

Application: 15-09-001
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Exhibit No.: (PG&E-15)
Date: November 20, 2015
Witness(es): Shelly J. Sharp

PACIFIC GAS AND ELECTRIC COMPANY

2017 GENERAL RATE CASE

SUPPLEMENTAL TESTIMONY

EXHIBIT (PG&E-15)

**STATUS UPDATES TO LIBERTY AND CYCLA RECOMMENDATIONS
SPECIFIED IN RATE CASE PLAN OIR DECISION 15-11-005**



**PACIFIC GAS AND ELECTRIC COMPANY
SUPPLEMENTAL TESTIMONY IN RESPONSE TO RATE CASE
PLAN OIR DECISION 15-11-005**

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SUPPLEMENTAL TESTIMONY IN RESPONSE TO RATE CASE PLAN OIR
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1 **PACIFIC GAS AND ELECTRIC COMPANY**
2 **SUPPLEMENTAL TESTIMONY IN RESPONSE TO RATE CASE PLAN**
3 **OIR DECISION 15-11-005**

4 **A. Introduction**

5 On November 5, 2015, the California Public Utilities Commission (CPUC or
6 Commission) issued Decision (D.) 15-11-005 in the Rate Case Plan Order
7 Instituting Rulemaking (OIR). This decision directed Pacific Gas and Electric
8 Company (PG&E or the Company) to consider additional testimony in its
9 2017 General Rate Case (GRC) to address certain recommendations made by
10 the Liberty Consulting Group (Liberty)¹ and the Cycla Corporation (Cycla)² in
11 PG&E’s 2014 GRC. Specifically, Ordering Paragraph (OP) 1 of
12 D.15-11-005 states:

13 To the extent Pacific Gas and Electric Company (PG&E) has not already
14 addressed certain of the recommendations contained in the consultants’
15 reports, PG&E shall supplement its 2017 general rate case application
16 (Application 15-09-001) to include explanations on how it plans to, or how
17 it has addressed, the recommendations referenced in this decision as
18 Liberty recommendations 5, 8, 9, 10 and 11, and Cycla recommendations
19 5, 6 and 7.

20 PG&E’s September 1, 2015 testimony addressed the Liberty and Cycla
21 recommendations in Exhibit (PG&E-1), Chapter 1, Appendix A. Nonetheless,
22 PG&E has prepared this supplemental testimony to provide a status report on
23 PG&E’s response to the particular Liberty and Cycla recommendations cited in
24 OP 1, as well as additional information regarding how PG&E’s 2017 GRC
25 forecast addresses the infrastructure sustainability issue raised in Liberty’s
26 recommendation #11.

27 **B. PG&E’s Status Report on the Liberty and Cycla Recommendations**
28 **Included in OP 1 of D.15-11-005**

29 OP 1 of D.15-11-005 identified eight recommendations made by Liberty and
30 Cycla in PG&E’s 2014 GRC. The following sections address each of these
31 recommendations.

1 May 6, 2013 “Study of Risk Assessment and PG&E’s GRC.” References throughout
this testimony to the Liberty report are to this report.

2 May 16, 2013 “Evaluation of PG&E’s 2014 Gas Distribution GRC Filing.” References
throughout this testimony to the Cycla report are to this report.

1 **1. Cyclo Recommendation #5 – Establish a monitoring program to track**
2 **progress in implementing activities funded through 2014 GRC**
3 **deliberation.³**

4 As PG&E indicated in its 2014 GRC rebuttal testimony⁴ and PG&E's
5 2017 GRC opening testimony, PG&E supports Cyclo's recommendation to
6 track progress in implementing activities funded through the GRC. The
7 2014 GRC decision adopted PG&E's proposal to continue producing an
8 annual budget report to track the progress of activities funded in the GRC
9 and to explain areas where there is a variance between what was adopted
10 and what the Company implemented.

11 Workpapers WP 1-1 through WP 1-268 in PG&E's 2017 GRC⁵ provide
12 PG&E's annual budget compliance reports that track the progress on
13 activities funded in the 2014 GRC. As indicated in Exhibit (PG&E-2),
14 Chapter 1, PG&E will provide its report for 2015 expenditures in March 2016
15 through supplemental workpapers once 2015 recorded information is
16 available. PG&E has proposed to continue this annual budget reporting for
17 the 2017 GRC cycle.⁶

18 In addition to the annual budget report, PG&E has been filing semi-
19 annual Gas Distribution Pipeline Safety Reports since September 2011 in
20 compliance with the 2011 GRC decision, D.11-05-018. PG&E has filed
21 nine semi-annual gas safety reports, including for the 2014 GRC period, that
22 describe in detail the funding for, and activities related to, gas distribution
23 safety and reliability.

3 Cyclo, p. vii.

4 A.12-11-009, Exhibit (PG&E-16), Chapter 2, Table 2-2.

5 A.15-09-001, Exhibit (PG&E-1), Chapter 1 Workpapers.

6 Exhibit (PG&E-2), Chapter 1, p. 1-2.

1 **2. Cyclo Recommendation #6 – *Work together with the Pipeline and***
2 ***Hazardous Materials Safety Administration (PHMSA), other state safety***
3 ***regulators, and the pipeline industry to promote advancements in***
4 ***pipeline system risk modeling.***⁷

5 As PG&E indicated in its 2014 GRC rebuttal testimony and PG&E's
6 2017 GRC opening testimony, PG&E supports this recommendation to
7 collaborate with PHMSA, other regulators and the pipeline industry to
8 advance pipeline risk modeling.

9 PG&E has participated in various benchmarking and industry
10 conferences—both inside and outside the natural gas industry—to advance
11 its knowledge of pipeline system safety. Some of these activities have
12 specifically focused on risk modeling. PG&E has also been working across
13 the natural gas pipeline industry to explore and leverage innovation in
14 developing methodologies to better inform risk modeling, including a
15 NYSEARCH project focused on interactive threats for gas transmission
16 pipelines. Further, Gas Operations is working with risk experts from
17 academia to leverage additional tools and techniques in risk modeling that
18 use simulation to better account for uncertainty and improve
19 decision-making.

20 PG&E is one of the first utilities in the nation to obtain Publicly Available
21 Specification (PAS) 55 and International Organization for
22 Standardization 55001 certification and PG&E is attempting to be the first
23 public utility in the world to achieve Responsible Care 14001 (RC 14001)
24 certification. Because of PG&E's achievements and leadership in asset
25 management and improving safety performance, PG&E's President of Gas
26 was asked to sit on the American Petroleum Institute (API) Committee
27 charged with developing an industry-wide Safety Management System. The
28 Committee is working with the National Transportation Safety Board
29 (NTSB), PHMSA, states and other industry representatives, in response to
30 NTSB recommendations resulting from the Enbridge pipeline incident. The
31 Committee's efforts led to the development of Recommended Practice 1173,
32 released on July 8, 2015, to help operators create a framework for

⁷ Cyclo, p. vii.

1 developing a comprehensive, process-oriented approach to safety,
2 emphasizing continual assessment and improvement.⁸ PG&E has been
3 certified by the Lloyds Register for Certification of Compliance under API
4 Recommended Practice 1173 for the operations of gas transmission and
5 distribution pipeline assets. PG&E is the first company to earn this
6 distinction under the new recommended practice.

7 In addition, PG&E participated in a workshop hosted by PHMSA on
8 September 9-10, 2015, regarding risk modeling. This workshop was held in
9 response to the NTSB's Safety Study regarding Transmission Integrity
10 Management. Representatives from other California operators, as well as
11 the CPUC, were in attendance. Probabilistic Risk Assessment (PRA) was
12 discussed as a tool to advance system risk modeling at the workshop.⁹

13 **3. *Cycla Recommendation #7 – Work together with PHMSA, other state***
14 ***safety regulators and the pipeline industry to promote exchanges of***
15 ***information on industry best practices that have demonstrated***
16 ***superior impact on safety performance.***¹⁰

17 As PG&E indicated in its 2014 GRC rebuttal testimony and PG&E's
18 2017 GRC opening testimony, PG&E supports this recommendation to work
19 closely with industry participants to identify safety performance best
20 practices. PG&E continues to participate in collaborative industry efforts to
21 learn and implement leading practices to improve safety. Examples in this
22 area include the deployment of Picarro, as well as "miniature robots" and
23 other innovative gas safety tools through industry organizations like
24 NYSEARCH, Pipeline Research Council International, and Operations
25 Technology Development. In addition, PG&E partners with universities to
26 further develop ideas and technologies that may improve pipeline safety.
27 PG&E has hired industry experts to further strengthen its knowledge base

8 <http://www.pipelinelaw.com/2015/07/08/pipeline-safety-management-systems-standard-ansiapi-rp-1173-released/>.

9 PG&E is conducting PRA pilots for external corrosion on gas transmission, electric distribution overhead primary conductor failure, and substation asset risk in the fourth quarter of 2015. Information gathered from these pilots will help to inform PG&E's next steps to achieve its Enterprise Risk Management program vision, which is described in Exhibit (PG&E-2), Chapter 3, page 3-9.

10 *Cycla*, p. viii.

1 and actively shares experiences and best practices in the Commission's
2 ongoing Safety Model Assessment Proceeding.

3 PG&E's risk team and other utilities also meet regularly to discuss areas
4 of best practice and to work toward greater uniformity based on best
5 practices. An example of PG&E's efforts to collaborate with others to
6 promote exchange of information on industry best practice is the risk
7 workshop PG&E and the Sempra utilities co-hosted for risk managers in the
8 utility and other industries to share best practices in June 2015.

9 Exhibit (PG&E-3), Chapter 1 provides an overview of Gas Operations'
10 benchmarking efforts and includes a list of industry best practices
11 incorporated in the 2017 GRC testimony.¹¹ Gas Operations' benchmarking
12 efforts include participation in annual association best practices
13 benchmarking, such as the American Gas Association (AGA) and Public
14 Service Electric and Gas Company (PSE&G), roundtable events and
15 conferences organized by AGA, the Interstate Natural Gas Association of
16 America, the Southern Gas Association, NACE International, and others, as
17 well as benchmarking with individual companies. Gas Operations has also
18 asked various industry experts to perform an independent review and
19 evaluation of the proposed 2016 Risk Registers for each of the asset
20 families. The experts ensured that the relative rankings of Gas Operations'
21 risks were consistent with industry incidents and that no risks were missing.
22 Most discussions with the industry experts and Gas Operations were around
23 the potential safety impacts of the asset failures.

24 Although this Cycla recommendation was addressed to Gas Operations,
25 Electric Operations also engages in best practices reviews related to safety.
26 For example, PG&E was instrumental in advocating for PSE&G member
27 utilities to benchmark wires down data. Beginning in 2012, PSE&G began
28 surveying utilities concerning the number of instances where an electric
29 transmission or primary distribution conductor is broken and falls from its
30 intended position to rest on the ground or a foreign object. PG&E continues
31 to work with PSE&G peer panel members to include more utilities in the
32 benchmark survey and ensure consistent measurement and reporting. In

¹¹ Exhibit (PG&E-3), Chapter 1, pp. 1-15 through 1-16, and p. 1-19, Table 1-2.

1 addition to wires down benchmarking, PG&E has also engaged in
2 benchmarking with the PSE&G peer utilities regarding the ability to respond
3 to potential hazards learned of through 911 calls. PG&E defines the metric
4 as the percent of time PG&E personnel respond (are on-site) within one
5 hour after receiving a 911 electric-related call, with on-site defined as
6 arriving at the premises where the 911 agency personnel are standing by.
7 PG&E is expected to achieve first quartile performance in this metric in
8 2015, and is driving further improvements in 2016. To further drive
9 performance in this area PG&E has begun measuring the percent of calls
10 responded to within 30 minutes. This tracking metric aligns with industry
11 best practice, as some of the best performers in this metric measure
12 response within 30 minutes.

13 Energy Supply is also active in industry benchmarking forums and
14 incorporates best practices into its operations. The Diablo Canyon Power
15 Plant (DCPP) is a member company of the Institute of Nuclear Power
16 Operations (INPO). INPO's mission is to promote the highest levels of
17 safety and reliability in the operation of commercial nuclear power plants.
18 This is achieved by:

- 19 • Establishing performance objectives, criteria and guidelines for the
20 nuclear power industry
- 21 • Conducting regular detailed evaluations of nuclear power plants
- 22 • Providing assistance to help nuclear power plants continually improve
23 their performance

24 Similarly, the Power Generation organization within Energy Supply has
25 benchmarked best safety practices through participation in several industry
26 groups such as the Electric Utility Cost Group, Center for Energy
27 Advancement through Technological Innovation, National Hydropower
28 Association, United States Society on Dams, Utility Public Safety Alliance,
29 and the Northwest Hydroelectric Association Operators Forum. Power
30 Generation has also specifically benchmarked dam safety with Southern
31 California Edison Company, PacifiCorp, and the East Bay Municipal
32 Utility District.

33 PG&E's non-operating lines of business (LOBs) also engage in safety
34 benchmarking efforts. For example, the Workforce Health Department has

1 benchmarked wellness and work conditioning programs with other large
2 employers and developed programs that will promote improved safety
3 through reduction in the number and severity of workplace injuries. The
4 Early Symptom Intervention and Work Conditioning programs target PG&E's
5 physical field workforce.¹²

6 **4. Liberty Recommendation #5 – Power Generation should modify the**
7 ***planning process in the future to: (a) provide allowances for new and***
8 ***carryover work and (b) provide the list of projects that are proposed to***
9 ***be deferred if less than requested funding is granted by the***
10 ***Commission.***¹³

11 As described in PG&E's September 1, 2015 testimony,¹⁴ Power
12 Generation updates its long-term plan three times a year to reflect newly
13 identified work, updates to project costs and schedules, and/or changes in
14 priorities or budgets. Additional information on Power Generation's planning
15 process is discussed in Section E.3 of Exhibit (PG&E-5), Chapter 4. Details
16 for Parts a and b of Liberty's Recommendation #5 are also incorporated in
17 PG&E's September 1, 2015 testimony as follows:

18 (a) As described in the Energy Supply exhibit,¹⁵ Power Generation included
19 specific line items in its 2017 expense and capital forecasts for
20 emergent work. PG&E expects emergent capital work to result from
21 storms or other force majeure events in 2017. PG&E's hydro facilities
22 are susceptible to damage during severe weather, seismic events, and
23 wildfires. Historically, such events have occurred annually but no
24 specific funding was set aside to repair or replace damaged facilities.

25 As a result, this emergent work has displaced other planned and needed
26 work. PG&E is proposing to establish a budget for emergent work going
27 forward so that other work can proceed as planned.

28 (b) All of the proposed work included in Power Generation's expense and
29 capital forecasts was evaluated using the Risk Informed Budget

12 Exhibit (PG&E-8), Chapter 5, pp. 5-6 and 5-7.

13 Liberty, p. S-5.

14 Exhibit (PG&E-5), Chapter 4, p. 4-79.

15 Exhibit (PG&E-5), Chapter 4, p. 4-47, lines 22-29, and p. 4-58, lines 16-25.

1 Allocation (RIBA) risk-scoring methodology described in Exhibit
2 (PG&E-2), Chapter 4. These scores were then used by management,
3 (along with other key data) to prioritize proposed work. Power
4 Generation provided a list of prioritized expense and capital work
5 activities for 2017 in the workpapers supporting Chapter 2 of the Energy
6 Supply exhibit.¹⁶ Power Generation will use this list of prioritized work
7 to determine what work would be rescheduled if its funding request is
8 not fully granted.

9 **5. Liberty Recommendation #8 – Executive sponsorship of risk**
10 ***management within the responsibility of the current incumbent would***
11 ***be enhanced by changing his reporting from the Chief Financial Officer***
12 ***to the Chief Executive Officer (CEO).***¹⁷

13 As PG&E indicated in Attachment A of Exhibit (PG&E-1), Chapter 1,
14 while PG&E's Chief Risk Officer does not directly report to the CEO, the
15 Enterprise and Operational Risk Management (EORM) Program is overseen
16 by the Audit Committee of the Board of Directors. Oversight of specific
17 enterprise-level risks is addressed by the various Board committees,
18 primarily the Nuclear, Operations, and Safety Committee. Senior
19 management also reviews progress to plan on risk management activities at
20 monthly Business Plan Review meetings, which are chaired by the
21 company's Presidents and attended by the Chief Executive Officer. In
22 addition, each of the LOBs has a Risk and Compliance Committee (RCC)
23 chaired by a Senior Officer and includes the senior leadership team of the
24 LOB. For example, the Gas Operations RCC is chaired by PG&E's Gas
25 Operations Senior Vice President and includes the President of the Gas
26 organization, all the Gas Operations Officers and Senior Directors.

27 Additional discussions on PG&E's risk organization and risk
28 management framework are provided in the following chapters in PG&E's
29 September 1, 2015 testimony:

- 30 • Exhibit (PG&E-2), Chapter 3, Section B.b and workpapers WP 3-11
31 to 3-13;

¹⁶ Exhibit (PG&E-5), Chapter 2, workpapers WP 2-25 through WP 2-38.

¹⁷ Liberty, p. S-7.

- 1 • Exhibit (PG&E-2), Chapter 5, Section 5.3;
- 2 • Exhibit (PG&E-3), Chapter 3;
- 3 • Exhibit (PG&E-4), Chapter 2; and
- 4 • Exhibit (PG&E-5), Chapter 2.

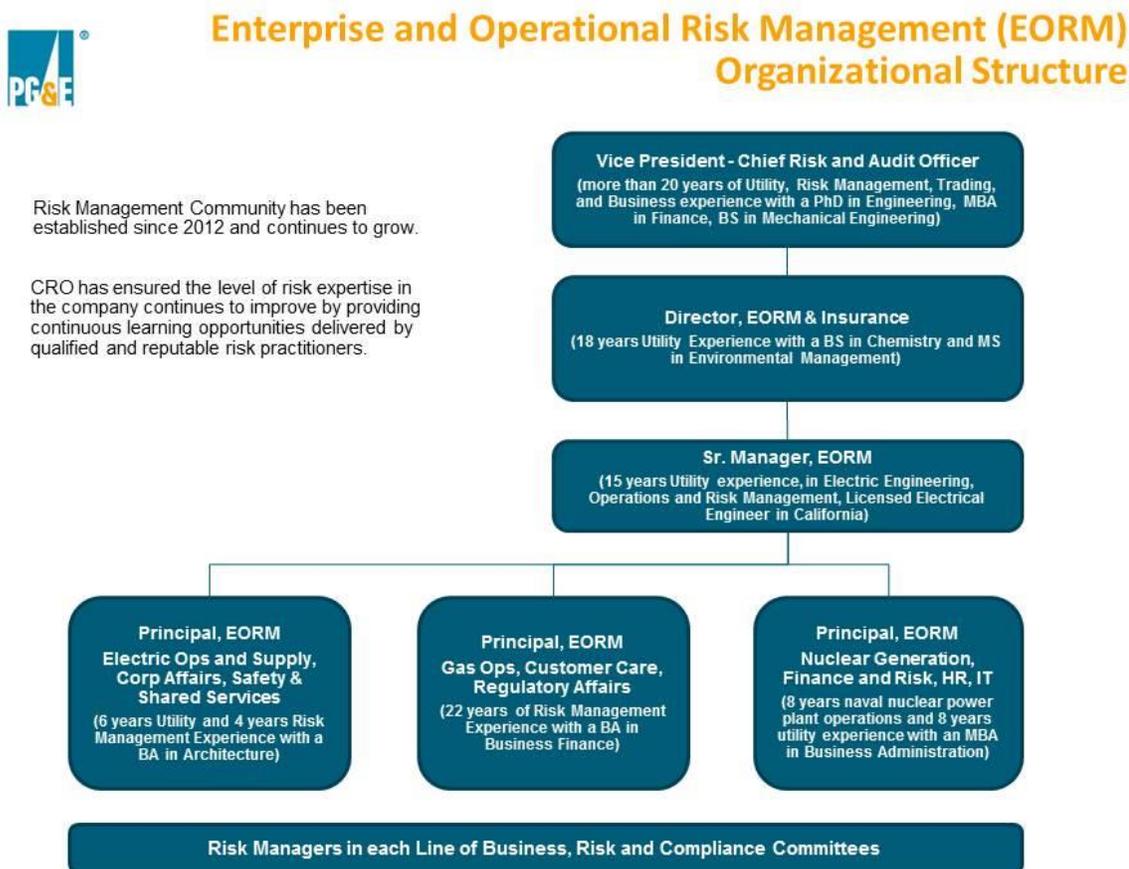
5 **6. Liberty Recommendation #9 – *The corporate risk organization would***
6 ***be significantly enhanced with the addition of a person with long and***
7 ***senior utility operating experience.*¹⁸**

8 As PG&E indicated in its 2014 GRC rebuttal testimony and PG&E's
9 2017 GRC opening testimony, PG&E continues to support this
10 recommendation to staff the risk organization with individuals with utility
11 operating experience. PG&E has established a new EORM group within the
12 Corporate Risk organization. The current Senior Manager of the group has
13 approximately 15 years of experience working in PG&E's Electric
14 Operations organization. Other members of the team have a combined 80+
15 years of experience in utility operations, risk management, compliance
16 and auditing.

17 The EORM program is discussed in Exhibit (PG&E-2), Chapter 3 and
18 workpapers WP 3-11 to 3-13. Figure 1 is the organization structure for
19 PG&E's EORM program with additional detail on the EORM team members'
20 expertise and tenure in the utility business.

¹⁸ Liberty, p. S-7.

FIGURE 1
ORGANIZATION CHART FOR EMPLOYEES WITHIN THE EORM TEAM



1 **7. Liberty Recommendation #10 – PG&E needs to recognize that the**
 2 **effective implementation of the program requires an inducement of**
 3 **culture change in how the Company assesses and uses risk**
 4 **considerations and a sense of greater urgency in moving toward its**
 5 **expected steady state.¹⁹**

6 As PG&E indicated in its 2014 GRC rebuttal testimony and PG&E’s
 7 2017 GRC opening testimony, PG&E continues to support this
 8 recommendation.

9 PG&E began implementing its expanded Integrated Planning process in
 10 2012. The process includes a Company evaluation of risks and compliance
 11 requirements (Session D), which then informs the Company’s strategy
 12 discussions (Session 1) and resource allocation (Session 2). PG&E is

¹⁹ Liberty, p. S-7.

1 currently on its fourth cycle of Integrated Planning and used outputs from the
2 process to develop the 2017 GRC forecast and testimony. PG&E
3 developed the RIBA program to “risk score” projects and programs in the
4 core LOBs. These risk scores were used to inform the Integrated Planning
5 process which, in turn, forms the basis of the 2017 GRC forecast.

6 Risk management, through Integrated Planning, forms the foundation for
7 system safety and compliance projects and programs forecast in PG&E’s
8 2017 GRC. In addition to the Integrated Planning process, PG&E’s EORM
9 program is fully operationalized in all LOBs. As described above, each LOB
10 has established its own RCC which is chaired by a Senior Officer in the
11 organization. These LOB RCCs meet at least four times per year—some
12 RCCs meet as often as monthly—and are responsible for overseeing risk
13 management activities within their LOB, including reviews of risk
14 assessments and progress made in implementing mitigation activities.
15 Additionally, progress and performance on risk management is included in
16 the Company’s previously mentioned Business Plan Review, a monthly
17 report by senior management on progress toward key operational
18 objectives.

19 The significant progress in implementing PG&E’s risk program is
20 described in Exhibit (PG&E-2), Chapters 3 and 4.

21 To address the cultural change aspect, PG&E’s lead safety Officer
22 committed that “We must continue to build on our strong safety foundation
23 and culture, so that our customers receive the safest and most reliable
24 service possible. This is only possible by ensuring that we have created a
25 culture that puts safety in the forefront for every one of our employees. ...
26 Our commitment to creating a leading safety culture is the reason we are
27 continuing to strengthen and integrate our risk management process into
28 operations. It is the reason we are implementing an Enterprise Corrective
29 Action Program, so that every single employee—no matter what his/her
30 role—feels empowered to identify and help resolve issues. It is the reason
31 training will be continued for leaders and enhanced for all ranks as we roll
32 out a peer to peer observation program. It is the reason contractor safety
33 will be expanded and enhanced to include more oversight, more training and
34 more coordination with our contracted teams. We are focusing on the right

1 things and encouraging the right behaviors. All of this work will continue to
2 drive a stronger safety culture, delivering safety results for our customers,
3 our employees and our contractors.”²⁰ To this end, PG&E has partnered
4 with a world-wide leading workforce safety company—Behavioral Science
5 Technology (BST)—to develop PG&E’s new Safety Culture program. PG&E
6 leadership have attended conferences with other BST members to
7 benchmark and learn about best practices in the Safety Culture arena.
8 PG&E has also established a Safety Culture team to support the goal of
9 building within PG&E a workforce culture where all employees care about
10 and set high safety standards for themselves and for one another, and have
11 the knowledge, skills and desire to complete each task safely. See
12 Exhibit (PG&E-7), Chapter 2 for additional information on PG&E’s Safety
13 Culture team.

14 **8. Liberty Recommendation #11 – *PG&E should consider the addition of***
15 ***an “infrastructure sustainability risk” to its enterprise risks. For***
16 ***example: “The risk that infrastructure deteriorates (due to age and/or***
17 ***other factors) at a pace and to an extent that makes future recovery***
18 ***prohibitively expensive.”***²¹

19 As PG&E indicated in its 2014 GRC rebuttal testimony and PG&E’s
20 2017 GRC opening testimony, although PG&E did not explicitly add an
21 “infrastructure sustainability risk” to its risk register, PG&E has been
22 addressing aging infrastructure issues for many years. Aging infrastructure
23 is addressed in PG&E’s risk management process through the evaluation of
24 asset condition, which is a key input for the process. Risk Registers in the
25 operating units are dominated by asset-related risks. Gas Operations
26 maintains its PAS 55 certification and uses the PAS 55 standards to
27 manage its physical assets. Electric Operations is developing the System
28 Tool for Asset Risk and Generation Risk Information Tool to facilitate the

²⁰ Exhibit (PG&E-2), Chapter 2.

²¹ Liberty, p. S-7.

1 management of asset-related risks for electric distribution and power
2 generation, respectively.²²

3 The Chief Risk and Audit Officer is leading an assessment of natural
4 hazards that could also impact the sustainability of PG&E's assets. This
5 effort is a multi-year, multi-department initiative to evaluate critical assets
6 and review climate change and geo sciences information to determine
7 assets that may be vulnerable to natural hazards such as earthquakes,
8 floods, sea-level rise, tsunamis etc.

9 Many of the programs implemented through PG&E's Integrated
10 Planning process will address the risk of assets deteriorating due to age or
11 other factors. In PG&E's 2017 GRC, PG&E has forecast programs and
12 projects that address aging infrastructure. Appendix A to this exhibit
13 includes a summary of key programs and projects by exhibit, chapter and
14 Major Work Category. Many of the programs and projects included in
15 Appendix A serve multiple purposes and address more than aging
16 infrastructure. Below is a high-level summary of PG&E's approach and a
17 few key programs and projects by exhibit.

18 **a. Exhibit (PG&E-3), Gas Distribution**

19 Gas Operations maintains its PAS 55 certification and uses the PAS
20 55 standards to manage its physical assets. This includes optimized
21 and whole-life management of its physical assets. Through this life
22 cycle management of its assets and through the assessment and
23 mitigation of asset-related risks, Gas Operations addresses the
24 "infrastructure sustainability" risk. The Gas Pipeline Replacement
25 Program (GPRP), Aldyl-A Main Replacement Program and the
26 Reliability Main Replacement Program are prime examples. The GPRP
27 focuses on cast iron and pre-1940 steel pipeline and the Aldyl A Plastic
28 Replacement Program focuses on pre-1985 Aldyl A pipeline. The
29 Reliability Main Replacement Program focuses on the replacement of
30 pipeline not covered by these two programs.

²² PG&E has also provided detailed descriptions of PG&E's asset management tools in its submission in the Safety Model Assessment Proceeding A.15-05-003.

1 PG&E, like most utilities in the United States, is facing increasing
2 challenges with its aging infrastructure. There is no specific life
3 expectancy for any pipeline system. PG&E's operating experience has
4 demonstrated that some pipelines may be operated up to 100 years
5 while others have life expectancies as short as 30 years. Using
6 100 years as a potential upper end of the life expectancy for legacy
7 pipelines, PG&E should be replacing on the order of 420 miles per year.
8 It is for these reasons that PG&E believes it should be systematically
9 increasing its pipeline replacement rates, to limit pipeline age while at
10 the same time managing risk and cost.

11 **b. Exhibit (PG&E-4), Electric Distribution**

12 As mentioned above, many of PG&E's programs forecast in the
13 2017 GRC are intended to address aging infrastructure, along with other
14 risks. Most of PG&E's electric distribution asset replacement programs
15 will address the risk of assets deteriorating due to age or other factors in
16 some way. The Pole Asset Management Program is a prime example.
17 Failing poles can pose a risk to public safety. The key risk drivers for
18 pole failure include deterioration, as well as third-party damage,
19 structural overload or equipment fire, vegetation, and natural hazards
20 including earthquake, wind, and fire. Through the Pole Asset
21 Management Program, PG&E inspects wood poles on a regular cycle
22 for early detection of deterioration, prolongs the service lives of wood
23 poles through reapplication of preservatives and/or restoration of
24 structural strength through reinforcement, identifies poles that are
25 nearing the end of their useful service lives, and replaces wood poles as
26 they approach the end of their service lives.

27 PG&E's electric distribution system includes approximately
28 2.48 million poles. Each year, on a continuous 10-year cycle that moves
29 geographically through the service territory, PG&E intrusively inspects
30 roughly 10 percent of the wood distribution poles installed across its
31 service territory. PG&E removes and installs an average of
32 21,000 poles per year. While not driven exclusively by the age of poles,
33 the Pole Asset Management Program is an example of an infrastructure

1 inspection and replacement program that is performed on a continuous
2 basis so future replacement is not prohibitively expensive.

3 Similarly, the Overhead (OH) Conductor Replacement Program
4 replaces, on a systematic and continuous basis, OH conductors that
5 have deteriorated. Deteriorated OH conductors are often characterized
6 by the unraveling of individual strands of wire, spans with multiple
7 splices, third-party damage, conductor corrosion and fault pitting. This
8 deterioration can be accelerated by agricultural chemical contamination
9 or sea spray conditions. PG&E's electric distribution system includes
10 over 113,300 circuit miles of OH conductor. PG&E plans to replace an
11 average of 425,000 circuit feet of OH conductor annually from
12 2015-2019, to improve safety and system integrity.

13 **c. Exhibit (PG&E-5), Energy Supply**

14 The generation functions within Energy Supply replace equipment
15 based on its condition, not strictly its age. However, the condition of the
16 equipment is generally correlated with the age of the equipment, and as
17 Energy Supply replaces equipment, it addresses the age of the
18 equipment. For example, there are a number of projects identified to
19 replace equipment within DCCP's Equipment Reliability Initiative (ERI).
20 The ERI strives to improve performance through a set of 23 action plans
21 that address station evaluation and prioritization practices as well as
22 maintenance plans and frequencies, and equipment replacement
23 schedules and inventoried spares. The ERI helps to ensure continued
24 safety and reliability at DCCP through projects such as replacing the
25 Unit 2 Main Generator Stator, Reactor Coolant Pump motor
26 replacements, purchase of spare Rod Control Cluster Assemblies, and
27 upgrades to all the major fuel handling components.

28 Another example is the replacement of aging hydroelectric
29 generating equipment, including, for example, generator windings,
30 turbine runners, seal rings, governors, exciters, wicket gates, valves,
31 breakers, switchgear, transformers, and station batteries. Power
32 Generation has also forecast other needed capital projects to address
33 dams, reservoirs, waterways, and other hydro-related infrastructure

1 before equipment or infrastructure failure results in higher-cost emergent
2 work or reliability issues.

3 **d. Other Efforts to Address Infrastructure Sustainability**

4 While the majority of programs and projects included in the forecast
5 to address infrastructure sustainability are included in the core
6 operational LOBs, there are programs in other exhibits that also address
7 infrastructure sustainability.

8 For Shared Services, there are a few key programs and projects
9 forecasted in the 2017 GRC that address infrastructure risk due to age
10 or other factors. Transportation Services' (Exhibit (PG&E-7), Chapter 3)
11 forecast includes significant capital for lifecycle replacement of PG&E
12 vehicles. Some of these vehicles are scheduled for replacement due to
13 normal lifecycle aging, and others are being replaced due to
14 environmental compliance with California Air Resource Board
15 regulations. Real Estate (Exhibit (PG&E-7), Chapter 6) also has
16 forecasted amounts for both expense and capital to address two areas
17 tied to infrastructure sustainability: facility asset upkeep and service
18 center optimization. Facility asset upkeep work is building maintenance
19 work on our real estate assets. Work is prioritized based on the risk to
20 the Company and is validated through physical inspections of each
21 asset to determine remaining useful life. Service center optimization
22 work will consolidate and relocate service centers based on several
23 factors, with age of facility assets being one of the factors considered.

24 PG&E's Information Technology (IT) organization has included in its
25 forecast five initiatives whose chief aim is to address the sustainability of
26 the Company's IT infrastructure. Three of these initiatives are part of
27 the IT organization's ongoing Core Lifecycle asset replacement
28 program, while the other two address specific instances of obsolescence
29 in PG&E's technology infrastructure.

30 The three Core Lifecycle initiatives—(1) Network Technologies Core
31 Lifecycle, (2) Data Center Technologies Core Lifecycle, and (3) User
32 Technologies Core Lifecycle—address the overall health of IT
33 infrastructure assets across the three largest IT asset families: Network
34 Technologies, Data Center Technologies, and User Technologies.

1 These initiatives include reactive replacements for assets that break and
2 proactive replacements or upgrades for high risk assets. PG&E
3 determines if an asset is high-risk by examining a variety of health
4 indicators, including asset age, asset performance, asset stability,
5 vendor support for the asset, and cybersecurity vulnerabilities present in
6 the asset. By regularly replacing assets that reach or surpass the end of
7 their useful service life, these initiatives help to maintain current
8 operational, reliability, and security standards for PG&E's IT
9 infrastructure. See Exhibit (PG&E-7), Chapter 9 for further discussion of
10 these initiatives and the infrastructure assets they address.

11 The last two initiatives—(4) Data Center Network Security and
12 Consolidation and (5) Legacy Carrier Technology Migration—address
13 critical IT infrastructure that needs to be modernized outside of the
14 typical asset replacement cycle. These initiatives will upgrade specific
15 components of PG&E's IT infrastructure that have become obsolete due
16 to growing incompatibility with evolving technology in use at PG&E and
17 in the IT industry. The Data Center Network Security and Consolidation
18 initiative aims to modernize and align outdated network technology
19 assets in PG&E data centers with current architectural and cybersecurity
20 standards. The Legacy Carrier Technology Migration initiative, on the
21 other hand, will transition PG&E off of obsolete network infrastructure
22 and services soon to be retired by the third party carriers that provide
23 them. Both of these initiatives will allow the Company to retain access
24 to IT services critical to PG&E operations. Further discussion of these
25 initiatives can be found in Exhibit (PG&E-7), Chapter 9.

26 Within the Corporate Services organizational forecasts presented in
27 the Administrative and General exhibit, PG&E's Corporate Security
28 Department is forecasting four projects to address the aging condition of
29 security equipment and technology. These projects are discussed in
30 Exhibit (PG&E-9), Chapter 3, and consist of the Security Asset
31 Management and Lifecycle Program to upgrade and replace aging
32 security technology and equipment in a planned, timely manner; the
33 Security Break/Fix Program to expedite the repair and replacement of
34 damaged or broken security technology and equipment; the Security

1 Preventative Maintenance program to test security equipment on an
2 annual basis; and the Security Control Center Technology program to
3 modernize and integrate a number of older, disparate security control
4 systems.

PACIFIC GAS AND ELECTRIC COMPANY
APPENDIX A
KEY PROGRAMS AND PROJECTS TO ADDRESS
INFRASTRUCTURE SUSTAINABILITY IN
PG&E'S 2017 GENERAL RATE CASE FORECAST

**Key Programs and Projects to Address Infrastructure Sustainability in PG&E's
2017 General Rate Case Forecast**

Line No.	Line of Business	Program/Project Name	MWC	Exhibit	Chapter
1	Electric Distribution	Pole Intrusive Inspection Program	GA	4	8
2		Pole Restoration Program	GA	4	8
3		Regulated Output Streetlight Replacement	2A	4	6
4		San Francisco Decorative Streetlights	2A	4	6
5		Network Protector Relay Replacement	2C	4	6
6		Transformer and Protector Replacement	2C	4	6
7		Network SCADA Safety Monitoring Project	2C	4	6
8		Pole Replacement	07	4	8
9		Overhead Conductor Replacement Program	08	4	9
10		Grasshopper/Overhead Switch Replacement	08	4	9
11		Wires Down Generated projects	08	4	9
12		Recloser Control Upgrades	49	4	9
13		Replace Distribution Line SCADA	09	4	10
14		Replace Substation SCADA	09	4	10
15		Replace Substation Protective Relays	09	4	10
16		Reliability Cable Replacement	56	4	11
17		Cable Rejuvenation and Testing	56	4	11
18		Network Cable Replacement	56	4	11
19		LBOR Switch Replacements	56	4	11
20		Battery Replacement	48	4	12
21		Circuit Breaker Replacement	48	4	12
22		Other Equipment Replacement - Switches	48	4	12
23		Switchgear Replacement	48	4	12
24		Other Equipment Replacement - Civil Structures	48	4	12
25		Other Equipment Replacement - Insulators	48	4	12
26		Transformer Replacement	54	4	12
27		Substation Seismic Upgrades	58	4	12
28		SCADA Platform Upgrade and DMS Integration	2F	4	15
29	Energy Supply	DCCP Capital	20	5	3
30		Maintain DCCP Plant Assets	BS	5	3
31		Install/Replace Equipment for Hydro Safety & Regulatory	2L	5	4
32		Install/Replace Equipment Hydro Generating Equipment	2M	5	4
33		Install/Replace Reservoirs, Dams & Waterways	2N	5	4
34		Install/Replace Hydro Infrastructure	2P	5	4
35		Maintain Reservoirs, Dams & Waterways	AX	5	4
36		Maintain Hydro Generating Equipment	KH	5	4
37		Maintain Hydro Buildings and Infrastructure	KI	5	4
38		Install/Replace Equipment for Fossil Safety & Regulatory	2R	5	5
39		Install/Replace Equipment Fossil Generating Equipment	2S	5	5
40		Install/Replace Fossil Infrastructure	2T	5	5
41		Install/Replace Equipment for Solar Safety & Regulatory	3A	5	5
42		Install/Replace Equipment Solar Generating Equipment	3B	5	5
43		Maintain Fossil Generating Equipment	KL	5	5
44		Maintain Fossil Buildings and Infrastructure	KM	5	5
45		Maintain Solar Generating Equipment	KR	5	5
46		Maintain Solar Buildings and Infrastructure	KS	5	5
47		IT Infrastructure - Nuclear	2F	5	7
48		IT Infrastructure - Power Generation	2f	5	7
49	Gas Operations	Gas Pipeline Replacement Program (GPRP)	14	3	4
50		Aldyl-A Plastic Replacement Program	14	3	4
51		Main Replacement Reliability	50	3	4
52		Service Replacement Reliability	50	3	4
53		Regulator Rebuild/Component Replacement Program	50	3	5
54		High Pressure Regulator Replacement/Rebuild Program	2K	3	5
55		Compressed Natural Gas Fueling Station Infrastructure	31	3	5
56		Gas Regulator Replacement	74A	3	6A
57		GD Corrective Maintenance	FI	3	6A
58		Maintain Gas Meters	HY	3	6A
59		Cathodic Protection Systems Capital Projects	50	3	6B
60		Atmospheric Corrosion Mitigation	FH	3	6B
61		Cathodic Protection Corrective Maintenance	FI	3	6B
62		Service Replacement Reliability due to Leaks	50	3	6C
63		Complex Service Replacement Reliability due to Leaks	50	3	6C

Line No.	Line of Business	Program/Project Name	MWC	Exhibit	Chapter
64	Safety & Shared Services	Facility Asset Upkeep	BI/22	7	6
65		Service Center Optimization Program	JH/23	7	6
66		Customer Service Office (CSO) Relocation Program	23	7	6
67		Vehicle Lifecycle Replacement	4	7	3
68		Vehicle Replacement ARB Compliance	4	7	3
69		Environmental Tank Removal	12	7	7
70		Tools and Equipment (Transportation Services)	5	7	3
71		Tools and Equipment (Materials)	5	7	4
72					
73	Information Technology	Network Technologies Core Lifecycle	2F/JV	7	9
74		Data Center Network Security & Consolidation	2F/JV	7	9
75		Legacy Carrier Technology Migration	2F/JV	7	9
76		Data Center Technologies Core Lifecycle	2F/JV	7	9
77		User Technologies Core Lifecycle	2F/JV	7	9
78					
79	Administrative and General	Security Asset Management and Lifecycle Program	2F	9	3
80		Security Asset Management Break/Fix	2F	9	3
81		Security Preventative Maintenance	JV	9	3
82		Security Control Center Technology	JV/2F	9	3