# PACIFIC GAS AND ELECTRIC COMPANY

## CHAPTER 1

## GAS DISTRIBUTION OPERATIONS POLICY AND INTRODUCTION

PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 1
GAS DISTRIBUTION OPERATIONS POLICY AND INTRODUCTION

TABLE OF CONTENTS

A. Introduction .....

B. Operations and Asset Performance .....

1. General Description of Operations and Assets .....

2. Risk Assessment Process and Methodology .....

3. Key Safety and Risk Mitigation Initiatives .....

a. Safety and Culture Processes ..... 1-11

1) Building a Safety-First Culture .....

2) Engaging the Workforce ..... 1-12

3) Process Safety ..... 1-14

4) Quality and Improvement ..... 1-16

5) Public Awareness and Emergency Response..... 1-

6) Publicly Available Specification (PAS) 55 Certification ..... 1

b. Other Key Safety Initiatives.....

1) Developing a Gas Distribution Asset Management System ..... 1-20

2) Technology Initiatives .....

3) Distribution Integrity Management.....

4) Pipeline Replacement.....

5) Leak Survey ..... 1-24

6) Leak Repairs .....

7) Leak Response Time.....

8) Gas Distribution Control Center ..... 1-27

4. Other Key Risks and How PG&E Plans to Address Them..... 1-28

C. Management Structure ..... 1-29

1. Organization and Staffing ..... 1-29

PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 1
GAS DISTRIBUTION OPERATIONS POLICY AND INTRODUCTION

TABLE OF CONTENTS
(CONTINUED)

2. Standards, Policies and Procedures .....
3. Building a Long-Term Work Plan (Investment Planning) .....
4. Metrics and Benchmarking ..... 1-35
D. Summary of Forecast .....
1. Total Gas Distribution Forecast ..... 1-37
2. Breakdown of Forecast by Chapter .....
a. Expenses.....
b. Capital Expenditures .....
3. Historic Trends and 2011-2014 Walk .....
a. Expenses.....
b. Capital Expenditures .....
E. Conclusion .....

# PACIFIC GAS AND ELECTRIC COMPANY

# CHAPTER 1

# GAS DISTRIBUTION OPERATIONS POLICY AND INTRODUCTION

## A. Introduction

As stated in the policy testimony in Exhibit (PG&E-1), we are approaching our business — and this General Rate Case (GRC) — with the recognition that we must set a new and higher bar for the future. For Gas Operations, this means that we have to do more to promote public and employee safety and we have to do more in this GRC to prove that the work and investments we are planning will achieve that goal. This exhibit presents the forecast work and associated costs to provide safe and reliable natural gas service from 2014 through 2016 and to achieve a level of performance consistent with industry best practices. Our goal is to provide top quartile service compared to the rest of the industry.[1] This forecast also addresses actions that must be taken to manage key safety risks associated with natural gas distribution service, based on PG&E's current risk assessment program that will continue to evolve as we implement the new risk management program described in Exhibit (PG&E-1), Chapter 4.

To provide the resources necessary to meet the new bar, PG&E requests that the California Public Utilities Commission (CPUC or Commission) adopt its 2014 forecast for gas distribution operations expense of $470 million and 2014-2016 forecast for gas distribution capital expenditures of $840 million, $856 million and $782 million, respectively. This represents a 2014 increase of $237 million, or 102 percent, for operating expenses and $532 million, or 173 percent, for capital expenditures compared to 2011 recorded levels. PG&E recognizes that these are significant increases, but they are essential for

[1] As a general rule, Gas Operations is defining "best practices" as those achieved by top quartile utilities. For example, if 25 percent of utilities respond to customer calls within 60 minutes 99 percent of the time, and the rest respond more slowly, Gas Operations would view responding within 60 minutes 99 percent of the time to be a best practice. Gas Operations has identified industry best practices through a combination of research, reviewing external benchmarking studies and visits with other utilities. We are defining "top quartile" based on available information, e.g., based on the information provided by those companies who responded to surveys.

PG&E to provide safe and reliable natural gas service consistent with industry best practices.

Consistent with PG&E's "back to basics" operating strategy, my philosophy for operating a safe and reliable gas system has seven components:

1. Know your system, including the key risks and risk drivers.
2. Develop and implement the right standards, policies and training.
3. Analyze the system integrity needs.
4. Engineer the projects needed to carry out the Company's integrity and reliability management responsibility.
5. Develop a long-term investment plan.
6. Execute the work in the field efficiently and effectively.
7. Have the right infrastructure and controls in place to operate the system safely and reliably.

Following this structure, the forecast detailed in my testimony will enable PG&E to, among other things:

- Complete construction of a state of the art gas distribution asset information management system (Pathfinder), where complete, detailed and accurate information about our distribution system will be readily available.
- Develop and provide new and improved training so that our employees can provide best-in-class service.
- Enhance our Distribution Integrity Management Program to reduce safety risks.
- Replace six times as many miles — or approximately 180 miles — of distribution pipe per year, eliminating the pipe with the highest risk.
- Survey our distribution system for leaks more frequently using better technology, thereby finding and repairing more leaks before they can become potential safety hazards.
- Repair non-hazardous leaks more quickly, preventing them from becoming hazardous leaks.
- Respond more quickly when customers notify us that they smell gas, and thus make the area safe more quickly and reduce the inconvenience to our customers.
- Build a gas distribution control center that will improve safety and reduce risk by providing greater visibility and control of the gas distribution system.

PG&E has been actively pursuing projects to improve service and safety. Development of our improved training is underway, as is the Pathfinder project. We are investing heavily in our integrity management program. We have begun to ramp up pipeline replacement. We have increased our leak response time metrics and hired additional gas service representatives. We have also begun work on our distribution control center. For the 2011 to 2013 period, Gas Operations forecasts spending almost $250 million more on operations and maintenance than provided in the 2011 GRC Settlement Agreement and over $500 million more in capital investments.[2] The additional expense will be paid for by shareholders and not by our customers.

These improvements are driven by Gas Operations' goal of becoming an industry leader in public safety. The San Bruno accident was a catalyst for improved focus on safety for all of PG&E, the Commission, the industry, and the public. I joined PG&E in June 2011 to oversee Gas Operations and to manage a team that provides for public and employee safety, regulatory compliance and operational excellence. Not long after I joined the Company, the state of California passed Senate Bill 705 which, for the first time, declared that "[i]t is the policy of the state that the commission and each gas corporation place safety of the public and gas corporation employees as the top priority," and required PG&E and the other California gas corporations to submit safety plans that implement this policy and that are "consistent with best practices in the gas industry."[3]

In the wake of San Bruno, PG&E took significant steps to improve the safety of its natural gas system, but we still have more work to do to get our gas business to a level that meets industry best practices. To determine how best to achieve this goal, we met with employees, reviewed external assessments, including reports by the Independent Review Panel (IRP) and the National Transportation Safety Board (NTSB), spoke with industry experts including the Pipeline and Hazardous Materials Safety Administration (PHMSA), CPUC senior staff, former NTSB leadership, American Gas Association (AGA), Interstate

---

2 Because Gas Operations' technology costs were not separately forecast in the 2011 GRC, it is not possible to calculate authorized targets. These figures therefore do not include the substantial increase in technology costs that Gas Operations is forecasting.

3 Public Utilities Code §§ 963(a)(3), 961(b) and 961(c).

Natural Gas Association of America (INGAA) and others, assessed and integrated industry best practices, conducted workshops with Gas Operations officers and directors, and consulted with other PG&E lines of business.

As a result of these efforts, we determined that, to bring our performance into line with industry best practices, PG&E needs to make investments in our assets, our systems and our people. My plan to improve our gas business focuses on 10 key areas:

1. Building a culture that puts public and personal safety first.
2. Establishing a clear organizational structure.
3. Improving asset knowledge.
4. Ensuring that our standards, work methods and procedures are consistent and uniformly implemented.
5. Engaging PG&E's workforce and recruiting talent.
6. Continuing to build the integrity management process.
7. Establishing an investment planning function.
8. Building a state of the art distribution control system.
9. Revamping Quality and Improvement (Q&I).
10. Achieving full regulatory compliance.

This plan emphasizes the development of clear processes designed to create accountability as well as transparent performance metrics so that PG&E's Board and senior management, the Commission and the public can evaluate our performance. As described more fully below, to further improve our asset and risk management and our accountability, PG&E's Gas Operations (transmission and distribution) is also going to seek Publicly Available Specification (PAS) 55 certification of its asset management processes. PAS55 is currently used by over 50 public and private organizations in ten countries and 15 industry sectors and is expected to become an International Standard of Operation (ISO) in 2014.[4]

These efforts, described in more detail below and throughout this exhibit, provide the foundation for PG&E's gas distribution forecast. While, as our 2014 forecast demonstrates, these investments will require greater capital expenditures and expenses than have been previously authorized, they pay

[4] It is expected that PAS55 will become ISO 55001 in 2014.

dividends in the form of improved safety, improved system performance and longer asset life. In the short term, revising training and procedures, acquiring new technology and replacing aging infrastructure costs money. In the long term, training improves employee skills and competency, technology promotes efficiency, and new infrastructure improves performance and reduces maintenance costs. Moreover, replacing aging infrastructure is inevitable, so delay is just that – delay. All of these investments will improve safety.

In past GRCs, the gas distribution forecast has typically been presented in fewer chapters. In this GRC, we are revising our format to provide more complete explanations of our plans and activities with an emphasis on safety and risk. The other chapters in this exhibit are:

Chapter 2 – System Operations Gas Control. This chapter, sponsored by the senior director of Gas System Operations, addresses the expense and capital costs to operate the system, including the new distribution control center.

Chapter 3 – Gas Distribution Mapping and Records. This chapter, sponsored by the senior director of Asset Knowledge Management, addresses mapping and records operating expenses and provides the business justification for the Pathfinder project (the associated costs are addressed in Chapter 11).

Chapter 4 – Gas Distribution Integrity Management Program. This chapter, sponsored by the director of Distribution Integrity Management, describes our Distribution Integrity Management Program and associated forecast costs. Chapter 4 also discusses: (1) certain integrity management-driven work, the costs of which are described in other chapters; and (2) the benefits of some of the work described in other chapters, such as the Pathfinder project, are expected to provide to PG&E's Distribution Integrity Management Program.

Chapter 5 – Pipe, Meter and Other Preventative Maintenance. This chapter, sponsored by the director of Maintenance and Construction – Central Coast, addresses the operating expenses for PG&E's preventative maintenance activities, as well as PG&E's natural gas vehicle maintenance expenses and both capital and expense forecasts for our Meter Protection Program.

Chapter 6 – Leak Survey and Repair. This chapter is sponsored by the director of Maintenance and Construction – Bay Area, and addresses PG&E's

leak survey and leak repair operating expenses, including new initiatives and new technologies.

Chapter 7 – Gas Field Services and Response. This chapter is sponsored by PG&E's director of Dispatch and Scheduling, and addresses the costs of PG&E's gas service representatives, who are the first responders for gas emergencies, as well as PG&E's gas dispatch and scheduling costs.

Chapter 8 – Gas Distribution Capital and Investment Planning. This chapter is sponsored by the director of Gas Distribution Investment Planning. Chapter 8 addresses the capital costs of PG&E's pipeline replacement program, natural gas vehicles, gas capacity, gas reliability, gas emergency response and high pressure regulator replacements.

Chapter 9 – New Business and Work at the Request of Others. This chapter is sponsored by our senior manager of Planning, Performance and Compliance in PG&E's Customer Service Delivery organization. This chapter describes the capital and expense costs associated with new gas distribution line extensions and customer connections as well as work at the request of others, such as work requested by government agencies or customer-requested facilities relocations.

Chapter 10 – Technical Training and Research and Development. This chapter is sponsored by our director of Work Methods and Implementation for Gas Operations, and describes PG&E's improved training initiative as well as our research and development initiatives.

Chapter 11 – Gas Operations Technology Costs. This chapter is sponsored by our senior director of Technology and Tools, and describes Gas Operations' technology initiatives and associated capital and expense forecast. The business drivers for many of these initiatives are described in other chapters. For example, the business driver for Pathfinder is described in Chapter 3, and the business driver for the M Connect project is described in Chapter 7.

Chapter 12 – Gas Operations Building Projects, AGA Fees and PAS55 Certification. This chapter is sponsored by Gas Operations' director of Regulatory Compliance and Support and addresses the capital expenditure and expense forecasts for building projects, as well as the forecast for American Gas Association (AGA) dues and PAS55 certification.

The remainder of this chapter provides a more detailed overview of PG&E's gas distribution forecast, including our approach to safety and risk management.

## B. Operations and Asset Performance

### 1. General Description of Operations and Assets

As of year-end 2011, PG&E's natural gas distribution system included approximately 42,000 miles of distribution main and 3.3 million services. The distribution main was composed of approximately 21,000 miles of steel, 115 miles of cast iron and 21,000 miles of polyethylene plastic, including approximately 5,700 miles of Aldyl-A brand plastic, approximately 1,200 miles of which were manufactured before 1973. Approximately 1.2 million of PG&E's gas services are steel, 16,000 are copper, and 2.1 million are polyethylene plastic. At year-end 2011, the average age of PG&E's gas distribution assets was approximately 45 years.

### 2. Risk Assessment Process and Methodology

As part of PG&E's Operational Risk Management Program described in Exhibit (PG&E-1), Chapter 4, Risk Assessment and Planning, the Gas Operations organization has established a Gas Operations Risk and Compliance Committee to identify, assess, monitor, and mitigate risks related to Gas Operations.

I chair the committee and our main objective is to actively manage risks and align risk management and mitigation activities with department goals, plans and resources and make risk management part of daily business operations within Gas Operations. The Committee meets monthly and has appointed a risk manager who is responsible for overseeing and coordinating the following activities:

- Designing a risk management process within Gas Operations that aligns with PG&E's Operational Risk Management Program, business objectives and risk activities.
- Identifying and evaluating risks in accordance with enterprise standards and tools.
- Developing a risk register that documents Gas Operations risks.
- Developing a range of alternative mitigation strategies.
- Tracking the progress of mitigation activities.

- Developing risk response implementation plans to be approved by the Gas Operations Risk and Compliance Committee.
- Establishing a process that enables risks to be reported to the Risk Policy Committee, as appropriate.

The Gas Operations Risk and Compliance Committee identified three principal, overarching risks facing gas distribution operations:

1. Loss of containment (gas leak).
2. Loss of supply and service.
3. Inadequate response and recovery.

Loss of containment is the risk that gas will escape the system causing a potential hazard to the public or PG&E employees. From a safety perspective, this is the most significant risk Gas Operations faces. PG&E's plan to mitigate this risk is driven by its Distribution Integrity Management Program. Distribution Integrity Management focuses on identifying ways to mitigate the risk drivers associated with loss of containment, including corrosion, natural forces, excavation damage, other outside force damage, material, weld or joint failure, equipment failure and incorrect operation. PG&E's Distribution Integrity Management Program is discussed in more detail below and in Chapter 4. Chapters 3, 5, 6, 7, 8, 10 and 11 in this exhibit[5] further support the mitigation of these risks through maintenance, leak survey, replacement and other activities.

The loss of supply and service is the risk that PG&E will be unable to deliver natural gas to customers. PG&E's plan to mitigate this risk is largely driven by systems operations and by the new gas distribution control center. Systems Operations is focusing on three risk mitigation measures:

1. Process
2. Visibility
3. Control

As detailed below in the discussion of Gas Operations' key safety and risk mitigation initiatives, and further in Chapter 2, PG&E will be instituting new processes and installing thousands of monitoring and control points to mitigate risks and improve safety. In addition to systems operations,

---

5 Unless otherwise stated, all references to other chapters are to chapters in this exhibit.

PG&E's efforts to mitigate this risk include investing in capacity, training and technology.

Finally, inadequate response and recovery is this risk that, if there is a loss of supply or service or a potentially hazardous leak, PG&E cannot adequately respond to make the situation safe. Mitigating this risk involves proper training, a robust emergency response plan, coordination with outside agencies and a timely and effective response by PG&E. PG&E's response and recovery mitigation efforts are described in more detail below and in Chapters 2, 6 and 7.

Gas Operations' Investment Planning department is tasked with ensuring that risk is appropriately considered when Gas Operations develops its budgets and long-term investment plans. To prepare the 2014 Gas Operations forecast, Investment Planning established a Governance Committee composed of Gas Operations' senior leadership team.[6] Process and project owners (e.g., leak survey, control center) submitted proposed forecasts that they believed were reasonable and sufficient to fund the work they forecasted completing. The Governance Committee reviewed the budget forecasts holistically and worked with the process and project owners and other subject matter experts to develop a final forecast designed to address system risks in a manner consistent with industry best practices.

PG&E's forecast for the cost of the work it believes is necessary and appropriate to manage and mitigate these risks is described in the chapters of this exhibit listed in Table 1-1 below.

---

6 At the time of the forecast, members of the Gas Operations senior leadership team were: Asset Knowledge Management senior director, Standards and Policies Vice President, Public Safety and Integrity Vice President, Project Engineering and Design senior director, Investment Planning Vice President, Transmission Vice President, Distribution Vice President and Gas System Operations senior director. Since then, Gas Operations hired a new Senior Vice President of Gas Transmission, Operations, Engineering and Pipeline Integrity.

TABLE 1-1
PACIFIC GAS AND ELECTRIC COMPANY
CHAPTERS THAT ADDRESS THE MANAGEMENT AND MITIGATION OF RISKS

| Line No. | Risk | Activities (Chapter) |
|---|---|---|
| 1 | Loss of Containment | • Control Center (Ch. 2)<br>• Asset Knowledge Management (Ch. 3)<br>• Distribution Integrity Management Program (Ch. 4)<br>• Preventative Maintenance (Ch. 5)<br>• Leak Survey and Repair (Ch. 6)<br>• Field Services and Response (Ch. 7)<br>• Capacity, Pipeline Replacement (Ch. 8)<br>• Training and Research and Development (R&D) (Ch. 10)<br>• Technology (Ch. 11)<br>• AGA and PAS 55 (Ch. 12) |
| 2 | Loss of Supply and Service | • Control Center (Ch. 2) (process, visibility and controls)<br>• Asset Knowledge Management (Ch. 3)<br>• Capacity (Ch. 8)<br>• New Business/WRO (Ch. 9)<br>• Training and R&D (Ch. 10)<br>• Technology (Ch. 11)<br>• AGA & PAS 55 (Ch. 12) |
| 3 | Response and Recovery | • Control Center (Ch. 2)<br>• Asset Knowledge Management (Ch. 3)<br>• Distribution Integrity Management Program (Ch. 4)<br>• Leak Survey and Repair (Ch. 6)<br>• Field Services and Response (Ch. 7)<br>• Training and R&D (Ch. 10)<br>• Technology (Ch. 11) |

* Key chapters that address managing and mitigating risks listed in

Going forward, Gas Operations plans to incorporate the framework provided by PG&E's Chief Risk and Audit Officer, discussed in Exhibit (PG&E-1), Chapter 4, and follow up on the guidance from its Risk and Compliance Committee and Risk Policy Committee, to systematically identify, evaluate and mitigate the key risks associated with its line of business and any interrelated dependency risks with other PG&E functions.

Gas Operations' risk management plan will use both top-down and bottom-up approaches, as the two cannot be mutually exclusive. The top-down approach provides a clear view of the primary risks faced by the organization, giving focus to all in the line of business. The bottom-up

approach, through a more robust risk identification and assessment, brings rigor to managing risk from all processes and sources. With this framework come risk-based adjustments to capital spending, improved alternatives analysis and ultimately safer, more reliable gas service for our customers.

The following section describes Gas Operations' key safety initiatives designed to mitigate the risks described above.

3. Key Safety and Risk Mitigation Initiatives

PG&E has several safety goals with the overall objective of having zero injuries to the public we serve and to PG&E employees. Though all employees are responsible for making safety their first priority, the responsibility for ensuring that Gas Operations develops and implements an effective gas distribution safety plan lies with the Vice President of Public Safety and Integrity Management. The directors of Transmission Integrity Management, Distribution Integrity Management and Emergency Response and Public Awareness all report to the Vice President of Public Safety and Integrity Management.

As required by SB 705, PG&E is developing a gas operations safety plan that is consistent with best practices in the gas industry and with federal pipeline safety statutes. The initiatives described in the introduction above are key elements of that plan.

To achieve our safety goals, we need to improve our safety culture, engage our workforce, recruit talent, improve processes and training, and make wise investments. Following are highlights of some of PG&E's key gas distribution safety and risk mitigation initiatives.

a. Safety and Culture Processes

1) Building a Safety-First Culture

As discussed in Exhibit (PG&E-1), PG&E recognizes that we must engrain safety in everything we do. Exhibit (PG&E-1), Chapter 3, sets forth the seven areas PG&E has identified to improve our safety culture; Gas Operations is committed to making these improvements.

The critical first step in improving our safety culture within Gas Operations was to create clear lines of responsibility. This

started with separating the once combined gas and electric businesses so that employees could be focused on only one of the two utility services and to ensure that gas and electric professionals each work in their respective areas of expertise. As described more fully in Section C (Management Structure), below, we have also reorganized within Gas Operations to promote accountability by more clearly delineating roles and responsibilities.

As PG&E has appointed a lead safety officer, Gas Operations has appointed a Vice President of Public Safety and Integrity Management, who, along with the Senior Vice President of Transmission Operations, and the Gas Operations Executive Vice President (myself), has overall responsibility for public and employee safety within Gas Operations.

To give our employees the tools and skills to always put safety first, Gas Operations is revising its standards and policies and improving its training. Key gas safety measures, including gas emergency response time and leak repair time, are now part of management's incentive compensation. We are also making substantial investments in improved public safety initiatives, such as improved leak surveys and increased pipe replacement. All of the key safety initiatives discussed below are part of Gas Operations' overall effort to support PG&E's goal of building a safety-first culture and becoming one of the safest utilities in the country.

2) Engaging the Workforce

Engaging the workforce means showing all employees that the Company values their ideas, contributions and professional development. One of Gas Operations' key initiatives to demonstrate its commitment to employee development is the Gas Training Improvement Project. The Gas Training Improvement Project is a benchmarking and research study to identify best-in-class training and evaluate practices in the industry to implement at PG&E. The resulting recommendations are designed to develop and retain employees who are competent, safe, and qualified. Well-trained

employees are able to perform their jobs more safely and efficiently and to use the latest tools, technology and practices. They are also better able to maintain the system in normal and abnormal operating conditions. Once these goals are met, PG&E will be better able to serve customers and maintain the safety and integrity of the natural gas system.

The results of the study led to several recommendations that are currently being implemented, including:

1. Creating a business process index to align codes and standards with the tasks and roles of employees. This will allow Gas Operations to confirm that it has guidance documents and training for work performed.
2. Developing training and evaluation programs that support all Gas Operations employees throughout their career.
3. Prioritizing training development and delivery for all of Gas Operations, rather than individual departments.
4. Broadening the scope of training to include technology solutions and leveraging curriculum external to PG&E.

This work will continue with the goal of moving from development into maintenance in coming years. The use of technology and external training solutions to enhance the learning environment along with the use of mobile solutions in the training process will help us become as efficient as possible. Chapter 10, sponsored by Gas Operation's director of Works, Methods and Implementation, provides further details concerning Gas Operations' training program and the associated costs.

In addition to being well trained, employees should know that their ideas and opinions count. This is the second piece of our workforce engagement plan. I regularly visit field-based employees to hear their ideas on what we are doing well, what we could do better, and how we should be doing it.

Gas Operations is developing and implementing processes to ensure meaningful employee input into operational decisions. For example, we pulled together a team comprised of field-based

union-represented employees and management employees to look at plastic pipes throughout our system. This cross-functional group continues to meet regularly and has provided valuable input to the Distribution Integrity Management Program.

3) Process Safety

Process Safety is a comprehensive, risk-based approach to enhancing safety based on fully identifying, understanding and mitigating risk. Although originally developed for low frequency, high consequence accidents in the chemical and refinery industries, Process Safety has the same goal and techniques used in the chemical and nuclear industries to develop effective processes and ensure employees fully understand the implications of what they are doing. Process Safety will play a key role in Gas Operations' overall safety plan.

Processes are broadly defined as how equipment operates (either individually or as part of a larger system) and how tasks (such as Locate and Mark and emergency response) are performed. The pillars of Process Safety include:

- Having a commitment to Process Safety
- Understanding hazards and risks
- Managing risk and learning from experience

The elements of Process Safety can include:

- Process safety culture
- Compliance with standards
- Process Safety competency
- Workforce involvement
- Stakeholder outreach
- Process knowledge management
- Hazard identification and risk analysis
- Operating procedures
- Safe work practices
- Asset integrity and reliability
- Contractor management
- Training and performance assurance

- Management of change
- Operational readiness
- Conduct of operations
- Emergency management
- Incident investigation
- Measurement and metrics
- Auditing and continuous improvement

These elements are used to assess all aspects of equipment or tasks to identify risks and mitigate them. The result is a safer, less error-prone and more effective process.

Successful implementation of Process Safety is a multi-year effort. In 2012, Gas Operations started implementation with the goal of advanced process in place in three years. For the first half of 2012, the focus was on developing governance, training, identification, prioritization and resolution of Process Safety projects and starting the implementation in the Codes and Standards organization.

The focus in the second half of 2012 will be on continuing to identify and complete projects, completing implementation in the Codes and Standards group and broader communication on benefits to superintendents/managers, front line supervisors and employees. Implementation in the Codes and Standards group will provide benefits across Gas Operations as these guidance documents are used by everyone, including managers, engineers, supervisors and front-line employees.

The Process Safety strategy beyond 2012 is to expand communication and training efforts so that all Gas Operations employees will understand Process Safety and apply it to everything they do by the end of 2014. This will embed the benefits discussed above across Gas Operations. Additionally, processes (equipment and tasks) will continue to be assessed using the Process Safety framework to build more robust, effective work practices and processes. Process Safety represents a level of focus in performing

various activities and the associated costs are therefore built into each work process forecast.

4) Quality and Improvement

Achieving top safety performance requires not just planning and executing the right work, but developing and implementing a solid quality and improvement (Q&I) program to make sure that the work is done correctly. Gas Operations established a director of Q&I who reports to the Vice President of Standards and Policies. The focus of this organization is to assess quality through reviews of individual work activities and end-to-end processes.

Key processes such as engineering, design, construction, maintenance and operations are reviewed to determine potential risks and are then prioritized based on impact. The Q&I team performs audits of these processes to identify gaps and areas of improvement. In addition, this team solicits employee feedback and input on matters needing additional review. The ultimate goal is continual improvement through identification and mitigation of problems or gaps.

On a monthly basis, the Q&I Department performs dozens of quality control assessments which measure hundreds of key items to determine the quality of PG&E's maintenance and construction work. If there are any gaps found through these assessments, a corrective action plan is developed to address to them. Going forward, the Q&I work will monitor and improve compliance with PG&E's standards and practices as well as identify areas for improvement in PG&E's standards, practices and training. As with process safety costs, Q&I costs are built into the costs of the work they support.

5) Public Awareness and Emergency Response

PG&E Gas Operations has a dedicated Emergency Preparedness and Public Awareness team to support coordination activities, training and communication with city, county and other local first responders within PG&E's service territory. A primary

function of this dedicated team is to provide pipeline and general safety training to local, state and volunteer first responders, as well as share our Gas Emergency Response Plan with the appropriate community partners. Emergency Preparedness and Public Awareness is made up of three distinct work streams: Performance and Compliance, Field Delivery, and Emergency Preparedness Planning. Each work stream has a dedicated manager and team to drive our vision of an integrated/coordinated emergency preparedness platform, whether internal or external.

Gas Operations recently hired eight senior public safety specialists and supervisors, reporting to the Field Delivery manager within the Emergency Preparedness and Public Awareness organization. The safety specialists are based throughout our service territory. The primary role of the safety specialists is to be the primary interface with local and state first responders for training, exercise or tabletop activities involving pipeline safety. The assigned safety specialist will deliver in-person training, provide guidance on how to use existing tools available to first responders, and provide insight into ways to best use our Gas Emergency Response Plan. Additionally, the safety specialist will help facilitate PG&E's use of the Incident Command System when a first responder is called to an event involving one of our facilities.

PG&E is proactively making contact with community leaders, local government officials, schools, and agricultural- and rural-community members to let them know what materials and tools are available and how they can be accessed.

To ensure our message is getting across effectively, the Emergency Preparedness and Public Awareness group has been tasked with developing metrics to measure our public outreach activities that focus on effectiveness, just not quantity of messaging. In addition, PG&E has purchased six emergency operations vehicles to help facilitate communication between our field personnel and the incident commander from the local or state fire services. These units are equipped with satellite phones,

desktop/laptop computer access, map plotters and a printer. The computer desktop/laptop has all of the necessary software for efficient emergency restoration activities installed. The units are available 24 hours per day, seven days a week for deployment.

PG&E launched a section on www.pge.com for customers, teachers and students that provides general mapping locations of our gas transmission pipeline segments, educational safety booklets and materials for grades K to 8, and much more.

In August 2011, we launched our first responder online portal that allows registered users access to more detailed characteristics of our gas transmission assets, portions of our Gas Emergency Response Plan and contact information for key members of the Emergency Preparedness and Public Awareness team. First responders can use this information in real time while en route to an incident or once they have arrived on scene.

6) Publicly Available Specification (PAS) 55 Certification

A key element of Gas Operations' long-term gas distribution safety plan is the development of a long-term asset management plan. Gas Operations is pursuing a best practice asset management certification offered by the British Standards Institute under its Publicly Available Specification (PAS) 55. PAS55, first published in 2004, was developed in consultation with a number of asset management experts and organizations. PAS55 is designed for large-scale asset systems — like utilities, rail roads, and airports — that are intended to perform into perpetuity. The certification process includes an initial readiness assessment, a certification audit and a recurring annual re-certification audit, all conducted by a recognized accreditation firm.

The standard requires that we develop a strategic plan for the organization and then systematically and in a coordinated fashion, execute that plan by optimally and sustainably managing our risks, assets and asset system, asset performance, and expenditures over a defined life cycle. The standard assures alignment between

Gas Operations' strategic plan, our gas asset management policy, standards, objectives, and work plans.

Gas Operations is pursuing PAS 55 certification as an objective validation that our gas system is on the right path to becoming one of the safest systems in the United States. PAS55 requires asset owners to take a disciplined approach to developing and achieving strategic objectives. Very simply, it will validate that we have established a replicable process of planning our work, executing against the plan, identifying issues, and adopting a formal approach to continuous improvement, installing new assets, using them, maintaining them and/or renewing and retiring them. The end result will be transparent and sustainable investment decisions that reduce risk and optimize asset health whether we are creating or acquiring, using, maintaining, or renewing/retiring assets.

Further, the ongoing audit and recertification requirements provide an independent assessment that is not only standard-based but based on the performance that PAS55 certification auditors observe at many high performing international companies. A parallel to this level of independent assessment can be found in the nuclear industry through the Institute of Nuclear Power Operations. Gas Operations will benefit greatly from the opportunity to undergo an independent and industry-based review of our asset management system on a regular basis.

Implementation of PAS55 will provide numerous benefits to our customers. We will demonstrate improved risk management and strengthened governance as well as provide a clear audit trail for our decision-making and the risks associated with the paths we take. We will provide evidence, through controlled and systematic processes, to demonstrate compliance. We will clearly demonstrate that we are focused on allocating expenditures to investments that provide the best value. These and other benefits driven by the rigor of the activities required by PAS55 will ultimately lead to greater customer trust, satisfaction and service.

As Gas Operations is only at the beginning of the PAS 55 certification process, these benefits are not all yet reflected in this GRC showing. However, going forward, the benefits of PAS55 certification will be reflected in future CPUC audits and rate cases.

A team of people from around the world is working to convert PAS55 to International Standard of Operation (ISO) 55001.[7] It will likely be approved by the ISO in March 2014. In that event, Gas Operations would seek ISO 55001 certification and strive to become the first ISO 55001 certified gas corporation in the United States, joining such international utilities as E.ON (Germany), EDF (France), Essent (Netherlands) and Western Power Distribution (U.K.), all currently PAS55 certified.

b. Other Key Safety Initiatives

1) Developing a Gas Distribution Asset Management System

The gas distribution asset management project, Pathfinder, modeled after the gas transmission asset project in the Pipeline Safety Enhancement Plan, is a key measure to improve our asset knowledge. Pathfinder is a multi-faceted effort to enhance the accessibility, quality and type of information that PG&E collects, stores and manages in relation to its gas pipeline system and its related business processes. The changes to PG&E's systems and business processes are designed to improve our ability to assess and mitigate potential public safety risks. The main components of the Pathfinder Project include:

- Continued development of the Geographic Information System (GIS) to reflect a geospatial model, which will track, manage and store distribution pipeline asset data, such as location/ connectivity, specification/features, and maintenance/inspection history. This approach will allow PG&E to view and analyze pipeline features, characteristics, and event history at specific

[7] ISO 55001 would differ from PAS55 in the following key respects: (1) enhanced Board level engagement expectations; (2) more direction on asset management strategy development; and (3) elevated financial expectation, especially with respect to the goal of responsible asset management.

reference points along the entire length of gas distribution pipelines.

- A comprehensive process and system to capture key pipeline features and specifications for materials used by PG&E through the operating life of the component.
- Enhancements to work management and data capture processes and tools for maintenance inspection (including locate and mark and leak survey), and mobile tools for new service connections. This componentof Pathfinder will replace paper-based work processes with automated ones that manage leak survey, locate and mark, maintenance and new business work.
- Tools to support the integration of all pipeline asset data (including event history such as leaks and dig-ins) to provide complex risk calculations assessing asset health and condition.

Pathfinder will improve the safety and reliability of PG&E's gas distribution system through increased access to pipeline system data, enhanced risk management and integrity management analytics, higher quality data, and improved work management. It will improve PG&E'sexisting natural gas pipeline information and asset management capabilities and create a technology infrastructure that:

1. Supports improved decision-making capabilities related to the risks and integrity of PG&E'sgas distribution system.
2. Consolidates multiple Information Technology (IT) systems and adds new capabilities to systems that interface with PG&E'sgas distribution system.
3. Maintains system data and records electronically on a continuous basis.
4. Improves data consistency and reliability and reduces the risk of data error.
5. Improves new business processes.

These Pathfinder attributes will benefit PG&E's customers by improving the operations of the gas distribution system.

Improved data management capabilities will lead to improved leak survey and locate and mark functions, which will directly improve public safety.

Chapters 3 and 11 provide additional detail on the project and associated costs.

2) Technology Initiatives

Use of new and improved technologies is a key element of Gas Operations' safety plan. Technology is a critical element of the Pathfinder project just discussed. Gas Operations is also using technology enhancements to improve Distribution Integrity Management and risk management. Leak surveyors are using more advanced equipment, and PG&E is the first in the industry to test the Picarro Surveyor, a new revolutionary technology that detects natural gas in parts per billion rather than parts per million. Gas Operations is also using mobile platforms and technologies to provide faster and more reliable access to data for field personnel, including gas service representatives, leak surveyors and locate and mark crews. New technology also will play a key role in PG&E's new gas distribution control center. These technologies are described throughout this exhibit; the associated costs are described in Chapter 11.

3) Distribution Integrity Management

PG&E's Distribution Integrity Management Program governs how we inspect and maintain more than 42,000 miles of pipe, 3.3 million gas service connections and other gas distribution assets. It is a core foundation of PG&E's ongoing efforts to provide safe and reliable service consistent with industry best practices. Under the program, we are taking the following key steps to safeguard the integrity of our system and modernize it:

- Enlisting the support of nationally recognized plastics experts to help refine our plastic pipe risk analysis.

- Substantially increasing the rate at which we are replacing pipe and prioritizing for replacement or increased leak patrols of pipes, fittings and other equipment that have a high leak history.
- Carefully examining our entire system, not just pipes made of specific materials or of certain age.
- Looking at gas utilities across the country to identify best practices in gas distribution.
- Studying the best technology available for leak detection and pipeline inspection.

Going forward, the additional data management capability that will be provided by PG&E's gas distribution asset management system (described above) will further enhance PG&E's Distribution Integrity Management Program with a resulting increase in public safety.

Chapter 4, sponsored by PG&E's director of Distribution Integrity Management, provides additional detail on the program and associated costs.

4) Pipeline Replacement

An important element of providing safe gas distribution service is replacing aging assets. PG&E's historical rate of pipeline replacement is about 30 miles per year. As our infrastructure continues to age, PG&E needs to pick up the pace significantly to maintain the integrity of the system and to promote public safety.

We have already begun ramping up pipeline replacement in 2012. Working closely with the integrity management team, Investment Planning has developed a plan for 2014 through 2016 to replace approximately 180 miles of distribution main per year. This will require investing over $200 million more per year than PG&E has historically invested in pipeline replacement. For 2014 through 2016, we will focus on replacing the highest risk pipe first, as identified by Integrity Management, principally based on leak rate. Even at 180 miles per year, we are on a 230-year replacement cycle for the system. In the near future, we will likely have to replace even more miles of pipe each year.

Chapters 4 and 8 provide further details concerning PG&E's pipeline replacement program.

5) Leak Survey

PG&E's forecast for leak survey reflects three key initiatives. First, PG&E plans to increase the frequency of its regular leak survey cycle for residential neighborhoods from once every five years to once every three years. PG&E proposed a three-year leak survey cycle in its last GRC and continues to believe that moving to a three-year leak survey cycle is the right thing to do. PG&E's benchmarking studies show that surveying residential neighborhoods at least once every three years is an industry best practice. As such, PG&E is proposing to do so as part of its SB 705 gas operations safety plan.

The goal and benefits of surveying the system more frequently are clear. PG&E will find and repair leaks more frequently. This, in turn, will result in fewer open leaks and a smaller number of potentially hazardous situations.

Second, PG&E plans to survey certain areas with higher than average leak rates annually. This will be done while PG&E conducts further engineering analysis to determine whether the higher leak rates can be mitigated or whether the pipe needs to be replaced.

Third, PG&E is acquiring new technology to more efficiently conduct its leak surveys. Multiple Leak Survey Detecting Equipment and Survey Grading Equipment are being upgraded with an all-in-one Heath Detecto Pak-Infrared (DP IR)™ instrument that self-calibrates, detects gas leaks with fewer false positives, grades leaks, and has wireless communication to transfer information. This instrument is also more sensitive to the presence of gas and performs a higher level of on-board analysis to determine the severity/grade of the leak, leading to a more accurate survey and associated grading of leaks.

As previously mentioned, PG&E is the first in the gas industry to investigate the use and integration of a state-of-the-art gas leak

detection analyzer, the Picarro Surveyor, developed by Santa Clara-based company, Picarro, Inc. This equipment is installed in a vehicle and is 1,000 times more sensitive than incumbent leak survey/detection equipment. It can distinguish between the natural gas in PG&E's distribution system and other naturally occurring gases. This new technology offers the possibility of not only increasing the efficiency of leak surveys, but of finding gas leaks at a greater rate than current equipment.

Unlike incumbent leak detection instruments, the Picarro Surveyor picks up trace molecules while driving through neighborhoods and analyzes them for detection of natural gas. PG&E is working with Picarro, Inc., a leading pipeline research institution called Pipeline Research Council International, along with other gas utilities across the nation to provide proof of concept and otherwise better understand this instrument's potential use in the gas industry for leak detection. While we are currently investigating the extent to which we can implement the new technology, preliminary indications are positive. This instrument offers the possibility of increased productivity and cost savings that will greatly improve system integrity and enable timelier leak repairs.

PG&E plans to begin using the Picarro Surveyor in one division in 2013, another three divisions in 2014, six divisions in 2015 and 10 divisions in 2016. We also plan to use the new Picarro technology for the annual surveys of pipe with higher leak rates.

Chapter 6 provides additional information concerning PG&E's leak survey program and the associated costs.

6) Leak Repairs

One of PG&E's key safety initiatives is to reduce the number of open leaks at any given time, and thus the number of potentially hazardous situations. Open leaks generally refers to Grade 2 or 2+ leaks scheduled for repair, Grade-3 leaks scheduled for resurvey or repair, or leaks that have not yet been identified. PG&E will reduce the number of open leaks through the leak survey and repair initiatives described above and in Chapter-6.

Reducing the number of open leaks will eliminate potential hazards before they have an opportunity to become real hazards. It will also result in a substantial increase in costs. PG&E is forecasting an increase of approximately $68 million in annual leak repair costs compared to 2011 recorded expenditures. Due to unknowns associated with the new Picarro technology, PG&E is proposing that leak survey and leak repair costs be recovered through a two-way balancing account. This way, if PG&E finds more leaks than forecasted due to the improved technology, PG&E will have the necessary revenue to repair them. Similarly, if it turns out that PG&E finds fewer leaks than forecasted, PG&E will return any unspent funds.

Chapter 6 provides additional information concerning PG&E's leak repair program and the associated costs.

7) Leak Response Time

For most gas customers, they have few encounters with PG&E beyond setting up service and paying bills. Our response to calls reporting the smell of gas or a possible leak is likely one of the most important interactions customers will have with PG&E and we will have with them. PG&E needs to make hazardous conditions safe as quickly as reasonably possible and to provide assurances when there is no danger – and customers should not wait in fear for an unreasonable amount of time.

In the past, PG&E made an initial assessment of the safety hazards of a possible leak by interviewing the customer by phone. Based on that initial assessment, not all leak calls were designated as immediate response items; some were classified as "same day."

The first key change, effective in 2012, is to target arrival at the customer's location within 60 minutes 99 percent of the time, and within 30 minutes 75 percent of the time for calls classified as immediate response items. Second, starting in 2015, all odor calls will be treated as immediate response items. Industry benchmarking shows these to be industry best practices.

These best practice safety goals require hiring an additional 120 gas service representatives through 2014, resulting in an increased expense of approximately $30 million.

Chapter 7 provides additional information regarding these activities and the associated costs.

8) Gas Distribution Control Center

PG&E benchmarked against the industry and determined that having a distribution control center is a best practice.

The distribution control center, which will be co-located with the transmission control center and gas dispatch, will be PG&E's first line of protection to prevent abnormal gas events. If an abnormal event does occur, the distribution control center will greatly enhance PG&E's ability to keep it from escalating.

Our Gas Distribution Control Center personnel will use new technology, business processes (such as new clearance procedures[8] for field work and resolving system upsets), and improved communication to proactively monitor and control the gas distribution system.

PG&E's investment in the Gas Distribution Control Center will improve safety and operations by:

- Preventing events caused by human error or lack of visibility into system status.
- Minimizing impacts of incidents that occur.
- Centralizing management of emergency response through situational awareness and coordination, streamlined communication, and improved system isolation response time.
- Transforming data into intelligence to identify and respond to potential risks.
- Increasing system visibility and control, with alignment to programs such as Distribution Integrity Management and

[8] The clearance process ensures the safe operation of the gas system while construction or maintenance work is performed on the pipeline network. It involves specified procedures and centralized control to ensure that the work is properly scheduled, safely executed, and documented.

Damage Prevention to address system risk, dig-in prevention, and real-time document control of key operating information.

- Implementing a consistent clearance process for distribution operations.
- Improving system reliability by real-time control of system pressure and flow rates.
- Improving environmental performance through monitoring of distribution odor intensity points.

Chapter 2 provides additional detail on the Gas Distribution Control Center and associated costs.

4. Other Key Risks and How PG&E Plans to Address Them

In addition to the safety risks addressed above, PG&E's forecast includes the costs of measures necessary to mitigate a number of other key risks identified by the Enterprise Risk Management program.

Business Continuity and Disaster Recovery – These are principally the risks associated with disruption or failure of computer systems and other critical infrastructure. To mitigate this risk, as discussed in Chapter 2, the Gas Distribution Control Center will have a mirror-image "hot" back-up facility to be used in the event of a system level emergency or catastrophic failure. Chapters 7 and 11 address costs related to backup radios for gas service representatives and field leadership. These radios will be used to communicate in the event that mobile communication towers or wireless devices are down.

Emergency Response – Chapter 2 provides a thorough discussion of the role PG&E's Distribution Control Center will play in improving its emergency response capabilities. As previously discussed, Chapter 7 describes PG&E's plans for improved emergency response time.

Other key risks identified by Enterprise Risk Management include cover-up/fraud, reliability, qualified workforce and seismic. PG&E's forecast includes the cost of work designed to mitigate these risks.

C. Management Structure

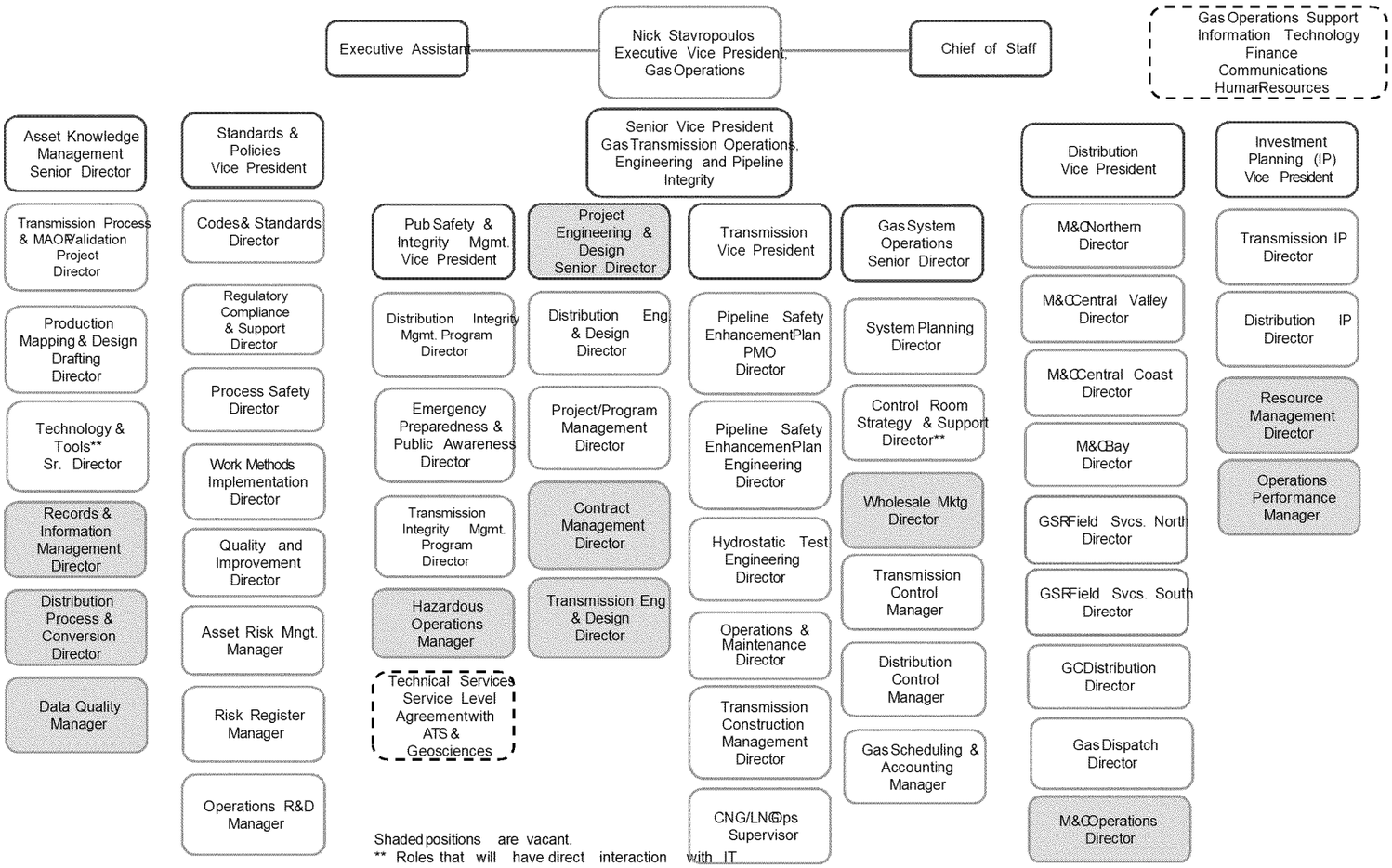
1. Organization and Staffing

PG&E took the first critical step in establishing a clear organizational structure when it separated the gas and electric businesses and designated separate Executive Vice Presidents to head each business unit. One of my first priorities after arriving at PG&E was to reorganize Gas Operations to achieve clearer roles and responsibilities and to better support our work and safety goals. My goal was that form should follow function and not the reverse. We established eight major areas of responsibility within Gas Operations:

1) Asset Knowledge and Management
2) Standards and Policies
3) Public Safety and Integrity Management
4) Project Engineering and Design
5) Investment Planning
6) Transmission Maintenance and Construction
7) Distribution Maintenance and Construction
8) Gas System Operations

Figure 1-1 depicts Gas Operations current organizational structure.

# FIGURE 1-1
# PACIFIC GAS AND ELECTRIC COMPANY
# GAS OPERATIONS ORGANIZATIONAL STRUCTURE



Having established these eight major areas of responsibility, our next objective was to staff the organization with the most talented people available, either from within or outside the organization. Thus, we focused both on recruiting new talent from the gas industry and on ensuring that our existing talent is best utilized. The guiding principles of staffing the organization are: (1) people follow the work (rather than the work following the people), resulting in assigning people to jobs that are relatively unchanged; (2) reassign employees whose jobs have changed and match skills and interests with roles; and (3) post all new jobs both internally and externally to ensure that they are filled the most-qualified people.

These principles have led to changing roles for existing employees as well as the recruitment of new talent.

The Independent Review Panel recommended that we retain additional expertise. Some of the key new employees who have brought additional talent and expertise to Gas Operations are:

- Jesus Soto Jr., Senior Vice President, Gas Transmission Operations, Engineering and Pipeline Integrity. Jesus is an experienced gas veteran, having previously served as Vice President of Operations Services for El Paso Corporation's pipeline group and having led the engineering and construction programs at ANR Pipeline, El Paso Natural GAS, Colorado Interstate Gas, Southern Natural Gas and Tennessee Gas Pipeline for onshore and offshore facilities. He is passionate about public and employee safety. Every department he has led has improved its employee safety record. He holds a Bachelor of Science in civil engineering from the University of Texas at El Paso, a master's degree in Civil Engineering from Texas A&M University and a master of business Administration (MBA) degree from the University of Phoenix.
- Kevin Knapp, Vice President, Gas Distribution. Kevin joined PG&E in March 2012 and has more than 30 years of experience in the utility industry with National Grid, KeySpan, Con Edison and Long Island Lighting Company. He started his career with Long Island Lighting Company as a field inspector and in his last position at National Grid, he was the Senior Vice President of U.S. Supply Chain. Prior to that, he

was the Vice President of Gas Operations at KeySpan. He earned both a Bachelor of Science and master's degree in industrial engineering from Hofstra University and Columbia University, respectively.

- Sean Kolassa, Vice President, Investment Planning. Sean joined PG&E in February 2012. He brings more than 15 years of gas experience to his new role. Most recently, Sean was director of Strategic Planning and Analysis with El Paso Corporation in Texas. He holds a Bachelor of Science degree in chemical engineering from the University of Michigan and an MBA from the University of Denver.
- Roland Trevino, Vice President, Public Safety and Integrity Management. Roland joined PG&E in August 2011 as senior director of Asset Knowledge Management and was later named Vice President, Public Safety and Integrity. Most recently, he served as director of engineering with El Paso Gas Co. Colorado Springs, Colorado. He has more than 20 years of engineering and operations experience in the interstate natural gas transmission industry. He was part of the El Paso Gas response team following the pipeline explosion in Carlsbad, New Mexico in 2000. He worked closely with the Pipeline and Hazardous Materials Safety Administration (PHMSA) to launch the investigation into the cause of the explosion and then worked to restructure operations and initiate the company's pipeline integrity program. Roland holds a Bachelor of Science degree in civil engineering from Marquette University, completed graduate coursework in structural engineering at University of Texas El Paso and earned an MBA from University of Phoenix.
- Mel Christopher, Senior Director, Gas System Operations. Mel joined PG&E in June 2011. He has 30 years of experience in the utility industry beginning his career in field operations and engineering. He served as Vice President of both Operations and Engineering, and Energy Supply and Marketing for Public Service Company of New Mexico; Vice President of both Regulatory Policy, and Transition Services for PNM Resources; and president and Chief Executive Officer of Vista Energy Solutions. Mel earned a Bachelor of Science in chemical engineering from New Mexico State University.

- Mike Falk, Director of Transmission Operations and Maintenance.[9] Mike joined PG&E in December 2011 and has nearly 30 years of experience with interstate natural gas transmission and alternate energy sources. Most recently, Mike came from PHMSA in Kansas City, Missouri, where he served as an engineer. He was responsible for inspecting natural gas and liquids pipeline for regulatory code compliance and performing accident investigations of incidents involving natural gas and liquids pipelines. Mike earned a Bachelor of Science degree in chemical engineering from the University of Notre Dame and an MBA from Vanderbilt University.
- Bennie Barnes, Director of Transmission Integrity Management.[10] Bennie joined PG&E in June 2012 and has over 20 years of experience in the natural gas transportation industry at El Paso Corporation. Most recently, Bennie served as El Paso's Director of Transmission Operations and Maintenance of Pipeline Risk Management. Bennie's experience at El Paso also includes 10 years in corrosion control, five years in reliability engineering and four years in quality assurance. Bennie earned a Bachelor of Science degree in metallurgical engineering from the University of Texas.

To perform the work PG&E needs to implement its best practices safety plan, Gas Operations has hired more than 300 new employees since January 2011.[11] Through 2014, we expect to hire an additional 1,400 employees. This, along with the substantial capital investments Gas Operations is planning, will result in a boost to California's economy.

These employees will respond to emergencies, perform leak surveys and leak repairs, replace unreliable pipe, install new infrastructure, perform critical quality assurance and quality control functions, do investment planning work and handle other functions critical to providing best-in-class, safe and reliable natural gas distribution service.

---

9 The costs of the work Mr. Falk will perform and direct are not part of this GRC.

10 The costs of the work Mr. Barnes will perform and direct are not part of this GRC.

11 Not including hiring from within PG&E.

2. Standards, Policies and Procedures

One of the goals in restructuring the organization was to create greater centralized control over standards, procedures and systems while maintaining decentralized work execution. Gas Operations currently has more than 900 guidance documents that define the standards, work methods, procedures and specifications that are used across the gas organization. The documents have been developed over a period of many years.

This initiative will first concentrate on updating our process for creating standards, work methods and procedures with a focus on improving how we get input and feedback from all affected parts of the organization. We are also staffing with subject matter experts who will be primarily focused on creating and documenting consistent standards and procedures for performing work. We are developing one- and three-year plans for creating and/or updating gas guidance documents.

Some of the key inputs to this plan are improving public and employee safety, incorporating changes due to new codes or regulations, improving performance based on new technology, best practices, or employee suggestions, and incorporating feedback from improved quality assurance/quality control processes or other audits.

Finally we are developing new methods for training and communication (see the training improvement initiative) and will be employing technology to improve the delivery and availability of current procedures for employees using a mobile electronic document delivery system.

Our customers will benefit from this foundational effort which enables our work to be performed consistently in all locations at a high level of safety, quality and efficiency.

3. Building a Long-Term Work Plan (Investment Planning)

In 2012, Gas Operations established an investment planning function, headed by the new Vice President of Investment Planning. Investment Planning's mission is to support the safety and reliability of our gas systems by developing capital and expense plans, driven by the application of a risk-based prioritization and governance process. The process will focus on driving the efficient use of resources.

In the short-term, the Investment Planning group will analyze actual performance and use the information to re-forecast and reprioritize as needed to achieve objectives. In the medium-term, Investment Planning will lead the process of creating Gas Operations input into the three-year integrated company plan as well as develop the operating plan. For long-term planning, it will create Gas Operations' 10-year long-range strategic plan. The long-term plan will "codify" the strategy of the organization in maintaining its aging infrastructure.

The investment planning process is described in more detail in Chapter 8, which is sponsored by Gas Operations' director of Distribution Investment Planning.

4. Metrics and Benchmarking

One of Gas Operation's goals has been to better leverage external resources to improve our operations. We started by asking, "What does good look like?" We participated in various benchmarking studies and sent teams to visit and learn from other utilities across the country. We learned that no single utility does everything best, but some do things better than others. Our goal is to reach top quartile in major categories such as:

- Fewest leaks per mile;
- Fastest response time;
- Fastest repair time;
- Lowest cost of construction per mile; and
- Fewest pressure incidents.

Throughout this exhibit are references to best practices. These best practices are based on a combination of industry benchmarking and surveys and other communication with industry members, such as site visits. The metrics described in this exhibit all are designed to achieve our goal of becoming a top quartile gas company as measured by this benchmarking.

In addition to benchmarking, we are working closely with our regulators and have listened carefully to the Independent Review Panel which recommended that PG&E:

- Create a culture of system integrity.

Gas Operations' top priority has been to improve its safety culture. The work described in Chapter 4 illustrates our success in this ongoing effort.

- Separate distribution and transmission integrity management programs.

  Our new management structure reflects this.

- Establish a multi-year program that addresses all the capital requirements to assure system integrity, based on sound risk criteria.

  Our Investment Planning function, described in Chapter 8, does this.

- Conduct a comprehensive review of data and information management systems to validate the completeness, accuracy, availability, and accessibility of data and information and take action through a formal management of change process to correct deficiencies where possible.

  The Pathfinder Project, described in Chapters 3 and 11, is the first critical step in meeting this recommendation.

- Review and restructure all division, regional and company emergency plans for consistency.

  The effort to centralize standards and procedures is designed to meet this recommendation and to apply its spirit to all of our standards and procedures.

- Study SCADA needs that would enable improved shutdown capabilities in the event of a pipeline rupture.

  This is a core function of the Gas Distribution Control Center, described in Chapter 2.

- Acquire a staff of professionals with the skills necessary to do state-of-the-art practical analysis of risk management decisions that concern employee and public health and safety, environmental and socioeconomic consequences, and financial implications for the Company.

  As discussed above, we have ben leveraging internal and external resources to make sure we have the right people with the necessary skills in the appropriate positions.

  Gas Operations has also placed a renewed emphasis on leveraging outside resources to develop or identify improved technologies to operate our business more efficiently and safely. We have partnered

with organizations such as NYSEARCH, which manages one of the premier natural gas research, development and demonstration programs in the United States, and Pipeline Research Council International (PRCI), a preeminent global collaborative research development organization for the energy pipeline industry, to invest in research and development efforts. We also exploring work with the Lawrence Livermore National Laboratory. The technologies we have identified to date are described in Chapter 11. Gas Operations has also established an internal Research and Development function, which is described in Chapter 10.

D. Summary of Forecast

1. Total Gas Distribution Forecast

PG&E's recorded and forecast expenses for Gas Distribution from 2011 through 2016 are shown in Table 1-2.

TABLE 1-2
PACIFIC GAS AND ELECTRIC COMPANY
GAS DISTRIBUTION
EXPENSES BY YEAR
(IN THOUSANDS OF NOMINAL DOLLARS)

| Line No. | Description | 2011 Recorded | 2012 Forecast | 2013 Forecast | 2014 Forecast |
|---|---|---|---|---|---|
| 1 | Total Expenses | $232,928 | $342,201 | $374,676 | $470,022 |

PG&E's recorded and forecast capital expenditures for Gas Distribution operations from 2011 through 2016 are shown in Table 1-3.

TABLE 1-3
PACIFIC GAS AND ELECTRIC COMPANY
GAS DISTRIBUTION
CAPITAL EXPENDITURES BY YEAR
(IN THOUSANDS OF NOMINAL DOLLARS)

| Line No. | Description | 2011 Recorded | 2012 Forecast | 2013 Forecast | 2014 Forecast | 2015 Forecast | 2016 Forecast |
|---|---|---|---|---|---|---|---|
| 1 | Total Capital Expenditures | $307,860 | $451,045 | $553,014 | $839,626 | $855,577 | $781,847 |

2. Breakdown of Forecast by Chapter

a. Expenses

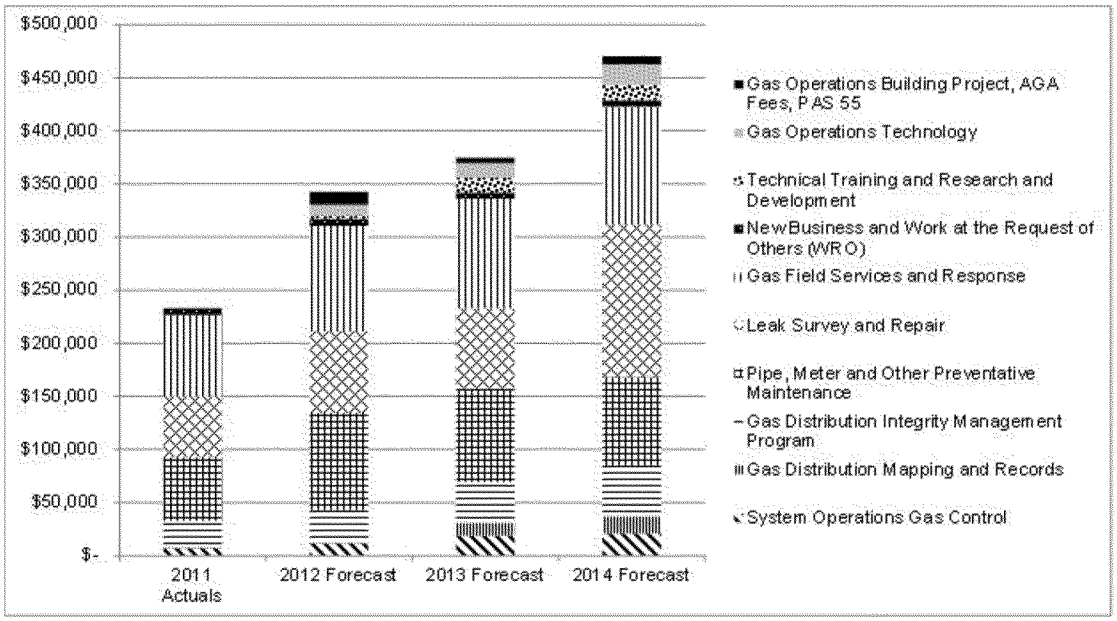
Table 1-4 and Figure 1-2, below, show recorded and forecast expenses by chapter, as presented in this exhibit.

TABLE 1-4
PACIFIC GAS AND ELECTRIC COMPANY
GAS DISTRIBUTION
EXPENSES BY YEAR BY CHAPTER
(IN THOUSANDS OF NOMINAL DOLLARS)

| Line No. | Description | 2011 Recorded | 2012 Forecast | 2013 Forecast | 2014 Forecast |
|---|---|---|---|---|---|
| 1 | Systems Operations Gas Control | $7,062 | $11,417 | $18,641 | $20,876 |
| 2 | Gas Distribution Mapping and Records | 970 | 944 | 12,402 | 16,199 |
| 3 | Gas Distribution Integrity Management Program | 24,670 | 30,276 | 38,198 | 47,335 |
| 4 | Pipe, Meter, and Other Preventative Maintenance | 59,883 | 91,387 | 87,868 | 83,737 |
| 5 | Leak Survey and Repair | 57,047 | 76,827 | 75,840 | 143,587 |
| 6 | Gas Field Services and Response | 76,876 | 99,697 | 102,972 | 111,043 |
| 7 | Gas Distribution Capital and Investment Planning | – | – | – | – |
| 8 | New Business and Work at the Request of Others | 6,149 | 6,500 | 5,600 | 6,000 |
| 9 | Technical Training and Research and Development | 6 | 3,200 | 14,000 | 14,520 |
| 10 | Gas Operations Technology Costs | 519 | 10,186 | 14,060 | 19,244 |
| 11 | Gas Operations Building Projects, AGA Fees and PAS 55 Certification | (254) | 11,767 | 5,096 | 7,481 |
| 12 | Total Expenses | $232,928 | $342,201 | $374,676 | $470,022 |

Note: Differences due to rounding.

FIGURE 1-2
GAS DISTRIBUTION
EXPENSES BY YEAR BY CHAPTER
(IN THOUSANDS OF NOMINAL DOLLARS)




The primary drivers for the increase from 2011 to 2014 are corrective maintenance, principally leak repair costs ($68 million increase) (Chapter 6), field services and dispatch increases due primarily to increased emergency response goals ($34 million increase) (Chapter 7), Distribution Integrity Management ($23 million increase) (Chapter 4) and technology expenses ($19 million increase) (Chapter 11). A substantial portion of the forecast increase is covered by the proposed Gas Leak Survey and Repair Balancing Account. If the work does not materialize at the level forecast, PG&E will not incur these costs and will refund the under-spent amount to customers. The proposed balancing account is described in further detail in Exhibit (PG&E-10), Chapter 9.

b. Capital Expenditures

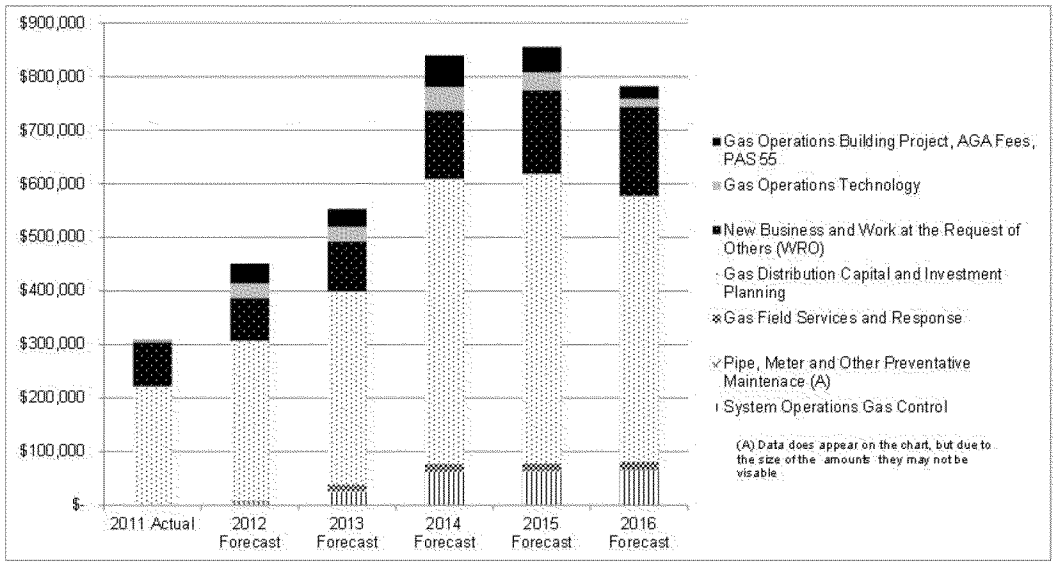
Table 1-5 and Figure 1-3, below, show recorded and forecast capital expenditures by chapter, as presented in this exhibit.

TABLE 1-5
PACIFIC GAS AND ELECTRIC COMPANY
GAS DISTRIBUTION
CAPITAL EXPENDITURES BY YEAR BY CHAPTER
(IN THOUSANDS OF NOMINAL DOLLARS)

| Line No. | Description | 2011 Recorded | 2012 Forecast | 2013 Forecast | 2014 Forecast | 2015 Forecast | 2016 Forecast |
|---|---|---|---|---|---|---|---|
| 1 | Systems Operations Gas Control | – | $4,447 | $24,851 | $62,209 | $63,008 | $64,918 |
| 2 | Gas Distribution Mapping and Records | – | – | – | – | – | – |
| 3 | Gas Distribution Integrity Management Program | – | – | – | – | – | – |
| 4 | Pipe, Meter, and Other Preventative Maintenance | $9 | 1,027 | 1,000 | 246 | 252 | 258 |
| 5 | Leak Survey and Repair | – | – | – | – | – | – |
| 6 | Gas Field Services and Response | 772 | 2,620 | 12,889 | 14,870 | 15,363 | 15,826 |
| 7 | Gas Distribution Capital and Investment Planning | 220,682 | 299,244 | 360,327 | 531,594 | 540,363 | 496,111 |
| 8 | New Business and Work at the Request of Others | 82,924 | 79,465 | 93,000 | 128,000 | 155,000 | 167,000 |
| 9 | Technical Training and Research and Development | – | – | – | – | – | – |
| 10 | Gas Operations Technology Costs | 2,977 | 26,919 | 27,725 | 43,722 | 34,235 | 14,649 |
| 11 | Gas Operations Building Projects, AGA Fees and PAS 55 Certification | 496 | 37,324 | 33,222 | 58,986 | 47,355 | 23,086 |
| 12 | Total Capital Expenditures | $307,860 | $451,045 | $553,014 | $839,626 | $855,577 | $781,847 |

Note: Differences due to rounding.

FIGURE 1-3
GAS DISTRIBUTION
CAPITAL EXPENDITURES BY YEAR BY CHAPTER
(IN THOUSANDS OF NOMINAL DOLLARS)



The primary drivers for the increase between 2011 and 2014 are accelerated pipeline replacement ($311 million increase) (Chapter 8), the new Gas Distribution Control Center ($62 million increase) (Chapter 2), new buildings ($58 million increase) (Chapter 12), new customer connections ($45 million increase) (Chapter 9), and new technology applications ($41 million) (Chapter 11).

3. Historic Trends and 2011-2014 Walk

a. Expenses

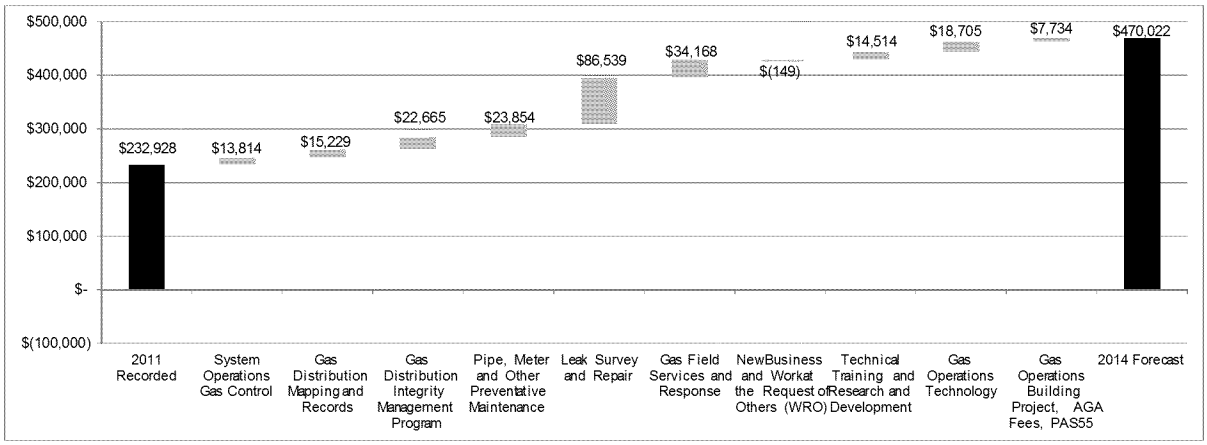
Table 1-6 shows the change in gas distribution expenses by chapter from 2011 to 2014.

TABLE 1-6
PACIFIC GAS AND ELECTRIC COMPANY
GAS DISTRIBUTION
EXPENSES BY CHAPTER
(IN THOUSANDS OF NOMINAL DOLLARS)

| Line No. | Description | 2011 Recorded | 2014 Forecast |
|---|---|---|---|
| 1 | Systems Operations Gas Control | $7,062 | $20,876 |
| 2 | Gas Distribution Mapping and Records | 970 | 16,199 |
| 3 | Gas Distribution Integrity Management Program | 24,670 | 47,335 |
| 4 | Pipe, Meter and Other Preventative Maintenance | 59,883 | 83,737 |
| 5 | Leak Survey and Repair | 57,047 | 143,587 |
| 6 | Gas Field Services and Response | 76,876 | 111,043 |
| 7 | Gas Distribution Capital and Investment Planning | – | – |
| 8 | New Business and Work at the Request of Others | 6,149 | 6,000 |
| 9 | Technical Training and Research and Development | 6 | 14,520 |
| 10 | Gas Operations Technology Costs | 519 | 19,224 |
| 11 | Gas Operations Building Projects, AGA Fees and PAS 55 Certification | (254) | 7,481 |
| 12 | Total Expenses | $232,928 | $470,022 |

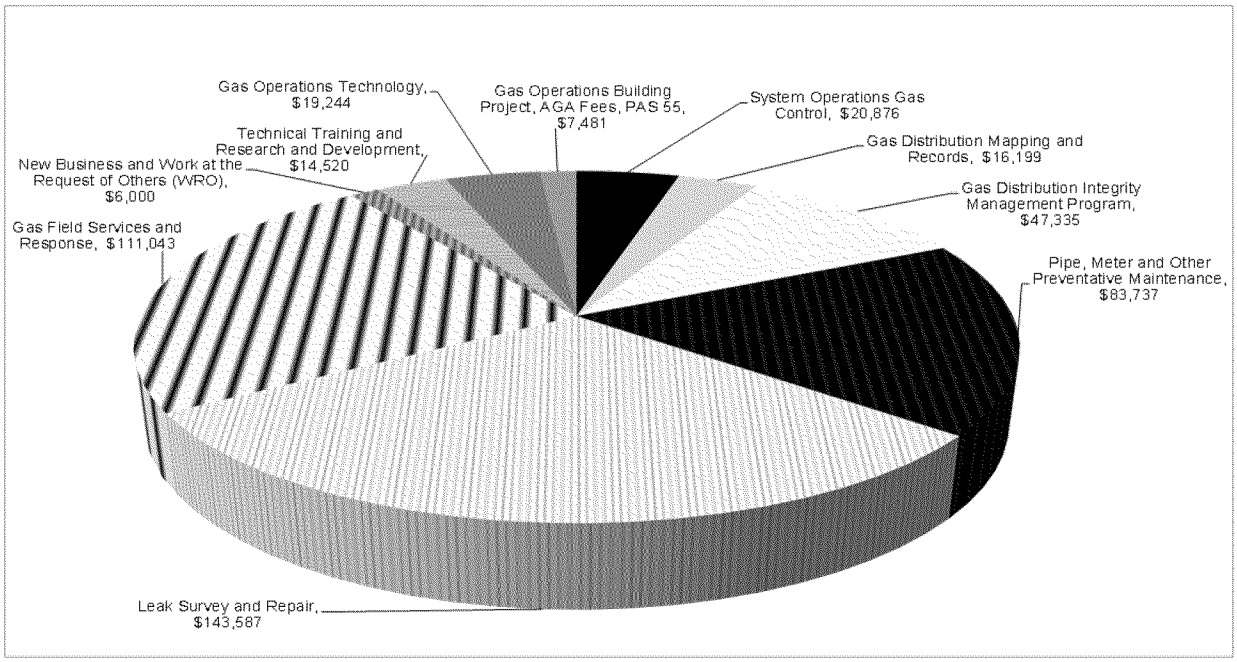
Figure 1-4 shows the gas distribution expenses walk by chapter from 2011 to 2014.

FIGURE 1-4
PACIFIC GAS AND ELECTRIC COMPANY
GAS DISTRIBUTION EXPENSES WALK
2011-2014
(IN THOUSANDS OF NOMINAL DOLLARS)




The overall breakdown of expenses for 2014 by chapter is shown in Figure 1-5, below.

FIGURE 1-5
PACIFIC GAS AND ELECTRIC COMPANY
GAS DISTRIBUTION EXPENSES BY CHAPTER
2014
(IN THOUSANDS OF NOMINAL DOLLARS)



b. Capital Expenditures

Table 1-7 shows the change in gas distribution capital expenditures by chapter from 2011 to 2014.

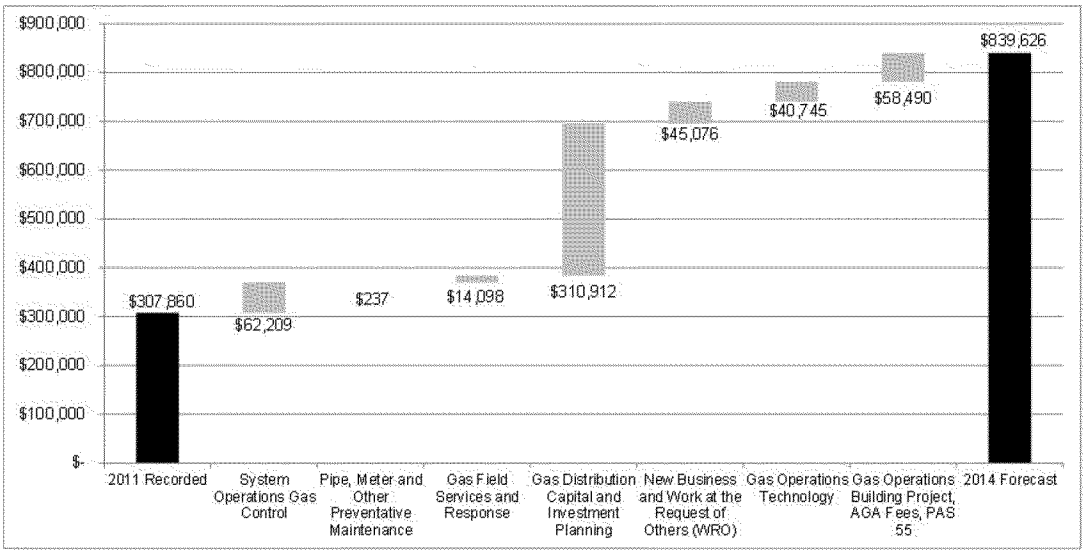
TABLE 1-7
PACIFIC GAS AND ELECTRIC COMPANY
GAS DISTRIBUTION
CAPITAL EXPENDITURES BY CHAPTER
(IN THOUSANDS OF NOMINAL DOLLARS)

| Line No. | Description | 2011 Recorded | 2014 Forecast |
|---|---|---|---|
| 1 | Systems Operations Gas Control | – | $62,209 |
| 2 | Gas Distribution Mapping and Records | – | – |
| 3 | Gas Distribution Integrity Management Program | – | – |
| 4 | Pipe, Meter, and Other Preventative Maintenance | $9 | 246 |
| 5 | Leak Survey and Repair | – | – |
| 6 | Gas Field Services and Response | 772 | 14,870 |
| 7 | Gas Distribution Capital and Investment Planning | 220,682 | 531,594 |
| 8 | New Business and Work at the Request of Others | 82,924 | 128,000 |
| 9 | Technical Training and Research and Development | – | – |
| 10 | Gas Operations Technology Costs | 2,977 | 43,722 |
| 11 | Gas Operations Building Projects, AGA Fees and PAS 55 Certification | 496 | 58,986 |
| 12 | Total Capital Expenditures | $307,860 | $839,626 |

Note: Differences due to rounding.

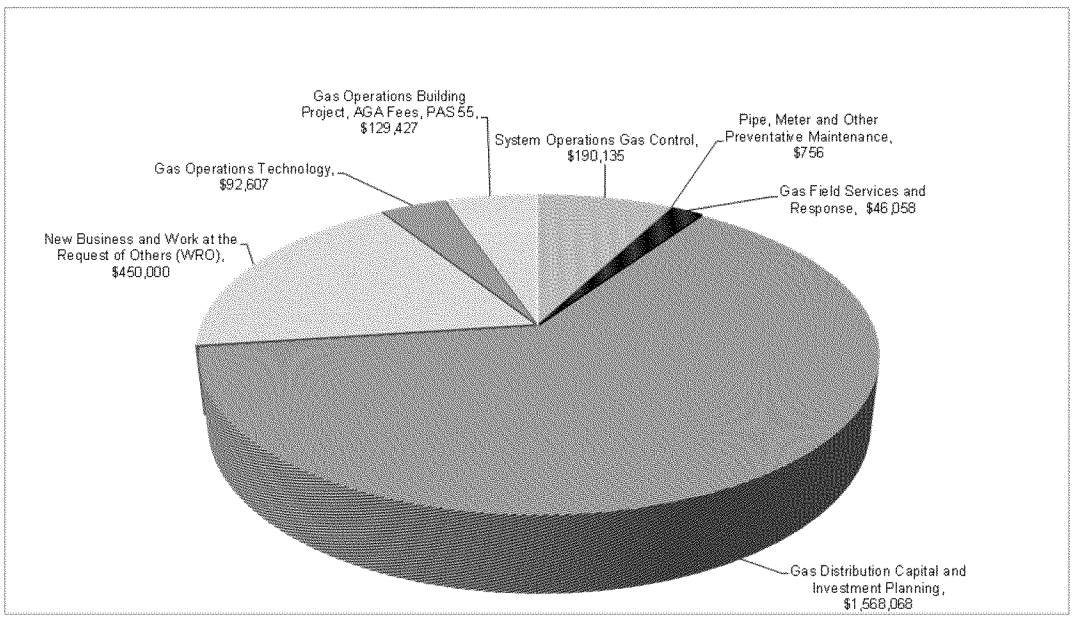
Figure 1-6 shows the gas distribution capital expenditures walk by chapter from 2011 to 2014.

FIGURE 1-6
PACIFIC GAS AND ELECTRIC COMPANY
GAS DISTRIBUTION CAPITAL EXPENDITURES WALK
2011-2014
(IN THOUSANDS OF NOMINAL DOLLARS)



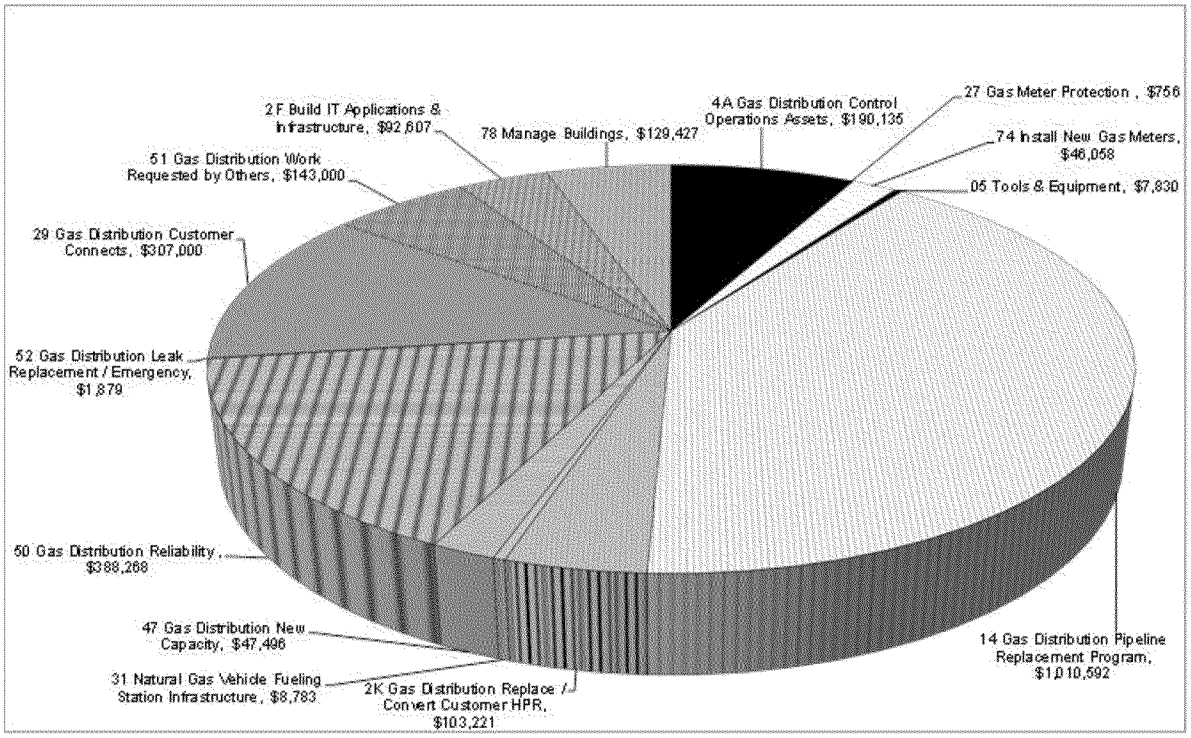

The overall breakdown of capital expenditures for the period 2014 to 2016 by chapter is shown in Figure 1-7, below.

FIGURE 1-7
PACIFIC GAS AND ELECTRIC COMPANY
GAS DISTRIBUTION CAPITAL EXPENDITURES BY CHAPTER
2014-2016
(IN THOUSANDS OF NOMINAL DOLLARS)



The overall breakdown of capital expenditures for the period 2014 to 2016 by MWC is shown in Figure 1-8, below.

FIGURE 1-8
PACIFIC GAS AND ELECTRIC COMPANY
GAS DISTRIBUTION CAPITAL EXPENDITURES BY MWC
2014-2016
(IN THOUSANDS OF NOMINAL DOLLARS)




## E. Conclusion

PG&E has heard its customers, employees and regulators and has responded. The bar has been raised, and Gas Operations has risen to the challenge. Gas Operations is poised to substantially improve its ability to provide safe and reliable gas distribution service, consistent with industry best practices, but needs more revenue to do so. With this new revenue, customers will see real, tangible benefits. Table 1-8 highlights the improvements customers can expect.

TABLE 1-8
PACIFIC GAS AND ELECTRIC COMPANY
CURRENT STATE (2011) VS. FUTURE STATE (2014)

| Line No. | | Current State (2011) | Future State (2014) |
|---|---|---|---|
| 1 | SAFETY AND COMPLIANCE | | |
| 2 | Emergency Response | | |
| 3 | Gas Odor Response – 30 Minutes | 58% | 75% |
| 4 | Public Safety Awareness (% monthly dig-ins without locate) | 54.6% | 51% (2012 target) |
| 5 | System Control & Monitoring | | |
| 6 | Remote Valve Monitoring & Controls | 300 SCADA locations | 199 SCADA/RTU control and monitor locations, 128 SCADA/RTU monitor locations with capability of control, 593 SCADA/RTU locations, 1,130 mobile ERS locations |
| 7 | Locate and Mark Response – 48 Hours | 98.9% | 99.4% |
| 8 | Distribution Control Center In Place | No | Yes |
| 9 | Leak Management | | |
| 10 | Leak Repair Performance (Grade 2 identified by Jan. 1 repaired by Dec. 31) | - | 100% |
| 11 | Picarro Pilot | - | 3 divisions plus leak clusters |
| 12 | Asset Risk Management | | |
| 13 | PAS 55 Certification in Place | No | Yes |
| 14 | RELIABILITY | | |
| 15 | Mapping Cycle Time (operational date to map updated in system) | 85.4 days (gas & electric combined) | < 30 days |
| 16 | Geographic Information System for Gas Distribution Assets in Place | No | Yes |
| 17 | Centralized Gas Distribution Asset Records in Place | No | Yes |
| 18 | Main Replaced – GPRP | 144,290 feet | 316,800 feet |
| 19 | Main Replaced – Plastic | 1,498 feet | 528,000 feet |
| 20 | Copper Services Remaining to be Replaced | 12,157 | 0 (excluding street moratoria impacts) |
| 21 | Gas Technical Training Center In Place | No | Yes |
| 22 | CUSTOMER | | |
| 23 | New Business Connection Days (SSG Short Cycle) | 94.4% < 21 days (gas & electric combined) | 95% < 14 days |
| 24 | New Business Project Satisfaction Survey (Very Good or Excellent) | 63% | 90% |
| 25 | GSR After Appointment Survey (Very Good or Excellent) | 94.9% | 95.4% (2012 target) |