

Company: San Diego Gas & Electric Company (U 902 M)
Proceeding: 2019 General Rate Case
Application: A.17-10-007
Exhibit: SDG&E-15-2R

SECOND REVISED

SAN DIEGO GAS & ELECTRIC COMPANY

DIRECT TESTIMONY OF WILLIAM H. SPEER

(ELECTRIC DISTRIBUTION O&M)

May 7, 2018

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA**



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APPENDICES

Appendix A - Glossary of Terms..... WHS-A-1

SUMMARY

O&M	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Total Non-Shared Services	122,467	168,626	46,159
Total Shared Services (Incurred)	0	0	0
Total O&M	122,467	168,626	46,159

Summary of Request

San Diego Gas & Electric (SDG&E) is requesting the Commission adopt its Test Year 2019 (TY 2019) forecast of \$168,626,000 for Electric Distribution Operations and Maintenance (O&M), to maintain the delivery of safe, reliable, and affordable electric service to our customers. SDG&E prioritizes its work to comply with applicable laws and regulations and to provide system integrity and reliability in accordance with our commitment to safety. SDG&E's longstanding commitment to safety focuses on three primary areas: 1) public safety, 2) employee safety, and 3) contractor safety. At SDG&E, we have a safety-first culture that is embedded in the way we carry out our work, design and build our system, and operate and maintain our system. This safety-first culture is stressed to our employees from initial training, through project design, prioritization of work, operation of the system, inspection and maintenance, and construction. Over the last decade, SDG&E's overall safety performance has measurably improved. Safety and risk reduction for our employees, contractors, and the public are core values at our company.

In addition to achieving excellent performance in safety in recent years, the reliability of SDG&E's electric service has also been an area of consistent superior performance. SDG&E's best-in-class reliability performance has resulted in recognition and awards from third parties. SDG&E has been ranked "Best in the West" in reliability by the PA Consulting Group,¹ earning their regional ReliabilityOne award for eleven consecutive years. In addition, SDG&E also received the PA Consulting Group national ReliabilityOne² award in 2014, and they recognized

¹ See <http://www.paconsulting.com/newsroom/releases/us-power-utilities-achieve-improved-reliability-performance-for-four-consecutive-years-17-november-2016/>.

² See <http://www.prnewswire.com/news-releases/pa-consulting-group-recognizes-north-american-utilities-for-excellence-in-reliability-at-the-2014-reliabilityone-awards-283184191.html>.

SDG&E in 2015 for Outstanding Response to a Major Outage Event.³ SDG&E has also received awards for achievements in the area of vegetation management, an area that has a significant impact on reliability of the overhead electric system. SDG&E has won the “Tree Line USA” award from the Arbor Day Foundation for 15 consecutive years. This award recognizes excellence in the categories of quality tree care, annual worker training, tree planting, and public education.

My testimony addresses the forecasted costs associated with operating and maintaining the SDG&E electric distribution system in a safe and reliable manner. The O&M electric distribution costs are broken down into 26 primary cost categories, four of which comprise the majority (68.1%) of the overall forecast. The four major categories are Construction Services (11.4%), Electric Distribution Operations (13.4%), Electric Regional Operations (27.7%), and Vegetation Management (15.7%). Each specific work category is described in greater detail in my testimony.

In preparing my forecasts for TY 2019 requirements, historical 2012 to 2016 spending levels were analyzed, underlying cost drivers were considered, and future requirements were assessed. Forecast methodologies were selected, based on future expectations for the cost category, taking into account the underlying cost drivers. The forecast methodologies used include:

- Forecasts based on historical averages;
- Forecasts based on the base-year (2016) adjusted recorded spending; and
- Forecasts based on linear trends

In addition, my testimony identifies work requirements incremental to levels of historical spending necessary to maintain the safe and reliable operation of the electric distribution system. Funding requirements for these new or more extensive work elements are developed using zero-based methods.

³ See <http://www.paconsulting.com/newsroom/releases/pa-consulting-group-honours-north-american-utilities-for-reliability-excellence-at-2015-reliabilityone-awards-23-october-2015/>.

**SDG&E DIRECT TESTIMONY OF WILLIAM H. SPEER
(ELECTRIC DISTRIBUTION O&M)**

I. INTRODUCTION

A. Summary of Electric Distribution O&M Costs and Activities

My testimony demonstrates that SDG&E’s forecasts of expenses required to operate and maintain its electric distribution system are reasonable and should be adopted by the California Public Utilities Commission (CPUC). This forecast supports SDG&E’s fundamental philosophy to achieve operational excellence while providing safe and reliable delivery of electric service at a reasonable cost to the ratepayer, while meeting all regulatory requirements and striving for a high level of customer service. SDG&E requests the Commission adopt its TY 2019 forecast of \$168,626,000 for Electric Distribution Operations and Maintenance (O&M) expenses, set forth in this chapter. For matters related to SDG&E’s Electric Distribution capital requests, please see the testimony of Mr. Alan Colton (Exhibit SDG&E-14). Table WS1 summarizes my sponsored costs.

**TABLE WS-1
Test Year 2019 Summary of Total Costs**

Functional Area: ELECTRIC DISTRIBUTION	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Total Non-Shared Services	\$122,467	\$168,626	\$46,159
Total Shared Services (Incurred)	0	0	0
Total O&M	\$122,467	\$168,626	\$46,159

SDG&E operates and maintains an electric distribution system that serves approximately 3.1 million people, through approximately 1.4 million meters. SDG&E’s service territory spans more than 4,100 square miles from the California-Mexico border north to Southern Orange County and Riverside County, and from the San Diego County Coastline east to Imperial County. SDG&E’s system includes 134 distribution substations, 1,035 distribution circuits, 225,697 poles, 10,558 miles of underground systems, 6,527 miles of overhead systems, and various other components of distribution equipment.

SDG&E’s distribution system (at year-end 2016) is further characterized by a customer mix of approximately 1.27 million residential, 158,000 commercial and industrial, and 46,000 street light customers. There is an average of 1,390 customers per circuit. In addition, there are

1 approximately 450,000 trees (in the proximity of SDG&E overhead lines) maintained through
2 SDG&E's vegetation management program. The electric distribution system consists of
3 predominantly underground facilities, approximately 62%. This percentage is much larger than
4 that of other large California Investor Owned Utilities (IOUs). The underground system can lead
5 to higher inspection and maintenance costs given the potential for traffic control on manhole
6 inspections, and extra manpower required to safely perform inspections on padmounted
7 equipment. The primary distribution voltage is predominantly 12 kV, with some large areas of
8 4 kV. These areas are being converted through a combination of attrition, maintenance
9 upgrades, and programmatic efforts.

10 **B. Summary of Risk Assessment Mitigation Phase-Related Costs**

11 Certain of the costs supported in my testimony are driven by activities described in
12 SoCalGas and SDG&E's November 30, 2016 Risk Assessment Mitigation Phase (RAMP)
13 Report.⁴ The RAMP Report presented an assessment of the key safety risks at SoCalGas and
14 SDG&E, and proposed plans for mitigating those risks. As discussed in the Risk Management
15 testimony chapters of Diana Day and Jamie York (Exhibit SCG-02/SDG&E-02, Chapters 1 and
16 3, respectively), the costs of risk-mitigation projects and programs were translated from that
17 RAMP Report into the individual witness areas.

18 In the course of preparing the General Rate Case (GRC) forecasts, SDG&E continued to
19 evaluate the scope, schedule, resource requirements and synergies of RAMP-related projects and
20 programs. Therefore, the final representation of RAMP costs may differ from the ranges shown
21 in the original RAMP Report.

22 Table WS-2 provides a summary of the RAMP-related costs supported by my testimony
23 by RAMP risk. Tables describing each RAMP chapter mentioned below and workgroups/cost
24 centers carrying RAMP-related costs are also provided further below, in Section II.A of my
25 testimony (Tables WS-4 and WS-5).

26

⁴ Available at <https://www.sdge.com/regulatory-filing/20016/risk-assessment-and-mitigation-phase-report-sdge-socalgas>.

1
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TABLE WS-2
Summary of RAMP Overlay

RAMP Risk Chapter	2016 Embedded Base Costs (000s)	TY 2019 Estimated Incremental (000s)	Total (000s)
SDG&E-1 Wildfires Caused by SDG&E Equipment	34,919	5,807	40,726
SDG&E-3 Employee, Contractor and Public Safety	29,610	6,000	35,610
SDG&E-4 Distributed Energy Resources (DERs)	0	575	575
SDG&E-8 Aviation Incident	55	355	410
SDG&E-11 Unmanned Aircraft System (UAS) Incident	0	162	162
SDG&E-12 Electric Infrastructure Integrity	1,261	21,040	22,301
SDG&E-13 Records Management	4,855	1,281	6,136
SDG&E-14 Climate Change Adaptation	24	403	427
SDG&E-17 Workforce Planning	1,206	152	1,358
Total O&M	71,930	35,775	107,705

3
4

As the table demonstrates, risk mitigation activities are a major cost driver for the 2019 forecast, accounting for \$36M of my approximately \$46M net proposed increase from 2016 (78%). The majority of the proposed incremental increases fall into the Electric Infrastructure Integrity risk category, where SDG&E is planning to evaluate overhead structures across the entire service territory. This program, the Pole Risk Mitigation and Engineering (PRiME) program, will evaluate approximately 22,600 poles in 2019. While SDG&E’s system was built to and is in compliance with General Order (GO) 95 design requirements, much of the overhead infrastructure is aging, and the standards, information, and design and evaluation tools have improved significantly over the past 10 years. In addition, regulatory requirements related to pole loading have increased through lessons learned. Advanced meteorological data is now readily available for designers and/or planners, and there have been significant advances in design methodology and software. SDG&E now has access to wind and weather data across the service territory, which has enabled the development of a detailed design wind map, and the development of improved design criteria. SDG&E has also begun utilizing Light Detection and Ranging (LiDAR) survey data in conjunction with 3-Dimensional (3-D) design software to accurately model distribution facilities. This software was historically used only for

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1 transmission design, but has now been adopted for distribution design and analysis as well. The
2 Power Line Systems Computer Aided Drafting and Design (PLS-CADD) 3-D software utilizes
3 finite element structural analysis, and gives designers the ability to evaluate conductor clearances
4 and model the dynamic interactions of the overhead electric facilities. Given these changes and
5 improvements, PRiME, which is discussed in detail in the body of my testimony, will evaluate
6 the overhead structure population over a period of nine years and make both O&M and capital
7 repairs/replacements where necessary, so that the structural integrity of the overhead electric
8 system will meet today's standards. This program is designed to reduce the risk of pole failures
9 across the service territory, improving public safety and reliability for our customers.

10 In a 2015 report from the Safety and Enforcement Division of the CPUC (Staff Report on
11 the Southern California Gas Company & San Diego Gas and Electric Company 2016-2018
12 Consolidated General Rate Case Applications A.14-11-003 and A.14-11-004), it was
13 recommended that SDG&E pursue an asset management strategy in line with ISO 55000. Since
14 the report was issued, SDG&E has created an Asset Management organization, which resulted in
15 incremental upward pressures categorized under the Electric Infrastructure Integrity risk chapter,
16 which are represented in my testimony under the Asset Management workgroup. The new Asset
17 Management organization will align the asset management functions and strategies across
18 SDG&E, to avoid performing these functions in silos. Establishing an internal structure is
19 recommended by ISO 55000 and will allow SDG&E to more optimally balance asset cost, asset
20 risk, and asset performance. These benefits align with SDG&E's goals of safety, reliability,
21 affordability and customer satisfaction.

22 Another cost driver for TY 2019 is our Customer Communications Safety Program,
23 which makes up the entirety of our proposed incremental increase on the risk mitigation efforts
24 for employee, contractor, and public safety risk category. Public safety is ingrained in our safety
25 culture and is a top priority for SDG&E. Many of the programs SDG&E has undertaken and
26 many of the activities SDG&E performs today have a direct impact on public safety. Proactive
27 efforts such as our fire risk mitigation programs, our inspection and maintenance programs,
28 advances in system protection, and our design and engineering standards and work methods are
29 in place to reduce the risks associated with the electric system. In the event of an electric
30 emergency, SDG&E's 24/7/365 approach to emergency response to quickly find, assess, and
31 make-safe potentially dangerous situations reduces the potential for public exposure. In

1 evaluating risks to the public, however, SDG&E sees an opportunity to further improve public
 2 safety by directly reaching out and educating the public through a media outreach program. This
 3 program is designed to provide customers with the education and tools to respond to electric and
 4 gas emergencies, such as a downed power line, in a way that will keep them and their families
 5 safe. It will also provide information on how to proactively avoid dangerous situations such as
 6 gas and electrical line dig-ins on home or development projects. This program is designed to
 7 reduce the risk of a public safety incident, add another valuable proactive public safety program
 8 to SDG&E's portfolio, and is in alignment with SDG&E's safety goals and culture. The
 9 Customer Communications Safety Program is described in detail in the body of my testimony
 10 under the Electric Regional Operations workgroup.

11 **C. Summary of Costs Related to Fueling our Future (FOF)**

12 As described in the Fueling Our Future Policy (FOF) Policy testimony of Hal Snyder and
 13 Randy Clark (Exhibit SCG-03/SDG&E-03), SoCalGas and SDG&E kicked off the FOF initiative
 14 in May, 2016. The primary objective of the FOF initiative was to identify and implement
 15 efficiencies and operational enhancements across the Corporation. My forecasts include
 16 approximately \$8.5M in net downward pressures due to FOF efficiency savings, with
 17 approximately \$4.8M coming from the Electric Regional Operations work group. These
 18 efficiencies were established through a variety of means including improving processes,
 19 leveraging technology for more targeted maintenance, and improved cost controls. A summary
 20 of savings by work group is shown in Table WS-3, for TY 2019.

21 **TABLE WS-3**
 22 **Summary of Net FOF Savings**

Categories of Management	TY 2019 Estimated Savings (\$000's)
Construction Services	-1,313
DistOps Enterprise Geographic Info Sys Standards	-222
Electric Distribution Operations	-288
Project Management	-74
Electric Regional Operations	-4,770
Skills and Compliance Training	-112
Substation C&O	-686
System Protection	-50
Distribution and Engineering	-485
Troubleshooting	-100
Vegetation Management	-84
Regional Public Affairs	-306
Technology Solutions and Reliability	7
Totals	-8,483

1 **D. Cost Drivers Introduction**

2 With respect to electric distribution system management, SDG&E seeks to maintain a
3 safe system for employees and customers, a high level of service quality and reliability, and a
4 high level of customer satisfaction. To achieve these objectives, SDG&E balances the expenses
5 of system maintenance and operations with reasonable replacement strategies, and optimizes
6 those expenses within desired levels of service and system design. SDG&E’s commitment to
7 public safety, employee safety, reliability performance, affordability, and customer satisfaction
8 are direct results of this pursuit.

9 Throughout my testimony, I have categorized new or expanded SDG&E programs
10 causing incremental cost pressures in accordance with six major factors impacting the TY 2019
11 expenditures:

- 12 • RAMP Proposed Activities
- 13 • System Growth
- 14 • Safety and Reliability
- 15 • Environmental and Regulatory Compliance
- 16 • Workforce Development
- 17 • FOF Efficiencies

18 **II. RAMP AND SAFETY CULTURE**

19 **A. RAMP**

20 As illustrated in Table WS-2, part of my requested funds is linked to mitigating the top
21 safety risks that have been identified in the RAMP Report. These risks are further described in
22 Table WS-4 below:

23 **TABLE WS-4**
24 **RAMP Risk Chapters**

RAMP Risk	Description
Wildfire	This is the risk of wildfires caused by SDG&E equipment, including third-party pole attachments. SDG&E continues to build upon its company-wide focus on addressing and minimizing wildfire-related risks to the public health, safety, and welfare.
Employee, Contractor, and Public Safety	The Employee, Contractor and Public Safety risk is the risk of non-adherence to safety programs, policies and procedures, which may

	result in severe harm to employees, contractors, and the general public.
Distributed Energy Resources (DER)	This is the risk of safety and reliability incidents due to the high penetration of DERs on SDG&E's system.
Aviation Incident	This risk is an aviation incident, by SDG&E contractors, subcontractors, or other third parties who may enter SDG&E's service territory, that results in damages to SDG&E infrastructure.
Unmanned Aircraft System (UAS) Incident	This risk is the risk of an employee, contractor, subcontractor, third party or parties, or external entities operating a UAS which results in damage to SDG&E infrastructure.
Electric Infrastructure Integrity	This risk is the risk of a safety, environmental, or reliability incident due to equipment failure. This equipment or asset failure could be caused by conditions including, but not exclusive to: degradation, age, operation outside of design criteria due to unexpected events or field conditions (e.g., force of nature), or an asset that is not constructed with the latest engineering standards.
Records Management	The Records Management risk relates to the potential public safety, property, reliability, regulatory, or financial impacts that result from the use of inaccurate or incomplete records.
Climate Change Adaptation	Identified risks to SDG&E's gas and electric system due to an evolving climate across the San Diego region, which includes increasing temperatures, a higher potential for wildfire occurrence, accelerated sea level rise, and changes to rainfall patterns.
Workforce Planning	Workforce Planning is the risk of loss of employees with deep knowledge, understanding and experience in operations due to retirements. The departure of employees who fill critical operational roles could affect employee and/or public safety, as their knowledge and experience is essential to safely operating and maintaining SDG&E's gas and electric system.

1
2 In developing my request, priority was given to these key safety risks to determine which
3 currently established risk-control measures were important to continue and whether incremental
4 efforts were needed to further mitigate these risks. The risk of wildfire threat, for example, has
5 been one of SDG&E's top safety risks since the 2007 fires. Like safety, fire risk mitigation has
6 become ingrained in our company's culture. SDG&E has a company-wide, single-minded focus
7 on addressing and minimizing wildfire-related risks as demonstrated in our Fire Prevention Plan⁵

⁵ SDG&E's October 31, 2016 Fire Prevention Plan is available at <https://www.sdge.com/documents/fire-prevention-plan>.

1 (FPP) and RAMP Report. SDG&E's commitment to fire safety, prevention, mitigation, control,
2 and recovery is a central tenet of our corporate culture. SDG&E takes a leadership role in
3 addressing fire threats in the communities we serve by sharing our personnel, resources,
4 information, communications facilities, and/or fire-defense assets so as to enhance the
5 capabilities of our local communities to defend against any repeats of catastrophic wildfire
6 events experienced in southern California. The FPP describes SDG&E's comprehensive fire
7 safety plans. SDG&E spent approximately \$35M in electric distribution O&M wildfire risk
8 mitigation programs in 2016, including vegetation management, capstone fire brigade crews, and
9 the O&M component of the FiRM capital project. In addition, SDG&E is proposing \$5.8M in
10 new mitigation programs, including year-round availability of the helitanker discussed in the
11 testimony of David Geier (Exhibit SDG&E-50),⁶ an expanded long span inspection and repair
12 program, and new software and information management tools for improved emergency
13 response.

14 Identifying projects and programs that help to mitigate these risks manifest themselves in
15 my testimony as adjustments to my forecasted costs. This adjustment process was used to
16 identify both RAMP mitigation costs embedded as part of traditional and historic activities, as
17 well as forecasted RAMP-incremental costs that are associated with mitigation strategies
18 corresponding to new or expanded activities. These can be found in my workpapers as described
19 below. The general treatment of RAMP forecasting is described in the testimony of RAMP to
20 GRC Integration witness Jamie York (Exhibit SCG-02/SDG&E-02, Chapter 3). There are also a
21 few instances where, in-the-course-of developing my GRC forecast, additional safety-related
22 mitigation activities were identified that would have been included in the November 2016
23 RAMP Report, were it not for timing issues. These activities have been marked in my testimony
24 as RAMP-Post Filing and treated as if they had been included in the original RAMP Report. An
25 example is the establishment of the centralized Asset Management work group to mitigate risks
26 associated with Electric Infrastructure Integrity category and the increased helitanker support
27 program to mitigate risks associated with the Wildfire category.

⁶ The Supplemental Direct Testimony of David L. Geier, Exhibit SDG&E-50 (Supplemental Year-Round Wildfire Risk Mitigation, served May 4, 2018).

For each of these risks, an “embedded” 2016 cost-to-mitigate and any incremental costs expected by TY 2019 are shown in Table WS-5 below. RAMP-related costs are further described in Sections III, IV, and V below, as well as in my workpapers. The table also provides the location in my workpapers where the specific adjustments representing those incremental costs can be found.

TABLE WS-5
RAMP 2016 actuals and 2019 estimates by work group

SDG&E-1 Wildfires Caused by SDG&E Equipment	2016 Embedded Base Costs (000s)	TY 2019 Estimated Incremental (000s)	Total (000s)
1ED002.000, Construction Services	3,089	0	3,089
1ED011.000, Electric Regional Operations	3,494	5,270	8,764
1ED018.000, Distribution and Engineering	191	0	191
1ED021.000, Vegetation Management (Pole Brushing)	0	29	29
1ED021.001, Vegetation Management (Tree Trimming)	23,005	0	23,005
1ED022.000, Regional Public Affairs	102	0	102
1ED027.000, Emergency Management	5,038 ⁷	508	5,546
Total	34,919	5,807	40,726
SDG&E-3 Employee, Contractor and Public Safety	2016 Embedded Base Costs (000s)	TY 2019 Estimated Incremental (000s)	Total (000s)

⁷ The base line costs associated to the Emergency Management workgroup are actually spread across multiple workgroups including Electric Regional Operations, Construction Services, and Troubleshooting. The activities associated with these RAMP baseline activities are managed out of Emergency Services, so for ease of creating one adjustment, Emergency Services was chosen as the representative area for these baseline activities.

1ED002.000, Construction Services	752	0	752
1ED011.000, Electric Regional Operations	5,134	6,000	11,134
1ED013.000, Skills & Compliance Training	16,418 ⁸	0	16,418
1ED018.000, Distribution and Engineering	2,942	0	2,942
1ED021.000, Vegetation Management (Pole Brushing)	3,450	0	3,450
1ED023.000, Major Projects	6	0	6
1ED027.000, Emergency Management	908	0	908
Total	29,610	6,000	35,610
SDG&E-4 Distributed Energy Resources (DERs)	2016 Embedded Base Costs (000s)	TY 2019 Estimated Incremental (000s)	Total (000s)
1ED001.001, Reliability & Capacity	0	75	75
1ED018.000, Distribution and Engineering	0	500	500
Total	0	575	575
SDG&E-8 Aviation Incident	2016 Embedded Base Costs (000s)	TY 2019 Estimated Incremental (000s)	Total (000s)
1ED011.000, Electric Regional Operations	55	355	410
Total	55	355	410
SDG&E-11 Unmanned Aircraft System (UAS) Incident	2016 Embedded Base Costs 000s)	TY 2019 Estimated Incremental (000s)	Total (000s)

⁸ The base line costs associated to the Skills & Compliance Training workgroup are actually spread across multiple workgroups including Electric Regional Operations, Construction Services, and Troubleshooting. The activities associated with these RAMP baseline activities are managed out of Skills & Compliance Training, so for ease of creating one adjustment, Skills & Compliance Training was chosen as the representative area for these baseline activities.

1ED011.000, Electric Regional Operations	0	162	162
Total	0	162	162
SDG&E-12 Electric Infrastructure Integrity	2016 Embedded Base Costs (000s)	TY 2019 Estimated Incremental (000s)	Total (000s)
1ED002.000, Construction Services	0	14,207	14,207
1ED011.000, Electric Regional Operations	1,207	1,039	2,246
1ED015.000, Substation C&O	0	290	290
1ED017.000, System Protection	54	0	54
1ED018.000, Distribution and Engineering	0	2,175	2,175
1ED019.000, Asset Management	0	3,329	3,329
Total	1,261	21,040	22,301
SDG&E-13 Records Management	2016 Embedded Base Costs (000s)	TY 2019 Estimated Incremental (000s)	Total (000s)
1ED011.000, Electric Regional Operations	39	0	39
1ED019.000, Asset Management	4,816	1,281	6,097
Total	4,855	1,281	6,136
SDG&E-14 Climate Change Adaptation	2016 Embedded Base Costs (000s)	TY 2019 Estimated Incremental (000s)	Total (000s)
1ED027.000, Emergency Management	24	403	427
Total	24	403	427
SDG&E-17 Workforce Planning	2016 Embedded Base Costs (000s)	TY 2019 Estimated Incremental (000s)	Total (000s)
1ED002.000, Construction Services	5	12	17
1ED004.000, Electric Distribution Operations	32	0	32
1ED008.000, Grid Operations	4	0	4

1ED011.000, Electric Regional Operations	1,094	0	1,094
1ED017.000, System Protection	6	0	6
1ED018.000, Distribution and Engineering	65	140	205
Total	1,206	152	1,358

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As Table WS-5 illustrates, the RAMP risk mitigation efforts are associated with specific programs or projects. For each of these mitigation efforts an evaluation was performed to determine the portion, if any, that was already being performed in historical activities. A determination was also made as to the portion that may be accommodated within a particular forecasting methodology such as averaging or trending, as well as the portion, if any, that represents a true incremental cost increase or decrease from that forecasting methodology.

The starting point for consideration of the risk mitigation effort and cost was the RAMP Report, but changes in scope, schedule, availability of resources, overlaps or synergies of mitigation efforts, and shared costs or benefits were also considered in developing TY 2019 forecasts. Therefore, the incremental costs of risk mitigation sponsored in my testimony may differ from those first identified in the RAMP Report. Significant changes to those original cost estimates are discussed further in my workpapers related to that mitigation effort.

My incremental request supports the ongoing management of these risks that could pose significant safety or reliability consequences to our customers and employees. The anticipated risk reduction benefits that may be achieved by my incremental ask are summarized below by risk.

1 **Wildfire**

2 My incremental request includes risk mitigation efforts such as helitanker support, long
3 span inspection and repair program, and our weather stations program. As described in Mr.
4 Geier’s testimony,⁹ SDG&E currently utilizes its helitanker asset three months of the year during
5 the height of fire season; however, due to what has become a year round fire season in
6 California, SDG&E is seeking incremental expenses in my testimony for year-round helitanker
7 support under the Electric Regional Operations work group. The long span program is designed
8 to further reduce the risk of wildfires through the inspection and subsequent repair on long
9 distribution spans known to have greater risk of clearance non-conformances during high wind
10 events. Longer spans have greater wind loading impacts on supporting wood pole structures,
11 and require greater pin spacing on cross arms to ensure proper clearances. Electric Regional
12 Operations will manage the long span work, so incremental expenses appear in that workgroup.
13 The weather station program is designed to further reduce the risk of wildfires by continuing to
14 provide critical wind and weather information necessary to produce real time fire risk
15 information used to adjust how SDG&E operates its electric system during times of extreme fire
16 risk. This weather network is also utilized to understand known local wind conditions;
17 information is used as design criteria in areas where wind exceeds 55 mph. Incremental
18 expenses related to meteorology services are reflected in the Emergency Management
19 workgroup.

20 **Employee, Contractor, and Public Safety**

21 The incremental request for Employee, Contractor, and Public Safety risk consists
22 entirely of the risk mitigation program called Customer Safety Communications. This risk
23 mitigation effort, as discussed previously, is designed to further reduce the risk of a public safety
24 incident by educating the public on the electrical and gas hazards they may encounter, and by
25 providing the information and tools to safely navigate these potentially dangerous situations
26 safely. Forecasts for this initiative are reflected in the Electric Regional Operations category,
27 which has sponsored costs for previous electric safety campaigns (e.g., wire-down safety
28 communications).

29

⁹ Exhibit SDG&E-50.

1 **Distributed Energy Resources (DER)**

2 The DER risk is the risk of safety and reliability incidents due to the high penetration of
3 DERs on SDG&E’s system. This incremental request includes risk mitigation efforts such as
4 improved software tools, designed to further reduce risk associated with DER by enhancing
5 SDG&E’s ability to forecast both load and DER growth. Mitigation forecasts fall within the
6 Distribution and Engineering workgroup.

7 **Aviation Incident**

8 This incremental request includes costs for risk mitigation efforts such as increased
9 oversight of contractor/service providers, pilot currency and proficiency training, aviation
10 construction observation/supervision, enhancements to existing policies and procedures, and
11 utilization of an operationally safer helicopter. These programs are designed to mitigate the risk
12 of aviation incidents. Aviation Services is a part of the Electric Regional Operations
13 organization, so forecasts fall under that workgroup.

14 **Unmanned Aircraft System (UAS) Incident**

15 This is the risk of damage to SDG&E infrastructure caused by an unmanned aircraft. The
16 incremental request includes risk mitigation efforts such as developing a UAS training program
17 for SDG&E employees designed to further reduce our UAS incident risk by ensuring our
18 employees have the knowledge and tools to operate UAS safely. Aviation Services manages the
19 UAS program, and they are part of the Electric Regional Operations organization, so forecasts
20 are reflected in that workgroup.

21 **Electric Infrastructure Integrity**

22 This incremental request includes costs for risk mitigation efforts such as the PRiME
23 program, designed to further reduce our Electric Infrastructure Integrity incident risk by
24 evaluating thousands of wood poles throughout the SDG&E service territory to ensure they
25 continue to meet structural integrity requirements and SDG&E standards. The majority of this
26 work will be managed by Construction Services, so expense forecasts are primarily reflected in
27 that workgroup, similar to the treatment of FiRM expenses.

28 **Records Management**

29 This incremental request consists entirely of the risk mitigation plan to formalize and
30 expand SDG&E’s records management governance program, as described in the Asset
31 Management section of my testimony. This risk mitigation effort is designed to further reduce

1 the risk of an incident by improving controls around SDG&E's compliance with records
2 management policies and procedures. Forecasted expenses in this area are reflected in the Asset
3 Management workgroup.

4 **Climate Change Adaptation**

5 This incremental request includes risk mitigation efforts such as the University Team
6 program, designed to further reduce our Climate Change Adaptation risk by partnering with
7 universities to investigate the latest science to inform system planning decisions related to
8 climate change. Forecasted incremental expenses are reflected in the Emergency Management
9 workgroup, which houses costs for the Meteorology group.

10 **Workforce Planning**

11 The incremental request for Workforce Planning includes risk mitigation efforts such as
12 the creation of formal training programs for engineering. These programs are designed to further
13 reduce our Workforce Planning risk by enhancing skill sets to prepare the less experienced work
14 force to be ready to move into critical operational roles. The forecasts for this activity fall within
15 the Distribution and Engineering workgroup.

16 **Alternatives**

17 When developing this proposed incremental request, alternatives were considered early in
18 the process and dismissed as the various team planning discussions where the most appropriate
19 options were identified. Generally, alternatives would be dismissed due to failing to adequately
20 mitigate the identified risk, or to being cost- or schedule-prohibitive. For example, one
21 alternative considered for every RAMP-proposed program is to maintain the status quo and not
22 implement the program. These would typically be rejected because SDG&E believes the
23 proposed programs are necessary to mitigate critical enterprise risks. An example of an
24 alternative that would be too cost-prohibitive is a proposed program to reduce the risk of wildfire
25 by undergrounding all distribution facilities within the Fire Threat Zone (FTZ). This alternative,
26 while effective at reducing the risk of a wildfire, would be estimated to run in the billions of
27 dollars. SDG&E believes that the current portfolio of fire mitigation activities along with the
28 few additional proposed programs will reduce the risk of a wildfire as a more cost effective

1 solution. For more on RAMP alternatives analysis, please see the various alternatives analysis
2 sections of SDG&E’s RAMP Report.¹⁰

3 **B. Safety Culture**

4 SDG&E is committed to providing safe and reliable service to its customers. Our safety-
5 first culture focuses on public, employee, and contractor safety, with this commitment embedded
6 in every aspect of our work, and at all levels of the organization. Electric distribution operations
7 and maintenance efforts toward maintaining a strong and successful safety culture include
8 training and educational programs, such as programs that encourage and formalize the
9 identification of risks, the allocation of personnel and resources to address those risks, the
10 development of programs to mitigate those risks, and the coordination of emergency response
11 efforts to minimize impacts when electric emergencies occur.

12 For example, in November 2016, SDG&E and the International Brotherhood of Electrical
13 Workers (IBEW) Local 465 formed an “Overhead Safety Partnership,” to conduct a thorough
14 examination of industry best practices and identify potential changes to current work practices
15 that would improve line worker safety while working on and around distribution energized
16 overhead equipment and conductors. The first priority for this Overhead Safety Partnership was
17 to complete a comprehensive industry review, as well as an evaluation of the Occupational
18 Safety and Health Administration (OSHA) Best Practices, to ensure that our work practices are
19 aligned with industry best practices, and to allow SDG&E to recommend improvements to
20 significantly enhance line worker safety.

21 Another important electric distribution program that advances SDG&E’s strong safety
22 culture is the Operations, Field, and Emergency Readiness (OFER) program. The OFER
23 program enhances SDG&E’s ability to react to and manage emergency scenarios by aligning all
24 operational groups on a flexible, scalable, sustainable, and measurable scene management
25 process that is Incident Command System (ICS) compatible. The program is built on the
26 concepts of the National Response Framework (NRF) and is compatible with the National
27 Incident Management System (NIMS). OFER is designed to be utilized on all worksites,
28 incidents, emergencies, crises, and disasters where SDG&E personnel, facilities, and
29 infrastructure are impacted. The program includes a strong Quality Assurance/Quality

¹⁰ See <https://www.sdge.com/regulatory-filing/20016/risk-assessment-and-mitigation-phase-report-sdge-socialgas>

1 Improvement component that will ensure the sustainability of effective incident Command,
2 Control, Communications, and scene safety practices.

3 Another part of SDG&E's commitment to safety is the continuous implementation of
4 safety training and education of SDG&E's workforce to ensure the safe operation of our electric
5 system for the benefit of the public as well as employees and contractors. SDG&E's training and
6 education program includes programs such as Behavior Based Safety (BBS) training. Behavior
7 based training captures data on at-risk behaviors as well as positive behaviors, positively
8 reinforcing the correct actions, which further builds and maintains our safety culture. SDG&E
9 also trains its employees on the Grassroots Safety Culture Change effort, which empowers front-
10 line field employees to identify cultural safety issues and to work as a team to develop solutions
11 to the cultural issues. These are just a couple of examples of programs that cumulatively
12 contribute to SDG&E's safety performance and successful safety culture.

13 The SDG&E electric distribution workforce is also trained to respond to any and all
14 emergencies related to its electric distribution systems, including managing programs designed to
15 mitigate the frequency and impact of fires during a Santa Ana wind event. As explained above,
16 public safety is a top priority for SDG&E, and extreme Santa Ana wind conditions and the
17 associated fire risks can have catastrophic impacts on electric service and the safety of the
18 communities we serve. During periods of heightened risk, SDG&E personnel are trained to
19 activate the Emergency Operations Center and/or the Electric Distribution Operations Storm
20 Desk, to monitor and respond to events either impacting the utility systems, or otherwise related
21 to the electric and gas infrastructure. These functions increase workforce awareness of risk, help
22 manage public safety and wildfire risks, and also promote our strong safety awareness culture.

23 A more complete description of SDG&E's training and educational programs promoting
24 safety culture can be found in the Human Resources, Disability & Workers Compensation and
25 Safety testimony of Tashonda Taylor (Exhibit SDG&E-30).

26

III. NON-SHARED COSTS

Non-shared services are activities that are performed by a utility solely for its own benefit. Corporate Center provides certain services to the utilities and to other subsidiaries. For purposes of this general rate case, SDG&E treats costs for services received from Corporate Center as non-shared services costs, consistent with any other outside vendor costs incurred by the utility. Table WS-6 summarizes the total non-shared O&M forecasts for the listed cost categories.

**TABLE WS-6
Non-Shared O&M Summary of Costs**

Categories of Management	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Reliability & Capacity	244	341	97
Construction Services	5,363	19,167	13,804
DistOps Enterprise Geographic Info Sys Standards	1,379	1,253	-126
Electric Distribution Operations	15,590	22,546	6,956
Kearny Operations Services	1,349	2,133	784
Grid Operations	667	567	-100
Officer	772	772	0
Project Management	660	1,347	687
Electric Regional Operations	35,613	46,689	11,076
Skills & Compliance Training	4,133	4,661	528
Service Order Team (SOT)	161	161	0
Substation C&O	4,582	5,322	740
System Protection	1,460	1,861	401
Distribution and Engineering	2,342	4,299	1,957
Asset Management	0	4,610	4,610
Troubleshooting	7,896	7,796	-100
Vegetation Management	26,455	26,415	-40
Regional Public Affairs	1,965	1,802	-163
Major Projects	119	110	-9
Technology Utilization	1,042	1,225	183
Compliance Management	2,694	2,856	162
Tech Solutions and Reliability	2,544	3,260	716
Emergency Management	2,503	5,344	2,841
Strategic Planning and Business Optimization	1,630	2,390	760
Distributed Energy Resources	1,304	1,699	395
Total Non-Shared Services	122,467	168,626	46,159

The following subsections describe each of the workgroup activities and forecasts for those workgroups in more detail. For each workgroup, I describe the costs and activities

1 associated with that workgroup, the forecast methodology, and cost drivers. For the workgroups
 2 with significant cost drivers and incremental cost pressures, additional support for the forecast is
 3 provided.

4 **A. Reliability and Capacity**

5 **TABLE WS-7**
 6 **Reliability and Capacity**

Reliability & Capacity	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Reliability & Capacity	244	341	97
Total	244	341	97

7
 8 **1. Description of Costs and Underlying Activities**

9 Distribution Planning performs planning activities related to providing administrative and
 10 technical support associated with the electric distribution system. Typical activities include
 11 forecasting, designing, and responding to utilization of the electric distribution system, to serve
 12 customers with safe and reliable electric energy. Electric distribution system load increases
 13 come in the form of new customer connections to the system and increased loads from existing
 14 customers. New or existing customer load growth drives the installation of new and upgraded
 15 facilities, circuits and substations. Distribution Planning is tasked with forecasting, planning,
 16 and approving as well as advising on generation interconnections submitted through the
 17 Wholesale Distribution Access Tariff and Electric Rule 21. Distribution Planning is responsible
 18 for designing the electric distribution system to facilitate the construction of electric facilities to
 19 connect new customers to SDG&E’s system and ultimately increase the capacity of the electric
 20 distribution system infrastructure to support both new load or Distributed Energy Resources
 21 throughout the service territory. In addition, Distribution Planning has been tasked with
 22 developing, implementing, and guiding on all aspects correlated with the Distribution Resources
 23 Plan. These tasks consist of developing reports, developing new analytical tools, providing
 24 comments to Proposed Decisions, adhering to Final Decisions, conducting detailed presentations,
 25 and leading or collaborating in a stakeholder-driven planning process. Furthermore, Distribution
 26 Planning actively supports O&M activities including staffing the Emergency Operations Center
 27 and Construction and Operations districts during major events and storms. Other responsibilities
 28 include support of the Community Fire Safety Program, reviewing and revising distribution

1 planning design standards, reviewing fusing requests and providing engineering input on
2 planning worksheets, approving load studies, participating in distributed generation and
3 renewable resource studies, integrating advanced technologies, designing utility owned
4 interconnection facilities for Distributed Energy Resources, project management for specific
5 GRC-approved projects, responding to internal and external customer data requests, training, and
6 attending relevant technical committee meetings.

7 **2. Forecast Method**

8 The forecast method developed for this cost category is a three-year average with
9 incremental adjustments. The structure of the organization changed in 2014. Historical costs
10 from 2012 and 2013 include costs from personnel that have been moved to Electric Regional
11 Operations. Given the changes, a five-year average would have overstated the labor needs in this
12 workgroup, making the three-year average the most reasonable base estimate for future years.

13 **3. Cost Drivers**

14 The following contribute to the incremental cost changes:

- 15 • RAMP Proposed Activities

16 **a. RAMP Proposed Activities**

17 The following activities were identified as proposed programs in the RAMP Report.
18 These are the programs from the RAMP Report that will impact the Reliability and Capacity
19 group.

20 **Improved Modeling Tools**

21 Distribution Planning has begun using an enhanced load forecasting tool that improves
22 forecasting by evolving from a static forecasted value to a 24-hour load shape. In addition to a
23 forecasted 24-hour load shape, the tool also applies geospatial data to generate a spatial forecast
24 that provides an improved method to allocate load growth. These enhancements allow for a
25 thorough distribution forecast, enable a detailed review of DER, and can provide hosting
26 capability for DER on the distribution system. This program falls under the DER Chapter of the
27 RAMP Report and mitigates the growing impact DER is expected to have on the distribution
28 system.

B. Construction Services

**TABLE WS-8
Construction Service**

Construction Services	2016 Adjusted- Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Construction Services	5,363	20,690	15,327
Total	5,363	20,690	15,327

1. Description of Costs and Underlying Activities

Construction Services consists of three main groups, Construction Management, Construction Services Contracting, and Business Controls.

Construction Management

The Construction Services Construction Management group provides construction management and field oversight of all construction performed by contractors on the electric distribution system. This is to ensure that all work is built to SDG&E Design and Safety Standards and in accordance with GO 95 and GO 128 design and construction specifications. The O&M portion of the work conducted by Construction Services includes O&M activities that are associated with completing capital project construction work and installing or removing transformers.

Construction Services Contracting

The Construction Services Contracting group is responsible for many of the administrative activities associated with the Construction Services-managed capital construction work. This includes managing all job packages, such as data management, permit verification, environmental releases, purchase orders and negotiation of start and end dates. Additionally, the group interfaces with Supply Management to aid in processing jobs that meet the criteria and constitute bid work, therefore requiring requests for proposals. Furthermore, Construction Services Contracting works with project managers, budget managers and contractors to manage timelines and completion dates. Construction Services Contracting is also supports invoice review and the construction closeout process. The group also monitors all "as-built" documentation packages to ensure accurate recordkeeping pertaining to SDG&E facilities. Finally, this group also coordinates with the Electric Regional Operations Corrective Maintenance Program (Compliance Management Program (CMP), a GO 165 compliance

1 program) by monitoring and tracking jobs constructed by contractors, including pole and
2 transformer replacements, quality control follow-up services and fire risk mitigation services.

3 **Business Controls**

4 The mission of the Business Controls Group is to provide objective assurance and
5 consulting activities designed to add value and improve the efficiency of the department.
6 Primarily, the Business Controls Group ensures Sarbanes-Oxley (SOX) audit and accounting
7 compliance, along with the timely processing of construction projects from start to finish.
8 Additionally, the group performs data analysis to evaluate department performance, identifies
9 opportunities to streamline business processes using technologies, and reduces waste by applying
10 lean six sigma methodologies.

11 **a. RAMP Current Activities**

12 The following activities were presented in the RAMP Report and are performed
13 by the Construction Services group. The risk mitigating programs are already implemented and
14 the costs associated with these activities are embedded in the historical recorded costs. These
15 costs are forecasted in TY 2019 as a component of the 2016 base year historical costs.

16 **Fire Risk Mitigation (FiRM) program**

17 FiRM addresses fire risk by hardening critical areas in the service territory most at risk
18 for wildfires – the FTZ and High Risk Fire Area (HRFA). This capital program includes
19 replacing older overhead distribution line elements by utilizing advanced technology and
20 improving facilities to adequately handle known weather conditions. FiRM modernizes the
21 electric system in areas of high risk through strategic investments. For additional details
22 regarding the scope of this program, please see the testimony of Mr. Alan Colton (Exhibit
23 SDG&E-14). This program falls under the Wildfire Chapter of the RAMP Report and mitigates
24 risks associated with catastrophic wildfires.

25 **Contractor Safety Program**

26 This program consists of administration activities associated with managing construction
27 work, oversight for construction, incident review and investigation, operations and maintenance
28 activities that involve fixed wing aircraft, and a wide range of highly skilled and experienced fire
29 safety personnel and fire preventative services. This program falls under the Employee,
30 Contractor, Public Safety Chapter of the RAMP Report and mitigates risks associated with
31 electric construction, and is in alignment with our safety culture.

1 **2. Forecast Method**

2 Both Labor and Non-Labor costs are based on the BY 2016 recorded data. The O&M
3 expenses related to the FiRM capital project were not fully captured in previous years, making
4 the BY 2016 forecast methodology the most representative estimate of future years spend.

5 **3. Cost Drivers**

6 The following contribute to incremental cost changes:

- 7 • FOF Efficiencies
- 8 • RAMP Proposed Activities
- 9 • System Growth

10 **a. FOF Efficiencies**

11 Construction Services has developed and will implement net efficiency savings programs
12 at an estimated \$1,313k non-labor in TY 2019. These savings are mainly associated with
13 improved construction contract bid processes and improved contract controls.

14 **b. RAMP Proposed Activities**

15 The following activities were identified as proposed programs in the RAMP Report.

16 **Provide Monthly Training Modules**

17 This program falls under the SDG&E Workforce Planning Chapter of the RAMP Report
18 and mitigates risks associated with contractor and employee safety by providing training to field
19 construction administrators to ensure they have the skills necessary to oversee contract
20 construction, the construction meets SDG&E safety requirements, and the finished product
21 adheres to SDG&E and CPUC General Order design and construction standards.

22 **Overhead small wire and connector replacement**

23 This is a comprehensive wire improvement program aimed to enhance distribution
24 system reliability specifically for protection from energized wire down incidents in the non-fire
25 threat zone (non-FTZ). The scope of work is included in the testimony of Mr. Alan Colton
26 (Exhibit SDG&E-14). This program falls under the Electric Infrastructure Integrity Chapter of
27 the RAMP Report and mitigates safety and reliability risks associated with premature overhead
28 equipment failure. The O&M component of this capital project was estimated at 3.7%.

29 **4 kV Modernization**

30 This is a capital program to remove 4 kV assets and replace them with 12 kV. The scope
31 of work is included in the testimony of Mr. Alan Colton (Exhibit SDG&E-14). This program

1 falls under the Electric Infrastructure Integrity Chapter of the RAMP Report and mitigates safety
2 and reliability risks associated with premature equipment failure. The O&M component of this
3 capital project was estimated at 5%. The O&M to capital split is based on actuals from similar
4 projects SDG&E has completed.

5 **Bridged Cutout Switch Replacements**

6 This capital program proactively replaces bridged cutout switches to improve reliability
7 and reduce the safety risks associated with operating bridged cutouts. The scope of work is
8 included in the testimony of Mr. Alan Colton (Exhibit SDG&E-14). This program falls under
9 the Electric Infrastructure Integrity Chapter of the RAMP Report and mitigates safety and
10 reliability risks associated with premature equipment failure. For the forecast methodology on
11 the split between capital and O&M, see my workpapers.

12 **Overhead Switch Inspection and High-Risk Switch Replacement**

13 This program proactively tests, repairs, or replaces high-risk switches on the overhead
14 system. The Construction Services scope of this program involves the O&M component of the
15 switch replacements. The scope of work is included in the testimony of Mr. Alan Colton
16 (Exhibit SDG&E-14). This program falls under the Electric Infrastructure Integrity Chapter of
17 the RAMP Report and mitigates safety and reliability risks associated with premature equipment
18 failure. For the forecast methodology on the split between capital and O&M, see my
19 workpapers.

20 **Underground Switch Inspection and High-Risk Switch Replacement**

21 This capital program proactively tests, repairs, or replaces high-risk switches on the
22 underground system. The scope of work is included in the testimony of Mr. Alan Colton
23 (Exhibit SDG&E-14). This program falls under the Electric Infrastructure Integrity Chapter of
24 the RAMP Report and mitigates safety and reliability risks associated with premature equipment
25 failure. For the forecast methodology on the split between capital and O&M, see my
26 workpapers.

27 **Pole Risk Mitigation and Engineering (PRiME)**

28 SDG&E owns and maintains approximately 200,000 wood distribution poles, 170,000 of
29 which are currently out of scope of other projects (e.g., FiRM, Cleveland National Forest
30 (CNF)). All overhead electric facilities, including wood poles, must be designed, constructed,
31 and maintained in accordance with GO 95. The current overhead electric system was designed

1 in accordance with the requirements in place at the time of construction. Many of SDG&E's
2 poles are greater than 40 years old, and have been subjected to increases in load due to additional
3 attachments that have been added over the life of the facilities, including those from third parties
4 such as fiber optic cables and antennas.

5 SDG&E has successfully utilized granular weather data and computer modeling to create
6 a system-wide wind design map, which is based on our best possible prediction of "known local
7 conditions." Today, SDG&E knows more about the weather conditions that the overhead
8 electric system is exposed to than ever before. The level of data far surpasses what was used
9 when many of the poles in our system were originally installed.

10 Since the original overhead electric system was first installed, not only has more local
11 knowledge been obtained, but new tools have been developed to enhance the accuracy of pole
12 loading calculations. Distribution designs have historically utilized standards, which were based
13 on conservative assumptions. Today, computer programs are available that not only make the
14 design of poles more accurate, but also make it easier to perform more comprehensive analysis.
15 Computer programs available today, such as PLS-CADD, allow engineers and designers to
16 model structures using non-linear analysis and finite element analysis. SDG&E is utilizing
17 precise LiDAR data to develop a very accurate three-dimensional model of the overhead electric
18 system. Not only does LiDAR provide the data necessary to analyze pole loading, it also creates
19 an opportunity to readily check wire-to-wire clearances. LiDAR and PLS-CADD are tools that
20 have been used on transmission lines for over 15 years, but are just recently being applied to the
21 distribution system.

22 In addition to having more information about how meteorological forces impact our
23 overhead electric system, we also now know that a contributing factor to the pole loading issue is
24 that there have been cumulative additions/attachments to poles over their lifespan. In many
25 cases, small pieces of electrical equipment have been added to poles, services have been added,
26 conductors have been replaced with larger conductors, additional communications lines have
27 been installed, over-lashing of communication lines has occurred, pole-top extensions have been
28 used to increase clearances, and/or equipment has been upsized when it was replaced during an
29 outage or for maintenance reasons. While many of the things described above add additional
30 load to poles, they may not generally be considered "material" increases in load, and therefore
31 calculations were not performed. These cumulative additions over the life of the asset can result

1 in poles being overloaded. As mentioned above, many of SDG&E's wood poles are 40 years
2 old. Over the last 40 years, there have been changes in technology, changes in consumer
3 communications needs, and improvements in the way overhead electric systems are configured;
4 all of which have contributed to additional mechanical load being added to wood poles.

5 Communication Infrastructure Providers (CIPs) have contributed to overloads on poles,
6 especially in the past few decades. In some cases, CIPs may have attached without notifying
7 SDG&E (most cases probably preceded the application and pole loading requirements), and
8 some have added additional facilities, assuming the existing agreement covered the new
9 equipment. The CIPs also historically may have attached to poles without knowing if the safety
10 factor was already reduced due to deterioration on the poles (GO 95 specifies a one-third
11 reduction due to pole degradation and/or additional load). The interaction of loads on the pole
12 and remaining strength of a pole have been a key point of discussion in the Electric Safety OIR.
13 In addition, a 2016 Commission decision¹¹ allows AT&T and other communications companies
14 providing Cellular Mobile Radio Service (CMRS) to attach to SDG&E's poles and use the
15 existing right of way. These new assets attached to SDG&E poles will also impact the loading
16 on wood pole structures.

17 Utilities across the United States have historically relied on the amount of deterioration
18 on wood poles obtained during intrusive inspections as a means to assess pole integrity. It is rare
19 that a utility's intrusive inspection contractors look at deterioration and loads in combination.
20 The primary factors considered in calculating the safety factor on poles are pole strength capacity
21 (taking into account deterioration) and loads.

22 Safety and reliability are very important to SDG&E. Because we have more information
23 about "known local conditions" than we ever had before and we have new tools available for
24 comprehensive analysis, we are embarking on a new program to confirm that the structures
25 supporting overhead electric lines meet the current required safety factors. SDG&E's PRiME
26 Program is yet another step in mitigating risks related to the overhead electric system, much like
27 FiRM has done.

¹¹ See D.16-01-046, the January 28, 2016, decision in Rulemaking (R.) 14-05-001, the "Decision Regarding the Applicability of the Commission's Right of Way Rules to Commercial Mobile Radio Service Carriers."

1 The initial subset of poles will be made up of approximately 1,850 poles as a pilot phase
2 spread across SDG&E's service territory. Appropriate conclusions can be drawn geographically
3 to determine the differences in expected outcome and population sizes that vary across
4 SDG&E's service territory. This occurred with FiRM. We embarked on the program with an
5 initial strategy, but as data came in and construction progressed, we saw the need to alter the
6 methodology and approach for that program. The pilot phase of PRiME will occur in 2018.
7 Results from the pilot phase will be used to prioritize future year projects based on risk and to
8 further define cost. The program will ramp up significantly in 2019 where 22,600 poles will be
9 analyzed each year through 2025. In 2026, SDG&E plans to analyze 10,200 poles, completing
10 the analysis of 170,000 poles in the overhead outside of the FiRM scope over a nine-year period.

11 The focus of the PRiME efforts will be on pole loading (clearances will be checked, but
12 that is not the primary driver in this case). In the case of PRiME, SDG&E plans on using a risk
13 based model that considers many factors to identify pole failure risk potential. Some of the risk
14 factors that will be included in the model are locally known conditions (wind), age of pole,
15 intrusive inspection data, un-guyed structures, conductor size/type, load of Communications
16 Infrastructure Providers, and conductor size. Once facilities are identified for replacement, PLS-
17 CADD will then be used to build a three-dimensional model of the overhead ruling span (dead
18 end to dead end) to ensure the pole replacement work takes into account the dynamic interactions
19 with other poles, and that the pole replacement work does not diminish the performance of the
20 other poles within the ruling span. Other risks such as clearances may be identified as part of the
21 analysis within the ruling span that will also be mitigated as part of the pole replacement project.
22 Upon completion of the work, a PLS-CADD model will be generated to true-up the data to be
23 stored in the asset registry. Other areas of PRiME focus include new pole loading processes and
24 enhancements aimed to improve data quality, and a true up of as-built designs and the
25 development of an asset registry to house PLS-CADD files. The 3-D ruling span models will not
26 only be used to assess existing conditions on the overhead system, but will also be used as the
27 foundation for future capital upgrades.

28 This program is designed to ensure poles continue to meet GO 95 standards and locally
29 known conditions (wind), meet loading safety factor and clearance criteria, and other conditions
30 that are known to be a risk. The O&M costs associated with PRiME are the construction

1 activities associated with mitigating the risks identified during the pole analysis. For the forecast
2 methodology on the split between capital and O&M, see my work papers.

3 **c. Safety and Reliability**

4 **Contractor Safety Program Enhancement**

5 The Contractor Safety Program addresses employee, contractor, and public safety risk
6 resulting from non-adherence to safety programs, policies, and procedures, which may result in
7 severe harm to employees, contractors, and/or the general public. Implementation will require
8 the addition of two construction managers, five field safety advisors, training, and software
9 licensing for a third-party administered software called "ISNetworld." The software is a
10 Contractor Safety database that will log records of contractor and supplier safety performance
11 and enhance overall safety performance by ensuring only safe and qualified contractors are used.

12 The Contractor Safety Program 1) evaluates and verifies the safety records of contractors
13 before they are hired for high and medium risk work; 2) enhances contractor safety standard
14 contract requirements; 3) provides for review by qualified SDG&E personnel of contractor safety
15 plans; 4) establishes business unit contractor oversight procedures; and 5) establishes post-
16 project safety evaluations of work performed by contractors and capturing/sharing of lessons
17 learned.

18 These personnel added for this program will mentor business units acting as safety
19 specialists in contractor safety requirements, ensure effective contractor safety oversight
20 procedures are in place, perform assessments of the business units to validate adherence to the
21 Contractor Safety Program and SDG&E Standard G8308, and perform assessments of variance-
22 approved contractors to ensure mitigations are being implemented and are effective. The
23 personnel are also responsible for presenting and participating in contractor safety committees
24 and meetings, providing guidance and analysis on pre-qualification status for contractors,
25 participating in contractor incident investigations, and providing guidance and feedback on
26 analysis and corrective actions.

27 **d. System Growth**

28 **Increased Contract Administrators**

29 In order to meet the schedule commitments for the proposed capital projects and
30 programs, new Contract Administrators will need to be hired. They will perform field

1 construction oversight and ensure that all work is built to SDG&E Design and Safety Standards
 2 and in accordance with GO 95 and GO 128 design and construction specifications.

3 **C. Distribution Operations Enterprise Geographic Information System**
 4 **Standards**

5 **TABLE WS-9**
 6 **Distribution Operations Enterprise Geographic Information System Standards**

DistOps Enterprise Geographic Info Sys Standards	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
DistOps Enterprise Geographic Info Sys Standards	1,379	1,253	-126
Total	1,379	1,253	-126

7
 8 **1. Description of Costs and Underlying Activities**

9 Enterprise GIS Services (EGISS) is the section of Electric Distribution Operations that
 10 creates and maintains all electric distribution, transmission, telecommunications, and substation
 11 data in SDG&E’s enterprise GIS system. EGISS digitizes the data in a preliminary state,
 12 energizes the data in real-time, reconciles and converts design work orders into construction
 13 order as-builts, scans them to a central repository, records details in the GIS system, and
 14 identifies these assets for tax and franchise fee calculations and reports. SDG&E’s enterprise
 15 GIS is a direct input of information into many operational and planning tools used by
 16 engineering and operations. Accurate and timely data is essential for safety and reliability.

17 **2. Forecast Method**

18 The forecast method developed for this cost category is Base Year recorded less
 19 incremental adjustments. For labor and non-labor, the base year provides an appropriate baseline
 20 in comparison to the overall labor target for the organization. Incremental labor increases from
 21 the base year are requested in order to meet targets, and these requests are more than offset by
 22 efficiency initiatives.

23 **3. Cost Drivers**

24 The following contributes to the incremental cost changes:

- 25 • FOF Efficiencies
- 26 • System Growth

1 **a. FOF Efficiencies**

2 EGISS has developed and will implement efficiency savings programs at an estimated
3 \$79k in labor and \$143k in non-labor in TY 2019. These programs include process
4 improvements, such as moving from paper versions of schematics and map updates to digital
5 versions, as well as improved process controls.

6 **b. System Growth**

7 Given the critical role this workgroup serves in the construction closeout process,
8 the increase in forecasted distribution capital projects creates a need for additional employees.
9 To meet forecasted workload, two management and six clerical and technical employees will be
10 hired.

11 **D. Electric Distribution Operations**

12 **TABLE WS-10**
13 **Electric Distribution Operations**

Electric Distribution Operations	2016 Adjusted- Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Electric Distribution Operations	15,590	22,546	6,956
Total	15,590	22,546	6,956

14 **1. Description of Costs and Underlying Activities**

15 The Electric Distribution Operations Control Center is responsible for the safe, efficient,
16 and reliable delivery of power to SDG&E's 3.1 million consumers through approximately
17 1.4 million electric smart meters. The control center personnel have overall operational control
18 of the electric distribution system for planned and unplanned work on a system that consists of
19 1,035 circuits and approximately 134 distribution substations. Emergency operations related to
20 service restoration, Red Flag Warnings, storm response, and GO 166 requirements originate in
21 the Distribution Control Center.

22 Grid modernization, including integration of microgrid and distributed energy resources,
23 has contributed to increased workload for the Distribution System Operators (DSO). These
24 devices add complexity to the decision making and switching requirements of electrical circuits.
25 Additionally, SDG&E continues to experience increased workload due to steady system growth,
26 replacement of aging infrastructure, requirements to comply with CPUC General Orders
27 including GO 165 and GO 166, risk mitigation efforts related to safety, reliability, and security,
28

1 and increasing customer expectations for outage information. Recent technological
2 advancements require a more technical skill set for DSOs. In order to effectively manage
3 today's complex electric system the operators must be computer literate and knowledgeable of
4 the Outage Management System, new electronic field devices, and new techniques to restore
5 electrical service. As distributed energy resources grow, the DSO's job to restore electrical
6 service becomes more challenging, and it is thus crucial to understand the dynamic electrical
7 system. Continuous developmental and refresher training is important and essential to enhancing
8 and keeping the DSO's skills up-to-date.

9 Electric Distribution Operations Technology (EDOT) provides technical and operational
10 assistance to the Electric Distribution Control Center, in order to operate the electric distribution
11 system safely and efficiently. DSOs will require increased levels of situational awareness for
12 monitoring the performance of the grid with the interaction of distributed resources. SDG&E
13 anticipates the installation of 200-300 new remote controlled devices per year, which will enable
14 operators to more precisely isolate faults and restore service to customers. Additionally, the
15 Outage Management System (OMS), Distributed Energy Resource Management System
16 (DERMS), and Advanced Distribution Management System (ADMS) will require increased
17 capabilities for control and monitoring to meet customer demand and manage two-way power
18 flow and granular visibility to support the integration of distributed energy resources onto the
19 grid. This will require increased support staff, additional equipment, and adequate facilities to
20 effectively manage and maintain these additional devices and resources. This will also require
21 continued support for the Back-Up Control Center, where equipment such as computers, servers,
22 monitors, and radio consoles will require constant monitoring.

23 **a. RAMP Current Activities**

24 The following risk mitigation activities and programs were presented in the
25 RAMP Report and are performed by the Electric Distribution Operations group. These risk
26 mitigating programs are already implemented, and the costs associated with these activities are
27 embedded in the historical recorded costs. These costs are forecasted in TY 2019 as a
28 component of the BY 2016 historical costs.

29 **Workforce Planning**

30 This program replaces critical roles due to attrition and retirements and provides
31 appropriate training. This program is part of the Workforce Planning Chapter of the RAMP

1 Report and mitigates risks associated with losing critical experience and knowledge through
2 attrition and retirements.

3 **2. Forecast Method**

4 Labor and non-labor costs are based on a three-year linear trend forecast. The non-labor
5 costs associated with Electric Distribution Operations have been trending upwards over the past
6 three years. Non-labor costs include increasing maintenance costs for hardware, software, and
7 exempt materials. These costs increase as the company completes more projects, and additional
8 hardware and new equipment is installed in the field. For example, Supervisory Control and
9 Data Acquisition (SCADA) devices, which enhance security, reliability, and reduce the risk of
10 fires, have been installed in greater numbers to assist our operators with monitoring and
11 operating the electric distribution system. The servers that manage and collect the data for these
12 devices will also need upgrading and/or replacing. The exempt materials are the largest portion
13 of non-labor in this workgroup. Exempt materials are low-value material items that are
14 replenished as “truck stock.” They consist of bulk type materials that are not individually
15 inventoried or managed by the district warehouses. These materials include items like nuts,
16 bolts, washers, connectors, electrical tape, and brief-relief kits, and are restocked onto service
17 trucks as needed and are not directly charged to the O&M account or Capital Budgets on which
18 they are used. This account represents the collector pool for all of the exempt material costs that
19 are then allocated to the appropriate gas and electric O&M accounts and Capital Budgets as
20 indirect charges. As construction projects increase, so too do the amount of exempt materials
21 required. We understand that linear projections are not realistic into perpetuity. However, a
22 three-year linear trend for this period will address the expanding needs and provide for
23 increasing costs until a steady state is achieved.

24 **3. Cost Drivers**

25 The following contribute to the incremental cost changes:

- 26 • FOF Efficiencies
- 27 • Safety and Reliability

28 **a. FOF Efficiencies**

29 Electric Distribution Operations (EDO) has developed and will implement efficiency
30 savings programs at an estimated \$288k in labor in TY 2019. Examples of savings initiatives

1 include optimizing operator shift times to reduce the need for overtime, and improving process
2 controls around planned outages.

3 **b. Safety and Reliability**

4 SDG&E is committed to maintaining a safe working environment for employees and a
5 safe electrical distribution system for the general public. Round-the-clock supervision is
6 required during normal operating conditions and additional management resources are required
7 during emergency conditions (system stress, Red Flag Warnings, Elevated Fire Weather
8 Conditions, Storms, etc.). Due to attrition, new hires are needed to meet the existing operator
9 demand. Distribution Operations is proposing nine Distribution System Operations classes to
10 start in January 2017 and 2019 for two years. No class was held in 2016. Please see my
11 workpapers for cost estimate methodology.

12 **SCADA System Support and Maintenance**

13 SCADA systems are critical to the reliable operation of the electric system. SCADA
14 switches allow for automated remote sectionalizing, which limit either the number of customers
15 who experience a power outage, or reduce the overall outage duration. The data these systems
16 provide are critical for providing operators with situational awareness of the distribution system
17 necessary to make informed operational decisions. This upward pressure is due to an increase in
18 the SCADA system maintenance contract costs.

19
20

1 **E. Kearny Operations Services**

2 **TABLE WS-11**
3 **Kearny Operations Services**

Kearny Operations Services	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Kearny Operations Services	1,349	2,133	784
Total	1,349	2,133	784

4
5 **1. Description of Costs and Underlying Activities**

6 Kearny Operation Services includes four functional work groups described below.

7 **Tool Repair**

8 This group is responsible for the maintenance, repair, fabrication, and acquisition of new
9 tooling to support the needs of Electrical Regional Operations, Kearny Substation Construction
10 and Operations, and System Protection Maintenance.

11 **Apparatus Group**

12 This group is responsible for salvaging line equipment removed from service. Activities
13 include the disposal or refurbishment of equipment such as overhead and underground
14 transformers, capacitors, Sulfur Hexafluoride (SF6) gas switches, oil switches, and the associated
15 gas and oil reclamation and recycling services.

16 **Transformer Repair & High Voltage Testing**

17 This group is a North American Independent Lab¹² certified high voltage test station that
18 tests and confirms the electrical condition of transformers, regulators, mechanical jumpers,
19 grounds, hot sticks and other live line tools and equipment. Their responsibilities also include
20 transformer, regulator, and street light controller repair, as well as field testing new equipment
21 received by the logistics group for quality control.

22 **Protective Equipment Testing Lab**

23 This is a North American Independent Lab certified to inspect and test rubber goods used
24 for electrical worker personal protection. The Lab is responsible for inventorying and providing
25 compliant rubber gloves for all of SDG&E’s workers at the mandated intervals.

¹² See <http://www.nail4pet.org/>.

1 **2. Forecast Method**

2 A five-year average plus incremental was used to forecast labor and non-labor for this
3 work group. The forecasted workload for this group is driven by factors that will vary from year
4 to year. The number of failed tools and equipment, what can be tested and repaired and what
5 must be scrapped is an example of a type of variance that can be seen from year to year. Given
6 this, an average provides the best estimate for a typical year.

7 **3. Cost Drivers**

8 The following cost driver contributes to the incremental cost changes:

9 Workforce Development

10 **a. Workforce Development**

11 Kearny Operations Services is creating a more formalized and robust Substation
12 Electrician training program which includes the following areas:

- 13 1. Journeyman required and elective training
- 14 2. Crew Lead elective training
- 15 3. Working Foreman required training
- 16 4. Annual Equipotential Zone (EPZ) required training

17 The purpose of the program is to increase the knowledge base, skill level, and confidence
18 of our union employees when performing their daily tasks. By doing so, we will create a safer
19 work environment with more engaged employees. The program also offers career development
20 guidance for those interested in progressing through the ranks of the union or who want to seek
21 opportunities in management/administration. In order to accomplish the development,
22 administration, and tracking of a program of this magnitude, resources are required. Please see
23 my workpapers for estimate methodology details.

24 **F. Grid Operations**

25 **TABLE WS-12**
26 **Grid Operations**

Grid Operations	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Grid Operations	667	567	-100
Total	667	567	-100

1 **1. Description of Costs and Underlying Activities**

2 Grid Operations consists of two main functional work groups, Energy Management
3 System Operations and Mission Control Training Section.

4 **Energy Management System Operations**

5 The Electronic Control Technicians are responsible for the overall installation, testing,
6 calibration and maintenance for all SCADA equipment that interfaces with the transmission
7 Energy Management Systems (EMS) and Distribution Management System (DMS), calculates
8 system loads, as well as larger distributed generation from customer facilities to SDG&E. The
9 accuracy and availability of the SCADA system is the 24-hour responsibility of the Electronic
10 Control Technician (ECT). Primary duties include the following: program and configure
11 Remote Terminal Units (RTUs); check SCADA site communication lines and levels from end-
12 to-end; respond to any RTU-related trouble calls from EMS and DMS; and perform maintenance
13 and troubleshooting on the existing system.

14 **Mission Control Training Section**

15 Mission Control is the name given to SDG&E’s facility that houses several system
16 monitoring and control functions. The Mission Control Training Section was established in
17 2016, and provides initial and continual training for DSO as well as authorization training for all
18 operating district personnel and contractors that work on the SDG&E electrical systems,
19 including Generator Operators within SDG&E’s footprint.

20 The purpose of the SDG&E Mission Control Training Program is to produce and
21 maintain adequately trained, well-qualified, and competent operating personnel to ensure reliable
22 system operations using a systematic approach to training. The training is based upon the job
23 tasks of each position to implement real-time actions. The DSO has the responsibility and
24 authority to implement real-time actions to ensure the safe and reliable operation of the SDG&E
25 electric distribution system, following all SDG&E policies, standards and procedures.

26 Distribution trainers train operators to perform and maintain reliability during routine and
27 emergency conditions for the safe and reliable operation of the distribution systems, which gives
28 the operators the skills and knowledge they need to perform their job tasks in a safe and reliable
29 manner.

30 The data systems in use and personnel in the Mission Control facility operate on a
31 24/7/365 schedule. Those data systems require facility enhancement with workstation, audio-

1 visual, telecommunications and storage equipment needed to perform operations. The Mission
 2 Control facility was first built in 1982 and houses Electric Grid Operations. The Grid Control
 3 Center, which was last renovated in 2008, requires major upgrading to accommodate the
 4 improved infrastructure and energy management data systems necessary for the safe monitoring,
 5 dispatch and operation of the personnel and automated systems at work on the electric system.
 6 This work is expected to be completed in 2018, and the estimated costs are shown in the
 7 testimony of Dale Tattersall (Exhibit SDG&E-22).

8 **2. Forecast Method**

9 The forecast method developed for labor and non-labor costs is base year plus
 10 incremental adjustments, because it best reflects current and future operating requirements due to
 11 a new Mission Control Training Section that was developed at the beginning of 2016. There is
 12 an incremental downward adjustment for this group due to non-recurring costs associated with
 13 developing a new training group in the base year.

14 **G. Officer**

15 **TABLE WS-13**
 16 **Officer**

Officer	2016 Adjusted- Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Officer	772	772	0
Total	772	772	0

17 **1. Description of Costs and Underlying Activities**

18 This workgroup includes the costs for officers and administrative assistants in support of
 19 electric distribution. The total salaries are a direct labor charge and the amount allocated to
 20 electric transmission is excluded from this account as an indirect charge and not included in the
 21 requested expenses. Non-labor expenses typically include consulting fees, benchmarking
 22 studies, office supply expenses, and office travel expenses.

23 **2. Forecast Method**

24 The forecast method developed for this cost category is a base year forecast. This
 25 method is most appropriate because the base year best represents the current and anticipated
 26 future organizational structure of the officers. The associated officer O&M costs are expected to
 27 be stable and no incremental changes are requested.
 28

1 **H. Project Management**

2 **TABLE WS-14**
3 **Project Management**

Project Management	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Project Management	660	1,347	687
Total	660	1,347	687

4 **1. Description of Costs and Underlying Activities**

5 Project Management’s responsibilities vary widely, but all relate to the preparation of
6 construction orders. Department personnel perform the design and engineering necessary to
7 develop comprehensive construction orders, from which additions and modifications to electric
8 distribution systems are constructed. Such construction orders range from simple services for
9 individual customers to large complex distribution systems that serve subdivisions, commercial
10 centers, and high-rise towers. Also included are construction orders for converting electric
11 overhead lines to underground through various programs and relocating existing facilities to
12 accommodate both private party requestors and government agencies. The construction order
13 development process includes meeting with customers, government agencies, and other utilities
14 in planning and coordinating additions and modifications to the electric distribution system.
15 Department personnel perform a variety of engineering calculations, analytical assessments,
16 secure and execute contracts, and special agreements. In addition, Project Management
17 personnel prepare and assemble the construction order job packages for distribution to
18 customers, contractors, other utilities, and all participating departments within SDG&E.

19 The construction orders developed by Project Management represent capital work.
20 However, many capital projects include a small component of O&M. There are also some small
21 construction orders for which the work is considered O&M as a result of its limited scope. As
22 such, Project Management’s time is generally split between Capital and O&M, with 98% of
23 personnel time charged to Capital and 2% charged to O&M. The relatively small O&M
24 component of Project Management is addressed here.
25

26 **2. Forecast Method**

27 Labor and non-labor costs utilize a base year forecast methodology plus incremental
28 increases, which most closely represents the annual O&M expense that is roughly 2% of Project

1 Management's total budget. The base year was used as opposed to averages due to an increased
2 Full Time Equivalent (FTE) count in 2016, making it the best estimate to use for future years.

3 **3. Cost Drivers**

4 The following contribute to the incremental cost changes:

- 5 • FOF Efficiencies
- 6 • Workforce Development

7 **FOF Efficiencies**

8 Project Management has developed and will implement efficiency programs that will net
9 an estimated \$74k savings in labor in TY 2019. These savings are primarily due to efficiencies
10 in employee development programs.

11 **Workforce Development**

12 Project Management is seeking to fill planner and support staff positions made vacant by
13 recent retirements. SDG&E must continue to systematically replenish the organization with
14 skilled individuals through hiring and development programs, in order to achieve its operational
15 goals. The department needs to first re-establish the appropriate planner staffing levels for
16 sustained output by holding planner training classes over the next three years. Once staffing
17 levels are stabilized for both customer project planners and service planners, Project
18 Management will be able to backfill any future planner attrition at the time of vacancy and train
19 via a combination of on-the-job training and workshops. Additions to the workforce will cause
20 additional upward pressure on O&M at a 2% O&M to capital split. Project Management will
21 also incur additional O&M expenses as a result of maintaining these positions.

22 The need for additional support staff will increase as the net number of planners
23 increases. Support staff employees' skills will be developed through on-the-job training and
24 mentoring rather than through formal classroom training. This addition to the support staff will
25 result in an additional upward pressure as 2% of their collective time is charged to O&M,
26 consistent with the department's Capital/O&M split. Please see my workpapers for detailed
27 estimate methodology.

1 **I. Electric Regional Operations**

2 **TABLE WS-15**
3 **Electric Regional Operations**

Electric Regional Operations	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Electric Regional Operations	35,613	46,689	11,076
Total	35,613	46,689	11,076

4 **1. Description of Costs and Underlying Activities**

5 Electric Regional Operations (ERO) includes all electric distribution crews, engineers,
6 and support staff located in six districts and two satellite operating centers (Ramona and
7 Mountain Empire), which covers SDG&E’s entire electric distribution system and service
8 territory of approximately 1.4 million customers in San Diego and southern Orange counties.

9 The primary job functions include:

- 10
- 11 1) Inspect and maintain the electric distribution system in compliance with CPUC
12 GO 95, 128, and 165, and SDG&E Standards;
 - 13 2) Restore service after outages;
 - 14 3) Repair service problems and address other customer issues;
 - 15 4) Construct new electric infrastructure.

16 ERO consists of electric linemen, apprentices, line assistants, schedulers, office support
17 personnel, supervisors, and management. ERO Compliance training consists of required training
18 from various organizational units including Distribution Engineering, Fleet, Safety,
19 Environmental, and various governmental agencies (CPUC, OSHA, State of California), as well
20 as a review of standards and practices that have evolved as a pattern from operational incidents.
21 ERO personnel complete most of their compliance training at the SDG&E Skills Training
22 Center.

23 **Aviation Services**

24 The Aviation Services group provides oversight for construction, operations and
25 maintenance activities that involve helicopter and fixed wing aircraft. Activities involve mission
26 planning, flight safety planning, safety oversight of operations, contractor and pilot qualification
27 review, equipment review, identification of landing zones, fuel management planning, and flight
28 tracking. This group also manages the contracts for these services.

1 **a. RAMP Current Activities**

2 The following activities were presented in the RAMP Report and are performed by the
3 Electric Regional Operations group. The risk mitigating programs are already implemented and
4 the costs associated with these activities are embedded in the historical recorded costs. These
5 costs are forecasted in TY 2019 as a component of the average historical costs.

6 **BBS Program**

7 The purpose of this program is to reduce the occurrence of at risk behaviors by modifying
8 an individual's actions and/or behaviors through observation, feedback and positive interventions
9 aimed at developing safe work habits. This program falls under the Employee, Contractor, and
10 Public Safety Chapter of the RAMP Report and mitigates the risk of a safety related incidents to
11 employees.

12 **Fire Retardant Uniform and other Personal Protective Equipment (PPE)**

13 This program provides SDG&E employees with fire retardant uniforms, hard hats,
14 gloves, protective eyewear, and other forms of personal protective equipment required by OSHA
15 and/or SDG&E safety standards to safely complete work. This program falls under the
16 Employee, Contractor, and Public Safety Chapter of the RAMP Report and mitigates the risk of
17 a significant injury or fatality associated with an employee safety incident.

18 **Annual Pole Reinforcement**

19 This is a cyclical program aimed to reinforce pole bases with a "C-Truss" device for
20 added structural support, and helps extend the useful life of the pole thereby deferring the need
21 for a pole replacement. The C-Truss is a steel brace that wraps around the base of the pole,
22 improving its strength at ground line. Wood pole structures that need this reinforcement
23 technique are identified during the ten-year wood pole intrusive inspection process. This
24 program falls under the Electric Infrastructure Integrity Chapter of the RAMP Report and
25 mitigates the risk of a premature wood pole failure.

26 **Telecommunications Equipment Attachment Management System (TEAMS)**

27 This program was implemented to communicate/coordinate with CIP to mitigate CIP
28 related GO 95 non-conformances. This program falls under the Wildfire Chapter of the RAMP
29 Report and mitigates the risk of ignitions, structure failures, and electrical clearance non-
30 conformances due to third-party CIP attachments.

31

1 **Crew Staging and Mobilization**

2 This program ensures that during Red Flag events, crews are stationed in high wind areas
3 and are ready to quickly respond in the event of an outage. This program falls under the Wildfire
4 Chapter of the RAMP Report and mitigates safety, reliability, and wildfire risk associated high
5 wind and Red Flag warnings.

6 **Aviation Safety Training**

7 The Aviation Services Group provides safety training for dispatch and advisor roles
8 within the department. The training focuses on implementing best practices throughout the
9 aviation industry to ensure public, employee, and contractor safety. This program falls under the
10 Aviation Incident Chapter of the RAMP Report and mitigates the risks associated with an
11 aviation incident.

12 **UAS Weight Limitations**

13 SDG&E has restricted the acquisition of any UAS with a weight in excess of 55 pounds
14 in order to lessen the severity of potential incidents. This program falls under the Aviation
15 Incident Chapter of the RAMP Report and mitigates the risks associated with an aviation
16 incident.

17 **Pilot in Command Experience and Training**

18 Federal Aviation Administration regulations require licensed recreational pilots to
19 operate a commercial UAS. SDG&E provides the training for our pilots to be certified under
20 this regulation. This program falls under the Aviation Incident Chapter of the RAMP Report and
21 mitigates the risks associated with an aviation incident due to an inexperienced or untrained pilot
22 in command.

23 **UAS Software and Hardware Checked Prior to Flight**

24 SDG&E has implemented the industry best practice of systematically checking UAS
25 software and hardware to ensure the latest upgrades are installed. This program falls under the
26 Aviation Incident Chapter of the RAMP Report and mitigates the risks associated with an
27 aviation incident due to outdated software or hardware systems.

28 **Flight Restrictions**

29 Flights are not conducted near people, aircraft, or within five miles of an airport without
30 air traffic control permission. SDG&E UAS maintains a safe distance from the general public
31 and private property. This program falls under the Aviation Incident Chapter of the RAMP

1 Report and mitigates the risks associated with an aviation incident leading to injuries or damage
2 to property.

3 **2. Forecast Method**

4 The base year recorded plus incremental increases was utilized as the forecast for both
5 labor and non-labor. Changes in 2016 that were not reflected in previous years include current
6 manning levels in the form of Apprentice Linemen and C&O Planners and Supervisors.

7 **3. Cost Drivers**

8 The following contribute to incremental cost changes:

- 9 • FOF Efficiencies
- 10 • RAMP Proposed Activities
- 11 • Environmental and Regulatory Compliance
- 12 • Safety and Reliability
- 13 • Workforce Development
- 14 • System Growth

15 **a. FOF Efficiencies**

16 ERO has developed and will implement efficiency programs that are expected to save an
17 estimated \$2,898k in labor and \$1,872k in non-labor in TY 2019. Some of the significant
18 efficiencies were developed through optimizing CMP inspection cycles to reduce the number of
19 trips to the same pole for different inspections and repairs. Another project will add a Saturday
20 shift to reduce the need for call-outs and overtime. Another project will leverage technology to
21 develop an inspection application that can be run on touch screen tablets. Other projects will
22 streamline processes such as city permit submittals and compliance reporting. Lastly, there are
23 projects that will improve cost controls on small tools and pre-arranged (after hours) planned
24 outages.

25 **b. RAMP Proposed Activities**

26 The following activities were identified as proposed programs in the RAMP Report.

27 **RAMP Long Span Inspection and Repair**

28 All long spans were inspected and repaired several years ago as part of the efforts to
29 reduce the risk of a catastrophic wild fire. Spans over 1000 feet were prioritized first, with spans
30 over 900 and 800 feet prioritized later. Potential issues that were discovered by these inspections
31 were repaired or new poles were interset to reduce the length of the span. This was a onetime

1 program, and SDG&E is proposing that these inspections be performed on a cyclical basis. The
2 program will focus on high-risk spans, specifically targeting freeway crossings. This program
3 falls under the Wildfire Chapter of the RAMP Report and mitigates safety, reliability, and
4 wildfire risk associated with wire slap and additional loading associated with longer conductor
5 span lengths.

6 **Customer Communications Safety**

7 This risk mitigation program falls under the Employee, Contractor and Public Safety
8 Chapter of the RAMP Report and mitigates the risk of an electric incident with the public
9 through education and awareness communications. This program is an expansion of existing
10 targeted communications efforts to inform, raise awareness, and educate the public about what
11 they can do to ensure their safety around gas and electricity. For SDG&E, keeping employees,
12 contractors and the public safe is of utmost importance. Unfortunately, there have been specific
13 incidents involving electricity and natural gas where people have been injured or hurt. In
14 addition, every year there are incidents of contractors puncturing gas lines when excavating. We
15 want customers to know that electricity and natural gas can be dangerous, but there are ways to
16 avoid those dangers. The campaign objective is to promote: safety around downed power lines,
17 tree trimming safety, electric safety, carbon monoxide safety, Dig Alert (calling 8-1-1), the
18 dangers of back feed, and safety for kids. For broader awareness and sustained education, mass
19 media channels – such as TV, radio, newspaper and digital – are recommended to run or air
20 every quarter in 2019. With this safety campaign, there are many target audiences –
21 homeowners/renters, children, contractors, people who live in areas with overhead power lines,
22 and net energy metering customers. In addition, we have a diverse customer base in our service
23 area so our campaign will speak to major ethnic groups that make up our customer
24 demographics. Specific messaging/content will be created for these target audiences and we'll
25 use multiple channels (some in-language) to reach them. For this campaign, mass media - TV,
26 radio, newspaper, digital, billboards – will be used to create awareness as well as direct
27 communication - mail, emails – to reach the target audiences. People need to hear a message
28 multiple times and in a variety of ways for it to resonate. Social media, so vital in today's world,
29 will be an additional channel used to keep safety top of mind. With this campaign, we propose a
30 layered and integrated approach. The call to action will be to visit the enhanced safety section of
31 our website for more information. The campaign forecast includes estimates for both production

1 and media. Production includes the costs to create video content, which can then be cut down to
2 thirty second TV spots. Production costs are also included for billboards, collateral, and
3 development of new web content. Estimated costs are based on historical projects and media
4 buys from past advertising campaigns. In addition, estimates include costs outlined for direct
5 communication – emails and mailings.

6 **Overhead Switch Inspection and High-Risk Switch Replacement**

7 This capital program proactively tests, repairs, or replaces high risk switches on the
8 overhead system. The Electric Regional Operations scope of this program involves the switch
9 inspection, testing, and repair of overhead switches. This program falls under the Electric
10 Infrastructure Integrity Chapter of the RAMP Report and mitigates safety and reliability risks
11 associated with premature equipment failure. The O&M components of this estimate are based
12 on per-unit historical costs of overhead switch inspections and repairs. For estimate
13 methodology details, see my workpapers.

14 **Underground Switch Inspection and High-Risk Switch Replacement**

15 This capital program proactively tests, repairs, or replaces high-risk switches on the
16 underground system. The Electric Regional Operations scope of this program involves the
17 switch inspection, testing, and repair of underground switches. This program falls under the
18 Electric Infrastructure Integrity Chapter of the RAMP Report and mitigates safety and reliability
19 risks associated with premature equipment failure. The O&M components of this estimate are
20 based on per-unit historical costs of underground switch inspections and repairs. For estimate
21 methodology details see my workpapers.

22 **Aviation Services Enhancements**

23 SDG&E has identified risks associated with aviation operations incidents that damage
24 electric transmission, distribution, and/or gas transmission facilities and may result in employee
25 or customer injury or death. Accordingly, SDG&E is proposing a set of enhancement programs
26 aimed at addressing:

- 27 • Aircraft or equipment failure;
- 28 • Pilot error or inexperience;
- 29 • Field error or ground crew inexperience; and
- 30 • Inadequate preflight planning.

1 First, subject matter experts believe that Safety Management Systems (SMS) will soon be
2 required by the FAA for all commercial operations. Through implementation of a robust SMS,
3 SDG&E will be in a position to safely and effectively support and expand manned aviation
4 activity. Second, a more robust job site observation program that includes expanded Line
5 Operations Safety Audits (LOSA) and job site inspections will be integrated into the ongoing
6 SMS oversight program. Third, the service provider audit program will be further developed,
7 incorporating updated procedures and more frequent audits. Fourth, SDG&E will be purchasing
8 a twin-engine helicopter with advanced avionics to provide a dual-redundant system with
9 increased automation. This will represent a two-fold increase in safety margin and an additional
10 reduction in risk of many human factors. Fifth, SDG&E will address the risk of communication
11 errors, lack of codified rules, and the need for an institutional foundation of operations by
12 implementing continuous aviation safety training, as well as new dispatch and advisor roles
13 within the department. Finally, SDG&E will perform currency and proficiency training for its
14 pilots, especially important in relation to the new twin-engine helicopter.

15 Collectively, these programs involve increased oversight of contractor/service providers,
16 pilot currency and proficiency training, aviation construction observation/supervision,
17 enhancements to existing policies and procedures, and utilization of an operationally safer
18 helicopter. These programs were filed under the Aviation Incident Chapter of the RAMP Report
19 and reduce the risk of incidents while performing aerial inspections and construction activities.
20 Applicable to this risk are incidents that occur on property by SDG&E contractors,
21 subcontractors, or other third parties who may encounter SDG&E facilities. For additional
22 details regarding individual programs, please refer to my workpapers.

23 **Aviation Services Unmanned Aircraft Systems (UAS)**

24 As the utilization of UAS continues to expand, additional controls and programs need to
25 be instituted to ensure safe operations within the utility environment. This includes the
26 development of policies and procedures, training programs, operational oversight, and utilization
27 of new technologies. These programs were filed under the UAS incident chapter of the RAMP
28 Report and reduce the risk of incidents while performing UAS activities. Specifically, SDG&E
29 proposes five new mitigations. First, as in the case with SDG&E's Aviation Services
30 enhancements, the development of a robust SMS program is aligned with the high level of
31 importance the FAA has assigned to this area and will enable the support and expansion of UAS

1 activity throughout SDG&E strategic operations. Second, a robust UAS Training Program for
2 SDG&E employees will be instituted. This program will consist of an initial training manual for
3 internal use of pilot development, continued training for currency and performance development,
4 and case-by-case skills performance development. A Contractor Qualification, Oversight, and
5 Audit Program will also be put in place. This will allow SDG&E to receive feedback and
6 unbiased assessments of aviation operations. Next, in order to monitor, track, and maintain
7 aircraft data, Flight Management Controls will be acquired. These software suites will
8 contribute to both the safety promotion and safety assurance capabilities of the program and
9 drive hazard identification, documentation, and policy development. Finally, as technology
10 rapidly changes, it is imperative for SDG&E to include the latest opportunities for safety,
11 efficiency, and efficacy in its operations. Accordingly, participation in industry conferences and
12 industry discussion groups will help support SDG&E safety and technological applications for
13 UAS.

14 **Expansion of Helitanker Program** – RAMP post filing

15 SDG&E currently leases a large, Type 1¹³ helitanker (aircrane) to provide firefighting
16 support for our service territory, as described in Mr. Geier’s testimony. SDG&E proposes
17 funding for an additional nine months, associated program support costs, and to secure the best
18 helitanker model to meet SDG&E’s and the communities’ purposes. The enhancement of the
19 helitanker program will provide additional support for what has become an year-round fire
20 season, as discussed in more detail in Mr. Geier’s testimony. Please see my supplemental
21 workpaper for additional cost details.

22 **c. Environmental and Regulatory Compliance**

23 SDG&E will need to purchase additional Hydrocarbon and Contaminates Removal filter
24 socks (HCOR) to comply with environmental regulations around pumping water out of
25 subsurface structures. SDG&E’s subsurface structures often fill with water after rain or
26 irrigation, and need to be pumped to perform work such as restoring power after a fault, or
27 proactively replacing underground cables and connections. These HCOR filter socks will allow
28 our crews to safely pump the water from these subsurface structures without the need for Hazmat

¹³ Type I helicopters are the largest category of helicopters for firefighting.

1 crews while meeting environmental laws and regulations regarding pumping the water. Please
2 see my workpapers for estimate methodology.

3 **d. Safety and Reliability**

4 SDG&E proposes to hire an additional twenty linemen and fifteen apprentices to meet
5 existing and future workload and reliability demands. These linemen are needed to perform the
6 core electric regional operations activities of inspection and maintenance, emergency and outage
7 response, and infrastructure repair and replacement. Please see my work papers for estimate
8 methodology.

9 **e. Workforce Development**

10 In order to support the multiple FOF efforts, as well as business process evaluations and
11 improvements throughout distribution operations, SDG&E proposes the establishment of a
12 project management office. In addition to repurposing existing personnel, this organization will
13 add a Manager, Project Manager, and Business Analyst.

14 **f. System Growth**

15 As cities/counties have increased their permit requirements, there is now a greater need to
16 provide more face-to-face interaction with dedicated resources. The establishment of a new
17 permitting group will address the expanded demands and allow SDG&E to provide quicker and
18 more comprehensive support to its customers. This new group will consist of a supervisor and
19 two permit coordinators.

20 **J. Skills & Compliance Training**

21 **TABLE WS-16**
22 **Skills & Compliance Training**

Skills & Compliance Training	2016 Adjusted- Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Skills & Compliance Training	4,133	4,661	528
Total	4,133	4,661	528

23 **1. Description of Costs and Underlying Activities**

24 The Skills and Compliance Training (SCT) organization is responsible for the
25 development and training of the electric distribution workforce. The workforce consists of
26 electric field personnel, non-electrical support personnel, and first line supervision. Subject
27 matter experts (SMEs) borrowed from the field comprise eighty percent of the instructor
28

1 workforce. Using SMEs from the field promotes a skilled and expert workforce in safe work
2 practices, new technology, current operating procedures, and construction standards. Skills and
3 Compliance Training programs support a workforce with the required skills to safely and reliably
4 maintain and operate the electric distribution and transmission system, in compliance with
5 General Orders 95, 128, 165, and SDG&E standards, work methods and operating procedures.
6 Core training consists of the programs described below.

7 **Electric Linemen Development**

8 SDG&E has a three-year state-approved apprenticeship program for the development of
9 journeymen electrical workers, with certification by the joint apprentice committee.

10 **Compliance Training**

11 SCT provides annual training required by existing federal, state, and local safety and
12 environmental regulations. All electric field personnel are required to maintain proficiency
13 regarding: (1) emergency rescue techniques, (2) safety and environmental policies and
14 procedures applicable to individual work responsibilities, and (3) non-commercial and
15 commercial vehicle operator training (initial and refresher) for safe driving practices.

16 **Equipotential Zone (EPZ) / Personal Protective Grounding Training**

17 SCT has developed enhanced EPZ/Personal Protective Grounding training for its Electric
18 Distribution and Transmission Construction & Maintenance field workforce. An equipotential
19 zone or EPZ is a work zone that protects a worker from electric shock from differences in
20 electric potential between objects in the work area (which can be caused by circumstances such
21 as induced voltage, line reenergization, or lightning). The worker in an EPZ is protected from
22 electric shock because there is a near-identical state of electrical potential between any two
23 points on the body. This annual training is designed to ensure work crews have a thorough
24 understanding of the hazards involved with differences in electrical potential and maintain
25 proficiency in establishing an EPZ and proper application of personal protective grounding.

26 **Equipment Operations and Commercial Drivers' Training**

27 All qualified SDG&E employees with valid Class "A" and "B" driver licenses must
28 undergo training required by both state and federal regulations and agencies. Employees learn
29 all necessary driving and maneuvering skills to safely operate SDG&E's regulated vehicles and
30 specialty equipment. This Commercial Driver's Training program includes:

- 1) A 40-hour class that prepares employees to obtain a new commercial driver license called Commercial Driver's Education Training, which covers all of the prerequisite components for student drivers before the student is trained "behind-the-wheel" in a commercial vehicle.
- 2) SDG&E's current trainers became certified Smith Driver's trainers, and the classroom portion of Smith Driver's Training is incorporated into SDG&E's Commercial Driver's Education Training class. The observed drive portion of the training is part of SDG&E's behind-the-wheel driver's training class.
- 3) Any commercial driver that is involved in a Controllable Motor Vehicle Incident (CMVI) is required to complete both the classroom portion of Smith Driver's Training for commercial drivers and an observed drive in the same type of commercial vehicle they were driving when the incident occurred. This training also includes a program to develop equipment operators that support field crews operating specialty equipment, as required by federal law.

Some examples of the specialty equipment SDG&E employees operate that requires special training include:

- mobile cranes (boom trucks);
- articulating cranes;
- stringing and pulling overhead and underground electrical wire;
- operating a production digger (auger) for removal of wooden power poles;
- skid steers;
- backhoes;
- dump trucks;
- water trucks;
- motor graders for grading gas and electric distribution lines; and
- material hauling combination vehicles (tractor trailers).

Additional Ancillary Training

SCT also supports training for other business units, such as Advanced Metering Operations (AMO), Gas Operations, Project Management, and other organizations.

System and Process Initiative

1 For ERO field personnel, SCT is incorporating new processes and procedures into
2 existing training classes and developing new media for training delivery.

3 **Specialized Task-Specific Development and Training Programs**

4 These programs are conducted for Relief Electric Troubleshooters, Relief Fault Finding
5 Specialists, Electric Meter Test Electricians, and lead cable splicers. Relief Electric
6 Troubleshooters and Relief Fault Finding Specialists are journeymen linemen that fill Electric
7 Troubleshooter and Fault Finding Specialist shifts when permanent Electric Troubleshooters or
8 Fault Finding Specialists are unavailable due to sickness, vacation, or holidays. They also
9 periodically work as Relief Electric Troubleshooters on a “training shift” in order to maintain
10 their troubleshooting skills.

11 **a. RAMP Current Activities**

12 The following activities are described in the RAMP Report and are performed by the
13 Skills and Compliance Training group. These risk mitigation programs are already implemented,
14 and the costs associated with these activities are embedded in the historical recorded costs.
15 These costs are forecasted in TY 2019 as a component of the average historical costs.

16 **Apprentice Program**

17 This program, described above, falls under the Employee, Contractor, Public Safety
18 Chapter of the RAMP Report and mitigates the risk of an employee safety incident by providing
19 years of hands on construction and classroom training.

20 **Replace Critical Roles**

21 This program replaces critical roles due to attrition or retirement. This program falls
22 under the Workforce Development Chapter of the RAMP Report and reduces the risk associated
23 with not having experienced instructors for job skills development training.

24 **Ongoing Training Maintenance Programs**

25 This program, described in the multiple training sections above, falls under Employee,
26 Contractor, and Public Safety Chapter of the RAMP Report and mitigates the risk of an
27 employee incident by providing adequate levels of employee training.

28 **2. Forecast Method**

29 Labor and non-labor costs are based on the BY 2016 recorded data. The base year
30 recorded plus incremental adjustments methodology best represents the outlook going forward as

2016 included new training programs such as EPZ that the Skills and Compliance Training Center plans to continue into future years.

3. Cost Drivers

The following contribute to incremental cost changes:

- FOF Efficiencies
- Workforce Development

a. FOF Efficiencies

Skills and Compliance Training has developed and will implement efficiency savings programs that will save an estimated \$112k in labor in TY 2019. These savings are primarily due to efficiencies in leveraging technology to utilize web based training.

b. Workforce Development

The Skill Compliance and Training group will be initiating the Safety Center of Readiness and Excellence (SCORE). SCORE advises ERO leadership and the field workforce on the integration of safety and risk management into ERO. SCORE also facilitates operational safety training and provides technical advice and assistance to the work crews. To fully staff this initiative, SDG&E is asking for funding to cover the costs of two project coordinators and two safety inspectors.

The following key functions are performed in collaboration with Safety Services, Work Methods, Electric Safety Subcommittee, BBS leaders, district safety committees, Culture Change, and other stakeholder groups:

- Safety education and awareness
- Safety communications
- Enhanced safety oversight of operations
- Incident review and reporting

K. Service Order Team

**TABLE WS-17
Service Order Team**

Service Order Team (SOT)	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Service Order Team (SOT)	161	161	0
Total	161	161	0

1
2 **1. Description of Costs and Underlying Activities**

3 The SOT is responsible for planning, overseeing, and managing new additions and
4 modifications to the electric distribution system, primarily related to services. The SOT acts as
5 the SDG&E customer representative on these projects, communicating and negotiating with
6 internal and external entities as needed to successfully manage customer expectations, service,
7 meter locations, and project status and costs, while ensuring customer satisfaction and meeting
8 project schedules. While the majority of the work is capital-related, a substantial amount of
9 O&M expense for the SOT includes disconnect/reconnect work associated with residential solar.
10 Other O&M expenses include the teams' support of the construction operations for storm
11 recovery, construction maintenance programs, labor for training activities, and order preparation,
12 including the replacement of minor units of property.

13 **2. Forecast Method**

14 Labor and non-labor costs are based on the BY 2016 recorded data. This methodology
15 was utilized as 2016 workload is most reflective of expected activity level/costs moving forward.

16 **L. Substation Construction and Operations**

17 **TABLE WS-18**
18 **Substation Construction and Operations**

Substation C&O	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Substation C&O	4,582	5,322	740
Total	4,582	5,322	740

19
20 **1. Description of Costs and Underlying Activities**

21 The Substation Construction and Operations and associated support organizations are
22 responsible for the installation, inspection and maintenance of approximately 134 distribution
23 substations on the SDG&E system. This includes the maintenance of approximately 293
24 distribution power transformers and their associated load tap changers or voltage regulators, and
25 approximately 1300 circuit breakers including oil, air, and vacuum classifications, and their
26 associated line and bus disconnect switches. This group inspects and maintains all substation
27 equipment including batteries, buses, support structures, capacitor banks, reactors, grounding
28 systems, fire suppression systems, and perimeter fences and gates. The substation construction

1 and operations group is responsible for GO 174 compliance, with regards to its inspection and
2 corrective maintenance program, compliance with health and safety programs, and compliance
3 with SDG&E's maintenance standards. These programs are critical to the safe and efficient
4 installation, inspection, maintenance, and reliability of all distribution electric facilities managed
5 and implemented within the Substation Construction and Maintenance group.

6 **2. Forecast Method**

7 A five-year average with incremental adjustments was used to develop both the labor and
8 non-labor forecast. Substation maintenance activities with associated labor and non-labor vary
9 depending on the amount of corrective maintenance resulting from inspections year to year,
10 outage and emergency response requirements, red flag warning days, and preventative
11 maintenance cycles. Given the variability of maintenance requirements, an average of historical
12 costs smooths these factors and provides a good base estimate of a typical maintenance year.

13 **3. Cost Drivers**

14 The following contribute to incremental cost change:

- 15 • FOF Efficiencies
- 16 • RAMP Proposed Activities

17 **a. FOF Efficiencies**

18 The substation construction and operations group has developed and will implement
19 efficiency savings programs at an estimated \$311k in labor and \$375k in non-labor in TY 2019.
20 The efficiency savings are developed from a number of program improvements including
21 leveraging an Information Technology (IT) software solution to automate forms that currently
22 are manually filled out on paper. Additional programs leverage asset health reporting technology
23 to defer time-based maintenance, improve cost controls on small tools, and improve the as-built
24 process and materials management.

25 **b. RAMP Proposed Activities**

26 The following activities were identified as proposed programs in the RAMP Report.
27 These are the programs from the RAMP Report that will impact the Substation Construction and
28 Maintenance group.

29 **Condition Based Maintenance (CBM) – Distribution**

30 This program installs and maintains specialized monitoring and communication devices
31 on substation equipment in order to create a data-informed maintenance and replacement process

1 for major substation assets. Distribution transformers (e.g., 69/12 kV) and their associated
 2 oil/gas measurements are monitored. If the levels are inadequate, alerts will inform maintenance
 3 management of the need for maintenance. This program falls under the Electric Infrastructure
 4 Integrity Chapter of the RAMP Report and mitigates safety and reliability risks associated with
 5 failing substation equipment. The installation and maintenance of monitoring equipment allows
 6 SDG&E to utilize asset health metrics for critical distribution power transformers, allowing for
 7 proactive maintenance and/or replacement of these devices based on asset health data.

8 **4 kV Modernization - Substation**

9 This is a capital program to remove 4 kV substation assets and replace them with 12 kV.
 10 The scope of work is described in detail in the testimony of Mr. Alan Colton (Exhibit SDG&E-
 11 14). This program falls under the Electric Infrastructure Integrity Chapter of the RAMP Report
 12 and mitigates safety and reliability risks associated with premature equipment failure. The O&M
 13 component of this capital project was estimated at 5%. The O&M to capital split is based off of
 14 actuals from similar projects SDG&E has completed.

15 **M. System Protection**

16 **TABLE WS-19**
 17 **System Protection**

System Protection	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
System Protection	1,460	1,861	401
Total	1,460	1,861	401

18 **1. Description of Costs and Underlying Activities**

19 System Protection department staffing consists of relay technicians, SCADA technicians,
 20 battery technicians, electrical engineers, supervisors, a system analyst, and a scheduler. Relay
 21 technicians maintain protective relays and control systems within SDG&E's substations. This
 22 program involves routine preventive maintenance on time-based intervals including calibrating
 23 and trip-testing protective relays, as well as corrective maintenance or trouble-shooting existing
 24 systems that alarm or fail to function properly. Relay technicians change relay settings when
 25 required and download relay event records after system faults occur for engineering event
 26 analysis. Technicians provide relay data such as distance to fault and phase data to help
 27 troubleshoot distribution and transmission line outages. This group maintains approximately
 28

1 4500 distribution relays. Relay technicians maintain other control systems for specialized
2 equipment that SDG&E uses, such as the static VAR Compensator at Talega substation, series
3 capacitor banks at Imperial Valley, Suncrest, and East County substations, and Synchronous
4 Condensers at Talega and Miguel substations.

5 The SCADA technicians work involves commissioning new systems that are installed,
6 performing time based maintenance, and responding to emergencies. This includes installing
7 and maintaining distribution voltage regulators, capacitors, distribution reclosers, weather
8 stations, and distribution SCADA controlled equipment. The SCADA group also maintains
9 substation batteries, aircraft warning lights, and other technical equipment on the distribution
10 system. There are approximately 1300 such devices in the system that this group maintains,
11 repairs, and installs.

12 Additionally, system protection personnel are on-call during non-business hours and
13 provide standby personnel for fire risk mitigation and system emergency response (e.g.,
14 unscheduled load shedding and earthquakes). SPM is a technical group that uses computer
15 driven test equipment to perform maintenance on relay and SCADA equipment. Databases are
16 used to generate work orders and store test results. Old electro-mechanical relays are in the
17 process of being replaced with microprocessor based relays. These new relays have considerably
18 more functionality than the older discrete single-function electromechanical units, but they also
19 require a greater degree of technical expertise and skill to maintain. In particular, computer and
20 logic skills are essential to work with these devices; whereas, in the past, it was not required.
21 The new, more complex, protection schemes are being implemented for these relays, which take
22 advantage of the increased functionality. As a result, the company has increased the training it
23 provides to relay technicians.

24 a. RAMP Current Activities

25 The following activities were presented in the RAMP Report and are performed by the
26 System Protection and Maintenance group. The risk mitigating programs are already
27 implemented and the costs associated with these activities are embedded in the historical
28 recorded costs. These costs are forecasted in TY 2019 as a component of the average historical
29 costs.

30 Replace Degraded or Non-Functioning SCADA RTUs

1 This program proactively replaces SCADA RTU with failed communications or bad
2 sensors, in order to improve data-informed operations of field switches and other equipment.
3 This risk mitigation program falls under the Electric Infrastructure Integrity Chapter of the
4 RAMP Report and mitigates risks to employee safety and system reliability that can be caused
5 by bad information provided by failing RTU equipment.

6 **Replace Critical Roles**

7 This program replaces critical roles within the system protection group. The at-risk roles
8 include the relay technician and principle engineer positions within this workgroup. This
9 program falls under the Workforce Planning Risk Chapter of the RAMP Report and mitigates
10 employee safety and reliability risks associated with losing skilled, specialized employees to
11 retirements or competitors.

12 **2. Forecast Method**

13 A five-year average plus incremental adjustments was used to develop both the labor and
14 non-labor forecast. System protection and maintenance activities with associated labor and non-
15 labor charges are driven by inspections and maintenance requirements, as well as emergency
16 response requirements. Given the variability of these activities, an average of historical costs
17 smooths these factors and provides a good base estimate of a typical maintenance year.

18 **3. Cost Drivers**

19 The following contribute to the incremental cost changes:

- 20 • Regulatory and Environmental Compliance
- 21 • Workforce Development
- 22 • FOF Efficiencies

23 **a. Regulatory and Environmental Compliance**

24 NERC Critical Infrastructure Protection cybersecurity regulation has expanded
25 from control centers to substations, and has had an impact on relay technician requirements.
26 There are new training and documentation requirements on asset removal, reuse, and disposal.
27 There are new relay technician work orders to patch and update relay firmware as part of
28 cybersecurity improvements, and the logging of every time a technician connects to a relay due
29 to the transient cyber asset regulation. These transmission-side upward pressures on technician
30 capacity are some of the drivers influencing the need to increase staffing levels in this area.
31 While these drivers are primarily transmission-related, the application of cybersecurity

1 protections and changes in work processes has impacted the way SDG&E relay techs protect
 2 distribution relays, which is why SDG&E recommends a transmission/distribution split for these
 3 resources.

4 **b. Workforce Development**

5 The replacement of obsolete equipment with new modern microprocessor-based devices
 6 and computer-driven test equipment, as well as complex new control systems for devices such as
 7 series capacitors and synchronous condensers, has created a training challenge for the System
 8 Protection workgroup. The skill sets for this position are getting more advanced and the
 9 frequency and type of training for relay technicians is increasing to keep up with this need.
 10 Given the additional regulatory requirements and the skilled workforce necessary, SDG&E is
 11 planning on hiring an additional three FTEs for this workgroup.

12 **c. FOF Efficiencies**

13 The System Protection and Maintenance work group expects to save \$50k in labor in TY
 14 2019 through technology improvements implemented by System Protection Engineering. The
 15 project will allow for remote connectivity to relays for the purpose of event retrieval. This will
 16 allow for faster engineering analysis of system fault events, as well as eliminating event retrieval
 17 work orders for relay technicians.

18 **N. Distribution and Engineering**

19 **TABLE WS-20**
 20 **Distribution Engineering**

Distribution and Engineering	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Distribution and Engineering	2,342	4,299	1,957
Total	2,342	4,299	1,957

21 **1. Description of Costs and Underlying Activities**

22 The Electric Distribution and Engineering group is responsible for all equipment
 23 pertaining to the distribution network. Responsibilities include the development and
 24 maintenance of overhead and underground equipment specifications, risk analysis and
 25 mitigation, as well as the development of construction standards and work methods to ensure
 26 safe and reliable customer service throughout the 4 kV and 12 kV electric distribution system.
 27 The specification requirements include all service standards for customer facilities as well as
 28

1 design manual standards for all of our project management design teams. Real-time support for
2 operations and constructions teams are also daily requirements. New and revised construction
3 standards and material specifications are designed to provide community safety and system
4 reliability while keeping pace with technology advancements in areas such as fire-preparedness,
5 communication technology improvements, and renewable integration with the advancements in
6 rooftop Photovoltaic (PV) penetration and Plug-in Electric Vehicles. The electric standard
7 practices developed by the team establish uniform and safe work methods and procedures and
8 inspection requirements to ensure regulatory compliance with all governing agencies.

9 Construction standards and standard practices are used by company and contractor construction
10 forces throughout the SDG&E electric distribution system.

11 The Engineering team is also responsible for field equipment investigations to determine
12 failure causes and note trends. The team works with manufacturers to get the right equipment
13 for our system with respect to functionality, reliability and safety. Environmental requirements
14 and associated impacts are also managed in engineering, an example of this being the Sulfur
15 Hexafluoride (SF6) switch replacement program that aims to eliminate all distribution switches
16 that are insulated with SF6 gas with new vacuum and solid dielectric switch technology. The
17 goal is to remove these switches and eliminate the SF6 emissions from our distribution system.
18 As new types of equipment and technology are introduced, the engineering team develops
19 implementation plans, requests funding, and manages the budgets for those programs.

20 Other examples of critical reliability enhancements and safety risk reduction include
21 developing and utilizing analytical tools to perform assessments of system-wide programmatic
22 improvements associated with RAMP Electric Infrastructure Integrity, such as the proposed

23 High Risk Switch Replacement, 4 kV Modernization, distribution network Tee
24 Modernization, and PRiME programs. The PRiME Program is designed to lower risk of a pole
25 failure do to loading, reducing the potential for impacts including personal injury, property
26 damage, and fire ignition. The oversight requirements on Pole Loading Calculations (PLC) is
27 increasing due to these potential impacts. This program still aims to meet all General Order
28 requirements but adds additional analysis by ensuring poles meet locally known conditions
29 (wind), loading safety factor, and clearance criteria, as well as other conditions that are known to
30 increase risk. Because CIPs are requesting to attach to the existing distribution network at an
31 increased rate, more PLC analysis is required.

1 Other engineering projects led by this team include Volt-Var Optimization (VVO), power
2 quality monitoring and data analysis for commercial/residential customers, transient event
3 forensics, and corrosion mitigation strategy development. Corrosion impacts are rapidly
4 increasing with changes in environmental conditions and are having significant impacts on
5 system safety and reliability. The Electric Distribution and Engineering team works closely with
6 other internal stakeholders, including (but not limited to) Regulatory, Information Management,
7 and Operations groups, to develop the business-side implementation strategy for distribution
8 asset management using modern medium- to large-scale analytics platforms.

9 **a. RAMP Current Activities**

10 The RAMP Report describes the following risk mitigation activities that are performed
11 by the Distribution and Engineering group. The risk mitigating programs are already
12 implemented and the costs associated with these activities are embedded in the historical
13 recorded costs. These costs are forecasted in TY 2019 as a component of the average historical
14 costs.

15 **Mylar Balloon Replacement**

16 Mylar balloons are conductive, cause outages and can be a potential source of ignition
17 when they contact electrical power lines. With this program, SDG&E has developed a non-
18 conductive Mylar balloon alternative that needs marketing and adoption to mitigate the risk of
19 outages and fires caused by balloon contacts. This program falls under the Wildfire Chapter of
20 the RAMP Report and mitigates reliability and wildfire risks associated with Mylar Balloon
21 electrical contacts.

22 **2. Forecast Method**

23 Labor and non-labor costs are based on a three-year average with incremental
24 adjustments for this work group. The three-year average is the most indicative of the current and
25 future forecasted spending.

26 **3. Cost Drivers**

27 The following contribute to incremental cost change:

- 28 • FOF Efficiencies
- 29 • RAMP Proposed Activities
- 30 • Workforce Development

1 **a. FOF Efficiencies**

2 Electric Distribution and Engineering has developed and will implement efficiency
3 savings programs that will save an estimated \$185K in labor and \$300K in non-labor in TY
4 2019. This savings is primarily due to efficiencies in streamlining engineering project lifecycles.

5 **b. RAMP Proposed Activities**

6 **Training programs for engineering groups**

7 In order to adequately address the risks of attrition, retirement, and knowledge loss, the
8 Distribution and Engineering group plans to add additional training programs for their engineers.
9 This program falls under the Workforce Planning Chapter of the RAMP Report and mitigates the
10 safety and reliability risks associated with the need for knowledge transfer.

11 **Distributed Energy Resources Outreach Program**

12 This program addresses the impact DERs may have on emergency responses of first
13 responders such as police departments, fire departments, and others. This is a communication
14 campaign that will include radio ads, print ads, and direct communications with homeowners and
15 local businesses. This program falls under the DER Safety Chapter of the RAMP Report and
16 mitigates the safety risks associated with backfeed of the 12 kV distribution system. Please see
17 my workpapers for estimate methodology.

18 **Pole Risk Mitigation and Engineering (PRiME)**

19 The scope of this program is described in detail in the cost drivers section of the
20 construction services workgroup section of my testimony. The Distribution and Engineering
21 related scope of this project includes performing the pole loading engineering analysis, creating
22 the design job packages for both O&M and capital replacements, and creating as-built
23 documentation for completed work. This program falls under the Electric Infrastructure Integrity
24 section of the RAMP Report and mitigates the safety and reliability risks associated with
25 premature overhead structure failures. Please see my workpapers for detailed methodology.

26 **c. Workforce Development**

27 New technology, aging infrastructure, environmental impacts, increasing regulatory
28 requirements, and the rapidly increasing demand for renewable integration requires much greater
29 oversight of the network. Staffing depth and resources are critical to comply with all of these
30 requirements moving forward and to reduce reliability and safety related risk. Distribution and

1 Engineering plans to add two engineering positions, please see my workpapers for the forecast
2 methodology.

3 The Associate Engineer program’s ongoing training is a key component of the effort to
4 develop and maintain engineers in SDG&E’s workforce. The program provides a diverse, cross-
5 functional experience and serves to accelerate the growth of our future engineers. Engineering
6 plans to add five additional associate engineering positions; please see my workpapers for the
7 forecast methodology.

8 **O. Asset Management**

9 **TABLE WS-21**
10 **Asset Management**

Asset Management	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Asset Management	0	4,610	4,610
Total	0	4,610	4,610

11 **1. Description of Costs and Underlying Activities**

12 Asset Management is a newly formed group that will be involved in creating and
13 developing a strategic asset management capability for SDG&E, in accordance with the world-
14 class standard of ISO 55000. ISO55000 compliance was recommended in a report by the Safety
15 and Enforcement Division (SED) in March 2015:¹⁴

16
17 Sempra should continue to evolve its Risk Management Program. Risk
18 Management encompasses many interrelated programs and processes that cut
19 across many different Business Functional Areas. Given constraints, an expedient
20 way to validate the effectiveness of these processes in managing assets in a safe,
21 reliable and efficient manner, would be for Sempra to demonstrate accredited 3rd
22 party certification of compliance with the ISO 550001 Asset Management
23 Standard.

24 This new group will be the program structure that assesses, leverages and integrates the
25 in-flight improvement work across all aspects of the business, and creates select new asset
26 management capability. This will benefit SDG&E’s ratepayers and our employees by supporting
27 our goals of safety, reliability, affordability, and customer satisfaction.

¹⁴ A.14-11-003/-004 (cons.), March 27, 2015, *Safety and Enforcement Division, Risk Assessment Section, Staff Report on [SoCalGas’ and SDG&E’s] 2016-2018 Consolidated General Rate Case* at 43.

1 The important benefits of applying ISO 55000 within SDG&E’s organization are three-
2 fold and align with the points raised by the SED. First, establishing an internal structure as
3 recommended by ISO 55000 will allow SDG&E to more optimally balance asset cost, asset risk,
4 and asset performance. By utilizing this standard, we will be able to place the safe and effective
5 management of our physical assets at the heart of what we do. Second, following a proven
6 benchmark will lead to greater internal consistency across asset groups that will lead to
7 repeatable business and asset-based processes, thereby improving the level of transparency of
8 decisions to regulators and interveners. Third, implementing the ISO 55000 framework will
9 promote significant alignment across the organization and build a “line of sight” to ensure
10 employees at all levels fully understand their role in supporting the goals of the organization.

11 To meet the requirements of ISO 55000, SDG&E will need to build out a system and
12 capability that is more integrated and holistic. The key roles of the Asset Management group can
13 be described as follows:

14 **Planning**

15 To establish a solid foundation, SDG&E will create an Asset Management Policy and a
16 multi-year Strategic Asset Management Strategy that will detail the company’s intentions on
17 how it will design and manage its assets under the guidelines of ISO 55000.

18 We will establish distinct asset families within the business and assign Asset Family
19 Owners (AFOs). These AFOs will be responsible for creating holistic plans that detail the
20 current and target asset risk, condition, and performance across the entire life cycle of the asset,
21 with a clear line of sight to the investment and resources required to achieve these targets. The
22 success of the asset management plans will be measured objectively using data and Key
23 Performance Indicators (KPIs), and the results will also be used to continue to refine future
24 plans. As SDG&E creates a greater focus on asset risk, we will expand the risk management
25 organization to undertake more detailed risk assessments, using leading methods that allow for a
26 more enhanced understanding of our assets, their risks, and the most cost effective risk
27 mitigations.

28 **Execution**

29 The construction of policies, plans, and frameworks will require thoughtful
30 implementation by the Asset Management organization. To support this, SDG&E will focus
31 resources in certain areas, with the objective of ensuring positive adoption of our asset

1 management strategies. An example lies in Information Management. SDG&E uses a variety of
2 systems and tools to manage its information, which will need to be coordinated with new asset
3 management policies and strategies. Asset Management will ensure that SDG&E is using
4 traceable, verifiable, accurate and complete information and records, on which SDG&E will base
5 its strategic and operational decisions, and that the selection and sequencing of implementing
6 new plans is consistent with our existing Information Management framework.

7 In addition, a key area for growth will be to implement a system and/or process to capture
8 corrective actions. By doing so, we will more efficiently identify potential issues and
9 opportunities within the business. These corrective actions will then be prioritized according to
10 risk, and the appropriate level of action will be taken. The benefits of this process would be to
11 enhance our understanding of SDG&E's assets, to reduce significant risk, and to increase the
12 levels of employee engagement in meeting the needs of our asset management and
13 organizational goals.

14 **Continuous Improvement**

15 The key tenet of ISO systems is the importance of continued evaluation and
16 improvement. SDG&E will formalize this by adding expertise in the areas of performance
17 measurement and continuous improvement. This role would assess our continued performance
18 through internal and external benchmarking and design the changes needed to keep our overall
19 asset management system improving in line with the requirements of ISO 55000.

20 **2. Forecast Method**

21 The forecast method for this new work group is zero based, as there are no historical
22 costs. SDG&E estimates the staffing needs of this group at approximately 39 full time
23 employees, and plans to fill 50% of this need from existing overlapping functions in the
24 organization. The funding request covers labor costs for the approximately 20 new hires it will
25 take to fill this organization, and for some consultant fees to help launch the organization and
26 ensure SDG&E is on track to receive ISO certification by 2020. Please see my work papers for
27 detailed estimate methodology.

28 **Cost Drivers**

29 The following contribute to incremental cost change:

- 30 • RAMP Proposed Activities

1 **a. RAMP Proposed Activities**

2 **Records Management**

3 This program will create a centralized records management group focused on managing
4 field asset records. This program falls under the records management chapter of the RAMP
5 Report and mitigates the safety and reliability risks associated with incorrect or incomplete asset
6 records. This new asset focused records management group will be a part of the new centralized
7 asset management organization.

8 **P. Troubleshooting**

9 **TABLE WS-22**
10 **Troubleshooting**

Troubleshooting	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Troubleshooting	7,896	7,796	-100
Total	7,896	7,796	-100

11 **1. Description of Costs and Underlying Activities**

12 The Operations & Engineering (O&E) workgroup covers six districts and two satellite
13 locations within SDG&E's service territory. The O&E workgroups for each of the six districts
14 consist of Electric Troubleshooters, engineers, a planner, technical assistants, and management
15 supervision. The O&E workgroup is responsible for engineering and system troubleshooting to
16 ensure reliable and safe electric service to SDG&E customers. Electric Troubleshooters are a
17 key resource, acting as SDG&E's first responders. The Electric Troubleshooters have the
18 specific skills necessary to timely restore electric service during emergencies and unplanned
19 interruptions while protecting public and employee safety. During service interruptions, Electric
20 Troubleshooters are tasked with isolating affected areas of SDG&E's distribution system and
21 implementing restoration efforts that will minimize the impact of any service interruptions to
22 SDG&E customers. During emergencies, Electric Troubleshooters work closely with emergency
23 response agencies to protect the public and SDG&E's employees from potentially hazardous
24 conditions. Electric Troubleshooters act as the primary interface with customers who are
25 experiencing service problems. Electric Troubleshooters perform a variety of additional tasks
26 including substation and field switching, substation patrols, and routine safety patrols related to
27 SDG&E's inspection and maintenance CMP. The remainder of the O&E workgroup provides
28

necessary engineering, planning, administrative, and supervisory support, all essential to providing safe and reliable service.

2. Forecast Method

Labor and non-labor forecasts for Troubleshooting are based on the BY 2016 recorded data. The base year recorded with incremental adjustments forecast methodology was utilized, because it best represents workload requirements moving forward, given system growth expectations.

3. Cost Drivers

The following cost drivers contribute to the upward incremental cost changes:

- FOF Efficiencies

a. FOF Efficiencies

Troubleshooting has developed and will implement efficiency programs at an estimated \$100k in labor in TY 2019. These savings are primarily due to efficiencies gained around optimizing work order prioritization.

Q. Vegetation Management (Pole Brushing)

**TABLE WS-23
Vegetation Management (Pole Brushing)**

Vegetation Management	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Vegetation Management (Pole Brushing)	3,450	3,741	291
Vegetation Management (Tree Trimming)	23,005	22,674	-331
Total	26,455	26,415	-40

1. Description of Costs and Underlying Activities

Pole brushing for SDG&E involves the clearing of flammable brush and vegetation away from SDG&E distribution poles subject to the California Public Resource Code (PRC), section 4292. PRC 4292 is intended to prevent energized electrical hardware from igniting a fire by keeping the area under the subject poles clear of flammable vegetation at all times. Currently, there are 86,000 distribution structures that are inspected annually to comply with PRC 4292. The locations are primarily composed of Federal Responsibility Areas, State Responsibility Areas and the SDG&E Fire Threat Zone. Of the 86,000 distribution structures inspected, 34,000 poles currently have hardware requiring follow up maintenance work.

1 SDG&E's maintenance cycle performs brushing twice a year to comply with federal,
2 state, and local regulations. The remaining poles do not currently require brush clearing due to
3 several factors causing them to be exempt from PRC 4292. These include poles with no
4 electrical equipment, poles containing PRC-exempt hardware only, poles subject to the
5 vegetation exemption for maintained and watered landscapes, and poles subject to hardscape
6 exemptions. All poles located in areas subject to PRC 4292 are inspected annually for
7 compliance.

8 Prior to 2003, SDG&E utilized mechanical pole brushing techniques (chain saws, weed
9 whips, rakes, and other means, as appropriate) to clear the vegetation around the subject poles.
10 Although mechanical pole brushing is an effective way to immediately remove the flammable
11 brush and grasses from within the required clearance area, it is not as effective on poles subject
12 to summer rains or leaves cast from adjacent trees. In 2003, SDG&E implemented a three-phase
13 approach to more effectively manage each subject pole. This approach includes: chemical pole
14 brushing, mechanical pole brushing, and re-clear pole brushing.

15 Chemical pole brushing involves clearing all vegetation from around the pole base and
16 applying an Environmental Protection Agency (EPA) approved herbicide. SDG&E treats
17 approximately 10,000 poles, during the fall and winter months, with a pre-emergent herbicide to
18 minimize vegetative re-growth and reduce overall maintenance costs. Not all subject poles can
19 be treated with herbicide due to environmental constraints, which include considerations such as
20 slope, proximity to water, proximity to trees and other vegetation, and customer approval.

21 Mechanical pole brushing involves the removal of vegetation from around the pole base
22 using mechanical means. Mechanical brushing is typically performed in the spring months.

23 Re-clear pole brushing, performed in summer months, involves removing any additional
24 flammable vegetation which has grown into, or blown into, the required clearance area since the
25 last maintenance activity. In many cases, a single re-clear cycle is not adequate to maintain
26 compliance with PRC 4292 at all times. For this reason, SDG&E completes two re-clear cycles
27 to further ensure compliance and reduce fire risk. The need to revisit a subject pole multiple
28 times is not uncommon due to leaf litter blown back into the managed clearance zone during
29 windy conditions, and due to the growth of weeds and grasses that cannot be easily controlled by
30 mechanical clearing or herbicide treatments. Trees adjacent to subject poles also require pruning

1 to keep dead, dying or diseased tree limbs, branches, and foliage from encroaching into the
2 radius of the cleared circle from ground up to the height of the electrical conductors.

3 In order to protect the public, support fire prevention, and maintain compliance, SDG&E
4 is requesting necessary funding for this program, in-line with historical average levels of
5 spending. SDG&E's pole brushing costs are anticipated to be near their five-year average, with
6 expenses primarily driven by required compliance levels and the need to continue with enhanced
7 fire risk reduction strategies. The five-year average reflects the level of non-exempt poles being
8 brushed in Local Responsibility Areas (LRAs), using tighter fire risk mitigation criteria. Re-
9 clear brush activities are being applied to the LRA poles as well. Funding includes the cost of
10 contracted services to perform the pole brushing activity in the field, as well as the pole brushing
11 portion of the contractor's excess liability insurance coverage (further explained in testimony in
12 the vegetation management tree trim section). Also included in SDG&E's pole brushing costs
13 are related field functions such as pole pre-inspection, quality control, and SDG&E staff and
14 other support costs.

15 a. RAMP Current Activities

16 The following activities were described in the RAMP Report and are performed by the
17 Vegetation Management group. These risk mitigating programs are already implemented, and
18 the costs associated with these activities are embedded in the historical recorded costs. These
19 costs are forecasted in TY 2019 as a component of the average historical costs.

20 Pole Brushing

21 This program, described in detail above, was filed under the Wildfire Chapter of the
22 RAMP Report and mitigates the risk of wildfire by performing brushing around structures in the
23 fire threat zone.

24 2. Forecast Method

25 Labor and non-labor costs are based on a five-year average. Labor includes a portion of
26 several positions that administer the pole brush program. Non-labor includes field work
27 performed by outside contractors plus the pole brushing share of contractor insurance coverage.
28 The most recent five-year average is most indicative of forecasted expenses for this group,
29 because it represents the funding level needed to complete the forecasted level of pole brush
30 activity while accounting for slight fluctuations in year-to-year costs.

1 **3. Cost Drivers**

2 The following contribute to incremental cost changes:

- 3 • RAMP Proposed Activities

4 **a. RAMP Proposed Activities**

5 The following activities were identified as proposed programs in the RAMP Report.

6 These are the programs from the RAMP Report that will impact Pole Brushing.

7 **Joint Inspections with CalFire**

8 SDG&E is working together with CalFire to inspect power lines in areas with high fire
9 threat potential. Utilizing their knowledge of fires and our knowledge of the electric distribution
10 system we can develop solutions to mitigate the threat of a catastrophic wildfire. This program
11 falls under the Wildfire Chapter of the RAMP Report and mitigates the safety, reliability, and
12 fire risks associated with vegetation in the fire threat zone. Please see my workpapers for
13 estimate methodology.

14 **R. Vegetation Management (Tree Trimming)**

15 **TABLE WS-24**
16 **Vegetation Management (Tree Trimming)**

Vegetation Management	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Vegetation Management (Pole Brushing)	3,450	3,741	291
Vegetation Management (Tree Trimming)	23,005	22,674	-331
Total	26,455	26,415	-40

17 **1. Description of Costs and Underlying Activities**

18 This section of testimony addresses the labor, materials and other expenses associated
19 with SDG&E’s tree pruning, tree removal, and other vegetation management expenses.

20 Vegetation Management expenses are currently treated under a one-way balancing account for
21 distribution-related work; however, SDG&E is proposing two-way balancing treatment as part of
22 this GRC filing. In its 2016 GRC,¹⁵ SDG&E had originally requested two-way balancing for
23 vegetation management work, and as part of the settlement agreement agreed to one-way
24 balancing treatment for the period 2016-2018. SDG&E renews its request for two-way
25

¹⁵ A.14-11-003/D.16-06-054 at 57 and OP-8 at 329.

1 balancing account treatment in this GRC. SDG&E's expense forecast for its electrical
2 distribution Vegetation Management Program is required to perform the vegetation management
3 activities necessary to mitigate risks to public safety, to support fire prevention and preparedness,
4 to maintain system reliability, and to comply with GO 95, Rule 35, Public Resource Code,
5 sections 4292 and 4293, and the North American Electric Reliability Corporation (NERC) FAC-
6 003. From year to year, expenses are hard to accurately predict, due to the high variability of the
7 number and variety of trees and vegetation requiring line clearance pruning annually, and the
8 variability in the amount of trim work required on each tree, combined with stringent
9 environmental factors, recent regulatory changes to GO 95, Rule 35, and increased inspection
10 and removal of hazard trees in response to concerns expressed by the California Department of
11 Forestry and Fire Protection (CalFIRE). With a two-way balancing account in place, SDG&E
12 requests that funding be maintained in line with a historical four-year average level of spending.

13 **Overview of the SDG&E Vegetation Management Program**

14 SDG&E's Vegetation Management Program is responsible for inspecting and
15 maintaining an inventory of approximately 450,000 trees that have the potential to encroach
16 within the minimum required compliance distance between vegetation and overhead power lines.
17 This work includes pruning healthy trees growing into overhead power lines as well as the
18 pruning or removal of dead, dying, diseased, or structurally unsound trees with the potential to
19 fall into overhead lines. Additionally, the pole brushing program inspects and maintains an
20 inventory of approximately 86,000 poles located in areas determined to be at high risk for
21 wildland fires. Pole brush work includes mechanical clearing, chemical treatment, and
22 mechanical re-clear activities to maintain compliance. SDG&E requests two-way balancing
23 account funding for its tree trim activity separate from its funding for the pole brushing program,
24 which is treated as a regular O&M expense.

25 SDG&E is responsible for compliance with CPUC GO 95, Rule 35; Public Resources
26 Code, sections 4292 and 4293; and NERC FAC-003. Compliance with these rules and
27 regulations mandate a minimum clearance between vegetation and SDG&E facilities and are the
28 primary cost drivers of the program. SDG&E's vegetation activities are coordinated through a
29 centralized Vegetation Management Program within the Construction Services department under
30 the Electric Operations organization. The Vegetation Program Manager and staff set the
31 standards, guidelines, and processes for the overall program to ensure that the company is in

1 compliance with all rules, laws, and regulations governing SDG&E practices. The Vegetation
2 Management staff includes Program Manager, Team Leads, Area Foresters, Contract
3 Administrators, Quality Assurance Specialists, Technical Support/Analyst, and Customer
4 Service Administrative staff.

5 There are two types of work that drive the tree program costs: 1) routine work and 2)
6 field memos and hazard tree work. Routine work includes annual-cycle pruning and removal of
7 trees. Pre-inspection contractors perform the overhead power line patrols which identify trees to
8 be pruned and removed. Routine tree pruning and removal is typically done by a contractor and
9 is compensated on a unit price basis.

10 Field memos are reactive and/or unscheduled tree pruning, and include customer refusals,
11 hazard tree pruning and removal, environmentally or culturally sensitive pruning activities, trees
12 which require priority pruning, district requests, and customer safety checks. Due to the varied
13 nature of these orders, this type of work is compensated on a Time & Equipment (T&E) basis
14 when performed by a contractor. On occasion, SDG&E field personnel may perform some
15 vegetation management activities if they are simple in nature and can be done immediately at the
16 time of identification.

17 To ensure the above activities are completed in accordance with the company's
18 contracted scopes of work, SDG&E has a quality control program to verify the completion and
19 certification of each work activity. An automated random sampling method is used to create
20 audit work packages, and then the auditor field reviews records for adherence to contract
21 specifications, quality, and compliance. In conjunction with the post-prune audit, auditing
22 activity includes a patrol of all spans of overhead power lines for any trees that may have
23 encroached the minimum clearance zones since the last pre-inspection activity. This activity
24 provides a higher level of compliance for the duration of the annual cycle. Due to the variability
25 in units audited and distance between locations, audit work is compensated using T&E rates.

26 **a. RAMP Current Activities**

27 The following activities were presented in the RAMP Report and are performed by the
28 Vegetation Management group. The risk mitigating programs are already implemented and the
29 costs associated with these activities are embedded in the historical recorded costs. These costs
30 are forecasted in TY 2019 as a component of the average historical costs.

31

Tree Trimming

This program, described in detail above, falls under the Wildfire Chapter of the RAMP Report and mitigates the risk of wildfire and reliability by performing tree trimming to ensure proper clearances from vegetation to energized power lines are maintained.

2. Forecast Method

Labor and non-labor forecasts are based on the most recent four-year historical average. Labor consists of Vegetation Management staff labor and other support activities. Non-labor includes field work plus tree trim's share of contractor insurance. SDG&E is concerned about the recent drought followed by significant rain and the potential impact these events are expected to have on vegetation management requirements in the form of increased vegetation growth and workload. This potential surge in vegetation management workload can be expected to put upward pressure on program costs. SDG&E requests a two-way balancing account in lieu of forecasting cost increases. The two-way balancing account will allow flexibility for SDG&E to respond to these issues as they materialize while protecting customers should the expected increase in vegetation management activity not materialize to the degree anticipated. SDG&E seeks to hold funding at a level equal to the most recent four-year average, and believes it is reasonable to grant two-way balancing treatment in order to reasonably manage safety and reliability risks resulting from the past drought, recent rainfall, and resultant fire safety issues.

3. Cost Drivers

The following contribute to incremental cost changes:

- FOF Efficiencies

a. FOF Efficiencies

Vegetation Management has developed and will implement efficiency programs at an estimated \$84k in labor in TY 2019. These efficiency savings are primarily related to work stream process enhancements leveraging the capabilities of the Powerworkz software, a GIS-based work management system which allows for the elimination of the manually maintained paper records of the work done by field crews.

1 **S. Regional Public Affairs**

2 **TABLE WS-25**
 3 **Regional Public Affairs**

Regional Public Affairs	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Regional Public Affairs	1,965	1,802	-163
Total	1,965	1,802	-163

4
 5 **1. Description of Costs and Underlying Activities**

6 SDG&E’s Regional Public Affairs group supports electric and gas distribution operations
 7 through its work with regional and local governments on issues regarding proposed regulations,
 8 permitting, and emergency preparedness and response. Regional Public Affairs also educates
 9 officials at the county and city levels about utility issues that could impact customers.

10 In addition to communicating with government agencies, Regional Public Affairs serves
 11 as the point of contact in the 125 communities SDG&E serves. Typical activities include
 12 educating stakeholders about utility operational activities, programs and services, responding to
 13 stakeholder inquiries, resolving customer complaints, and working with underserved
 14 communities.

15 **2. Forecast Method**

16 The forecast method developed for this cost category is a three-year average less
 17 incremental FOF savings. The three-year average was selected as historical costs and activity
 18 levels from 2014, 2015, and 2016 most closely align with future forecasted levels.

19 **3. Cost Drivers**

20 The following contribute to incremental cost changes:

- 21 • FOF Efficiencies

22 **a. FOF Efficiencies**

23 Regional Public Affairs has developed and will implement efficiency programs to reduce
 24 costs by \$269k in labor and \$37k in non-labor in 2019. These savings are achieved by using
 25 technology to increase visibility and reporting on projects, as well as improved controls around
 26 accounting and vehicle usage.

1 **T. Major Projects**

2 **TABLE WS-26**
3 **Major Projects**

Major Projects	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Major Projects	119	110	-9
Total	119	110	-9

4 **1. Description of Costs and Underlying Activities**

5 Major Projects is responsible for effectively managing distribution and substation
6 projects by focusing on a clearly defined project scope, schedule, and budget. This group
7 manages projects from inception to conclusion, ensuring consistent project management
8 responsibility throughout the life of the project.

9 **2. Forecast Method**

10 The forecast method developed for this cost category is a three-year average. This
11 method is most appropriate because the current organizational structure of Major Projects is best
12 reflected in the historical costs from 2014, 2015, and 2016. The O&M expenses for Major
13 Projects are minor and are expected to remain consistent over the next three years, as most
14 expenses are related to capital projects.

15 **U. Technology Utilization**

16 **TABLE WS-27**
17 **Technology Utilization**

Technology Utilization	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Technology Utilization	1,042	1,225	183
Total	1,042	1,225	183

18 **1. Description of Costs and Underlying Activities**

19 At SDG&E, we are using technology to transform our electric system and deliver benefits
20 to customers. SDG&E has been working to make the electrical grid more reliable and able to
21 incorporate large-scale renewables, plug-in electric vehicles, and rooftop solar panels by
22 incorporating energy storage and other technologies. Advanced technologies will support system
23 stability by offsetting the intermittency of large-scale wind and solar through large scale battery
24 storage installations, and will help us operate our electric system more safely, reliably, and
25

1 efficiently, with fewer Green House Gas (GHG) emissions. By leveraging our forward-thinking
 2 workforce and advanced technologies, we can bring these benefits to our customers. They will
 3 be able to take advantage of new energy products such as plug-in electric vehicles, roof top solar
 4 panels, home energy management systems, and energy smart appliances.

5 These costs will support SDG&E’s and California’s goals via the analysis, development,
 6 evaluation, and integration of new technologies to drive grid modernization, enhance reliability,
 7 and provide benefits to our customers.

8 **2. Forecast Method**

9 The forecast method developed for this category is a four-year average for both labor and
 10 non-labor costs. The four-year average is most reflective of the cost incurred due to
 11 organizational changes and a limited cost history.

12 **3. Cost Drivers**

13 The following contribute to incremental cost change:

- 14 • Workforce development

15 **a. Workforce Development**

16 Technology Utilization will continue to evaluate and develop projects that first pilot and
 17 then deploy technologies to the SDG&E grid to support increased renewables, in order to meet
 18 state mandates and regulatory compliance. Energy storage and other advanced technologies will
 19 be utilized to enhance overall system reliability. The increased focus on these goals will require
 20 additional resources to assist in the activities above, to further California and SDG&E energy
 21 objectives. My workpapers describe the Technology Utilization estimate methodology.

22 **V. Compliance Management**

23 **TABLE WS-28**
 24 **Compliance Management**

Compliance Management	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Compliance Management	2,694	2,856	162
Total	2,694	2,856	162

25 **1. Description of Costs and Underlying Activities**

26 The Compliance Management workgroup is focused on ensuring that SDG&E maintains
 27 its compliance with internal and external regulations, policies, and procedures as they relate to
 28

1 operating and maintaining the electric distribution system in a safe, reliable, and efficient
2 manner. The two main subsections that comprise the Compliance Management Workgroup are
3 the Compliance Management Group and the Program Management Group. Additional
4 information on each of the subsections and their function is presented below.

5 **Compliance Management**

6 Compliance Management (CMG) has the responsibility to manage regulatory compliance
7 to GO 95, 128, 165 and 166. The group carries out its function through audits, statistical
8 analysis, reporting, and training of field personnel. It also maintains the relationship with the
9 CPUC's SED to comply with CPUC requests regarding the electric distribution system. CMG
10 also maintains responsibility for all joint utility processes related to CIP attachments, assuring
11 compliance to CPUC D.98-10-058¹⁶, SDG&E's structural licensing process, and GO 95.

12 **Program Management**

13 Program Management is responsible for developing and centrally managing the patrol,
14 inspection, and maintenance elements related to the GO 165 CMP. Functions include
15 developing policies and procedures, training field employees, statistical reporting and analysis,
16 budgeting, leading practice initiation, and other similar program management related activities.
17 Other related inspection/maintenance programs overseen by the Program Management group
18 include Avian Protection Program management, Wood Pole Inspection Program, Graffiti
19 Abatement and Quality Control Inspections, and related corrections in the fire threat zones.

20 **2. Forecast Method**

21 Labor and non-labor costs are based on a three-year average, with incremental
22 adjustments for specific pressures. The three-year average plus adjustments is the most
23 representative methodology for estimating future labor and non-labor costs associated with this
24 group.

25 **3. Cost Drivers**

26 The following contribute to incremental cost changes:

- 27 • Workforce Development

¹⁶ See ftp://ftp2.cpuc.ca.gov/LegacyCPUCDecisionsAndResolutions/Decisions/Decisions_D9507001_to_D9905055/D9810058_19981022_R9504043.pdf.

1 **a. Workforce Development**

2 A 2016 Commission decision¹⁷ allows AT&T and other communications companies
3 providing CMRS to attach to SDG&E’s poles and use the existing right of way. These new
4 assets attached to SDG&E poles will require additional inspections and maintenance, as well as a
5 higher volume of field validations and information processing. In order to accommodate the
6 additional workload, additional personnel and training are required.

7 **W. Technology Solutions and Reliability**

8 **TABLE WS-29**
9 **Technology Solutions and Reliability**

Tech Solutions and Reliability	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Tech Solutions and Reliability	2,544	3,260	716
Total	2,544	3,260	716

10 **1. Description of Costs and Underlying Activities**

11 The Technology Solutions and Reliability workgroup is made up of several groups:
12 Enterprise System Solutions (ESS), ESS Production Support, Electric Reliability, Construction
13 Planning and Design, Electric Business Process, and Geographic Business Solutions (GBS)
14 mobile, web, and desktop, and Operations Technology Integration (OTI).

15 The ESS group provides system analyst support for Electric Operations. This includes
16 providing functional support for systems (e.g., SAP PM, Automated Roster Call Out System
17 ARCOS, PowerWorkz, etc.), requirements development, facilitation of business domain testing,
18 and training.

19 ESS Production Support provides field hardware support for SDG&E field operations.
20 Services include first level application support (e.g., Click, PowerWorkz, Franson) and technical
21 support for all computing devices in the field (e.g., Mobile Data Terminals (MDTs)).

22 In general, the Reliability Engineering group is responsible for tracking and reporting the
23 Electric Reliability indices, developing a capital strategy to improve reliability performance, and
24 managing capital projects through completion to realize the reliability benefits. Reliability is
25

¹⁷ See D.16-01-046, the January 28, 2016, decision in R.14-05-001, the “Decision Regarding the Applicability of the Commission’s Right of Way Rules to Commercial Mobile Radio Service Carriers.”

1 tracked in accordance with CPUC decision D.16-01-008¹⁸. The reliability performance of
2 SDG&E systems is currently measured with four key performance indicators:

- 3 • System Average Interruption Duration Index (SAIDI) is used to measure the
4 duration of outages;
- 5 • System Average Interruption Frequency Index (SAIFI) is used to measure the
6 frequency of outages;
- 7 • Customer Average Interruption Duration Index (CAIDI) is used to measure the
8 average time to restore customers during an outage;
- 9 • Momentary Average Interruption Frequency Index (MAIFI) is used to measure
10 the frequency of momentary outages customers experience; and
- 11 • SDG&E's worst performing circuits (WPC) are tracked based on a five-year
12 performance and a two-year performance rate, for both SAIDI and SAIFI.

13 Reliability Engineering provides support for several programs that are aimed at
14 maintaining electric reliability with key drivers such as the SCADA system expansion, the
15 underground cable replacement program, and aging infrastructure at both the distribution line
16 and substation levels. (Please see the discussion on proposed metrics as a result of the prior
17 GRC decision D.13.05-010 later in this testimony at section IV.)

18 The Electric Business Process group manages projects around system enhancements,
19 process improvements, and efficiency initiatives. The project management activities provided
20 for these areas include developing scope, identifying business requirements, managing the
21 project schedule, mitigating risks and issues, and coordinating communication and training
22 activities. Previously, the Electric Business Process group only provided support to ERO;
23 however, beginning in July 2017, the group has an expanded scope that provides project
24 management for any initiatives related to asset management.

25 Construction Planning and Design provide project management requirements
26 development, system and user acceptance testing, change management planning and facilitation,
27 coordination of software release activities, and post implementation/storm support. They also
28 provide on-going system support for Electric and Gas operations, supporting both office and
29 field personnel, related to SAP Work Management Systems (Construction Planning and Design

¹⁸ See <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M157/K724/157724560.PDF>

1 (CPD) and Distribution Planning and Scheduling System (DPSS)), Design software (Graphical
2 Work Design (GWD)), and Construction Crew Scheduling and Dispatching applications (Click
3 Mobile and Click Schedule).

4 The Geographic Business Solutions (GBS) & Operations Technology Integration (OTI)
5 workgroup is responsible for providing business analytics, (requirements, design, cost benefits,
6 testing, development, etc.), associated with the maintenance and advancement of Geographic
7 Information System (GIS) technology to support existing and future SDG&E enterprise business
8 needs. GBS & OTI will be building out the data model in greater detail to support Distributed
9 Energy Resources (DER) integration with Electric Vehicle Charging Stations. Services focus on
10 the following applications/user interfaces: Desktop, Web, Portal and Mobile supporting the
11 following business operations: Land, Environmental, Electric Transmission, Substation, Electric
12 Distribution and Telecommunication. Services also include the management of GIS interface
13 with other major and mission critical systems: OMS/NMS – Outage Management
14 System/Network Management System (GIS Electric Distribution Network Models), GEARS –
15 Environmental System (GIS Polygon Layers), SAP Work Management (GIS Electric
16 Distribution Assets), EDW –Engineering Data Warehouse (GIS Electric Distribution Assets &
17 Network Models), Synergi – Power Flow System (GIS Electric Distribution Network Models),
18 and CISCO – Customer Care System (GIS Transformer/Customer Relationships).

19 GBS and OTI will also be responsible for supporting Graphical Work Design (GWD)
20 third quarter 2017. GWD support will consist of fixes and enhancements to: ArcFM Designer /
21 GWD-2 (Electric Distribution Drawing Tools), Engineering Calculations (Overhead Design
22 Analysis, Volt Drop, and Flicker and Cable Pulling), Butterfly Diagrams and Service Order
23 drawing tools.

24 **2. Forecast Method**

25 Labor and non-labor costs are based on a five-year average. A five-year average
26 was chosen to best represent the current and future structure of the organization, and account for
27 annual fluctuations in cost pressures.

28 **3. Cost Drivers**

29 The following contribute to incremental cost changes:

- 30 • Workforce Development
- 31 • Safety and Reliability

1 **a. Workforce Development**

2 The Technology Solutions and Reliability organization is requesting new employees, in
3 order to address resource gaps in the following areas:

4 Enterprise System Solutions (ESS) and ESS Production Support request additions to
5 provide system analyst support for Electric Operations. Services performed will include first-
6 and second-level functional support for systems impacting the SDG&E field force, requirements
7 development for new projects and enhancements, facilitation of business domain testing,
8 training, and execution of business processes, which supports the data integrity of SDG&E’s
9 Corrective Maintenance Program and Vendor Billing.

10 The Electric Business Process group requests Project Managers to support the expanded
11 scope of the group. The current and additional project managers are continuing to support
12 projects for ERO while taking on additional projects from various groups including, but not
13 limited to, Clean Transportation, Generation, Distribution Operations, System Planning, and
14 DER. With the scope expanding to include asset management initiatives, additional resources
15 are required to manage those projects.

16 Construction Planning and Design request an addition to support the Organization
17 Change Management (OCM) function for ERO. The additional resource is to maintain the
18 support level for ERO.

19 The GBS and OTI requests additional analysts due to increased work as the company
20 relies more on GIS for reliability, OMS/NMS, Synergi, etc. GBS and OTI will provide business
21 analytics in support of new technology driving ongoing upgrades or replacement to the GIS
22 Mobile, Portal, and GEARS applications. In addition, the GIS Web product will be updated to a
23 later release, providing improved performance and functionality. With evolving DER integration
24 and the associated business requirements, the team will need to enhance the current system to
25 provide applications and integration to meet the business requirements. On an ongoing basis,
26 changes will continue to be made to the GIS model applications and interfaces to support
27 advanced technology utilization business requirements.

28 **b. Safety and Reliability**

29 Enhancements to ARCOS Mobile Functionality will allow managers and supervisors to
30 utilize their smart phones to view information on active callouts. They can see the basic details
31 of the callouts and who has accepted them. They can also see who has scheduled exceptions

1 such as sick or vacation, etc., and can remotely put people into those exceptions. Field people
 2 can utilize their smart phones to see information about callouts when they happen and can accept
 3 or decline callouts from the screen of their smart phone. They can also dynamically see where
 4 they are in a roster list as they move up due to other people accepting callouts.

5 Outage Management System (OMS) Damage Assessment is a mobile solution that
 6 converts our existing paper process of reporting damages, and leverages a mobile device to
 7 collect and send to the appropriate individual for decision making. The benefits allow for
 8 reducing grid restoration time during an outage.

9 Systems Functionality Enhancements provide upgrades and enhancements to the OMS to
 10 support distribution operations. These enhancements will support new devices or model changes
 11 needed to support grid modernization.

12 **X. Emergency Management**

13 **TABLE WS-30**
 14 **Emergency Management**

Emergency Management	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Emergency Management	2,503	5,344	2,841
Total	2,503	5,344	2,841

15 **1. Description of Costs and Underlying Activities**

16 Emergency Management comprises three groups: Emergency Services, Meteorology,
 17 and Fire Coordination and Prevention.
 18

19 Emergency Services provides planning and guidance for responding in anticipation of,
 20 response to, or following an incident. Emergency Services effectively and efficiently supports
 21 the Company’s ability to prevent, prepare for, respond to, and recover from incidents regardless
 22 of cause, size, or complexity. Emergency Services’ work and responsibilities also support the
 23 mitigation of other enterprise risks, for which Emergency Services does not have direct
 24 management. Emergency Services has responsibility for both risk mitigation and emergency
 25 response, ensuring the Company is prepared to respond, if an event occurs. The overall purpose
 26 of emergency preparedness, including planning, is to safeguard the public, employees,
 27 contractors, stakeholders, reputation, and the continuation of essential business functions.
 28 Additionally, Emergency Services oversees Federal, State, local, and Company emergency

1 preparedness and response plans, as well as standards and other compliance requirements.
2 Emergency Services oversees the testing and updating of its plans.

3 To assist in coordination and recovery efforts during a variety of emergency events,
4 SDG&E has in place three sixteen-foot trailers and one thirty-two-foot trailer containing all of
5 the necessary communications, networking, and office supplies to establish a command and
6 control center at an impromptu staging yard. Because these trailers are utilized for emergency
7 needs, they are required to be operational at any moment in time. Most recently, two of these
8 trailers were utilized during the 2016 fires that affected SDG&E's service territory in
9 June. These trailers are especially important during the fire season. SDG&E stages these trailers
10 in preparation for an extreme weather event, so that they are close to areas that are expected to
11 experience extreme weather.

12 SDG&E's Meteorology department currently has three meteorologists on staff. The
13 meteorologists provide daily reports that are critical to making real-time operating decisions, in
14 order to safely manage and operate the electric system, on a 24-hours a day, seven-days per week
15 basis. The Meteorology group also manages the largest utility weather network in the country,
16 and has developed a high-performance computing program, which uses state-of-the-art analytical
17 methods to provide superior decision support tools to our company and community. This is
18 especially important during periods of adverse weather conditions, with special focus on
19 mitigating fire risk and providing situational awareness during times of extreme Santa Ana
20 weather conditions. During high fire risk periods, real time weather information support is
21 essential to understanding the changing weather conditions, to operate the system safely under
22 given conditions, and to minimize the risk that SDG&E equipment could be a source of
23 ignition. SDG&E also has cameras throughout the service territory, which provide visual
24 situation awareness. These cameras are normally located in non-populated areas, such that the
25 first initial identification of a fire could be from one of these cameras.

26 SDG&E's Fire Coordination and Prevention team consists of individuals who possess
27 broad expertise in a variety of firefighting disciplines, from wildland fire control and municipal
28 fire departments, to aerial firefighting operations. This team works closely with engineering,
29 operations, and construction to build fire safety and fire preventive measures and procedures into
30 designs and operational and construction activities. They also provide fire prevention expertise
31 during the planning phase of major projects. Because of their Incident Command System

1 experience, the Fire Coordination and Prevention team can integrate with first responders at the
2 Command level to ensure the emergency response is safe, efficient, and coordinated. Fire
3 Coordination and Prevention representation at strategic and operational planning meetings during
4 an ongoing incident allows for SDG&E objectives to become part of the overall Incident Action
5 Plan. The Fire Coordination and Prevention team also oversees SDG&E's contract fire
6 prevention and suppression services, when electric crews are working in high fire threat zones
7 during fire season and extreme fire weather such as red-flag Santa Ana events. The team
8 provides fire safety training internally to SDG&E employees and electrical safety training
9 externally to fire department and law enforcement first responders. The Fire Coordination and
10 Prevention team also provides subject matter expertise in regulatory proceedings.

11 **a. RAMP Current Activities**

12 The following activities were described in the RAMP Report and are performed by the
13 Emergency Management group. The risk mitigating programs are already implemented and the
14 costs associated with these activities are embedded in the historical recorded costs. These costs
15 are forecasted in TY 2019 as a component of the average historical costs.

16 **Fire Brigade**

17 SDG&E contracts a Fire Brigade crew, which is available 24/7 to fight substation and
18 structure fire, using typical fire control facilities and fire suppression foam trailers. This program
19 falls under the Wildfires Chapter of the RAMP Report and mitigates the risks associated with
20 extended outages to equipment and the spread of wildfires.

21 **Weather Forecasting Models**

22 SDG&E maintains, replaces, recalibrates, and checks over 170 weather stations within
23 the service territory. These weather stations monitor weather conditions on every circuit across
24 the SDG&E Fire Threat Zone. This information is used to inform detailed forecast models that
25 support our operations and are also shared with local fire agencies, emergency responders, and
26 the National Weather Service. Regular upgrades of computer hardware and processors are
27 required to run the latest versions of data analytics. This program falls under the Wildfires
28 chapter of the RAMP Report and mitigates the risks associated with wildfires by providing
29 advanced detection of fire conditions.

1 **Weather Awareness System**

2 Maintain and upgrade the communication tool that allows for real time weather
3 information to support system operations. SDG&E collects over 200,000 pieces of weather data
4 through its network of weather stations every day. The Weather Awareness System helps to
5 streamline this information, as well as images from mountaintop cameras and other intel that
6 enhances situational awareness for the company and community. This program falls under the
7 Wildfires chapter of the RAMP Report and mitigates the risks associated with wildfires by
8 providing advanced detection of fire conditions.

9 **Wildfire Risk Reduction Model (WRRM)**

10 The Wildfire Risk Reduction Modeling (WRRM) done at SDG&E integrates the latest
11 weather and GIS technology to understand wildfire growth patterns across the region. From a
12 project planning perspective, this tool can help identify the highest risk areas and prioritize those
13 for system hardening. From an operational standpoint, we can understand the highest risk areas
14 at any given time and adjust day-to-day operations to minimize wildfire risk to the company and
15 community. WRRM program costs include licensing agreement payments and enhancements to
16 continually improve the software, make the model more usable and provide ease of navigation.
17 This program falls under the Wildfires chapter of the RAMP Report and mitigates the risks
18 associated with wildfires by providing advanced detection of fire conditions.

19 **Fire Potential Index**

20 The Fire Potential Index (FPI) is a state-of-the-art tool that takes into account weather
21 conditions and the fuels/vegetation environment to understand the overall wildfire risk across the
22 SDG&E service territory. This situational awareness tool is used to guide operational and daily
23 work decisions and is also shared with local fire agencies, emergency responders, and the
24 National Weather Service to minimize the wildfire risk to the company and community. The FPI
25 contains inputs that require regular updating and awareness on information such as the greenness
26 of grass layer and fuel moisture. This program falls under the Wildfires chapter of the RAMP
27 Report and mitigates the risks associated with wildfires by providing advanced detection of fire
28 conditions.

29 **Utility Wildfire Prevention Teams**

30 These teams are used to follow electric line crews at heightened fire risk times to make
31 sure no errant spark as a result of active line work turns into a fire. This program falls under the

1 Wildfires Chapter of the RAMP Report and mitigates the risks associated with wildfires caused
2 by SDG&E equipment.

3 **Emergency Management First Responder Outreach Program**

4 This program provides safety and basic operational information about electricity and
5 SDG&E's facilities as they relate to First Responder operations and activities. This program
6 falls under the Public Safety Event – Electric Chapter of the RAMP Report and mitigates the
7 risks associated with a public safety event by providing customer communications and training
8 of first responders.

9 **Emergency Operations Center (EOC) Training**

10 This program provides training for all personnel that support the Emergency Operations
11 Center. This program falls under the Employee, Contractor and Public Safety Chapter of the
12 RAMP Report and mitigates the risks associated with a safety event by having trained personnel.

13 **Meteorology Support**

14 SDG&E employs a team of meteorologists to provide 24/7 operational support to the
15 company. Two meteorologists also dedicate time to researching the latest climate science and
16 opening dialogue with internal departments to assess the potential impacts of a changing climate
17 on the electric and gas systems and identify resilience strategies. This program contains the
18 meteorologist support for addressing and identifying potential risks posed to SDG&E's system
19 by climate change. This program falls under the Climate Change Adaption chapter of the RAMP
20 Report and mitigates the risks associated with Climate Change.

21 **2. Forecast Method**

22 Labor and non-labor forecasts are based on the BY 2016 recorded data. The base year
23 recorded with incremental adjustments forecast methodology was utilized to best represent the
24 structure of the organization, while accounting for the additional programs SDG&E plans to
25 implement moving forward.

26 **3. Cost Drivers**

27 The following drivers contribute to incremental cost changes:

- 28 • Safety and Reliability
- 29 • Environmental and Regulatory Compliance
- 30 • RAMP Proposed Activities

1 **a. Safety and Reliability**

2 **Atmospheric Profiler Operations**

3 SDG&E owns two unique mobile radar systems known as “Atmospheric Profilers.”
4 These atmospheric profilers provide vertical snapshots of wind speed, temperature, and humidity
5 in the lowest several thousand feet every few minutes. The profiler data enhances SDG&E’s
6 situational awareness during high-impact weather events such as red flag warnings, Santa Ana
7 winds, and severe storms. The data can also be used to support renewable energy forecasts. The
8 manufacturer provided operating cost estimates for 2017-2019.

9 **Emergency Response Training and Curriculum Development**

10 Incident and emergency response is a corporate and individual responsibility. Employees
11 have an obligation to respond to incidents as directed by SDG&E management. As a result, a
12 significant number of employees are trained and have been assigned response roles. Emergency
13 Services is responsible for the development of training curriculum, the training facilitation, and
14 ensuring an emergency response workforce is certified and qualified to respond to the
15 Company’s Emergency Operations Center. Current training must be modernized to include a
16 risk based approach as well as the adoption and adaptation of a common incident response
17 structure unilaterally across the enterprise, such as the Incident Command System (ICS).

18 **EOC Audio Visual (AV) Maintenance**

19 EOC AV Maintenance will be for the upkeep and maintenance of the AV equipment in
20 the EOC to ensure EOC Responder situational awareness during times in which the EOC is
21 activated to address impacts to electric and gas reliability as well as to the safety of the public
22 and employees of SDG&E. Maintenance and repair would include regular wear and tear items
23 such as bulbs for the projectors utilized in the EOC or updates to the displays and sound systems
24 that are in the EOC or the EOC backup site.

25 **Fire Safety Contract labor**

26 Due to the climate-induced environmental changes, the threat of wildland fire continues
27 to extend throughout the year, and the need for Fire Prevention and Suppression standby crews
28 grows with that threat. The main contract period of three months per year is frequently
29 augmented to include additional field requests for coverage, such that the need for contract fire
30 suppression crew coverage has extended to four months per year.

1 **Fire Safety**

2 SDG&E is a member of the Peer Development Panel (a lead position) in R.15-05-006,¹⁹
3 the High Fire Threat District Map proceeding. Additional costs are required for SDG&E
4 personnel to travel more frequently than in the past to attend meetings and make presentations.

5 **Incident Command System**

6 The implementation of organizational structures and management principles aligned with
7 the ICS has, in the last several years, become a standard practice at utilities across North
8 America. This trend is in large part due to how ICS provides not only for coordination between
9 responding entities but also for relationship enhancement between local, state, and federal
10 governments and utilities. ICS provides for a standardized, on-scene, all-hazards incident
11 management approach that:

- 12 • allows for the integration of facilities, equipment, personnel, procedures, and
13 communications operating within a common organizational structure;
- 14 • establishes common processes for planning the response and managing resources;
15 and
- 16 ▪ enables a coordinated response among various jurisdictions and functional
17 agencies, both public and private.

18 As a system, ICS not only provides an organizational structure for incident management,
19 but it also guides the process for planning, building, and adapting that structure. Finally, an ICS
20 compatible response structure has been mandated by the CPUC in terms of how utilities respond
21 and mitigate emergency incidents.²⁰ This was the impetus for developing the OFER program
22 described earlier in my testimony.

23 **Maintenance for the new Emergency Mobile Command Trailer (EMCT)**

24 The EMCT is a thirty-two foot trailer containing all of the necessary communications,
25 networking, and office supplies to establish a command and control center at an impromptu
26 staging yard. SDG&E has key monthly maintenance for the equipment and services inside and
27 on the roof of the EMCT. This maintenance includes turning on all equipment (generator,

¹⁹ See <https://www.sdge.com/regulatory-filing/18671/order-instituting-rulemaking-develop-and-adopt-fire-threat-maps-and-fire>.

²⁰ See 143.6 at <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M163/K327/163327660.PDF>.

1 computers, satellite, etc.) to ensure everything works and is connecting to communications.
2 Costs to repair equipment that is not working will be included as “Materials for EMCTs.”

3 **Materials for EMCTs**

4 After key monthly maintenance is completed, nonworking materials and services need to
5 be replaced. Materials in the EMCTs must always be ready in case the units are needed on site
6 to assist in coordinating crews and resources where there has been an event and/or impact to the
7 delivery of gas or electricity to customers. Materials include resources such as office supplies,
8 tools, and safety or personal preparedness equipment (PPE) that crews might need while the unit
9 is deployed on site at an event.

10 **SDG&E Meteorology Cloud Computing**

11 Over the last several years, SDG&E has developed a high-performance computing
12 program that supports several operational tools such as the Fire Potential Index (FPI), the Santa
13 Ana Wildfire Threat Index (SAWTI), the Solar Potential Index (SPI) and the Outage Prediction
14 Model. SDG&E’s primary operational computer cluster is coming to the end of its available
15 warranty in 2017, and modern technology will now enable us to leverage the stability of cloud
16 computing. This funding will support the transition of our high performance computing program
17 into the cloud.

18 **b. RAMP Proposed Activities**

19 **Climate Change Consultant Support**

20 SDG&E is proposing the use of consultants to develop an in-depth review of climate
21 change impacts and affected gas and electric assets. Initial climate change consultant support
22 will take place over two to three years, though it would need to be revisited in future years as
23 climate science evolves. The results would provide SDG&E risk managers with detailed asset-
24 based risk assessments and potential mitigation strategies, which SDG&E would then evaluate
25 and use to develop future plans. This program falls under the Climate Change Adaption chapter
26 of the RAMP Report and mitigates the risks associated with Climate Change.

27 **Santa Ana Wildfire Threat Index**

28 SDG&E Meteorology led a project which completed in 2015 to develop the SAWTI, a
29 tool to communicate wildfire risk to utilities, fire agencies and the public. SAWTI is now used
30 across Southern California and across the country. The long-term success of the SAWTI project
31 will be dependent upon the integration of the latest fire science as it is developed. SDG&E is

1 requesting TY 2019 funds to code-up and integrate the latest advancements into the SAWTI.
2 The SAWTI program falls under the Wildfire Chapter of the RAMP Report and mitigates the
3 wildfire risk.

4 **University Team**

5 SDG&E is proposing to partner with a university team of experts, specifically Scripps
6 Institution of Oceanography, to study SDG&E's projected impacts of climate change. This
7 partnership would consist of graduate-level teams researching the evolving climate change
8 science and potential impacts of climate change on SDG&E infrastructure. This information will
9 be important in grid modernization to ensure safe and reliable operations well into a future with a
10 changing climate. SDG&E's partnership would position SDG&E as a leader across the state of
11 California. This program falls under the Climate Change Adaptation Chapter of the RAMP
12 Report and mitigates the risks associated with Climate Change.

13 **Weather Stations**

14 SDG&E owns and operates the largest utility weather network in the country, a
15 situational awareness tool that has served as a foundation for our meteorological technology.
16 Many components of the weather network are approaching end-of-life, and this funding will
17 modernize the equipment with new sensors, batteries and modems, to plan for reliable operation
18 of the network well into the next decade. The life span on weather equipment is three to five
19 years and the sensors will need replacing periodically. Requested costs also cover maintenance
20 of a web-based forecasting system behind the FPI. This program falls under the Wildfire
21 Chapter of the RAMP Report and mitigates the wildfire risk.

22 **Web-Based Situational Tool for Coordination with Agencies During a Wildfire**

23 SDG&E's web-based situational awareness and collaboration tool is known as SCOUT.
24 Originally developed by the private sector, the California Governor's Office of Emergency
25 Services has now acquired SCOUT. There will be a subscription fee for this service starting in
26 late 2017, estimated at \$10K per year. There were no SCOUT service fees in 2016. This
27 program falls under the Wildfire Chapter of the RAMP Report and mitigates the wildfire risk.
28

1 **c. Environmental and Regulatory Compliance**

2 **Training Augmentation**

3 The training of all appropriate personnel in the prompt, safe, and efficient response to
4 incidents is an important aspect of SDG&E's response preparedness. Training is intended to
5 ensure all members of the response teams have a clear understanding of: SDG&E's safety
6 practices; the contents of emergency response plans; how SDG&E is organized to respond and
7 manage incidents, specifically in the adoption of ICS; roles and responsibilities; and notification
8 and activation processes. The types of incidents that could affect SDG&E include: wildfires and
9 fire risk mitigation, natural disasters (e.g., earthquake), fuel supply interruptions (gas and
10 electric), cyber terrorism, and hostile intruders. Our current training program addresses these
11 risks, but will need to be augmented in light of recent regulation.

12 In order to effectively comply with General Order 166, Standard 3, as well as with newly
13 established General Order 112 requirements, SDGE's training around emergency preparedness,
14 response and reporting must be augmented from current practice. Biennial training/refreshers
15 will be required for all SDG&E employees, in order to review:

- 16 • the Company's Emergency Response Plan (CERP);
- 17 • any changes made to the CERP since the previous training;
- 18 • SDG&E's emergency response organizational structure (roles and
19 responsibilities);
- 20 • key response processes; and
- 21 • critical elements of a personal preparedness plan.

22 SDG&E's training process begins with a yearly plan and schedule of training that
23 includes two to four emergency response simulation exercises and annual refresher trainings. At
24 least two exercises will be conducted every year. With an emergency responder workforce of
25 over 300 responders and because of space constraints, each exercise will be preceded by multiple
26 refresher training sessions to ensure everyone has an opportunity to be trained and prepared to
27 respond. The aforementioned trainings and exercises will serve the purpose of integrating the
28 adopted ICS structure, along with key elements of the Company's Corporate Emergency
29 Response Plan, and help ensure an integration of response procedures and plans across the
30 enterprise. SDG&E will need to hire two program managers to implement this training.

Y. Strategic Planning and Business Optimization

TABLE WS-31
Strategic Planning and Business Optimization

Strategic Planning and Business Optimization	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Strategic Planning and Business Optimization	1,630	2,390	760
Total	1,630	2,390	760

1. Description of Costs and Underlying Activities

Strategic Planning and Business Optimization consists of three main functional work groups: Strategic Planning, Business Optimization, and Financial Analysis.

Strategic planning

Strategic planning supports and facilitates the implementation of strategies intended to deliver the best value for customers and financial stability for the utility. The group analyzes the availability and economics associated with new technologies and market trends, as well as the demand for new products and services for both our electric and natural gas businesses. The strategic planning function assists Senior Management in developing the tools necessary to help employees focus on meeting the changing needs and desires of customers in a cost-effective manner, and communicate to stakeholders the initiatives of the company.

Business Optimization

The Business Optimization group supports business units to analyze and execute on continuous improvement projects that result in efficient processes, enhanced services and reduced costs. The group conducts organizational reviews to identify opportunities for operational effectiveness. The group monitors and reports to management on progress and achieved accomplishments of on-going initiatives. This includes reporting on the progress of the FOF initiatives, responsible for \$8.6M in electric distribution O&M savings by 2019.

Financial Analysis

The financial analysis group provides guidance, control, and validation for all departments on financial and economic project evaluation, including performing short- and long-term financial analysis and regulatory filings. The department provides necessary scrutiny for SDG&E's proposed major investments, which facilitates effective financial decision making, including validating business models and business cases developed by others, and supplying

1 consistent economic assumptions to the entire organization. The Financial Analysis group also
2 performs financial due diligence on executive-level proposals.

3 **2. Forecast Method**

4 The forecast method developed for this cost category is a five-year average for labor and
5 non-labor. A five-year average smooths the variable costs from year to year and provides a good
6 estimation for future year forecasts.

7 **Z. Distributed Energy Resources**

8 **TABLE WS-32**
9 **Distributed Energy Resources**

Distributed Energy Resources	2016 Adjusted-Recorded (000s)	TY 2019 Estimated (000s)	Change (000s)
Distributed Energy Resources	1,304	1,699	395
Total	1,304	1,699	395

10 **1. Description of Costs and Underlying Activities**

11 The DER group uses technology to lessen the impact of DER growth and integration on
12 electric reliability, operational flexibility, and public safety. The dynamic impact of DERs, such
13 as renewable resources and energy storage, on our system can be significant. We use advancing
14 technology (such as inverter technology, advanced controls/communications, and other
15 intelligent electronic devices) to bring more DER onto the system while lessening negative
16 impact. In addition, DER adds value by contributing to capacity deferrals, voltage support, load
17 support, and islanding capability.

18
19 SDG&E operates and maintains a Microgrid that has the capability to leverage 100%
20 renewables to provide electric continuity to a remote community during emergencies and
21 outages. Additional installations of energy storage systems throughout the SDG&E service
22 territory have deferred traditional infrastructure improvements and have reinforced safety for
23 community evacuation facilities. Future public purpose installations will benefit from the
24 improved reliability, power quality, and overall customer experience. Customers will also
25 benefit from DERMS, an advanced control system that will allow for renewable integration and
26 intelligent electronic devices into a traditional electric system.

27 SDG&E is installing advanced technologies and energy storage where feasible, and its
28 deployment is maximized through safe, proactive testing and analysis at the Integrated Test

1 Facility (ITF). This facility allows SDG&E to understand system characteristics and device
2 behavior before it is installed on the electric grid. The ITF serves as a platform to drive industry
3 standards, promote collaboration, and develop institutional knowledge to operate the electric
4 system more safely, reliably and efficiently. SDG&E is a responsible partner that is pioneering
5 the future of the electric industry through the use of microgrids, energy storage, advanced control
6 systems and proactive engineering, testing, and demonstration.

7 **2. Forecast Method**

8 The forecast method developed for this cost category is base year with incremental
9 adjustments. A base year forecast was chosen as current staffing and activity levels are most
10 representative of the costs moving forward. The DER group is a relatively new organization
11 (created in 2013) and the historical costs are not indicative of future spending.

12 **3. Cost Drivers**

13 The following contribute to incremental cost change:

- 14 • System Growth

15 **a. System Growth**

16 The DER group has installed energy storage projects that will require increased levels of
17 maintenance. The expected maintenance costs are:

- 18 • \$15k for annual Borrego Microgrid Generator Maintenance;
- 19 • \$20k for Annual Permit to Operate (PTO) testing and certification; and
- 20 • \$100k for annual energy storage maintenance (\$20k/unit, 5 units in the fleet).

21 The DER group has plans to expand the ITF. New maintenance activities associated with
22 expanding the ITF include Real Time Digital Simulator (RTDS) maintenance, equipment
23 calibration, lab tooling, and safety supplies totaling \$120k in 2019.

24 The additional responsibilities of the Distributed Energy Resources group requires the
25 addition of two engineering positions. The first engineer will be responsible for power system
26 modeling and testing new technology and equipment with the RTDS. This engineer will also
27 support daily operations and management of the ITF. The second engineer will support the
28 deployment of new microgrid and energy storage projects, and asset engineering for the DERMS
29 solution. This position will also support the ITF and demonstration of Engineering Procurement
30 Installation Commissioning (EPIC) projects.

1 **IV. PERFORMANCE BASED RATEMAKING (PBR)**

2 SDG&E is not proposing an electric reliability performance-based ratemaking
3 mechanism in this proceeding.²¹ SDG&E believes that its priority focus should be on safety, and
4 that requesting a performance-based ratemaking (PBR) mechanism for this GRC cycle would not
5 be consistent with SDG&E's efforts to build upon its strong safety culture and to provide cost-
6 effective service to its customers. This is in part because SDG&E is already delivering best-in-
7 class electric service to its customers. Improving upon consistently excellent SAIDI (System
8 Average Interruption Duration Index) and SAIFI (System Average Interruption Frequency
9 Index) reliability performance history becomes increasingly difficult and expensive, as SAIDI
10 and SAIFI target values are reduced lower and lower (i.e., requirements that approach zero
11 outages). SDG&E is concerned that the additional spend required to meet decreasing SAIDI and
12 SAIFI PBR target values would not be justified from a cost-efficiency perspective, and that
13 continuing the PBR under these circumstances would lead to greater costs with diminishing
14 returns for its customers.

15 **1. The PBR Is Not Required or Warranted.**

16 The Commission does not require SDG&E to propose an electric reliability PBR, and
17 circumstances do not warrant requiring adoption of one in this case. SDG&E's electric delivery
18 service has been consistently excellent for many years, as a matter of public record, and is the
19 best in its class. Neither Pacific Gas & Electric Company (PG&E) nor Southern California
20 Edison Company (SCE) have an electric reliability PBR. Table 1 below shows that SDG&E has
21 consistently performed much better for SAIDI and SAIFI than PG&E and SCE over the past 10
22 years, even in years where SDG&E had no PBR in place.²²

²¹ This is consistent with SDG&E's position in its May 24, 2017, joint petition with the Coalition of California Utility Employees (CCUE), to modify D.16-06-054.

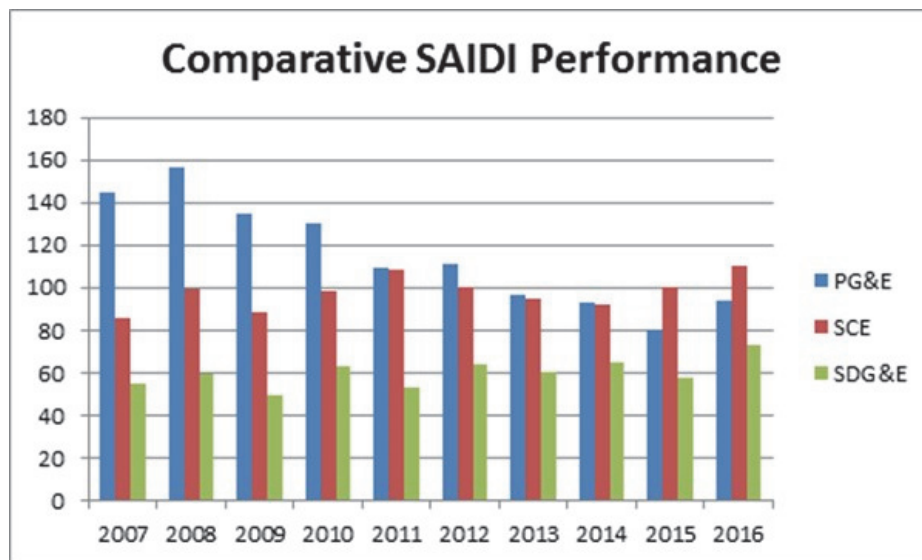
²² Information in Table WS-33 is derived from PG&E's, SCE's, and SDG&E's 2016 annual reliability performance reports, available at <http://www.cpuc.ca.gov/General.aspx?id=4529>.

TABLE WS-33: California Investor-Owned Utility Electric Reliability Performance (10 Years)²³

Metric	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
PG&E SAIDI	144.8	156.9	134.3	130.2	109.7	111.2	96.4	92.8	80.7	93.7
SCE SAIDI	85.34	99.35	88.77	98.69	108.15	100.7	94.48	92.3	100.15	109.98
SDG&E SAIDI	54.89	59.17	49.71	63.36	53.43	64.36	59.96	64.6	57.92	72.75
PG&E SAIFI	1.204	1.208	1.119	1.106	0.966	1.031	0.964	0.879	0.787	0.940
SCE SAIFI	0.88	0.95	0.83	0.82	0.91	0.86	0.88	0.86	0.86	0.99
SDG&E SAIFI	0.477	0.517	0.466	0.520	0.471	0.533	0.472	0.603	0.526	0.620

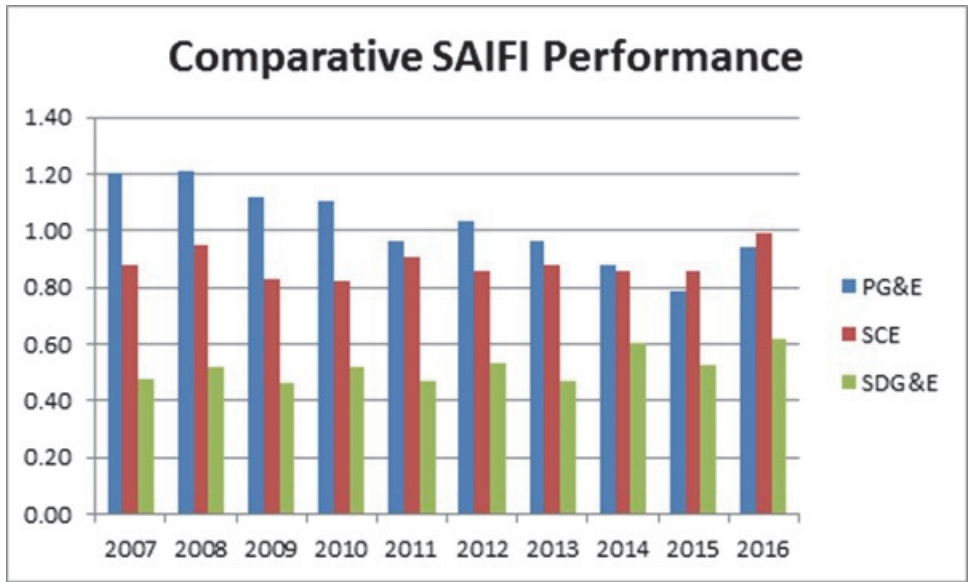
During the 2008-2014 period with no PBR, SDG&E’s SAIDI performance remained consistently between 30% to 63% better (i.e., lower) than PG&E and SCE. SDG&E’s SAIFI performance also remained consistently between 30% to 58% better (i.e., lower) for SAIFI than PG&E and SCE. Figures WS-1 and WS-2 below also illustrate the comparative 10-year difference in SAIDI and SAIFI performance:

FIGURE WS-1: California Investor-Owned Utility Comparative SAIDI (10 Years)



²³ Per CPUC reporting requirements, these numbers exclude planned and Independent System Operator outages and includes the Threshold for Major Event Day exemption.

1 **FIGURE WS-1: California Investor-Owned Utility Comparative SAIFI (10 Years)**



2
3 Commission Staff has recognized SDG&E’s consistently high performance, stating that
4 “reliability in the SDG&E service territory has maintained a consistently high level of
5 reliability,”²⁴ in a recent report. And as of today, SDG&E has received the PA Consulting award
6 for Outstanding Reliability for the West Region for eleven straight years, through 2016.²⁵
7 SDG&E was also named the Recipient of the prestigious 2014 ReliabilityOne™ National
8 Reliability Excellence Award,²⁶ which was the second time in five years that SDG&E has
9 received this prestigious national honor. The ReliabilityOne™ National Reliability Excellence
10 Award is given to the regional award recipient that has demonstrated sustained leadership,
11 innovation and achievement in the area of electric reliability. PA Consulting also recently
12 recognized SDG&E for its excellence in responding to the May 2014 fires, by giving SDG&E its
13 2015 “Outstanding Response to a Major Outage Event” award.²⁷

²⁴ See *California Electric Reliability Investor-Owned Utilities Performance Review 2006-2015*, at iii, available at [http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/About_Us/Organization/Divisions/Policy_and_Planning/PPD_Work/PPD_Work_Products_\(2014_forward\)/PPD%20Reliability%20Review.pdf](http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/About_Us/Organization/Divisions/Policy_and_Planning/PPD_Work/PPD_Work_Products_(2014_forward)/PPD%20Reliability%20Review.pdf).

²⁵ See <http://www.paconsulting.com/newsroom/releases/us-power-utilities-achieve-improved-reliability-performance-for-four-consecutive-years-17-november-2016/>.

²⁶ See <http://www.prnewswire.com/news-releases/pa-consulting-group-recognizes-north-american-utilities-for-excellence-in-reliability-at-the-2014-reliabilityone-awards-283184191.html>.

²⁷ See <http://www.paconsulting.com/newsroom/releases/pa-consulting-group-honours-north-american-utilities-for-reliability-excellence-at-2015-reliabilityone-awards-23-october-2015/>.

1 **2. The PBR Is Outdated and Contrary to Commission Policy.**

2 SDG&E believes that the financially-driven electric reliability PBR mechanism presents
3 conflicting incentives with the more recent safety risk-mitigation initiatives at the Commission
4 and is an outdated approach to directing utility behavior. Because the electric reliability PBR
5 mechanism only provides financial incentives for reliability performance, without considering a
6 prioritizing and balancing of safety interests, it runs the risk of perversely incentivizing SDG&E
7 to prioritize reliability over safety, contrary to public policy and Commission efforts in the S-
8 MAP, RAMP, and Electric Reliability Reporting OIR proceedings. SDG&E’s historically
9 consistent best in class reliability history has created target SAIDI and SAIFI values for 2016-19
10 that have become increasingly difficult to meet, as discussed above. The punitive threat of PBR
11 penalties perversely incentivizes SDG&E to invest more heavily in reliability projects than it
12 otherwise would, contrary to SDG&E’s and the Commission’s stated priorities.

13 Commission stakeholders are currently developing uniform methodologies to prioritize
14 IOU safety risks and risk mitigation programs and investments through the S-MAP and RAMP
15 proceedings, and the Commission has expressly taken the prioritization of reliability risks out of
16 consideration in the process, as follows:

17 Some of the parties raised the issue that the S-MAP and RAMP process should
18 also make reliability, along with safety, a top priority of the Commission and the
19 energy utilities. We do not believe that we need to expand the methods and
20 methodologies being developed in this proceeding to include an assessment of
21 making reliability a top priority.²⁸

22 This policy was also recently confirmed in the Electric Reliability Reporting Decision,
23 which also declined a proposal to include reliability from the components of the framework from
24 RAMP.²⁹

25 The Commission’s decision to exclude prioritization of reliability in S-MAP and RAMP
26 was based in part on the IOUs’ pre-existing general “duty to furnish and maintain ‘adequate,
27 efficient, just, and reasonable service’” under California Public Utility Code Section 451,³⁰ as
28 well as more recent enactments requiring prioritization of safety first:

²⁸ Risk OIR Decision, D.14-12-025 at 19.

²⁹ D.16-01-008 at 25.

³⁰ *Id.*

1 [Senate Bill] 705 only refers to making safety a top priority. To expand it to
2 include reliability opens up new considerations about the quality of service, what
3 constitutes “reliability,” and events that may be outside the utility’s control which
4 affect reliability.³¹

5 SDG&E’s wildfire safety risk management priorities were demonstrated throughout the
6 evidentiary record in its TY 2016 case, and SDG&E proposals in this TY 2019 case continue to
7 identify wildfire as its top safety risk, through proposed RAMP mitigation activity requests. As
8 also demonstrated in its TY 2016 proceeding, SDG&E has responded to fire threat with a variety
9 of programs and projects aimed at mitigating fire risk, including turning off reclosing in its Fire
10 Threat Zone during fire-prone conditions.³² SDG&E also presented evidence that changes in its
11 operational practices, like the reclosing policy, have negative reliability impacts that are directly
12 correlated to the duration of elevated fire conditions.³³ These impacts alone justify eliminating
13 the PBR, given the Commission’s recent policy statements requiring all California utilities to
14 prioritize safety risks as their top risks.

15 Continuing the electric reliability PBR, which holds SDG&E to increasingly more
16 stringent SAIDI and SAIFI targets, could have the negative consequence of penalizing SDG&E
17 for addressing fire threat in the interest of public safety, or otherwise creating the wrong
18 incentives. These effects would be inconsistent with Commission policy statements, as well as
19 SDG&E’s goals to build upon its strong safety culture. For all of these reasons, SDG&E
20 declines to continue its electric reliability PBR mechanism.

21 **V. CONCLUSION**

22 The costs represented in this testimony are a reasonable and necessary forecast of the
23 requirements to safely and efficiently manage the Electric Distribution activities of SDG&E.
24 SDG&E continues to hold safety, reliability, and customer service as key principles for day-to-
25 day operations. Forecasts were developed by using both historical expenditures and specific
26 project estimates, assessing upward pressures, and using all available information to develop
27 reasonable forecasts. As described in the testimony, many of the core business activities remain
28 the same as described in previous rate cases (with increases in most cases, due to incremental
29 cost drivers), but there are areas of expanded focus due to the ever-changing environment. As

³¹ *Id.*

³² A.14-11-003/-004 (cons.), Ex. 21 SDG&E/Geier at 7:13-15; *see also* Ex. 266 SDG&E/Withers at 7.

³³ A.14-11-003/-004 (cons.), Ex. 266 SDG&E/Withers at 7-8.

1 mentioned in the introduction, safety and risk related activities as described in our RAMP Report
2 make up 74% of the net incremental ask from BY 2016 spending. The specific risks SDG&E are
3 mitigating are as follows:

- 4 • Wildfire
- 5 • Employee, Contractor, and Public Safety
- 6 • Distributed Energy Resources
- 7 • Aviation Incident
- 8 • UAS Incident
- 9 • Electric Infrastructure Integrity
- 10 • Records Management
- 11 • Climate Change Adaptation
- 12 • Workforce Planning

13 SDG&E already has in place extensive programs to mitigate risks in certain risk
14 categories such as Wildfire, and Employee, Contractor, and Public Safety, and believe these
15 programs are necessary and should remain. The values of public, employee, and contractor
16 safety, as well as wildfire risk mitigation are a core part of our corporate culture and are shared
17 throughout our organization. In addition, SDG&E has requested incremental programs to
18 address the risk of Electric Infrastructure Integrity through programs such as PRiME and the
19 establishment of the centralized Asset Management workgroup. While not classified in the
20 wildfire mitigation or safety categories, ensuring our overhead infrastructure meets today's
21 requirements should reduce the risk of public safety incidents, failures that could lead to
22 ignitions, as well as improve reliability.

23 The compilation of O&M costs described in my testimony will allow SDG&E to operate
24 its system in order to address public and employee safety, system maintenance and reliability,
25 focus on environmental and regulatory compliance, develop its workforce, introduce new
26 systems, address mature and aging equipment, and mitigate risk. I respectfully request the
27 Commission to approve the cost forecasts described in my testimony and workpapers. This
28 concludes my prepared direct testimony.

1 **VI. WITNESS QUALIFICATIONS**

2 My name is Will Speer. My business address is 8316 Century Park Court, San Diego,
3 California, 92123. I received a Bachelor of Science degree in Electrical Engineering from
4 University of Illinois, Urbana-Champaign, Illinois, in 1999. I also received a Bachelor of Arts
5 degree in Communication from DePauw University, Greencastle, Indiana in 1997. In 1999, I
6 began full-time employment with San Diego Gas & Electric Company in Substation
7 Construction and Maintenance. From 1999 through 2005, I led the construction, testing and
8 energizing of over 30 substation projects from 69 kV-500 kV, including new substations,
9 rebuilds, upgrades and equipment additions. From 2005 through 2009, I worked in the
10 Operations and Engineering group, managing the distribution engineering efforts for northern
11 San Diego while overseeing the electric trouble shooters and the distribution maintenance
12 program. From 2009 through 2011, I joined Grid Control and was responsible for managing real
13 time operation of the transmission system, outage scheduling, operating procedure development,
14 and operator training. From September 2011 through May 2017, as Director of Electric System
15 Planning, I was responsible for the long term electric transmission and distribution infrastructure
16 planning for San Diego and Southern Orange County, including generation interconnection.
17 From May 2017 to the present, as Director of Electric Transmission and Distribution
18 Engineering I am responsible for all SDG&E's engineering and design activities in the following
19 disciplines: transmission, substation, distribution, civil/structural, protection, reliability and
20 distributed energy resources. I hold a Professional Electrical Engineer license in the state of
21 California.

APPENDIX A GLOSSARY OF TERM

3-D	3-Dimensional
ADMS	Advanced Distribution Management System
AFO	Asset Family Owner
AMO	Advanced Metering Operations
ARCOS	Automated Roster Call Out System
AV	Audio-Visual
BBS	Behavior Based Safety
CAIDI	Customer Average Interruption Duration Index
CalFIRE	California Department of Forestry and Fire Protection
CBM	Condition Based Maintenance
CCUE	Coalition of California Utility Employees
CERP	Company Emergency Response Plan
CIP	Communication Infrastructure Providers
CMG	Compliance Management
CMP	Corrective Maintenance Program
CMRS	Cellular Mobile Radio Service
CMVI	Controllable Motor Vehicle Incident
CNF	Cleveland National Forrest
CPD	Construction Planning and Design
CPUC	California Public Utilities Commission
DER	Distributed Energy Resources
DERMS	Distributed Energy Resource Management System
DMS	Distribution Management System
DPSS	Distribution Planning and Scheduling System
DSO	Distribution System Operator
ECT	Electronic Control Technician
EDO	Electric Distribution Operations
EDOT	Electric Distribution Operations Technology
EDW	Engineering Data Warehouse
EGISS	Enterprise GIS Services
EMCT	Emergency Mobile Command Trailer
EMS	Energy Management System
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
EPIC	Engineering Procurement Installation Commissioning
EPZ	Equipotential Zone

ERO	Electric Regional Operations
ESS	Enterprise System Solutions
FOF	Fueling our Future
FPI	Fire Prevention Index
FPP	Fire Prevention Plan
FTE	Full Time Equivalent
FTZ	Fire Threat Zone
GBS	Geographic Business Solutions
GEARS	GIS Electric Distribution Network Models
GHG	Green House Gas
GIS	Geographic Information Systems
GO	General Order
GRC	General Rate Case
GWD	Graphical Work Design
HCOR	Hydrocarbon and Contaminates Removal
HRFA	Highest Risk Fire Area
IBEW	International Brotherhood of Electric Workers
ICS	Incident Command Structure
IOU	Investor Owned Utilities
IT	Information Technology
ITF	Integrated Test Facility
KPI	Key Performance Indicator
LiDAR	Light Detection and Ranging
LOSA	Line Operations Safety Audits
LRA	Local Responsibility Area
MAIFI	Momentary Average Interruption Frequency Index
MDT	Mobile Data Terminal
NERC	North American Electric Reliability Corporation
NIMS	National Incident Management System
NRF	National Response Framework
O&E	Operations & Engineering
O&M	Operations and Maintenance
OCM	Organization Change Management
OFER	Operations, Field and Emergency Readiness
OIR	Order Instituting Rulemaking
OMS	Outage Management System
OSHA	Occupational Safety and Health Administration
OTI	Operations Technology Integration
PBR	Performance Based Ratemaking
PFM	Petition for Modification
PG&E	Pacific Gas and Electric Company

PLC	Pole Loading Calculation
PLS-CADD	Power Line Systems Computer Aided Drafting and Design
PPE	Personal Protective Equipment
PRC	California Public Resource Code
PRiME	Pole Risk Mitigation and Engineering
PTO	Permit to Operate
PV	Photovoltaic
R.	Rulemaking
RAMP	Risk Assessment Mitigation Phase
RTDS	Real Time Digital Simulator
RTU	Remote Terminal Unit
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SAWIT	Santa Ana Wildfire Threat Index
SAWTI	Santa Ana Wildfire Threat Index
SCADA	Supervisory Control and Data Acquisition
SCE	Southern California Edison
SCORE	Safety Center of Readiness and Excellence
SCOUT	Situation Awareness & Collaboration Tool
SCT	Skills Compliance and Training
SDG&E	San Diego Gas and Electric
SED	Safety and Enforcement Division
SF6	Sulfur Hexafluoride
SME	Subject Matter Expert
SOT	Service Order Team
SOX	Sarbanes-Oxley
SPI	Solar Potential Index
SPM	System Protection and Maintenance
T&E	Time & Equipment
TEAMS	Telecommunications Equipment Attachment Management System
TY	Test Year
UAS	Unmanned Aerial Systems
VVO	Volt-VAR Optimization
WPC	Worst Performing Circuits
WRRM	Wildfire Risk Reduction Model

SDG&E 2019 GRC Testimony Revision Log –May 7, 2018

Exhibit	Witness	Page	Line or Table	Revision Detail
SDG&E-15	William H. Speer	WHS-ix	Summary Table	Total Non-Shared Services row, TY 2019 Estimated column changed “164,729” to “168,626.” Total Non-Shared Services row, Change column changed “42,262” to “46,159.” Total O&M row, TY 2019 Estimated column changed “164,729” to “168,626.” Total O&M row, Change column changed “42,262” to “46,159.”
SDG&E-15	William H. Speer	WHS-ix	Summary	Changed “\$164,729,000 to “168,626.”
SDG&E-15	William H. Speer	WHS-x	Summary	Changed “67.5%” to “68.1%,” “11.7%” to “11.4%,” “13.7%” to “13.4%,” “26.0%” to “27.7%,” and “16.1%” to “15.7%.”
SDG&E-15	William H. Speer	WHS-1	11	Changed “\$164,729,000” to “168,626,000”
SDG&E-15	William H. Speer	WHS-1	Table WS-1	Total Non-Shared Services row, TY 2019 Estimated column changed “164,729” to “168,626” Total Non-Shared Services row, Change column changed “42,262” to “46,159” Total O&M row, TY 2019 Estimated column changed “164,729” to “168,626” Total O&M row, Change column changed “42,262” to “46,159”
SDG&E-15	William H. Speer	WHS-3	Table WS-2	SDG&E-1 Wildfires Caused by SDG&E Equipment row, TY 2019 Estimated Incremental column changed “1,137” to “5,807” SDG&E-1 Wildfires Caused by SDG&E Equipment row, Total column changed “36,056” to “40,726” Total O&M row, TY 2019 Estimated Incremental column changed “31,105” to “35,775” Total O&M row, Total column changed “103,035” to “107,705”
SDG&E-15	William H. Speer	WHS-3	5-6	Changed “\$31M” to “\$36M,” “\$42M” to “\$46M,” and “74%” to “78%.”
SDG&E-15	William H. Speer	WHS-8	9-11	Changed “\$1.1M” to “\$5.8M,” added “year-round availability of the helitanker discussed in the testimony of David Geier (Exhibit SDG&E-50),” and added footnote 6.

SDG&E-15	William H. Speer	WHS-8	26-27	Added “and the increased helitanker support program to mitigate risks associated with the Wildfire category.”
SDG&E-15	William H. Speer	WHS-9	Table WS-5	Changed 1ED011.000, Electric Regional Operations row, TY 2019 Estimated Incremental column “600” to “5,270” Changed 1ED011.000, Electric Regional Operations row, Total column “4,094” to “8,764” Changed Total row, TY 2019 Estimated Incremental column “1,137” to “5,807” Changed Total row, Total column “36,056” to “40,726”
SDG&E-15	William H. Speer	WHS-13	2	Added “helitanker support.”
SDG&E-15	William H. Speer	WHS-13	3-7	Added “As described in Mr. Geier’s testimony, SDG&E currently utilizes its helitanker asset three months of the year during the height of fire season; however, due to what has become a year round fire season in California, SDG&E is seeking incremental expenses in my testimony for year-round helitanker support under the Electric Regional Operations work group.” Added footnote 9. Changed “former” to “long span program.”
SDG&E-15	William H. Speer	WHS-13	11-13	Moved sentence “Electric Regional Operations will manage the long span work, so incremental expenses appear in that workgroup.” Changed “latter” to “weather station program.”
SDG&E-15	William H. Speer	WHS-18	Table WS-6	Electric Regional Operations row, TY 2019 Estimated column changed “42,792” to “46,689.” Electric Regional Operations row, Change column, changed “7,179” to “11,076” Total Non-Shared Services row, TY 2019 Estimated column changed “164,729” to “168,626” Total Non-Shared Services row, Change column, changed “42,262” to “46,159”
SDG&E-15	William H. Speer	WHS-40	Table WS-15	Electric Regional Operations row, TY 2019 Estimated column changed “42,792” to “46,689” Electric Regional Operations row, Change column, changed “7,179” to “11,076”

				<p>Total Non-Shared Services row, TY 2019 Estimated column changed “42,792” to “46,689.”</p> <p>Total Non-Shared Services row, Change column, changed “7,179” to “11,076”</p>
SDG&E-15	William H. Speer	WHS-47	14-21	<p>Added “Expansion of Helitanker Program – RAMP post filing” section heading.</p> <p>Moved and revised the paragraph “SDG&E currently leases a large, Type 1 helitanker (aircrane) to provide firefighting support for our service territory, as described in Mr. Geier’s testimony. SDG&E proposes funding for an additional nine months, associated program support costs, and to secure the best helitanker model to meet SDG&E’s and the communities’ purposes. The enhancement of the helitanker program will provide additional support for what has become a year-round fire season, as discussed in more detail in Mr. Geier’s testimony. Please see my supplemental workpaper for additional cost details.”</p> <p>Added footnote 13.</p>