) filings every year and Staff reviews those submittals. There have been no formal proceedings involving LAUF in many years.
New Mexico	Notably in Case 2811 in 1998; also cases 2587, 2760 and 2762 have mentions of LAUF gas.
North Carolina	LAUF is set in rate cases. LAUF is also reviewed in annual reviews of LAUF gas.
North Dakota	No
Ohio	PGA audits of small LDCs review LAUF along with management and performance audits of large LDCs. The last case filed with the Commission was Duke's 2012 M/P audit in case number 12-218-GA-GCR.
Oklahoma	Yes, in several dockets.
Pennsylvania	LAUF is primarily addressed in Purchase Gas Cost (PGC) or Gas Cost Recovery (GCR) mechanisms within Pennsylvania but could also be considered in rate cases, orders, etc. However, each PGC or GCR company would be separately docketed. In addition, the Commission has issued a Proposed Rulemaking Order, *Establishing a Uniform Definition and Metrics for Unaccounted-For-Gas*, at its June 7, 2012 Public Meeting at Docket No. L-2012-2294746 (note: The Commission has since approved the rule).
South Carolina	Docket No. 2009-435-G - Order No. 2010-250 (Piedmont)
South Dakota	No
Tennessee	No
Texas	The Railroad Commission addresses either directly or indirectly the issue of LAUF gas in virtually all gas distribution rate orders. Rate cases for the larger distribution utilities will generally only address the cost of service rates, exclusive of gas costs which have their own separate rider-type provision. Those PGA (GCA, etc.) provisions will address LAUF and its limitations, typically the lowest of actual LAUF or 5%. A recent example with PGA (GCA) inclusions in the Final Order is Docket No. 10170 (Atmos Energy, Mid-Tex Division).

Utah	[Docket 08-057-02: *In the Matter of the Revision of Questar Gas Company's Integrated Resource Planning Standards and Guidelines* at http://www.psc.utah.gov/utilities/gas/gasindx/0805702indx.html](http://www.psc.utah.gov/utilities/gas/gasindx/0805702indx.html). The Commission's March 31, 2009, Order in this docket requires reporting on "The current level of lost and unaccounted for gas and an explanation of the Company's efforts at reducing lost and unaccounted for gas and reducing natural gas emissions in pipeline construction and operations activities." (*See* Page 30), at http://www.psc.utah.gov/utilities/gas/gasindx/documents/0805702ROosagfqgc.pdf. Docket No. 09-057-16: *In the Matter of the Application of Questar Gas Company for Authority to Increase its Retail Gas Utility Service Rates in Utah and for Approval of Its Proposed Gas Service Schedules and Gas Service Regulations*.
Vermont	No
Virginia	No
Washington	Yes, in Docket UG-060256, Order 05, paragraph 49
Wisconsin	The Commission addresses LAUF gas in every rate case proceeding during its review of expenses for reasonableness. However, the allowance of LAUF has not been a contentious issue in any recent rate proceeding.
Wyoming	LAUF gas has been addressed in rate cases, pass-on filings, and as separate filings in the past. Natural gas utilities document their LAUF gas in tariffs, and the calculation is most typically changed in Rate Cases. The most recent rate case example is Questar Gas, Docket 30010-113-GR-11 (Record 13023). The most recent example of an adjustment outside of a rate case is SourceGas, Docket 30022-187-GA-12 (Record 13109). SourceGas' LAUF gas was previously established in their rate case, Docket 30022-148-GR-10 (Record 12450).

State	**2. Has your commission written a report or other document on LAUF gas?**
Alabama	No
Alaska	No

Arizona	No
Arkansas	No
Colorado	No
Connecticut	Only when LAUF gas is found to be an issue would it be addressed in the company's rate case
Delaware	No
Florida	No
Georgia	No
Idaho	No
Indiana	No
Iowa	No
Kansas	The November 28, 1988 Order in Docket 106,850-U discussed in *Question 1* above
Kentucky	No
Louisiana	No
Maryland	No
Massachusetts	No
Michigan	No

Minnesota	No, the Commission generally relies on the summary and comparison of each regulated natural gas utility's LAUF-gas percentage in the Minnesota Department of Commerce's annual review of gas costs.
Mississippi	No
Montana	No
Nebraska	No
Nevada	In Docket No. 08-05010, SWG filed a report on May 15, 2008 pursuant to a Commission Order entitled, *Lost and Unaccounted for Gas Contributors*. This report was the subject of Docket No. 08-03033 – an investigatory docket – on the calculation of the shrinkage rate in the Southern Nevada Division of SWG. On March 2, 2009, the Commission issued an Order in Docket No. 08-03033 with its findings that the shrinkage rate in the Southern Nevada Division of SWG should have a separate high-pressure and low-pressure rate for transportation customers. Transportation customers served directly off high-pressure lines only pay the high-pressure shrinkage rate and all other transportation customers pay both the high and low-pressure shrinkage rate. The high-pressure and low-pressure shrinkage rates are calculated based on the ratio of the miles of high-pressure pipe and low-pressure pipe to the total miles of pipe in the distribution system.
New Hampshire	No
New Jersey	No
New Mexico	No
North Carolina	No; It should be noted that because North Carolina did not get interstate service until 1951, our distribution system is generally newer than the systems in some states. Also, over a period of decades, gas pipeline operators in North Carolina, working with the Commission's Pipeline Safety Section, have eliminated cast iron and bare steel mains in our State (some of which were inherited with old manufactured gas systems). As shown in PHMSA's inventory of cast iron pipe, some states have a very significant amount of old pipes that tend to be a source of leaked gas. If the Commission has not written a report on LAUF gas, it is because it isn't the issue here that it is in some states.
North Dakota	No
Ohio	No, the Commission does not have reports other than those in the audit reports.

Oklahoma	Yes, each gas distribution utility must report annually its actual LAUF gas.
Pennsylvania	Commission Staff released a report with the Proposed Rulemaking Order at Docket No. L-2012-2294746 entitled *Unaccounted-for-Gas in the Commonwealth of Pennsylvania* (Joint Report).
South Carolina	No
South Dakota	No
Tennessee	No
Texas	Through the utility's Plan of Correction documents, the Safety Division monitors the utility's progress to resolve the LAUF gas issues and continues to monitor the situation during the next scheduled inspection.
Utah	No
Vermont	No
Virginia	No
Washington	No
Wisconsin	No
Wyoming	No, the standards and levels of LAUF gas are compared with nationwide industry averages and comparable Wyoming utilities to determine reasonableness; also, a utility's historical reported LAUF is used to discern any changes. In cases where variability or levels seem suspect, the Commission has inquired of the utilities to investigate and report.

State	3. How does your commission treat LAUF gas for ratemaking? a. Does it flow through the PGA? b. Is it part of base rates?
Alabama	Flows through the PGA
Alaska	Flows through the PGA
Arizona	Flows through the PGA
Arkansas	Flows through the PGA
Colorado	Flows mostly through the PGA and minimally through base rates
Connecticut	Flows through the PGA
Delaware	Flows through the PGA
Florida	For companies that are not totally unbundled, LAUF-gas costs flow through the PGA With respect to transportation customers, LDCs retain a small percentage of gas received by the customer to cover LAUF gas; this amount is specified in the tariff and varies by LDC; the amount of gas retained is credited to the PGA and reduces the quantity of gas the LDC is required to purchase for its system supply. For utilities that are no longer in the merchant function, LAUF gas is part of the overall imbalances and allocated among the third party marketers.
Georgia	AGL: No, *see* Docket No. 15527. Interruptible customers are allocated 0.8% of their annual gas volumes. Marketers are allocated the remainder through a true-up process. These costs are passed on to the firm customers. Atmos: Flows flow through the PGA
Idaho	(a) Yes; (b) Intermountain Gas has a normalized unit cost amount of LAUF gas they are allowed to collect through base rates. During each PGA, the base rate revenue recovered by the Company for LAUF gas is determined by applying the unit cost amount to estimated sales, and then adjusting for the

	rate of recovery approved from the prior PGA. The Company reconciles the difference between what was collected from the previous year's forecasts and actual LAUF gas during each PGA hearing. Avista collects all of its LAUF-gas cost through the PGA and then reconciles the difference between the previous year's forecasts and actual LAUF gas during each PGA.
Indiana	The Commission establishes an LAUF percentage as part of a rate case, but the LAUF gas flows through the PGA process.
Iowa	Flows through the PGA
Kansas	Flows through the PGA, up to a LAUF-gas percentage of 4%; also, included in base rates
Kentucky	Flows through the PGA
Louisiana	Flows through the PGA for sales customers Not recoverable for transportation and non-jurisdictional sales service
Maryland	Generally, it is handled in base rates, with any adjustments for the commodity costs made in the annual PGA proceedings. However, gas costs for sales service customers are addressed in the annual PGA proceedings.
Massachusetts	Flow through the PGA.
Michigan	The utility subtracts LAUF gas from our annual PGA cases and not recovered through the PGA; it is part of base rates.
Minnesota	Flows through the PGA
Mississippi	Flows through the PGA
Montana	Typically flows through the PGA
Nebraska	Flows through the PGA

Nevada	Flows through the PGA; all sales (bundled) customers in Nevada pay for LAUF-gas costs through the purchased gas costs contained in the quarterly gas cost filings. In Southwest's service territories, transportation customers pay a shrinkage rate calculated in the annual rate adjustment application for their share of LAUF gas costs. The revenues from the shrinkage rate are credited to the 191 Account. In Sierra Pacific Power Company's ("SPPC") service territory, transportation customers provide in-kind gas for their share of LAUF gas pursuant to SPPC's tariff, Schedule Nos. TF & TI §5.2.
New Hampshire	Flows through the PGA
New Jersey	Flows through the PGA
New Mexico	Flows through the PGA
North Carolina	Part of both base rates and PGA flow through
North Dakota	Part of both base rates and PGA flow through
Ohio	Flows through the PGA
Oklahoma	Flows through the PGA
Pennsylvania	LAUF is handled in PGC or GCR proceedings relating to gas cost rates. The PGC or GCR mechanisms are not part of base rate cases. However, LAUF's drivers or remedies could be a factor in base rates and therefore, could be a focal point of base rates.
South Carolina	Flows through the PGA for both Piedmont Natural Gas Company and South Carolina Electric & Gas Company
South Dakota	In some cases flows through the PGA; in others part of base rates
Tennessee	Flows through the PGA

Texas	Flows through the PGA, with limitations. The Commission generally limits LAUF gas to actual, not to exceed 5% (computed annually). Generally speaking any gas cost expense associated with LAUF gas in excess of 5% must be absorbed by the utility and not passed on to the customers. For many years now the practice has been for gas costs to stand alone, found in the PGA (GCA) provisions, and this is where you will find the rate treatment for LAUF gas. The base rates cover the entire range of the utilities revenue requirements, exclusive of gas cost. So, the short answer is no.
Utah	Flows through the PGA
Vermont	(a) Yes; (b) Yes, it's included with the gas costs.
Virginia	Flows through the PGA.
Washington	Flows through the PGA.
Wisconsin	The Commission may treat LAUF differently for any given utility but, in general, a reasonable amount is considered an allowable expense; LAUF gas costs are part of both base rates and the PGA.
Wyoming	Flows through the PGA: The utilities report fuel purchased at the supply meters, and flow the cost to actual metered sales. The difference, or LAUF gas, is reviewed for historical and industry reasonableness. There are cases (SourceGas, ChoiceGas Program, for example), however, where the LAUF gas is included in the SourceGas Distribution Cost to the competitive suppliers and is included within the procedure by tariff for assessing the fees. *See* Docket 30022-187-GA-12 (Record 13109) for example of this reported LAUF level.

State	4. What incentives does your commission provide utilities to manage LAUF gas?
Alabama	None
Alaska	None
Arizona	None

Arkansas	In some instances, the Commission has capped the LAUF-gas percentage as an incentive for utilities to repair natural gas leaks; also, the Commission has approved a program which supports the expedited replacement of pipeline infrastructure.
Colorado	None
Connecticut	None
Delaware	For Chesapeake Utilities Corporation there is presently an *Unaccounted For Gas Incentive Mechanism* outlined in the Company's tariff; this mechanism was approved to continue beyond an initial three-year test period in the early 1990s by Order No. 4189 in PSC Docket No. 95-206F.
Florida	None
Georgia	AGL: LAUF-gas percentage must meet the minimum performance standards, otherwise AGL will be held to the penalty structure established in DN 15527. Atmos: None
Idaho	The Commission does not have specific incentives for managing LAUF gas.
Indiana	The Commission attempts to establish a reasonable LAUF-gas percentage in each rate case; since the utility will not recover any costs above the established percentage, the utilities' incentive is to keep the LAUF-gas percentage at or below the Commission's established percentage; it is their responsibility to manage the LAUF-gas percentage granted in its last rate case.
Iowa	Unknown
Kansas	Penalty mechanism in the PGA if LAUF gas exceeds 4%
Kentucky	From a cost recovery aspect, the Commission's long-time practice has been to limit LAUF gas recovered through gas cost in PGA rate changes to five percent; the intent is to encourage timely leak detection and pipeline repair, addressing both cost and safety concerns.
Louisiana	Under no circumstances may LAUF gas recoverable from sales customers exceed 6% of purchase volumes on an annual basis

Maryland	There is no specific Commission incentive to manage LAUF gas. However, as a matter of course, if there is a significant change in LAUF gas on a year-to-year basis that is noted in a gas utility company's annual PGA/PGC proceeding, the issue is addressed at that time.
Massachusetts	The Commission has approved proposals by utilities to recover on an annual basis (rather than wait for the next rate case filing) the costs associated with the replacement of non-cathodically protected steel mains and services as well as cast-iron and wrought-iron mains. *See* Bay State Gas Company, d/b/a Columbia Gas of Massachusetts, D.P.U. 12-25 (10/31/2012).
Michigan	The fact that LAUF-gas cost recovery is set in a rate case and does not vary from year to year is supposed to incent utilities to keep losses under control; but now utilities are filing rate cases almost every year due to new laws passed in Michigan.
Minnesota	None
Mississippi	None
Montana	Cost recovery for "reasonable" loss is straightforward: Cost recovery for loss in excess of the reasonable level may be contested and disallowed; in a contested case the "reasonable" level would be determined according to historical loss, utility activity in pipeline maintenance and investment, customer benefits, and other relevant variables.
Nebraska	None
Nevada	The Commission does not provide incentives to the utilities to manage LAUF gas given the historically low levels of LAUF gas, i.e. approximately 1% for SWG and 3% for SPPC. (Historical LAUF percentages are provided by utilities and verified by review of PHMSA Reports over time.)
New Hampshire	There are no formal policy decisions spelling out incentives.
New Jersey	No direct incentives *per se*
New Mexico	Not aware of any incentives
North Carolina	The Commission oversees LAUF gas in the annual reviews of gas costs, and the Company is asked to investigate LAUF gas if it is too high by either Public Staff requests or Commission Order.

North Dakota	None
Ohio	The Commission can disallow purchase gas cost recovery of LAUF above 5 percent.
Oklahoma	Each company's tariff has a Safe Harbor provision which limits the percentage of LAUF it may recover from ratepayers through the PGA. LAUF gas above the allowed levels triggers reviews. Performance Based Tariffs have allowed the utility to collect a bonus return on equity when LAUF is below a certain percentage and suffer a penalty when it exceeds a certain level. Fort Cobb Fuel Authority has petitioned the Commission to move away from a percentage LAUF-gas allowance to one based on customer density.
Pennsylvania	All LAUF gas is recovered by the utility and included within gas costs provided it is not excessive.
South Carolina	None
South Dakota	None
Tennessee	None
Texas	The main incentive is the negative incentive of disallowing gas costs associated with LAUF in excess of 5% of purchases. However, in a couple of instances the Commission has authorized "System Replenishment Fees" such as in Docket No. 9703 (T & L Gas) and Docket No. 10112 (Bluebonnet Natural Gas). These additional fees allow for expenditures targeted to reducing gas losses and replacement of selected lines.
Utah	Prudence of the utility's actions is judged in a PGA filing.
Vermont	The Board provides no specific incentives to manage LAUF.
Virginia	If LAUF rates are deemed to be too high, the Commission could find that the costs associated with all or some portion of the LAUF gas were imprudently incurred, and that their recovery should be disallowed. By statute, utilities are also allowed to recover qualifying infrastructure replacement costs through a rider (Chapter 26 (§ 56-603 et seq.) of Title 56 of the Code of Virginia).
Washington	None

Wisconsin	In general, the Commission does not provide an "incentive" to manage LAUF. However, there may be no rate recovery if LAUF exceeds the allowed amounts.
Wyoming	Historically, no incentive *per se* existed for a utility to manage LAUF. The incentive derives from not having to explain a deviation to the Commission.

State	**5. What actions do utilities in your state take to reduce LAUF gas? Are these actions based on a cost-benefit criterion?**
Alabama	Active cast-iron replacement; based on other criteria
Alaska	*See* the U-08-142 hearing (page 397-398 of transcript): "The only way you could be absolutely perfect is to have instantaneous meter reading on every location coming in and every location coming out. Enstar has tried over the years to do all kinds of things to make its [LAUF gas] less than -- than it is. We are -- even with this error we are substantially below what we see in the Lower 48 because of the newness of our system. We don't have pipes that leak. We don't tolerate leaks, but we've gone through and upgraded purchased meters to use new technology like ultrasonic (ph) meters which (indiscernible) makes some of these variances, their tolerance in reading is wider than in orifice meters and in turbine meters."
Arizona	Utilities are expected to take reasonable steps to reduce their LAUF gas.
Arkansas	The primary actions taken by Arkansas utilities is repairing and replacing pipeline infrastructure.
Colorado	None
Connecticut	The gas utilities decrease their LAUF gas through the repair and replacement of older mains, services and reduction in stolen gas.
Delaware	Generally, the utilities' overall operational maintenance programs address the theft and -loss issues that are the primary sources of LAUF gas; Commission Staff does not prescribe a cost-benefit criterion.
Florida	No actions have been taken to reduce LAUF gas.

Georgia	AGL: Failure to meet performance standards will result in penalties. Atmos: The utility is not under Commission mandate to reduce LAUF gas.
Idaho	The utilities have inter-disciplinary teams that regularly review the LAUF-gas audit processes currently in place. The teams investigate potential sources of LAUF gas and take remedial action as needed to continue keeping LAUF-gas levels low. Their business process identifies measurement errors from nominations, scheduling, flow volume allocation, and billing. The utilities also regularly make sure they are in compliance with the city gate's operational standards and the pass/fail requirements for customer's meters. Since Intermountain Gas has begun closely looking and reporting on LAUF gas, it has made alterations to the billing factors, gas reporting, and audit process. These alterations have helped the Company control the quantities and costs associated with LAUF gas (*See* the response to *Question 10* for results). These actions are based on a cost-benefit criterion. However, the utilities are most concerned with customer safety and avoiding operational fines for non-compliance at the city gate. There is not a one size fits all cost-benefit criteria, but the utilities use this type of analyses to evaluate particular projects. For example, Avista uses a cost-benefit approach to evaluate the probability and impact of leaks from the Aldyl A pipe on its system. From the results of this study, Avista determined the optimal timeframe for replacing the leak prone pipe.
Indiana	Due to utilities' desire to keep their LAUF gas at or below its established percentage and to provide safe and reliable service, utilities typically identify and repair the cause of any LAUF.
Iowa	Unknown
Kansas	Our previous response addressed the line loss limit in the PGA.
Kentucky	Leak surveys and associated repair/replacement of pipe that is leaking; meter testing programs to ensure proper and accurate measurement of gas flow through meter, metering all points of transfer of gas (i.e. customer meters, purchase stations, even free gas customers) to track volume of gas purchased versus volume of gas sold; actions are based on a combination of cost-benefit analysis and regulatory requirements.
Louisiana	The Commission takes no other actions other than disallowing recovery over the 6% threshold.
Maryland	Most recently, Maryland gas utilities have been expanding their pipe replacement programs to address a number of issues, including LAUF gas. In the current 2013 Maryland State Legislative session, both houses of the Legislature passed pipe replacement legislation, but this legislation has not been finalized nor signed by the Governor.
Massachusetts	*See* the previous response.

Michigan	The Commission requires prudent infrastructure maintenance and operating storage; if the utility has fewer losses than set in the rate case, it gets to keep any over-recovery.
Minnesota	The utilities have been encouraged to more precisely identify the source (or cause) of LAUF gas, which should lead to better control of these costs and assure that general ratepayers are the last resort for recovering these costs.
Mississippi	The larger systems (both investor owned and municipalities) reduce LAUF gas using proactive regular maintenance and control measures, taking action based on both cost-benefit and performance-based criteria. Smaller systems tend to be more reactive.
Montana	Montana utilities perform routine inspections, maintenance, and required upgrades to pipeline infrastructure. Cost-benefit analyses are expected for non-emergency procedures.
Nebraska	Unknown
Nevada	Neither SWG nor SPPC has an active program to reduce LAUF gas. Any actions are part of the normal course of operations, such as surveying for leaks in compliance with the PHMSA requirements, and repairing leaks when discovered.
New Hampshire	Utilities have cast iron and bare steel (CIBS) main replacement programs to upgrade the distribution systems (*see* docket DG 12-128). There are defined meter testing requirements in Commission gas rules (*see* Puc Chapter 500 gas rules). Automated meter reading has reduced estimated bills. These actions are based on a cost-benefit criterion, with the CIBS program. For other remedial actions, depending on the severity of the problem, cost-benefit is used more informally.
New Jersey	Utilities are involved in programs to replace cast iron and bare steel mains and services under "infrastructure" programs.
New Mexico	Utilities have meter testing, leak locating/repairing and pipeline safety programs. Perhaps utilities have taken other actions of which I'm unaware. Generally such programs are in compliance with state or federal requirements.
North Carolina	The utilities pursue a third-party reimbursement when a line breaks, and the Public Staff follows up.
North Dakota	Normal maintenance, based on a cost-benefit criterion

Ohio	The utilities has several categories into which LAUF gas is placed such as service theft, metering differences and errors, Dth to Mcf conversion, line strikes and line loss, and company use. If any of these categories appears to have changed substantially from a prior period, the company will form a team to determine the cause.
Oklahoma	Gas distributors perform frequent line surveys to detect for leaks. Capital improvements are based on safety and cost-benefit analysis.
Pennsylvania	Utilities take various actions to reduce their LAUF gas, including leak surveys, main replacement, meter testing/renewal programs, and theft programs. Some of these actions would be based upon a cost-benefit analysis.
South Carolina	Unknown
South Dakota	Nothing required by the Commission
Tennessee	Unknown
Texas	Utilities typically increase leak survey frequencies, review measurement history of large volume customers, and review the measurement records for purchase points. Additional measures include the estimation of known large leaks that occurred during the subject LAUF-gas period.
Utah	In its most recent Integrated Resource Plan, Questar Gas indicated it has implemented several practices to minimize LAUF gas, including: (1) *Temperature and elevation compensation.* In August of 2010, the Company began compensating for temperature and elevation in the computation of Dekatherms in its Utah service territory as ordered by the Commission. The effect has been a reduction in the volume of gas that is unaccounted for; (2) *Maintenance work on high pressure feeder lines.* When scheduled maintenance work requires the feeder line to be blown down, the line is allowed to feed down to the lowest possible pressure before being completely blown down. This minimizes the amount of gas that is blown down to the atmosphere. The pressure is recorded to allow the amount of gas that is blown down to be calculated; and (3) *Leak survey and repair.* The Company regularly conducts leak surveys and performs system maintenance as required. Additional leak surveys are conducted in accordance with applicable regulations in high consequence areas or areas with aging infrastructure.
Vermont	Vermont's natural gas utility (only one exists) has company policies to repair all discovered gas leaks promptly and to monitor/remediate customer meter accuracy. Furthermore, the company recently completed a program which replaced all cast iron and bare steel in their pipeline system. These actions are not based on a cost-benefit criterion.

Virginia	As previously noted, by statute utilities can recover qualifying infrastructure replacement costs through a rider (Chapter 26 (§ 56-603 et seq.) of Title 56 of the Code of Virginia. The definition of eligible infrastructure replacement costs is set forth in the statute.
Washington	Utilities are required to repair leaks upon discovery, replacement of services and small segments of mains. Cost-benefit is not usually the driver in these instances.
Wisconsin	There may be no rate recovery if LAUF gas exceeds the allowed amounts.
Wyoming	With the exception of a small gas utility, gas utilities have done a commendable job of constantly monitoring the metering values and LAUF gas, and responding in a timely manner to anomalies. Meter accuracy, line integrity and processing efficiency are typically discussed in rate cases.

State	6. Does your commission feel that utilities could do a better job of managing their LAUF gas?
Alabama	One can always do a better job, but it may not be cost effective. The answer is yes, they are doing a good job.
Alaska	Yes
Arizona	The Commission has not expressed an opinion on this in recent years.
Arkansas	There are always opportunities for utilities to improve on the management of their LAUF gas.
Colorado	This has not been a significant issue.
Connecticut	The Authority always expects the gas companies to mitigate their LAUF gas.
Delaware	While there is always room for improvement, generally the Commission feels that the utilities satisfactorily manage their LAUF gas.
Florida	The Commission has not taken a position.

Georgia	Don't know
Idaho	The Commission believes the utilities do a reasonable job of managing LAUF gas while keeping the system safe and costs down for ratepayers.
Indiana	The Commission believes that improvements are always welcome and can be made in all areas of operations by our gas utilities; however, the Commission is encouraged with the progress that gas utilities have made to maintain and update infrastructure needs; in particular, some utilities have trackers specifically for the replacement of cast iron and bare steel piping.
Iowa	Unknown
Kansas	Though the gas utilities in Kansas can always perform better, the most recent LAUF-gas percentage of these utilities ranged from .19% to 2.18%.
Kentucky	From a pipeline-safety branch perspective, most of our utilities are at or under the 5% LAUF-gas target and manage it due to it being tied directly to their revenue stream.
Louisiana	Some of the smaller gas utilities could do a better job, but overall the average is 3.62% and 2.47% for the group.
Maryland	This has not been an issue of concern, up to this point. See response to *Question 5* above.
Massachusetts	Unknown
Michigan	Yes, with what has been requested in recent rate case filings we definitely believe they could do a better job, assuming their requested LAUF-gas amounts are accurate, which we do not believe they are.
Minnesota	In 2012, the Commission asked MERC-PNG to provide more detailed explanations of its LAUF gas calculations to ensure that transportation service on its system was being correctly accounted for in the calculations. The Department of Commerce also requested that all utilities, if not already in place, create a program where they can estimate the amount of lost gas associated with a particular incident instead of charging gas costs to all ratepayers.
Mississippi	Don't know

Montana	The Commission encourages and supports pipeline maintenance and upgrades. The Commission is very active in the pipeline safety community.
Nebraska	No opinion adopted
Nevada	With respect to measurement errors, there is a concern that SWG reported a "gained gas" situation for both its Southern and Northern Nevada Divisions in the most recent annual rate adjustment application, Docket No. 12-06013. The result of this situation of metering more gas to customers than was metered into the system was a credit shrinkage rate for transportation customers. The "gained gas" situation in the Southern Nevada Division was the second consecutive year that this has occurred.
New Hampshire	From time to time Commission Staff will point out areas of concern that have resulted in Commission directives for corrective action by utilities (*see* cost of gas Docket No. DG 07-102, Order No. 24,798).
New Jersey	The Board feels that the accelerated infrastructure programs approved recently will improve the LAUF-gas levels.
New Mexico	Although the LAUF-gas percentage can vary, generally Staff has felt that it has been within acceptable standards.
North Carolina	While we would always welcome improvements, generally, no
North Dakota	Haven't addressed
Ohio	No, the utilities have a strong interest in minimizing their LAUF-gas levels.
Oklahoma	The Public Utility Division believes that all Oklahoma utilities are performing safety-first and cost-effective maintenance to the systems. We are unaware of any actions that could be taken by Oklahoma utilities that have not been addressed.
Pennsylvania	*See* the Commission's Proposed Rulemaking Order at Docket No. L-2012-2294746. The Commission believes that a consistent definition as well as established metrics will aid in ensuring LAUF is not a problem for Pennsylvania.
South Carolina	The Commission has not spoken on this issue.

South Dakota	No reason to believe so
Tennessee	Commission has not addressed this issue.
Texas	Commission Staff is committed to safety, believing that distribution utilities should always give maximum effort toward controlling and managing LAUF gas.
Utah	The Commission has not evaluated this issue.
Vermont	The Board has rendered no opinion on this topic.
Virginia	The Staff is not aware of any concerns that the Commission has regarding this issue.
Washington	No
Wisconsin	Our utilities have been managing their LAUF to allowable amounts.
Wyoming	The emphasis by the Commission has historically been directed toward metering accuracy (Section 405 of Commission Rules & Special Regulations), which has accounted for a significant percentage of the apparent LAUF gas. LAUF gas has not been a "hot button" issue in Wyoming, but has never been ignored, either.

State	7. Has LAUF gas become a topic of concern in recent years triggering a commission investigation or other action?
Alabama	No
Alaska	There has been discussion at adjudications for informational purposes, but no formal investigation or other action has occurred.
Arizona	No

Arkansas	Pipeline safety, gas leakage, and the control of pipeline erosion have and will continue to be a primary concern of the Commission and its Pipeline Safety Office.
Colorado	No
Connecticut	No
Delaware	This matter has been an item looked at more closely during the annual "GCR" and "GSR" filings in recent years; however, the Commission has not recently opened a Docket initiating an investigation for either gas utility serving Delaware customers.
Florida	No
Georgia	AGL: *See* Docket No. 15527—decided September 2002 Atmos: No
Idaho	No, not since Case No. INT-G-08-03
Indiana	The Commission is always monitoring the LAUF-gas percentages reported by regulated utilities; however, the issue has not become a topic of concern, yet.
Iowa	No
Kansas	No
Kentucky	With respect to gas cost and safety, LAUF gas has always been a topic of concern for the Commission; in response to growing concern about pipeline safety, KRS 278.509 was enacted in 2005, resulting in all five major gas utilities requesting and receiving authority to carry out accelerated main replacement programs, with accompanying surcharges.
Louisiana	No
Maryland	No

Massachusetts	No
Michigan	No
Minnesota	Yes, in 2008, the Commission asked the Department of Commerce to begin monitoring and reporting each utility's LAUF-gas percentage. While LAUF-gas percentages should be relatively stable over time, the Commission believes that monitoring this number and finding explanations for any exceptions could be useful. Therefore, the Commission will request that the OES [the Office of Energy Security was a previous name used by the Department of Commerce] develop and report in next year's AAA review a summary and comparison of each regulated natural gas utility's LAUF-gas percentages.
Mississippi	Not across the board – this is dealt with on a case-by-case basis – *see* City of Moss Point Docket as an example
Montana	No Commission action, but pipeline safety Staff does monitoring, as reported on the PHMSA 7100 form, Gas Annual Report.
Nebraska	No
Nevada	In 2005, Staff discovered during its audit in Docket No. 05-5015 that SWG was incorrectly calculating the shrinkage rate by including the volumes of transportation customers who had negotiated contracts that exempted them from paying the shrinkage rate. In the Southern Nevada Divisions, these volumes represented approximately 50% of the volumes on the distribution system. When Staff corrected this error in 2005, instead of just doubling the shrinkage rate as one would expect, the shrinkage rate increased ten-fold because the LAUF-gas percentage had tripled from 0.3% to 0.9% and the cost of gas had increased more than 50% at the same time that the error was corrected. Transportation customers subject to the shrinkage rate had been accustomed to paying approximately one-tenth of a cent per therm in the shrinkage rate suddenly saw the shrinkage rate increase to approximately one cent per therm in 2006. The Commission opened Docket No. 08-03033 as a result of a complaint from one of these transportation customers. As described in our response to *Question 2*, the result of this investigatory docket was to create a separate high-pressure and low-pressure shrinkage rate in the Southern Nevada Division.
New Hampshire	Yes, *see* DG 07-102 and DG 09-050
New Jersey	Concerns relate to the replacement of cast iron and bare steel main but not directly related to concerns about the level of LAUF gas.

New Mexico	No
North Carolina	No
North Dakota	No
Ohio	No
Oklahoma	No, however, the Commission has been involved with stakeholder meetings concerning PHMSA regulations and the possible need for state level legislation.
Pennsylvania	Yes, *see* the Commission's Proposed Rulemaking Order at Docket No. L-2012-2294746
South Carolina	No
South Dakota	No
Tennessee	No
Texas	As mentioned above, the Commission has had two rate cases which approved System Replenishment Fees, addressing the reduction of LAUF gas.
Utah	No
Vermont	Somewhat, but not enough to trigger any action
Virginia	No
Washington	No
Wisconsin	No

Wyoming	One gas utility was challenged to reduce its LAUF-gas level (around 4-5%) and ultimately was imputed a target LAUF gas, above which level they would 'eat' the cost of additional losses. This action was a result of analysis of a PGA filing, in the 2001-2004 timeframe, leading to improvements to the company's pipe integrity, metering accuracy, and reporting, and ultimately brought the LAUF gas in line with comparable utilities. Every rate case involving a gas utility I have been associated with has included some discussion and analysis of LAUF gas. Utilities are openly compared with other Wyoming gas utilities, challenged to explain differences and trends, and have been directed at times to address and provide special reporting of their LAUF-gas levels.

State	8. Has your commission investigated the relationship between LAUF gas and pipeline safety? Has your commission, for example, ever relied on historical statistics on LAUF gas to encourage or require a utility to reduce its pipe leaks by more prompt detection or repair?
Alabama	No, we have not investigated the relationship between LAUF gas and pipeline safety. In the past years, we have monitored the utilities' Annual Reports to get their reported LAUF gas. Anything above 5% required a site visit to the utility. During this visit, a determination was made as to the source(s) of the LAUF gas, then a procedure was put into place to bring the LAUF gas back to an allowable amount. For the past three years, we have been gathering data from the Annual Reports to insert into our Risk Ranking Index. We are trying to develop a tracking system to verify which utilities might consistently have excessive LAUF gas.
Alaska	No
Arizona	There was a case with a small company in the 1990s where its LAUF gas was high and it led to a reduction in leaks.
Arkansas	Yes, the Commission has in past proceedings relied on historical statistics in capping the LAUF-gas rate as an incentive for the utility to repair natural gas leaks.
Colorado	No, it has been more of an accounting issue and measurement error issue.
Connecticut	The Authority has investigated LAUF gas as part of the company's rate case; it is well known that older leaking pipes cause a portion of the LAUF gas but customer theft is also a source; the Authority expects that LAUF gas will decrease as a result of cast iron replacement programs and the reduction of theft of service.

Delaware	No, this Commission generally relies on the utility to identify and reduce its pipeline leaks through their ability to detect and repair; this is monitored thru Commission Staff in the Pipeline Safety roles.
Florida	The Commission Staff relies on the total number, frequency, and category of leaks to determine if a utility needs to take additional action to reduce its pipe leaks; Staff does not use historical statistics on LAUF.
Georgia	All utilities are required to report their LAUF percentage on their annual PHMSA 7100 report. The Commission's Pipeline Safety Staff looks at LAUF gas as part of the regular comprehensive inspections, and they consider the LAUF-gas percentage that they report as one component of our utility risk ranking. Typically, after the 7100s are finalized each year, PHMSA will request that the Commission follow up on the utilities that report above 5% lost gas.
Idaho	Yes, the Commission Staff evaluated Avista's Aldyl A Pipe Replacement Program in Case No. AVU-G-12-07. As part of the evaluation, Staff reviewed the Company's study showing the number of leaks estimated to occur given different replacement timeframes. The Commission has relied on historical statistics on LAUF gas to encourage or require a utility to reduce its pipe leaks by more prompt detection or repair. In PGA filings the Commission reviews historical statistics on LAUF gas to track trends. For example, when Intermountain Gas had a significant increase in LAUF gas during the 2008 PGA, the Commission placed a cap on the allowable amount of recoverable LAUF gas. As stated in response to *Question 1*, the Commission also ordered the Company to file reports indicating how it planned to "outline steps toward identifying the sources of lost and unaccounted-for gas and work toward improvement." (Order No. 30649) These reports can be found by following the link provided in response to *Question 1*.
Indiana	No
Iowa	Unknown
Kansas	For small systems, the Commission pipeline safety section reviews LAUF gas on an annual basis. If the value is more than 4%, Staff seeks to discover the reason up to and including requiring additional leak surveys which are witnessed by Staff. It is our experience the error is typically an accounting error or inaccurate meters instead of leaks. For large systems, LAUF gas on a statewide level is not an effective tool to evaluate leakage. We have not required LAUF-gas calculations on a city-by-city basis; that is, tracking the aggregate sales points back to each purchase point.
Kentucky	I am not aware of a formal investigation on a relationship between the LAUF gas and pipeline safety conducted by the Commission; however, the Pipeline Safety Branch has reviewed annual reports for instances where a utility's LAUF gas is greater than 5% and notified the utility that steps should be taken to reduce its LAUF gas.

Louisiana	No, an investigation has never been launched, but Commission Staff has discussed it with companies that were above the 6% threshold. This resulted in one of the companies discovering smaller leaks and repairing pipes, which brought it down to below 6%.
Maryland	No, however, as noted in the response to *Question 5*, the gas utilities operating in Maryland have been encouraged to improve the reliability and safety of their individual distribution systems by investing in more pipes and mains replacement. This will have the salutary effect of improving reliability, safely, and reducing the loss of natural gas through leaks on the individual gas utility distribution systems.
Massachusetts	No
Michigan	No
Minnesota	Yes, the initial comparisons made were between the percentages reported in the annual true-up filings and the percentages reported each year in PHMSA Form 7100.1-1. The Department of Commerce has observed that the LAUF-gas percentage utilities reported in PHMSA on Form 7100.1-1 often does not match the LAUF gas data that they provide to the Department of Commerce and the Commission for cost-recovery purposes. The Department of Commerce has recommended that regulators exercise caution when using LAUF-gas figures from the PHMSA forms in an analysis.
Mississippi	Yes, our Pipeline Safety Department monitors each system annually.
Montana	*See* response to *Question 7*
Nebraska	No
Nevada	No, as stated above, the distribution systems in Nevada are relatively new compared to other states. Leakage has not been a major concern in Nevada.
New Hampshire	Not formally, however, the Gas Safety Division requires each gas utility to file copies of its periodic PHMSA reports on unaccounted for gas and will follow up directly with the utility company if the reported figures are outside the norm. The Commission has relied on historical statistics on LAUF gas to encourage or require a utility to reduce its pipe leaks by more prompt detection or repair; *see*, for example, Docket No. DG 05-055 (Order 24,464) and DG 05-158 (Order 24,536).
New Jersey	The Board looks at the leak rate, rather than the volume of LAUF gas.

New Mexico	The Commission conducted an investigation into a gas distribution line explosion in Santa Fe about a decade ago. This resulted in an enhanced program of gas leak location and repair. I do not know if LAUF gas historical analysis was part of that investigation, but it is possible. A review of the record of that case should answer that question.
North Carolina	Yes, to both
North Dakota	Yes
Ohio	No, the utilities have taken it upon themselves to monitor the age and conditions of their pipes and if in their opinion a safety risk exists, the utility will seek to replace the pipe prior to its failing and seek recovery of the cost through an accelerated main-line replacement program.
Oklahoma	Yes
Pennsylvania	*See* the Commission's Proposed Rulemaking Order for Docket No. L-2012-2294746. The Commission's Gas Safety Division within the Bureau of Investigation and Enforcement could require a utility to reduce leaks or repair a pipe based upon present conditions, including historical LAUF gas. As mentioned on page 2 and page 11 of the Proposed Rulemaking Order, the Commission views the adoption of a LAUF-gas definition and metric to be a potential addition to its safety efforts.
South Carolina	No
South Dakota	No
Tennessee	Pipeline Safety Division regularly inspects utility pipelines. This has not been a major issue.
Texas	Each safety evaluation of a gas distribution system includes a review of the utility's LAUF gas. The most recent year ending data are reviewed and documented within the Pipeline Safety inspection package. If the LAUF exceeds 10% for the period under review, the inspector will investigate further through review of the most recent purchase and sales figures available. If the inspector believes the utility has not taken proper measures to determine the cause of the high volume of LAUF gas, an alleged violation is cited. Through the Pipeline Safety Division review of the utility's Plan of Correction, the Commission monitors the utility's progress to resolve the issue and continues to monitor the situation during the next scheduled inspection.
Utah	No

Vermont	No
Virginia	Yes
Washington	Yes, pipeline Staff have used the information reported to compare LAUF gas with the number of leaks reported for the same calendar year; this is done mostly to determine the accuracy of the information they are reporting.
Wisconsin	The LAUF-gas percentage has historically been less than 2%, and sometimes even positive. Our experience is that LAUF-gas is largely attributable to metering differences.
Wyoming	The Commission has not investigated the relationship between LAUF gas and pipeline safety, but has a section devoted to facilities integrity and safety; and the Commission has trusted the historical statistics in its determinations regarding utility facilities.

State	**9. Do all the utilities in your state:** **a. Use the same definition for LAUF gas?** **b. Treat LAUF gas the same for ratemaking?**
Alabama	Yes, for both
Alaska	ENSTAR's tariff does not define LAUF gas specifically. It is found in part of the Company Use definition found at Tariff Sheet No. 23.
Arizona	Unknown, for both
Arkansas	(a) Generally, yes; LAUF gas in Arkansas is generally considered to be natural gas that is purchased and then loss due to pipeline leakage, accounting errors, and/or inaccurate measurement; (b) Generally, yes.
Colorado	Yes, for both

Connecticut	Yes, for both
Delaware	(a) The term Unaccounted For Gas is defined in Chesapeake Utility Corporation's tariff, but is not a defined term in Delmarva Power & Light Company's; (b) LAUF gas is treated the same for both of Delaware's regulated natural gas utility companies.
Florida	Yes, for both
Georgia	AGL: As a result of Docket No. 15527, AGL was required to determine the contributing factors for LAUF gas. Therefore, AGL classifies the gas into various components. Atmos: "Unaccounted for gas" is gas lost that the utility cannot account for as usage or through appropriate adjustment. Adjustments are appropriately made for such factors as variations in temperature, pressure, meter-reading cycles, or heat content; calculable losses from construction, purging and line breaks, where specific data are available to allow reasonable calculation or estimate; or other similar factors. (Taken from Instructions for Completing Form PHMSA F 7100.1-1 (Rev. 01/11)); (b) No, *see* above response.
Idaho	(a) Yes; (b) *See* the response to *Question 3*
Indiana	(a) Yes, (b) No
Iowa	Yes, for both
Kansas	Yes, for both
Kentucky	(a) For cost purposes, LAUF gas is considered the difference between sales and purchase volumes; (b) All the small LDCs using PGA mechanisms apply the same 5 percent "limiter" to LAUF-gas pass-through. The major LDCs pass through their pipeline suppliers' LAUF gas. Their system LAUF gas tends to be in the 1 to 3 percent range so is not an issue with respect to the 5 percent limiter. All of the system LAUF gas below 5 percent is passed through gas cost.
Louisiana	Yes, for both
Maryland	(a) Yes, however, the adjustment they make to account for LAUF gas varies. For example, Baltimore Gas and Electric calculates monthly the LAUF-gas factor and performs the adjustments monthly. Washington Gas Light Company and Columbia Gas of Maryland calculate LAUF gas quarterly, and apply the adjustments quarterly for the PGA and monthly for transportation and shopping customers; (b) yes.

Massachusetts	Yes, for both
Michigan	Yes, for both
Minnesota	(a) Yes, all of the utilities use the same definition for responding to the Department of Commerce discovery requests. These responses are then used by the Department in the summary and comparison that is included in its annual report to the Commission; (b) Yes, all of the utilities recover LAUF gas in their annual gas cost reconciliation and true-up mechanism. There are, however, minor differences in how the utilities account for lost gas that is attributable to a specific incident or party.
Mississippi	Yes, for both
Montana	(a) LAUF gas is considered to be product that is observed to enter the system, but is not observed to exit the system; (b) *See* response to *Question 1*.
Nebraska	(a) Unknown; (b) the Commission regulates three gas utilities -- two use the gas cost adjustment and the third, which operates a choice gas program, recovers LAUF gas volumetrically from suppliers based on an allocation.
Nevada	(a) Yes. Both SWG and SPPC define LAUF gas or shrinkage similar to the Commission's definition in NAC 704.960 for "Unaccounted for Gas." NAC-704.960 --"Unaccounted for Gas" defined. (NRS 703.025, 704.210, 704.991) --"Unaccounted for Gas" means the difference between the total amount of gas delivered to a utility and the total amount of gas which is used, sold, or delivered to other entities by the utility. (b) Yes and no. Sales customers for both SWG and SPPC pay for LAUF gas as a component of purchased gas costs. However, SPPC recovers LAUF gas from transportation customers using an in-kind contribution and SWG uses the shrinkage rate methodology to recover LAUF gas from transportation customers. Furthermore, the shrinkage rate is calculated differently in SWG's Southern and Northern Nevada Divisions.
New Hampshire	Yes, for both
New Jersey	(a) Generally, yes; (b) yes
New Mexico	(a) There is not a standard definition in the Commission rules; (b) Yes

North Carolina	Yes, for both
North Dakota	(a) Not sure; (b) yes
Ohio	Definitions vary by utility; all costs recovered through the PGA
Oklahoma	No, for both
Pennsylvania	(a) Not currently, *see* the Commission's Proposed Rulemaking Order at Docket No. L-2012-2294746 aimed at establishing a uniform definition; (b) Yes, LAUF gas is treated similarly for all jurisdictional utilities despite the differences in definition.
South Carolina	Yes, for both
South Dakota	Yes, for both
Tennessee	(a) Not known; (b) no answer
Texas	(a) Generally speaking, yes, but there can be subtle variations; (b) Again, generally speaking, yes, but some computation methods might differ in subtle ways, such as accounting for transportation (only) volumes inside a distribution system and their relationship to the purchase and sales volumes.
Utah	There is only one investor-owned utility in Utah under the Commission's jurisdiction. It is unknown how the three small municipal gas companies treat both items.
Vermont	Vermont has only one gas utility.
Virginia	Yes, for both
Washington	(a) For the most part, yes; (b) yes
Wisconsin	(a) Yes; (b) the Commission treats LAUF gas the same for revenue requirement purposes but may have different ratemaking for recovery purposes.

Wyoming	(a) Yes; (b) Yes, although some have unique applications.

State	**10. Do utilities in your states quantify LAUF gas by source? These sources can include measurement error, pipe leaks, stolen gas, accounting error.**
Alabama	These sources can include measurement error, pipe leaks, stolen gas, accounting error. Utilities do not calculate the effect of pipe leaks on LAUF gas. Generally, utilities do not publicly report any calculations; but there is a line on EIA 176 report that requires utilities to identify "losses from leaks, damages, accidents, migration and/or blowdown with the reporting state."
Alaska	ENSTAR does not quantify LAUF gas by source; it is all lumped together. *See* Volumes and Gas Received and Sold in GCBA filings.
Arizona	Not that I'm aware of.
Arkansas	LAUF gas is generally calculated in total and is not broken down by source.
Colorado	No
Connecticut	No
Delaware	During the discovery process of the GCR and GSR cases, the utilities are usually asked to provide their annual PHMSA reports which include leaks. During cases the utilities may also be asked for the data on pipeline leaks or breaks caused by third parties during the past 12 months. The responses should address the extent of such occurrences, the estimated volume of gas lost, and what recoveries were sought and obtained from any responsible third parties. LAUF gas is reported as a total percentage in the annual filing and is not broken down by source; this information is not public; however, the LAUF percentage contained in annual filing is public.
Florida	LAUF is calculated for main line leaks or breaks; this information is not publicly reported.

Georgia	For both_AGL and Atmos, breakdowns include consumption on inactive meter, third party damages, meter/measurement error, and leaks. <u>AGL</u>: Required to file monthly and annual reports <u>Atmos</u>: The information is provided in the Annual Distribution Operator report filed with PHMSA.
Idaho	Intermountain Gas identifies and reports sources of LAUF gas as part of its semi-annual reports provided to the Commission. Specifically, it historically tracks metering issues, drive rate errors, and pressure errors by service area region. Avista tracks similar items internally through its accounting system, but does not provide results to the Commission outside of discovery in a general rate-case proceeding. The utilities do estimate LAUF gas caused by leaks.
Indiana	The Commission is always monitoring the LAUF-gas percentages reported by regulated utilities; however, the issue has not yet become a topic of concern.
Iowa	Unknown
Kansas	No, all sources are combined into one calculation.
Kentucky	For cost pass-through purposes, rarely; all PGA applications are public record unless confidentiality of certain information is requested. Information relating to the utilities' calculation of their gas cost pass-through is never held confidential unless it contains proprietary supplier information.
Louisiana	Not in anything reported to the Commission; they may have internal auditing and reporting
Maryland	No
Massachusetts	No, the LAUF gas reported include (a) company use gas; and (b) unaccounted for gas.
Michigan	I believe they must break it down into more specific lost gas categories, but I don't know if the Commission is presented with each category or not. Stolen gas on MichCon's system is a big problem.

Minnesota	Generally LAUF gas is not reported by source with the exception of gas lost due to leaks caused by contractors striking a gas main; only if the leak was caused by an independent contractor, or other party, can the cost of the lost gas be recovered from the contractor or the party that caused the damage. Reporting of LAUF gas due to contractor main strikes has just started. The utilities may or may not claim this is non-public information. One utility provided the Department of Commerce with specific data for each event attributable to a given party in response to a discovery request. The Department does not believe this information was formally filed, but believes the costs and gas lost information should be public, but contractor names and addresses probably would be considered confidential.
Mississippi	Varies by utility
Montana	Utilities use all sources available to determine the volume of LAUF gas. Again, this (the amount, not the source) is reported on the PHMSA 7100 form which might indicate an action to be taken in a certain area of the utility system. The 7100 form is available publicly through the Commission or through PHMSA.
Nebraska	No
Nevada	Yes and no: SWG will bill the responsible party for the estimated gas lost from excavation damage (*see* PHMSA Form F-7100.1). These volumes will be recorded in SWG's Unaccounted for Gas Report.
New Hampshire	No
New Jersey	No
New Mexico	I don't know if any of our three regulated utilities quantify LAUF gas by source for internal purposes. I don't believe such quantification is routinely reported to the Commission.
North Carolina	In order to file suit against parties that negligently cut their lines, utilities calculate gas lost from excavation damage. However, this is not aggregated and reported.
North Dakota	Not sure
Ohio	Yes, as contained in our response to *Question 5*, but not publicly reported

Oklahoma	Varies by utility; each utility internally tracks lost gas by pipe segments.
Pennsylvania	Not routinely, however, as part of individual LAUF-gas reduction plans, utilities have identified potential losses by cause. If part of a joint settlement, these calculations would be publically available within the PGC or GCR proceeding. The Commission's Joint Report, attached to the Proposed Rulemaking Order at Docket No. L-2012-2294746, pages 5-7, addresses the definition of LAUF gas in Pennsylvania.
South Carolina	No
South Dakota	No
Tennessee	Not known
Texas	Some utilities, in the case of large leaks, estimate calculations of gas loss. This is particularly true with third- party damages where the hole size and leak duration are known values. We have also seen calculated true-ups in situations of measurement error (wrong multiplier used or wrong meter index installed).
Utah	*See* response to *Question 12*
Vermont	No
Virginia	Yes, and they are publicly reported
Washington	No, calculation is as follows: [(purchased gas + produced gas) minus (customer use + appropriate adjustments)] divided by (purchased gas + produced gas) equals percent unaccounted for.
Wisconsin	No, leaks surveys are required to be conducted annually in most areas; leaks are generally repaired when discovered.
Wyoming	This data separating gas leaks from metering/accounting error is typically established at rate cases. Both the Questar and SourceGas rate cases cited above have discussion of pipe leakage within the maintenance sections of testimony. In the case of Questar, it covers adoption of a relatively poorly designed and maintained distribution system near Kemmerer, Wyoming, the corrective measures, and the resultant leakage reductions. The calculations are available to the public through our website.

State	11. Does your commission require utilities to report periodically the amount of their LAUF gas?
Alabama	No
Alaska	No, we do not require ENSTAR to file the information. However, it is filed in the GCBA quarterly filings and the information is used to support the Shippers Share filing.
Arizona	No
Arkansas	PHMSA requires gas utilities to annually report the Unaccounted For Gas percentage on its system for the 12 months ending June 30th.
Colorado	None
Connecticut	Yes
Delaware	For Chesapeake Utilities Corporation, Commission Staff reviews the actual Unaccounted For Gas volumes on an annual basis and then reviews the Company's performance under the Unaccounted For Gas Incentive Mechanism in the next base rate proceeding.
Florida	No
Georgia	AGL: Required quarterly and annual reports to the Commission, pursuant to Docket No. 15527 Atmos: A copy of the annual PHMSA 7100 is provided to the Commission's Facilities Protection Unit.
Idaho	The utilities report LAUF gas as part of each annual PGA filing, and in the FERC Form 2.
Indiana	Yes, the utilities are required to report their LAUF gas within the GCA/PGA process and some are required to provide annual updates through a compliance filing.

Iowa	Yes, in both the annual report IG-1 and the annual PGA filings
Kansas	Yes, annually through the PGA report, FERC Form 2 filings and Pipeline Safety reports
Kentucky	Unaccounted for Gas is reported as the difference between purchases and sales in gas utilities' Annual Reports, which are required to be filed with the Commission before March 31st. For major LDCs' Annual Reporting requirements, Unaccounted for Gas is divided into production system losses, gathering system losses, transmission system losses, distribution system losses, and storage system losses.
Louisiana	Utilities report their LAUF gas monthly in the PGA filings and a three-year average is used in the monthly calculation.
Maryland	Generally, the gas utility companies in Maryland report their LAUF-gas numbers when they make their annual PGA/PGC filings. However, one gas utility, Baltimore Gas and Electric Company, files monthly reports of their LAUF-gas numbers with the Commission.
Massachusetts	Yes, gas utilities are required to report LAUF-gas information in their annual reports to the Commission.
Michigan	Yes, they report actual last gas annually in the GCR.
Minnesota	Yes, starting with annual fuel reports for fiscal-year 2008, the Commission asked the Department of Commerce to compile a summary and comparison of each utility's LAUF-gas percentage.
Mississippi	No
Montana	Only in the context of a gas tracker or other cost recovery proceeding
Nebraska	Not explicitly, but to the extent utilities want to recover their LAUF-gas costs in the gas cost adjustment, they must support their request with information on all costs they are seeking, which would include LAUF-gas related if they are seeking it. Two utilities provide it as part of a confidential filing.
Nevada	Yes and no: SWG files "Unaccounted for Gas Reports" with the annual rate adjustment application to support their calculation of the shrinkage rate. SPPC does not report its LAUF-gas percentage to the Commission.

New Hampshire	Yes, in addition to the PHMSA reports described earlier, utilities are required to show the actual LAUF-gas volumes as part of each 6-month cost of gas reconciliation.
New Jersey	Reported in annual BGSS filings
New Mexico	Not to my knowledge; the rules do not, and I am not aware of any specific case requirements on any of our gas utilities.
North Carolina	Yes, LAUF gas is reported in monthly deferred account reports and the annual review of gas costs.
North Dakota	No
Ohio	No, other than the audits, LAUF gas is not reported.
Oklahoma	Yes
Pennsylvania	Yes, *see* the Commission's Proposed Rulemaking Order at Docket No. L-2012-2294746, page 3 for more discussion
South Carolina	No
South Dakota	Only the percentages, which when applied to a price result in a dollar amount
Tennessee	No
Texas	Yes, we receive LAUF volumes and percentages annually, from both investor owned and municipal gas distribution utilities.
Utah	Yes, in the annual Integrated Resource Plan filed with the Commission.
Vermont	No

Virginia	The Staff is not aware of any concerns that the Commission has regarding this issue.
Washington	No, however, the Commission does report this information on its webpage with data found in the FERC Form 2.
Wisconsin	The Commission requires utilities to report the amount of their LAUF gas on an annual basis.
Wyoming	LAUF gas is included in PGA calculations and is reported in utility annual reports.

State	12. Are there public statistics on LAUF gas percentages by utility over an historical time frame?
Alabama	Yes, it is reported on each utility's annual report (EIA 176).
Alaska	The volumes and percentages can be found in the Shippers Share filings.
Arizona	No
Arkansas	Yes
Colorado	No
Connecticut	LAUF data is publicly available in rate cases and company order compliance filings.
Delaware	There is reporting available from previous "GCR" and "GSR" Dockets through Discovery Requests; generally, these are not posted for the public.
Florida	No
Georgia	AGL: Quarterly/annual filings in Docket No.15527 are required and filed publicly. Atmos: No

Idaho	LAUF gas is reported by LDCs in the FERC Form 2. Therefore, these results could be tracked over a historical timeframe.
Indiana	No, there is not one comprehensive document that contains this information; however, Petitioner's filings before the Commission are public record, which could be used to compile such information.
Iowa	Yes, the annual reports
Kansas	Yes, annually through the PGA report, FERC Form 2 filings and Pipeline Safety reports
Kentucky	Utilities' Annual Reports, which contain the Unaccounted for Gas reporting requirement, are available on the Commission's Web site. This information is not compiled into a summary report.
Louisiana	While there are no public statistics available, the LAUF-gas three-year average spreadsheets are kept by Commission Staff and reports or tables could always be compiled upon request.
Maryland	No
Massachusetts	Yes, annually
Michigan	Not sure, we may have this data but I don't know if it is publically available.
Minnesota	Yes, annual LAUF-gas percentages, reported by the utilities since fiscal-year 2008, are publically available in the Department of Commerce's Annual Fuel Reports (the docket numbers are listed above in response to *Question 1*.
Mississippi	No
Montana	The filed documents in cost recovery proceedings are public information. However, this data has not been compiled into simple tabular form.
Nebraska	No

Nevada	No, the Commission does not have a process to maintain LAUF-gas percentages over an historical time frame. If one needed this information, one could review the Unaccounted for Gas Reports filed in SWG's past annual rate adjustment applications or the public statistics reported by SWG and SPPC in the PHMSA Gas Distribution System Annual Reports.
New Hampshire	No
New Jersey	*See* BGSS filings
New Mexico	The regulated gas utilities file their PGA factors prior to changing them. Each PGA factor filing includes the purchase/sale ratio. These factor filings represent an historical record of LAUF gas as used to calculate rates, but not a measured account of LAUF gas over a specific period.
North Carolina	Yes, for at least a few years, in the Pipeline Safety Annual Reports required by PHMSA
North Dakota	No
Ohio	No
Oklahoma	Yes
Pennsylvania	*See* the Commission's Proposed Rulemaking Order for Docket No. L-2012-2294746 (page 9 and 10), for current levels. Otherwise, all data filed within PUC Annual Reports, or the DOT Annual Reports would be publically available as well as PGC or GCR rates.
South Carolina	No
South Dakota	No
Tennessee	No

Texas	The data are published on the Commission's web site and is updated annually. It is found in Tables 2 and 3 of the Gas Utilities Annual Statistical Reports. Several (fiscal) years of data are available at this site.
Utah	Some information is available in Questar Gas Companies IRPs filed in years 2010, 2011, and 2012.
Vermont	No
Virginia	No
Washington	Data from the FERC Form 2 is available in the Commission's statistics reports for each investor owned utility posted on the Commission's webpage.
Wisconsin	There are there public statistics on LAUF-gas percentages by utility over an historical time frame.
Wyoming	The information is available, requiring collection across several documents such as annual reports and previous pass-on supporting documentation. This collection (a) has been performed at various times by analysts processing filings, (b) has in the past been provided upon request to legislators and Commissioners, and (c) may reside in the archives of some analyst's computers but is not maintained and updated as a simple public document.

State	**13. Does your commission have estimates of the increase in purchased gas costs attributable to LAUF gas?**
Alabama	No
Alaska	No, we do not have an estimate in increase of purchased gas attributable to LAUF gas. It is lumped in with Company use when the estimated purchases are provided.
Arizona	No
Arkansas	No

Colorado	No
Connecticut	LAUF gas has a very low percentage and the impact on gas costs is very small.
Delaware	Typically, utilities account for the LAUF gas in their projected sales and requirement reports; these reports do not include a financial estimate.
Florida	No
Georgia	No
Idaho	The Commission looks at this as part of each PGA filing. Typically, LAUF gas is a negligible piece of the purchased gas costs (less than 3% of total throughput).
Indiana	Estimates for such information are readily available in the regulated utilities' GCA/PGA filings.
Iowa	Unknown
Kansas	No, but it would be easy to calculate from the reports listed above. As stated earlier, Kansas gas utilities' most recent LAUF-gas percentages ranged from .19% to 2.18%.
Kentucky	Not as such, but for the most part increases due to LAUF gas are 5 percent or less.
Louisiana	No, but again, the information from the LAUF-gas spreadsheets is available and could be used to track the increase.
Maryland	No, LAUF gas costs are provided by gas utilities in their annual PGA/PGC filings.
Massachusetts	No
Michigan	Staff could calculate that value.
Minnesota	No, the estimates are based on volumes of gas rather than the dollar amount of the losses.

Mississippi	No
Montana	The increase in customer costs is simply the product of the allowed LAUF-gas percentage and the average procurement cost of gas.
Nebraska	No
Nevada	No, however, this number can be calculated in the annual rate adjustment applications by taking the difference between (a) the cost of gas on a purchased-volume basis and (b) the cost of gas on a sales-volume basis.
New Hampshire	Approximately 1-2% of total purchased gas volumes are LAUF-gas related. If a utility's annual gas purchases are $100 million, approximately $1-$2 million would be the attributed to LAUF gas.
New Jersey	No
New Mexico	*See* answer to *Question 12*
North Carolina	Data is available but it would have to be calculated.
North Dakota	No
Ohio	No, if LAUF gas exceeds the 5% limited contained in the Ohio Administrative Code, the Commission can disallow a portion of the costs in the utility's PGA.
Oklahoma	Yes
Pennsylvania	Increases in PGC or GCR rates attributed to LAUF gas may be encompassed within each PGC or GCR case. However, the Commission does not compile statistics on actual cost implications across Pennsylvania. As an aside, the Commission has estimated these losses in Commission's Proposed Rulemaking Order at Docket No. L-2012-2294746, see page 10 of Commission's Joint Report.
South Carolina	No

South Dakota	Yes, by applying the percentages passed through the rates
Tennessee	No
Texas	No, but this could easily be approximated by using the average gas costs or in the Distribution Annual Reports
Utah	No
Vermont	No
Virginia	No
Washington	No
Wisconsin	The Commission has estimates of the increase in purchased gas costs attributable to LAUF gas. In general, LAUF can be expressed as a percent of the utility's average weighted cost of gas.
Wyoming	Yes, this data point is typically reviewed in rate cases and PGA filings.

State	**14. Does your commission monitor LAUF gas over time? If so, how does it use the information?**
Alabama	The Gas Pipeline Safety Division does the monitoring.
Alaska	No
Arizona	We at times will look at it in rate cases, but it hasn't been a concern in recent years.
Arkansas	Yes, for specific regulatory purposes, the Commission may monitor a utility's LAUF gas.

Colorado	No
Connecticut	The Authority monitors LAUF through rate cases and the compliance filings.
Delaware	Generally, this Commission monitors LAUF gas in relation to the annual GCR and GSR filings; typically, during the course of these annual filings the utilities are asked, through data requests, to provide a summary of LAUF-gas volumes for prior periods; this information is used as a comparison to the most current LAUF-gas information provided.
Florida	No
Georgia	AGL: Yes, quarterly/annual reports are required. The Staff reviews and monitors the filings to ensure compliance with Docket No. 15527. Atmos: A copy of the annual PHMSA Form 7100 is provided to the Commission's Facilities Protection Unit. The Facilities Protection Unit monitors the filings for trends.
Idaho	The Commission monitors LAUF gas trends in each annual PGA filing. The information is used to track changes and to determine whether it is necessary to request more specific information, reporting, or remediation. For example, the Commission ordered Intermountain Gas to begin submitting reports aimed at improving LAUF-gas levels because of increasing historical trends. Since that time the Company has shown improvement.
Indiana	Yes, it is monitored in the GCA/PGA filings within Schedules 11 & 11A on a quarterly basis; the information assists in determining if the utility is having any distribution-system issues.
Iowa	No
Kansas	Yes, there is a penalty mechanism in the PGA. The LDC is not allowed to recover the Purchased Gas costs associated with a LAUF-gas percentage in excess of 4%.
Kentucky	Yes, this is done through annual reports submitted to the Commission's Pipeline Safety Branch as well as during compliance inspection. Generally, this information is reviewed for LAUF gas that is greater than 5%. Utilities may be contacted to see what process and/or procedures are in place to address and reduce LAUF gas.
Louisiana	Yes, the Commission has been keeping LAUF-gas spreadsheets for all regulated companies since the PGA order went into effect in 1999. The information is mostly used to verify that the company is using the correct PGA amount on customer bills. It has also been used in discussions with the companies to alert them to possible leaks or other problems.

Maryland	No
Massachusetts	Yes, the Department monitors the changes from year-to-year; it could investigate if there is significant variation.
Michigan	Yes
Minnesota	The Department of Commerce monitors the annual LAUF-gas percentages and notes exceptions or unusual amounts.
Mississippi	Pipeline Safety monitors all systems annually. If LAUF gas becomes a concern, they will investigate to determine the cause and assist utilities in developing plans to remedy the problem.
Montana	The utilities monitor the LAUF-gas percentages. The Commission is typically concerned with LAUF gas with respect to pipeline safety, customer rate impact, and as an indicator of the overall health and reliability of pipeline infrastructure.
Nebraska	No
Nevada	The Commission does not have a formal process to monitor LAUF gas over time. However, SWG does provide its Unaccounted for Gas Reports in the annual rate adjustment application which is used to support the calculation of the shrinkage rate. Furthermore, Commission Staff will review the PHMSA Gas Distribution System Annual Reports for both SWG and SPPC to monitor the reported LAUF-gas percentages to ensure that the reported percentages do not establish a pattern of deviating from the historical norms of 1% for SWG and 3% for SPPC.
New Hampshire	Commission Staff continually compares current reported actual LAUF-gas volumetric data in cost of gas reconciliations and in PHMSA reports to actual LAUF-gas numbers in prior period reports. If the numbers reflect anomalies to historical numbers, Staff will follow up with discovery questions directed to the utility.
New Jersey	The Board monitors LAUF gas through BGSS filings.
New Mexico	Only to the extent it is represented in the PGA factor filings. If the gas purchased/gas sold ratio should appear to be excessive, the Commission could investigate the matter.
North Carolina	LAUF gas is reviewed during the annual review. The Public Staff reviews historical data to see if LAUF gas is within a reasonable range. Pipeline Safety monitors LAUF gas. If LAUF gas is 2% or higher, Pipeline Safety considers it to be a red flag and investigates.

North Dakota	No
Ohio	No
Oklahoma	This is a consideration when approving a utility for recovery of LAUF gas and setting the Safe Harbor.
Pennsylvania	Yes, this information is used by multiple bureaus for different purposes. For instance, this information would be used during PGC or GCR cases to aid in development of gas cost rates. This information would also be used for compliance/investigatory action by Gas Safety or the Bureau of Audits.
South Carolina	No
South Dakota	Rarely
Tennessee	No
Texas	As previously mentioned, the Pipeline Safety Division monitors the LAUF gas of distribution systems during scheduled inspections. If the LAUF gas is over 10%, the inspectors are directed to investigate further and attempt to find out the reasons for the elevated LAUF. Utilities not able to explain reasons for the high values are cited an alleged violation and Commission inspectors thereafter monitor progress to reduce the LAUF-gas level.
Utah	The Commission does not monitor LAUF gas but the Division of Public Utilities might.
Vermont	No
Virginia	The Commission Staff reviews LAUF gas in the context of PGA reconciliation hearings.
Washington	No
Wisconsin	Our Commission does monitor LAUF gas over time; it uses this information to identify LAUF trends.

Wyoming	The monitoring of LAUF gas is a responsibility of the team of analysts and engineers. It typically is raised as a point of discussion in the context of submitted filings; if deemed worthy of investigation, it is typically pursued in the form of information requests and dialog between the analyst and utility, potentially resulting in a discussion of the matter with Commissioners when the Docket is presented for consideration. Most recently, LAUF gas has been a sub-issue within the SourceGas show cause investigation (Docket 30022-191-GI-12, Record 13200) and subsequent reviews of its financial reporting resulting from the findings in that case.