

Safety and Enforcement Division

Risk Assessment Section

Staff Report

on

Southern California Gas Company &

San Diego Gas and Electric Company

2016-2018 Consolidated General Rate Case

Applications A.14-11-003 and A.14-11-004



March 27, 2015

EXECUTIVE SUMMARY

In this report, the Safety and Enforcement Division (SED) of the California Public Utilities Commission (Commission) evaluated selected safety and risk program areas included in the 2016 General Rate Case (GRC) Applications for the Sempra Energy California Utilities: San Diego Gas and Electric (SDG&E)¹ and Southern California Gas (SoCalGas).² The rate cases for these utilities have been consolidated into a single proceeding. In many cases, the utilities share common or similar testimony. For purposes of this report, we collectively reference the companies as “Sempra”.

Safety and risk spending proposals are a core element of the GRCs for both utilities. Combined, SoCalGas’ and SDG&E’s risk spending plan for natural gas calls for \$1.46 billion in capital for the three-year period. The requested risk O&M for both companies risk mitigation mitigations in TY 2016 totals \$391 million.

SDG&E identified over \$678 million in total capital expenditures for electric program risk mitigation for the three-year period, and nearly \$200 million for risk O&M in TY 2016.

This report also reviews Sempra’s evolving Enterprise Risk Management program, and describes many of the areas that Sempra has identified as Key Risks in both gas and electric operations from a safety perspective.

Although Decision (D.) 14-12-025 established a framework for the Commission to consider utilities’ risk methodologies, it did not adopt a specific risk assessment

¹ SDG&E 2016 GRC CPUC Application A.14-11-003:

http://delaps1.cpuc.ca.gov/CPUCProceedingLookup/f?p=401:56:11171111596785::NO:RP,57,RIR:P5_PROCEEDING_SELECT:A1411003

SDG&E 2016 GRC Website:

<http://www.sdge.com/regulatory-filing/12931/sdge-grc-testimony-exhibit-list>

² SoCalGas 2016 GRC CPUC Application A.14-11-004:

http://delaps1.cpuc.ca.gov/CPUCProceedingLookup/f?p=401:56:11171111596785::NO:RP,57,RIR:P5_PROCEEDING_SELECT:A1411004

SoCalGas 2016 GRC Website:

<http://www.socalgas.com/regulatory/A1411004.shtml>

methodology or evaluation process. As part of their GRC applications, SDG&E and SoCalGas have submitted testimony about their Risk Management programs and identified top risk categories with reference to their proposed safety and reliability investments.

This report is based upon selected utility testimony and utility responses to data requests from SED staff. One finding of this report is that although the Sempra utilities have identified an evaluation methodology for assessing risks, it is difficult to link those evaluations to specific spending requests.

In order to illustrate how risk evaluation and mitigation may or may not match program expenditures, this report provides a detailed analysis of wildfire risks, which SDG&E considers its top risk. This report concludes that Sempra should provide additional information in order to help evaluate both its GRC and its Risk Management programs.

The Commission has opened a rulemaking to develop further guidance for how utility risk management will be incorporated into rate cases, and many of the observations made in this report may be relevant for the Safety Model Assessment Proceeding that will commence in May 2015.

Given constraints on time and resources, SED is unable to provide a comprehensive evaluation of Risk Management and Safety Proposals or the GRC spending proposals to mitigate those risks. SED may provide subsequent analysis as the GRC proceeding develops.

In the final section of this report, SED makes specific [recommendations](#), based upon the safety and risk program areas evaluated.

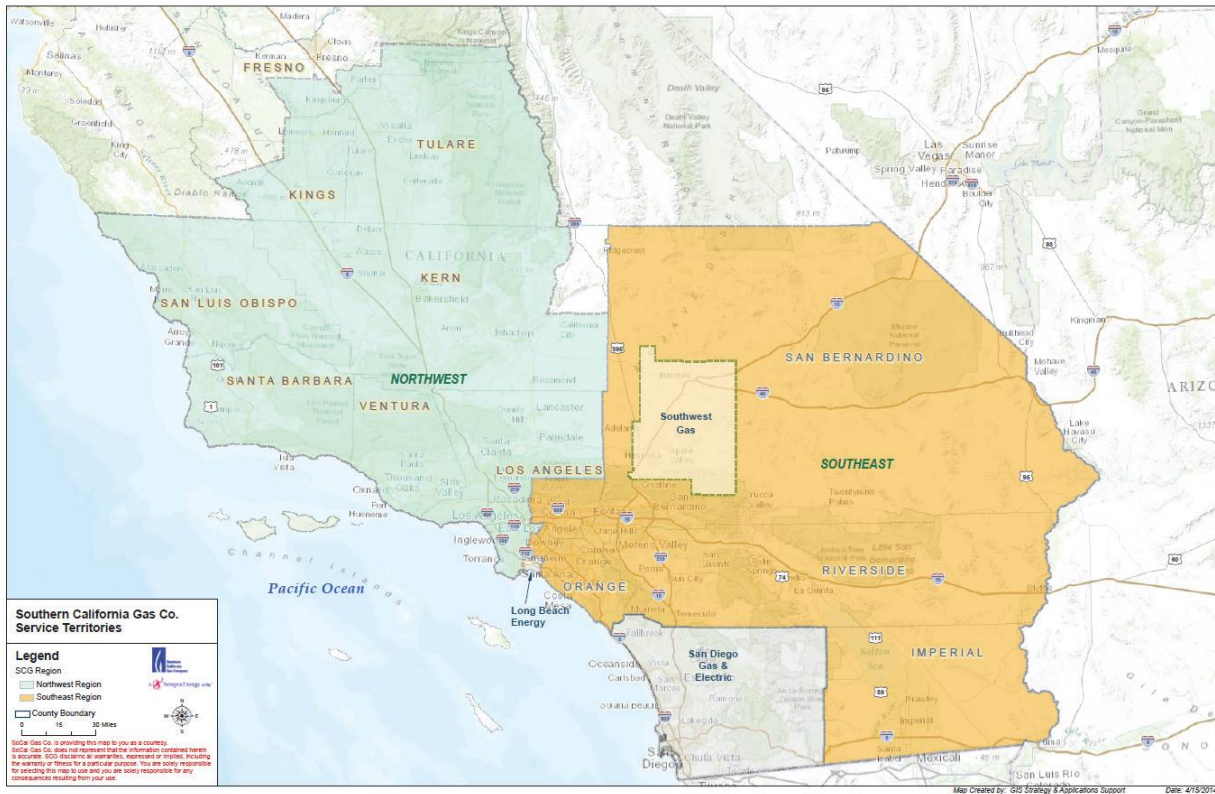
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OVERVIEW

Map of SoCalGas and SDG&E Service Territories



This map³ shows the gas distribution territory of SoCalGas in orange and green, with SDG&E on the lower left (and a small internal pocket of Southwest Gas surrounded by SoCalGas). SDG&E is a full-service utility that provides electricity and natural gas to 3.4 million people within a service territory that covers 4,100 square miles, extending from Orange County to the U.S./Mexican border. SoCalGas is the largest natural gas distribution utility in the nation, with 21.4 million people and a service territory that covers County approximately 20,000 square miles of Southern California.

³ SCG-04, Gas Distribution, Testimony of Frank Ayala, FBA-3

1 INTRODUCTION AND BACKGROUND

The Assigned Commissioner’s Scoping Memo in Application (A.) 14-11-003/004 directed the Safety & Enforcement Division (SED) to produce a report on San Diego Gas & Electric’s and Southern California Gas Company’s “approach and policies regarding risk and safety”.⁴

In particular, the Scoping Memo stated that among the many issues in the General Rate Case (GRC) proceeding is consideration whether each utility’s “proposed risk management, safety culture, policies, and investments will result in the safe and reliable operation of its facilities and services”.

SED staff provides this report to provide an evaluation of selected risk and safety program areas of Sempra’s GRC applications. Staff’s evaluation includes a brief review of the risk identification and risk management methodology used by the applicants in their GRC application.

SED’s evaluation will also briefly review selected program areas, although at this point SED makes no recommendations on the underlying merits of any particular project or the amount of funding that the utilities seek in their GRC requests.

Finally, this report provides some recommendations for ways that the utilities might enhance their risk methodologies and processes for the future. This last portion may be most instructive for the purposes of forthcoming Safety Model Assessment Proceeding (SMAP). The SMAP proceeding will evaluate risk management programs of each of the major investor-owned utilities, to provide a more standardized approach that can inform future GRCs.

In the rulemaking to consider a more-risk informed basis for GRCs, the Commission issued Decision (D.)14-12-025 to establish a framework for the Commission to consider

⁴ San Diego Gas & Electric (SDG&E) and Southern California Gas Company (SoCalGas) are both Sempra companies, and will be referred to collectively as “Sempra.”

utilities' risk methodologies. However, it did not adopt a specific risk assessment methodology or evaluation process. That will be the role of the SMAP proceeding that will commence with the May 1, 2015, filing of utility proposals. The Commission did, however, order that the risk-based decision-making framework “shall apply to all future General Rate Case application filings” for the major gas and electric utilities.

Because this GRC application was submitted prior to the final decision in the Risk OIR, Sempra was not required to follow the framework adopted in the Risk OIR. Consistent with the direction of D. 14-12-025, however, SDG&E and SoCalGas have submitted testimony about their Risk Management programs and identified top risk categories with reference to their proposed safety and reliability investments as part of their GRC applications. Selected utility testimony, along with utility responses to data requests from SED staff, serve as the foundation for SED's analysis of the applications.

1.1 A GENERALIZED APPROACH TO RISK

Utilities face many kinds of risk, including financial risks associated with business practices. This report will focus on risks to the safe and reliable operations of the utility. However, the notion of Enterprise Risk Management plays a key role in how the utility as an organization calculates and attempts to manage operational risks. Therefore, later in the report, we will address Enterprise Risk Management as it relates to the risk practices of these utilities.

A typical risk-based approach to decision-making includes:⁵

- Risk Identification
- Risk Assessment
- Risk Management

⁵ ISO 55001, Asset Management , Section 6.2.2(k)
ISO 31000 Risk Management, Section 5: Risk Management Process
Cycla “Elements of a Risk-Informed Resource Allocation Process”, Attachment 3, Page 2:
<http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M065/K397/65397078.PDF>

Risk is typically defined as the probability of an event occurring (in this context, an event is a hazard or a threat to the SoCalGas distribution system, or to SDG&E's electric generation, transmission or distribution system) multiplied by the consequence (or impact) should that event occur. Risk assessment involves the analysis of data to identify which hazards/threats present the greatest risk to the system. Risk management is the process by which the organization responds to the identified risk.

The value of risk assessment is derived from systematically identifying risks and prioritizing them based on their impact and likelihood of occurrence. Following identification and ranking of risks, the next step is to determine the suite of possible risk mitigation measures. The operator then selects the mitigation measure which best "fits" the assessed risk. Selecting a mitigation strategy should include an evaluation of best practices (including industry standards) and available technologies. Selecting between the various different mitigation options should factor in relative costs and benefits and also the operator's knowledge and perspective of that particular part of the system.

Risk can never be eliminated; a risk can only be mitigated down to an acceptable level. Utilities must seek to optimize risk mitigation in the context of limited funds and the existence of multiple risks.

1.2 THE RELATIONSHIP BETWEEN SAFETY AND RELIABILITY

The Commission's mission is to ensure safe and reliable utility services at an affordable cost. Of paramount concern is the safety of utility personnel, first responders, inspectors, installers and end-users. On the electric side, there will be more opportunities in the future for customers to seek interconnection of new devices and technologies to the electric distribution system, and there may be increased involvement of non-utility personnel in the installation and operations of this equipment.

For gas utilities, there is an inherent risk in nearly every aspect of the transmission, storage and local distribution of a volatile fuel such as natural gas.

The California Public Utilities Code requires utilities to furnish and maintain adequate, efficient, just, reasonable service and facilities. The law specifically cites the necessity to promote “safety, health, comfort and convenience” of utility patrons, employees, and the public.⁶ The law also authorizes the Commission to order infrastructure improvements needed to “secure adequate service and facilities”.

For infrastructure upgrades and maintenance, General Order (GO) 165 established minimum requirements for electric distribution facilities regarding inspection (including maximum allowable inspection cycle lengths), condition rating, scheduling and performance of corrective action, record-keeping, and reporting, in order to ensure safe and high-quality electric service. Other general orders adopted by the Commission that establish rules and standards for safe and reliable utility operations include GO 95 and GO 128. Natural gas operations have their own rules, including GO 112, which sets forth rules governing the design, construction, testing, operation, and maintenance of gas gathering, transmission, and distribution pipelines.

Safety and reliability are distinct aspects of the Commission’s core mission, but there is an undeniable overlap and intertwining of the two concepts. Factors that are frequently the cause of disruptions to reliability, including downed lines, pipeline ruptures, equipment failures, lightning strikes and other major weather events, may also have direct safety consequences. Extended power outages or gas supply disruptions during extreme summer heat or winter cold could impair the ability of utilities to ensure safe and reliable service to critical facilities, including hospitals, medical facilities, police and fire operations, and to customers who rely on life-supporting medical devices.

2 SAFETY AND RISK MITIGATION SPENDING PROPOSALS

Safety and risk spending proposals are a core element of the GRCs for both utilities. Combined, SoCalGas’ and SDG&E’s risk spending plan for natural gas is \$1.46 billion in

⁶ PUC Section 451, Chapter 3, Article 1, enacted by Statutes 1951, amended 1977.

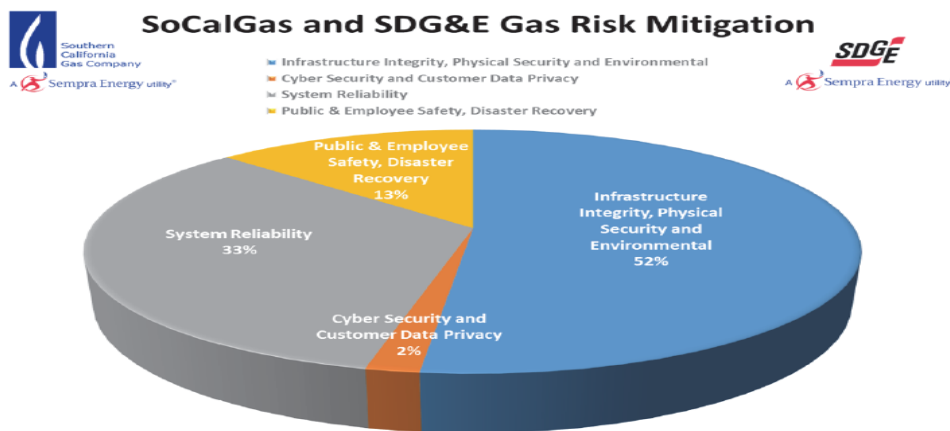
capital projects for the three-year period. The requested risk O&M budget for both companies' risk mitigations in TY 2016 totals \$391 million.

SDG&E identified over \$678 million in total capital expenditures for electric program risk mitigation for the three-year period, and nearly \$200 million for risk O&M in TY 2016.

A large component of this mitigation portfolio includes programs that would enhance both safety and reliability. For instance, SoCalGas' and SDG&E's spending plan for natural gas capital and operations requests 33 percent of its risk mitigation capital budget for System Reliability and 52 percent for Infrastructure Integrity, Physical Security, and Environmental. That is, over 85 percent reliability-related risk mitigation of the total \$1.46 billion in risk capital requests for the three-year period. The requested O&M reliability-related risk mitigation budget associated with System Reliability and Infrastructure Integrity is nearly \$320 million – roughly 81.5 percent of the total safety and reliability risk mitigation budget of \$391 million (see Figure 1).⁷

Figure 1 – Major Risk Categories for Sempra Gas Utilities and TY 2016 GRC Spending

Risk Category	Capital (\$ 000's)	O&M (\$ 000's)
Infrastructure Integrity, Physical Security and Environmental	\$757,015	\$204,410
Cyber Security and Customer Data Privacy	\$31,570	\$1,294
System Reliability	\$502,395	\$115,077
Public & Employee Safety, Disaster Recovery	\$171,274	\$71,312



⁷ SCG-03, Gas Operations Risk Policy, Testimony of Douglas Schneider, DMS-9

For SDG&E electric risk mitigation, System Reliability, and Infrastructure Integrity, Physical Security, and Environmental comprises 72 percent of over \$678 million in total capital expenditures for risk mitigation proposed for the three-year period and nearly \$200 million for risk O&M in TY 2016 (see Figure 2).⁸

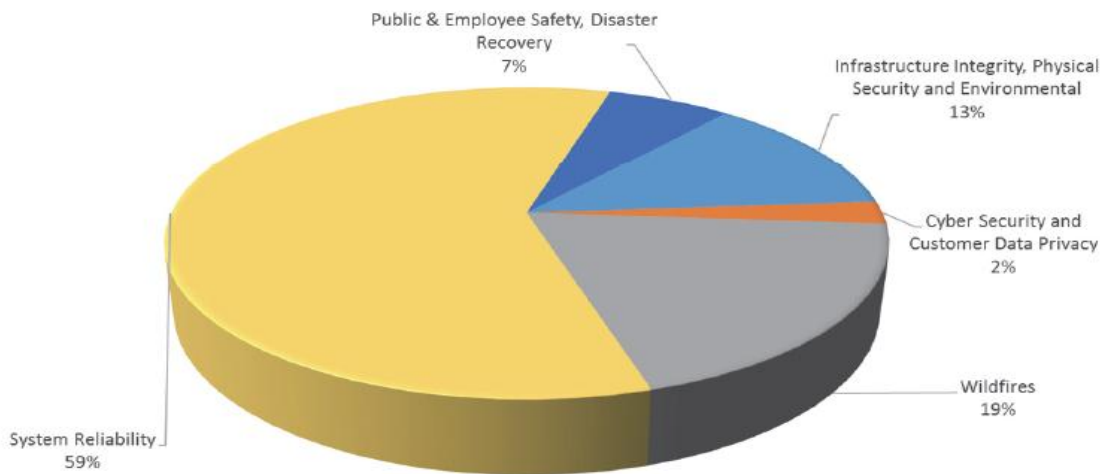
Figure 2 – Major Risk Categories for SDG&E Electric Operations and TY2016 GRC Spending Request

Risk Category	Capital (\$ 000's)	O&M (\$ 000's)
Infrastructure Integrity, Physical Security and Environmental	\$100,497	\$11,220
Cyber Security and Customer Data Privacy	\$11,584	\$6,541
Wildfires	\$140,112	\$28,851
System Reliability	\$395,467	\$123,901
Public & Employee Safety, Disaster Recovery	\$31,074	\$26,715



SDG&E Electric Risk Mitigation

- Infrastructure Integrity, Physical Security and Environmental
- Cyber Security and Customer Data Privacy
- Wildfires
- System Reliability
- Public & Employee Safety, Disaster Recovery



⁸ SDG&E-03, Electric Operations Risk Policy, Testimony of David Geier and Douglas Schneider, DLG-12

3 AN EVOLVING ENTERPRISE RISK MANAGEMENT PROGRAM

Enterprise Risk Management (ERM) is a corporate-level risk management program that provides a framework for assessing and mitigating risks in various Sempra Business Functional Areas (BFAs). Although gas and electric operations are separate within the corporate structure, Sempra intends its ERM program to be applicable to each of its utilities and both electric and gas operations, as well as to corporate risk analysis. In testimony, Sempra states, “The ERM process that is currently being developed and implemented will provide a consistent framework for addressing risk at SoCalGas and SDG&E.”⁹

Although some form of ERM program existed previously, Sempra continues to develop its program to address changing needs, in particular regulatory directives that promote more risk-informed decision-making. In this GRC cycle, Sempra requests \$5.556 million O&M expenses to implement an integrated ERM organization; \$2.964 million for SDG&E and \$2.592 for SoCalGas.¹⁰

The companies expect their approach to continue to grow and mature to allow for safety and security risk management to be an integral part of key organizational decision-making processes:

- Address risks in a more systematic, structured, transparent and timely manner;
- More closely integrate risk, asset and investment management; and
- More fully inform risk, asset and investment management decisions with qualitative and quantitative analysis.¹¹

To effect this structure, Sempra recently created the position of Vice President of Enterprise Risk Management. This GRC request seeks funding for nine (9) full-time

⁹ SDG&E-02, Testimony of Diana Day, page DD-7

¹⁰ SDG&E-02, DD-ii.

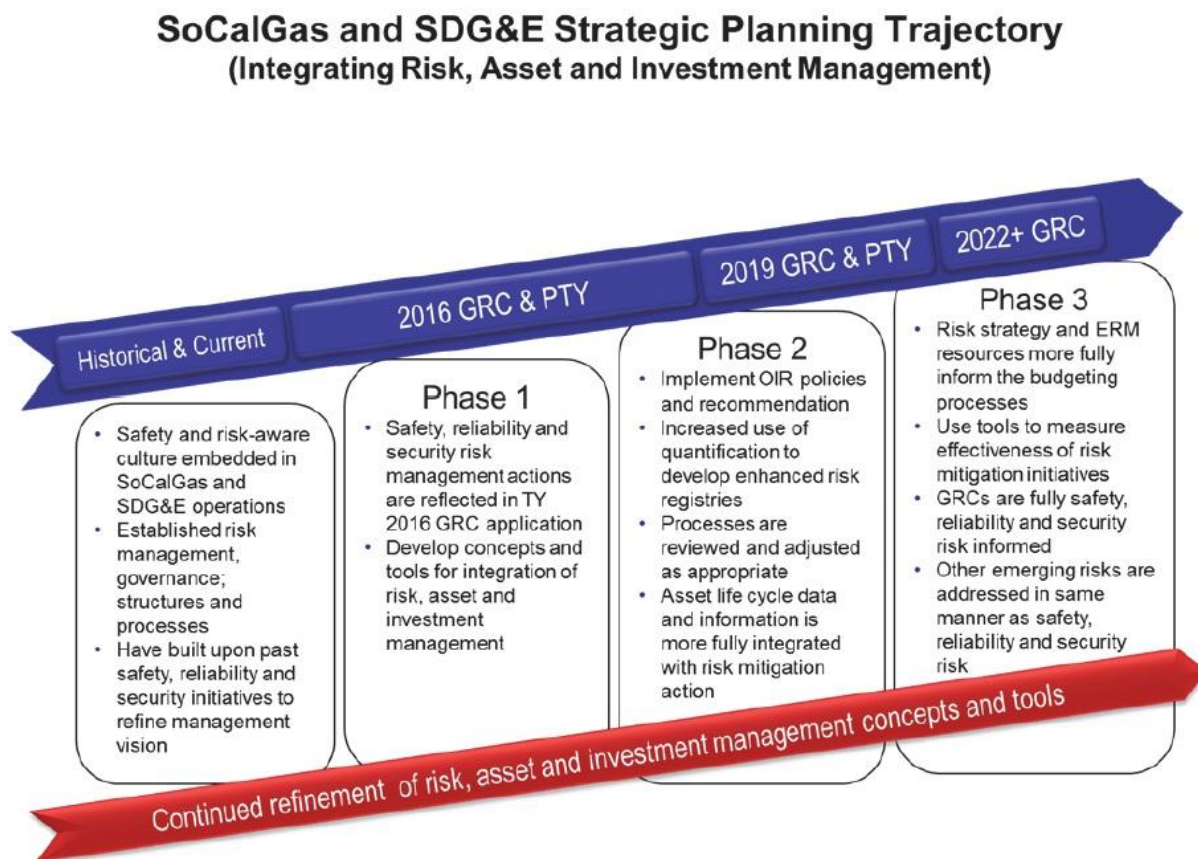
¹¹ SDG&E-02, DD-8

equivalent positions, including two (2) Director-level positions, two (2) Managers and four (4) Principal Analysts, as well as the VP.

This team would be responsible for leadership, innovation, governance, and management necessary to identify, evaluate, mitigate, and monitor operational and strategic risk and to integrate the risk management and asset management with the SoCalGas' and SDG&E's investment management process.¹² Key to this strategy appears to be developing a performance metrics approach, and furthering asset management practices.

In its testimony, Sempra has proposed phased development of its risk management program spanning future rate cycles (See Figure 3).¹³

Figure 3 – Phased Approach to ERM Development



¹² SDG&E-02, DD-10

¹³ SDG&E-02, DD-9

A central element of the ERM process will be to build upon existing risk registries to develop a comprehensive registry for each utility, which will provide an integrated view of each utility's risks. The risk registry will capture sufficient information to be able to assess whether a risk has been assessed, the level of controls implemented and whether the controls are adequate. The company expects to develop a set of guidelines that defines the process of risk identification, analysis (risk triggers/causes and consequences), evaluation (risk scoring methodology), and development of mitigation and contingency plans.¹⁴

3.1 RISK DECISION MAKING

Sempra's risk evaluation process is based upon scoring the initial, or inherent, risk and the resultant, or residual, risk after some action or mitigation has been taken.

The evaluation of risks includes the assessment of the effectiveness of the existing controls (aka, Strength of Controls), the consequence and the likelihood of a risk and the calculation of a residual risk gap score. The purpose of risk evaluation is to aid in deciding, in accordance with legal, regulatory and other requirements, which risks need mitigation/treatment and the priority for implementation.¹⁵

It is clear that specific aspects of Sempra's ERM process are evolving. In a March 2014 presentation to the Commission, Sempra provided an overview of its Risk Evaluation Framework¹⁶ based upon identifying and quantifying five levels of Risk Severity, Likelihood, and Strength of Controls. By January 2015¹⁷, this framework had changed to account for seven levels of Risk Impact, Likelihood, and Strength of Controls (see Figure 4 and Figure 5, below). Admittedly difficult to read in this format, these charts are meant to illustrate the increased complexity of Sempra's scoring process.

¹⁴ SDG&E-02, DD-7

¹⁵ <http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M084/K331/84331865.PDF> (Pg 9)

¹⁶ <http://www.cpuc.ca.gov/NR/rdonlyres/DD52DAD0-ADBD-4376-9E1C-A78083992235/0/SDGERiskOIRWorkshopWangfinal.pdf>

¹⁷ Sempra Response to SED Data Request 141219-02

Figure 4 - March 2014: 5-Levels of Severity, Likelihood, Strength of Controls
(Full Size Version in [Appendix A](#))

Severity					
	5	4	3	2	1
	Catastrophic Impact	Major Impact	Moderate Impact	Minor Impact	Insignificant
Health & Safety: Endanger workplace or public safety	Severely harm a large number of employees or customers	Severely harm an employee or a customer	Cause OSHA recordable rates exceed normal levels	Cause OSHA recordable rates at normal levels	Cause OSHA recordable rates below normal levels
Operational: Disruption to company operations that could impact customers	> 50% of customers affected	> 25% of customers affected	> 10% of customers affected	> 5% of customers affected	< 5% of customers affected
Financial: Potential financial loss (gross), including disallowance, legal actions or fines	Depending on the position in the risk hierarchy				
Reputation: Diminishing confidence by stakeholder groups (i.e. Employees, Contractors, Shareholders, Customers, Regulators, Politicians, Vendor/Suppliers, etc.)	> 5 years to recover; Global media coverage; Indictments/Settlements, etc.	< 5 years to recover; National media coverage; Regulatory/Legal Action	< 1 year to recover; National media coverage; Possible investigations	< 6 months to recover; Local/Regional "frontpage" media coverage; Increasing social media traction	< 1 month to recover; Local "backpage" media coverage; Social media comments

Likelihood					
	5	4	3	2	1
	Certain	Likely	Possible	Unlikely	Rare
Occurrence & Frequency	Expected to occur at least once within the next year	Expected to occur at least once within the next 2 years	Expected to occur at least once within the next 3 years	Expected to occur at least once within the next 4 years	Not likely to occur within the next 5 years

Strength of Controls					
	5	4	3	2	1
Risk Treatment: Implementation level and effectiveness of mitigation plan	Few effective controls implemented (<10%)	Partial effective controls implemented (>30%)	Intermediate effective controls implemented (>50%)	Substantial effective controls implemented (>80%)	Complete effective controls implemented (>95%)



Figure 5 - January 2015: 7-Levels of Impact, Likelihood, Strength of Controls
(Full Size Version in [Appendix B](#))

Impact							
	7	6	5	4	3	2	1
	Catastrophic	Severe	Extensive	Major	Moderate	Minor	Insignificant
Health, Safety, & Environmental: Endanger workplace or public safety; impact to surrounding environment; Long-term: 10+ years; Medium-term: 3-10 years; Short-term: 1-3 years	Multiple fatalities or life threatening injuries; Immediate, severe, and irreversible impacts to environment	Fatality or life threatening injury; Severe and long-term impacts to environment	Many serious injuries to employees or the public; Significant and medium-term impacts to environment	Severely harm a few employees or the public; Significant and short-term impacts to environment	Result in OSHA reportable event; Moderate and short-term impacts to environment	Result in OSHA reportable event; environmental impact is immediately correctable or contained within small area	Result in OSHA reportable event; no environmental impact
Operational and Reliability: Disruption to company operations that could impact customers; may be measured in quantity of impacted customers, critical locations, loss of energy flows, and/or duration	> 1 MM customers affected; or impacts an entire metropolitan area, including critical customers; or disruption of service of more than a year due to permanent loss to a facility	> 100 K customers affected; or impacts multiple critical locations and customers; substantial disruption of service greater than 1 months	> 50 K customers affected; or impacts multiple critical locations and customers; substantial disruption of service greater than 10 days	> 10 K customers affected; impacts single critical location or customer; disruption of service greater than 1 day	> 1 K customers affected; impacts single critical location or customer; disruption of service for 1 day	> 100 customers affected; impacts small area with no disruption to critical location or customer; disruption of service less than 1 day	< 100 customers affected; impacts small localized area with no disruption to critical location/customer; disruption of service less than 3 hours
Regulatory, Legal, & Compliance: Diminishing relationship and increased scrutiny by regulators or government agencies; ongoing media coverage forces outreach to policy makers/regulators; increasing stakeholder revolt or objections leading to increased oversight; loss of license, exclusivity, or monopoly	Actions resulting in closure, split, sale of the company, or criminal conviction	Cease and desist orders are delivered by regulators; Critical assets and facilities are forced by regulators to be shut down; revoking license, market-based rate authority, or monopoly	Governmental, regulatory investigation (including criminal), and enforcement actions lasting longer than one year; violations that result in fines/penalties and large non-financial sanctions	Violations that result in fines or penalties, or a regulator enforces non-financial sanctions, or significant new and updated regulations are enacted as a result of an event	Violations that result in fines or penalties	Self-reported or regulator identified violations with no fines or penalties	No impact to administrative impact only
Financial: Potential financial loss, including disallowance, legal actions or fines, replacement energy, remediation, damage to 3rd party properties, etc.	Loss > \$3 billion; Ability to raise capital significantly impacted; or decrease in stock price greater than 25%; or potential insolvency	\$1 B - \$3 B; Ability to raise capital is challenged; or decrease in stock price greater than 15%	\$100 MM - \$1 B; Ability to raise capital becoming more difficult; or decrease in stock price greater than 5%	\$10 MM - \$100 MM	\$1 MM - \$10 MM	\$50 K - \$1 MM	< \$50 K

Likelihood							
	7	6	5	4	3	2	1
	Common	Regular	Frequent	Occasional	Infrequent	Rare	Remote
Frequency of an occurrence: How often does the risk event occur	> 10 times per year	1-10 times per year	Once every 1-3 years	Once every 3-10 years	Once every 10-30 years	Once every 30-100 years	Once every 100+ years

Strength of Controls							
	7	6	5	4	3	2	1
	Leads Industry	Best Practice	Good	Adequate	Low	Minimal	None
Risk Treatment: Implementation level and effectiveness of mitigation plan; the estimated mitigation level is shown in parentheses	Complete effective controls implemented (>95%); duplication for critical controls	Substantial effective controls implemented (>85%)	Effective controls implemented (>75%)	Intermediate effective controls implemented (>50%)	Partial effective controls implemented (20%-50%)	Few controls implemented, not effective (<20%)	No controls or ineffective controls

This scoring is derived from a formula that assigns a value to the Frequency and potential Impact of some risk. Sempra described its formula in general terms, basically as adding together the square of the Frequency score and the Impact score, then taking the square root of the sum to develop an Inherent Risk score.

As will be seen later in a fuller description of one of SDG&E's top risks, wildfires caused by utility equipment, this risk scoring process works as follows: for evaluation of Inherent Risk, both Frequency and Impact were given the highest score under the seven-level assessment, Frequency 7 squared (49), plus Impact 7 squared (49) equals 98, which has a square root of 9.9, which is the Inherent Risk Score.

What is unclear, however, is how the company values the effect of mitigations on the inherent risk score factors, and what the additional "Strength of Mitigation" contributes. Sempra should provide more detail about its formulaic approach to risk scoring, and provide examples of how it works to allow the Commission and interested parties a clearer understanding of this approach.

There may be value in relative risk scoring to inform risk management. In the long run, it may be expanded to a more thorough quantitative approach to risk management.

3.1.1 ANALYSIS

Sempra's method of using relative risk scores to establish risk mitigation priorities should be considered an early approach to risk evaluation – which may be further refined in Commission consideration of Safety Model Assessment Proceedings (SMAP) beginning in May 2015. SED expects that with subsequent rate cases, Sempra's risk management approach will gain additional maturity, as reflected in improvements in data collection capability, data quality, and use of probabilistic models, with the long-term result that Sempra will eventually migrate to an expanded quantitative risk assessment approach.

To the extent possible, Sempra should more clearly separate the costs of addressing safety risks from those of financial and regulatory/legal risks.

4 SEMPRA KEY SAFETY RISKS

In 2014, Sempra identified 16 Key Risks for SoCalGas, and 14 Key Risks for SDG&E.¹⁸ These Key Risks included disruption of natural gas supply, disruption of electrical service, wildfires, major public safety events, and physical and cyber security. There were also a number of business risks described. Of these, SED has focused on the risks that are primarily concerned with safety (although major system outages and blackouts are included). In two cases, both utilities described the same risk, so the duplicates were eliminated. The resulting list includes 7 top risks for SDG&E and 5 for SoCalGas.

For each type of Key Risk, Sempra identified a risk owner, risk manager, mitigations, potential triggers, potential consequences, and risk scores. The risk scoring did not provide insight into detailed evaluation of risk options.

SDG&E and SoCalGas follow the above Risk Scoring process to assess many kinds of corporate and operational risks. In responses to SED staff data requests, the utilities provided individual scoring sheets for dozens of potential risks, indicating preliminary risk scores based on potential frequency and severity of impact (on a 7x7 scale) and an inherent risk score (describing a baseline risk without mitigations, or with existing mitigations).

These scores are modified after assessment of various mitigations that are described in the documents. A final Residual Risk Score, based on residual impact, frequency, and strength of mitigation factors, is then used to rank the Risks for prioritization of funding consideration.

4.1 SAN DIEGO GAS & ELECTRIC KEY SAFETY RISKS

For the purposes of this report, we will present only the situations or conditions most associated with safety risk. That means matters of business enterprise risk or regulatory risk that are examined in the utilities' risk assessments are not included in the listings

¹⁸ Response to Data Request on Key Risks faced by SDG&E and SoCalGas.

below. In addition, because of concerns about security, we do not reveal specific risks that fall under the categories of cybersecurity, although both SDG&E and SoCalGas provided information about these.

We do not present each of the inherent or residual scores for the elements of each risk, such as impact, frequency, etc, but rather present only the resulting Inherent Risk and Residual Risk Scores to note how application of various mitigations is expected to adjust the companies' risk assessments.

4.1.1 WILDFIRES CAUSED BY SDG&E EQUIPMENT (INCLUDING 3RD PARTY POLE ATTACHMENTS)

Wildfires may be caused by several types of utility equipment failure, and failures may contribute to severity of fires caused by exogenous factors (lightning, arson, accident, etc).

Inherent Risk Score 9.9

Residual Risk Score 7.8

Mitigations

- Equipment failure: QA/QC Program; Wood to Steel; Capacitor Program; Long span inspections
- Vegetation contact: Enhanced vegetation inspections
- Foreign object contact: Marker balls; Aviation protection; Spacer cables; Tree guard wires; Pursue Mylar balloon replacement; add bollards to areas of known vehicular contact locations
- Third party equipment attachments: Improved joint pole attachment agreements; Rule 18 (resolving safety hazards)
- Response and awareness: Fire Potential Index (FPI); Weather network; Firefighting contractors/crew staging/Sunbird availability; Construction restrictions on fire weather days
- Operational prevention: De-energization (high winds during fire weather days); Enhanced system protection (re-closing policy, patrol before re-energizing, intellirrupters)

4.1.2 MAJOR DISTURBANCE TO ELECTRICAL SERVICE (E.G. BLACKOUT)

This considers the risk of a blackout or major loss of electric service throughout the SDG&E service territory.

Inherent Risk Score 7.6

Residual Risk Score 7.3

Mitigations:

- Compliance with applicable reliability standards for planning and operations, which provide for system performance during unplanned events
- System impact studies of major outage events used as the basis for developing mitigation strategies (i.e. Safety Net)
- Coordination of transmission protection schemes with neighboring utilities with annual updates to the under-frequency load shedding program within WECC requirements
- Participation in inter-utility regional studies and reliability councils & standards development
- Monitoring and coordination of operations with CAISO and neighboring utilities, both in advance and in real time to ensure continuity of electric service
- Communication protocol developed which provides guidelines for proactive information sharing between SoCalGas outage scheduling and impact to SDG&E electrical system
- Working with CAISO to install the following in our systems:
 - Phasor Measurement Units
 - Synchronous Condensers
 - Static Voltage Compensators
 - Transmission Switching Applications to help reduce human error potential

4.1.3 PUBLIC SAFETY EVENTS (GAS AND ELECTRIC)

Events involving public safety and/or property damage related to SDG&E infrastructure, employees or third parties.

Inherent Risk Score 8.5

Residual Risk Score 7.2

Mitigations:

- Implementation of Natural Gas Security Plan based on Transportation Security Agency Guidelines and recent Critical Asset Security Team
- Natural Gas System Operator Safety Plan
- Pipeline Safety Enhancement Program (PSEP), Transmission Integrity Management Plan (TIMP), Distribution
- Integrity Management Plan (DIMP)
- Safe Driving Practices: Defensive driving, training and compliance programs for employees
- Ensuring safe work practices: Employee Safety Handbook, which provides guidance on electric and gas standard practices
- Contractor safety review and third party audits for DOT and operator qualifications for Gas Operations
- Ongoing communication with employees and contractors regarding safety (e.g. daily tailgates, safety stand downs, annual Contractor Safety Summit, quarterly contractor safety meetings)
- Continual best practice benchmarking with other gas and electric utilities, industry associations and Fortune 500 companies
- Customer Communications and First Responder training
- On-going maintenance programs

4.1.4 ELECTRIC INFRASTRUCTURE INTEGRITY

The risk of safety, environmental or reliability events due to degraded or overloaded equipment (i.e. transformers, breakers, relays, pole loading, overhead conductor, underground cable, PCB issues).

Inherent Risk Score: 7.8

Residual Risk Score: 7.1

Mitigations:

- Condition Based Monitoring system
- Inspection and preventative maintenance programs
- GO165: Distribution Inspect and Repair program
- Corrective maintenance program
- Prioritized underground cable replacement program

- Substation equipment health rankings based on age, cost, equipment manufacturing lead-time, etc.
- Substation rebuild/replacements based on operational significance and SDG&E reliability standards
- Long span conductor replacement or pole insertion (eliminates “long span”) on capacity only work
- Visual and Intrusive inspection program for wood poles
- In progress: Fire Risk Mitigation or FiRM (i.e. Hardening areas in the Fire Threat Zone)
- In progress: 4kV insulation program to allow for energization at 12kV or replace with distribution equipment

4.1.5 AVIATION INCIDENT

An aviation incident by our contractor, subcontractors or other third parties that damages electric transmission/distribution and/or gas transmission facilities and results in an employee and/or customer injury or death.

Inherent Risk Score: 7.8

Residual Risk Score: 6.7

Mitigations:

- Implementing aviation Company/pilot Audit/Qualification Program
- Implementing Aviation Safety Management System (SMS)
- Further developing real-time flight management controls (base to pilot)
- Implementing job site field observation program
- Mark all overhead lake crossings
- Implemented process to identify locations for Overhead markings and/or lighting
- Automated monitoring system through On-Ramp wireless devices
- Utilizing aviation consultants’ expertise (Annually)
- Developing utility aviation risk tool & complete overall assessment
- Continue “tuning” SDG&E aviation liability insurance coverage
- Ensuring compliance with applicable regulatory standards (FAA/NTSB)
- Increased use of unmanned air systems (e.g. drones)

4.1.6 WORKPLACE VIOLENCE

A disgruntled employee, former employee or customer takes action (i.e. abduction, entrapment, etc.) resulting in emotional or physical harm (including death) to employee(s) or third parties.

Inherent Risk Score: 8.6

Residual Risk Score: 6.7

Mitigations:

- Security department follow-up and investigation on employee reports
- Security contractor presence at strategic locations
- Facility modifications (e.g. - physical barriers, access controls, etc.)
- New-hire screening processes
- Employee Assistance Program(s)
- Supervisor/employee mandatory Workplace Violence training
- Workplace Violence Mitigation Team
- Planned elimination of Meter Reading workforce
- Employee awareness (e.g. - security alerts, gang awareness, emergency response planning, etc.)
- Hostile Intruder Training

4.1.7 EMPLOYEE SAFETY

The risk of significant and preventable injuries to employees, contractors or third parties, as well as damage to company property.

Inherent Risk Score: 7.2

Residual Risk Score: 6.7

Mitigations:

- A comprehensive Injury and Illness Prevention Program is in place at SDG&E with clear delineation of authority and officer level accountability, provisions for compliance, communication, identifying and evaluating work place hazards, investigation of incidents, procedures for correcting unsafe and unhealthy conditions, and mandatory employee training and instruction

- Ongoing communication with employees and contractors regarding safety – (e.g. daily tailgates, safety stand downs, annual Contractor Safety Summit, quarterly contractor safety meetings)
- Extensive employee engagement/recognition opportunities (e.g. Behavior-Based Safety Program, Safety Committees, Grassroots teams, Annual Safety Congress and Safety Leadership Awards)
- Continual best practice benchmarking with other gas and electric utilities, industry associations and Fortune 500 companies
- Additional risk reduction/transfer measures in purchase and service contracts
- Insurance coverage for workers’ compensation claims
- Contractor safety review, third party audits for DOT and operator qualifications for Gas Operations
- Monitoring of Health & Safety regulatory changes at the federal/state/local levels

4.2 SOUTHERN CALIFORNIA GAS COMPANY KEY SAFETY RISKS

SoCalGas’ documentation included duplicate risk profiles for the issues of Employee Safety and Workplace Violence. They are not repeated in the following list.

4.2.1 GAS PUBLIC SAFETY EVENTS

The risk of pipeline failure event resulting in injuries to the public or damage to property

Inherent Risk Score: 7.6

Residual Risk Score: 7.3

Mitigations:

- Transmission Integrity Management and Distribution Integrity Management programs are closely monitored and given high priority.
- Frequent audits are conducted
- Distribution pipeline replacements are prioritized based on condition and performance
- Approved PSEP program to test or replace High Consequence Area High Pressure pipelines that do not meet current records criteria
- Employees are comprehensively trained to perform compliance inspections
- Systems are in place to monitor and manage compliance activity schedules
- Storage Integrity Management Plan

4.2.2 DAMAGE TO GAS INFRASTRUCTURE

Risk of damage to the gas infrastructure by contractors or other 3rd parties.

Inherent Risk Score: 7.8

Residual Risk Score: 7.2

Mitigations:

- Provide comprehensive training and qualify employees to perform locate and mark duties
- Provide on-going employee support/training to reduce mis-marks
- Receive USA notifications about proposed excavation work near company facilities by being a member of the California One-Call Centers and locate pipeline facilities within required timeframes
- Locate company facilities using sophisticated locating equipment and GIS maps
- Conduct annual retesting of all qualified locating personnel
- Standby when excavation work is within 10 feet of high pressure / high priority facilities
- Secure greater enforcement of penalties against parties not following well established rules to have pipelines marked prior to excavation
- Present at public awareness events to educate excavators about calling 811 before digging
- Support "safe digging" legislation to toughen enforcement
- Remain active members of the California Regional Common Ground Alliance to influence and keep updated on the industry best practices
- Remain active on the board of directors for both California One-Call centers
- Continuously pursue new technologies to improve quality of marking hard to locate pipe segments and services
- Inline inspection to detect damages

4.2.3 PHYSICAL SECURITY OF CRITICAL INFRASTRUCTURE

Physical Sabotage or Terrorism

Inherent Risk Score: 6.7

Residual Risk Score: 6.3

Mitigations:

- Corporate Security maintains contacts with local, state, and federal law enforcement agencies and private security professionals for threat intelligence
- Corporate Security participates on trade group (EEI, AGA) security committees and benchmarks with other
- California utilities (PG&E, SCE, DWP) regarding security incidents, response, and prevention
- Corporate Security participates on the Critical Asset Security Team addressing physical security
- Corporate Security maintains a Business Resumption Plan (BRP) to staff all positions and maintain security during a catastrophic event
- The Corporate Security BRP is a Level 1 plan due to the priorities for access control system restoration, security guard deployment, security monitoring, and executive travel requirements
- SDG&E and SoCalGas employ additional physical security measures not disclosed here

4.2.4 SAFETY - MOBILE HOME PARK PROJECT

Safety threat to our employees, contractors and/or the public posed by replacing Mobile Home Park (MHP) yard gas lines that may not have been well maintained and in areas where information of substructures is not well documented.

Inherent Risk Score: 7.8

Residual Risk Score: 5.8

Mitigations:

- Training Company Crews on best safety practices for trenching and construction where there is a lack of information on substructures
- Ensuring that Residents, MHP owner know their responsibilities to address red tag and leaks and encourage them to have contingency plans
- Assisting where possible to identify and locate leaks

4.2.5 FAILURE OF DISASTER RECOVERY

In the event of a natural disaster, pandemic or any catastrophic event, the risk exists that the disaster recovery and/or business resumption plans may not be adequate or could fail.

Inherent Risk Score: 6.7

Residual Risk Score: 5.8

Mitigations:

- Each Tier 1 &2 department has a formal Business Recovery Plan (BRP) that addresses emergency response, recovery and resumption of critical business functions and IT applications in the event of a disaster.
- Emergency preparedness programs and BRPs are reviewed, exercised and updated annually. The programs can be used to respond to various scenarios including gas & power curtailments, wildfires, earthquakes, terrorist attacks, gas explosion, cyber security, or any other catastrophic event.
- Action reports are added to the plan following exercises and lessons learned from real events.
- Annual training exercises and training is conducted for Emergency Operation Center responders including officers in charge in order to be prepared to respond to emergencies. A business resumption plan of level 1 exists for Emergency Services. Also a backup site for the EOC exists.
- First responder outreach and training program administered through Emergency Services in collaboration with the Regions and Transmission to build and maintain working relationships and work together to minimize hazards to life and property.
- Compliance with GO 112, and CFR 192.615 (Emergency Plans) for gas infrastructure, GO 95 and 165 for electric infrastructure, including design, construction, and maintenance procedures.

To provide greater insight into how Sempra translates its Risk Evaluation into programmatic spending requests in the General Rate Case, the following section will use as an example a more detailed review of SDG&E’s request for spending to prevent and mitigate risks associated with Wildfires.

At this time, it is not SED’s intention to make recommendations about the level of funding that should be considered in the GRC proceeding, although some preliminary observations are made about aspects of SDG&E’s proposal that bear additional analysis.

4.3 WILDFIRE PREVENTION AND RISK MITIGATION

The predominant risk that SDG&E faces is due to fire threats.¹⁹ This assessment, cited throughout several volumes of utility GRC testimony is also reflected in the significant portion of requests in the utility’s Electric Distribution Capital and O&M budgets.

The subcategory of “Wildfires” comprises 19 percent of the funding associated with SDG&E’s Safety and Risk Management group of identified risks – amounting to over \$140 million in capital spending for the three year period 2014-2016, and \$28.8 million in O&M for TY 2016. This category of fire-risk related costs includes tree trimming and other vegetation management, weather measurement devices, funding for the utility’s Wildfire Strike team, and costs of infrastructure enhancements to reduce potential ignition sources in high-risk areas, such as the Cleveland National Forest (see discussion of FERC Driven Projects, below).

There are, in fact, so many references to fire-related programs in the descriptions of SDG&E projects, that it is sometimes difficult to segregate distribution circuit capital and/or operations spending that is not in some way related to reducing fire risks. The utility notes that, “While wildfire risk reduction has been engrained in SDG&E’s core business practices, the sole purpose of several projects in this category is to reduce risk by performing capital upgrades.”²⁰

A table provided in its Electric Distribution Capital testimony showing projected budgets for Safety & Risk Management projects illustrates the difficulty of completely sorting out fire-related activities, unless explicitly noted by SDG&E. Clearly, the major programs Fire Risk Management (FiRM) are primarily associated with wildfire risk (see discussion below). Others, including Weather Instrumentation and Aerial Marking & Lighting have some components that provide fire risk reduction benefit. Other categories, such as Powerworkz of SF6 switch replacement, do not appear to be fire-related at all.

¹⁹ SDG&E-03, Electric Operations Risk Policy, Testimony of David Geier, (DLG-7)

²⁰ SDG&E-03, pg. 7.

Table 1 Safety & Risk Management Capital Projects (Fire Specific/Related*) (\$000)²¹

	2014	2015	2016	Total
Replace Live Front Equipment	843	843	843	2,529
*Weather Instrumentation	285	0	0	285
Powerworkz	468	0	0	468
*C1215 Fire Mitigation	186	0	0	186
*FiRM Phase 1&2	13,056	12,780	12,496	38,332
*C441 Pole Loading	186			186
*Aerial Marking/Light	140	140	140	
*CNF Blanket	0	2,598	7,106	9,704
*FiRM Phase 3	11,045	24,323	44,950	80,318
SF6 Switch Replacement	0	0	9,888	9,888
Total	26,209	40,684	75,423	142,316
<i>Fire specific or related*</i>	<i>24,898</i>	<i>39,841</i>	<i>64,692</i>	<i>129,431</i>

On the other hand, capital projects accounted for in System Reliability budgets described elsewhere in the testimony may also contribute to fire-risk reduction. Despite the total

²¹ SDG&E-09, Electric Distribution Capital, Testimony of John Jennings, JDJ-118

derived from the table above, SDG&E’s testimony also offers another set of numbers for forecasted expenditures that are specifically focused on addressing safety and risk: \$27.5 million in 2014, \$42.3 million in 2015, and \$77.4 million in 2016.²² No explanation for this discrepancy is available, but the trend is clear toward greatly increasing expenditures.

So, while the total budget for the Safety and Risk Management programs detailed in the table at \$142.3 million approximates the \$140 million that SDG&E is attributing to Wildfire risk, they are not exactly the same, and it is difficult to derive the exact set of projects and funding that fits the Wildfire category.

In large part, SDG&E’s emphasis on fire as a top risk is a result of lessons learned following devastating fires in 2003 and 2007 (and during 2014) and because the utility considers the majority of its service territory to be at high risk for fires. According to California Department of Forestry and Fire Protections, about 55 percent of SDG&E’s territory lies within areas designated as “very high” or “extreme” fire threat zones.

Over 3,400 miles of electric distribution lines are within these areas, with most of these lines overhead circuits.²³ The fire threat is exacerbated by the regular occurrence of extreme Santa Ana dry wind conditions in the area, and the current widespread drought conditions in the State.

As a result of this perception of the high risk posed by wildfires, SDG&E states “risk reduction efforts in this area are typically prioritized above other categories of work.”²⁴

Although not explicitly described in SDG&E testimony, the major risk perceived by the utility is not just that wildfires occur – due to lightning, accidents, arson or other uncontrollable causes – but that utility equipment may cause or contribute to uncontrolled fires.

²² SDG&E-09, JDJ-9.

²³ SDG&E-09, JDJ-24.

²⁴ SDG&E-09, JDJ-11.

It may be implied that fires caused by utility equipment pose not only the risk of damage and outages, but also a legal and financial liability that should be considered in assessing the impacts of the risk.

In evaluation sheets provided as part of data request responses, SDG&E enumerated several factors that contribute to this risk:

- Failure of SDG&E equipment
- Vegetation contact with SDG&E equipment
- Foreign object contact
- Failure of third-party equipment attached to SDG&E equipment
- Slow response and inadequate awareness due to lack of coordination with other agencies
- Lack of an effective operational approach to prevention

So-called “power line firestorms” pose a substantial liability, both in terms of liability for damage claims but also for compliance with Commission rules.²⁵

4.3.1 RIRAT SPAWNS FiRM

One outcome of this high priority given to wildfire prevention is that SDG&E has revised its risk prioritization practices to carve out a specific Fire Risk Management (FiRM) program derived from the previously existing Reliability Improvements for Rural Areas Team (RIRAT). This utility group has been responsible for systematically analyzing the risks associated with aging equipment and proposing newer technologies or systems meant to mitigate fire risks, while also accounting for public safety and system reliability.

Formed in 2010, RIRAT as previously operational was composed of managers and engineers from SDG&E’s Asset Management and Smart Grid Department, the Electric Transmission and Distribution Engineering Department, the Electric Regional Operations Department, and other stakeholders. Its major functions are described in SDG&E testimony, but notably include “assigning priorities to capital and operating programs and

²⁵ SDG&E is no doubt particularly aware of this (although its risk testimony does not address it), given the role utility equipment played in the Witch fire in 2007, and the resulting \$2 billion in liability claims, and a \$20 million settlement of a Commission investigation.

projects that could address fire-related risks in the Fire Threat Zone (FTZ),”²⁶ where the potential for uncontrolled wildfires, and the greatest losses, is highest. This same structure is now being applied to FiRM, according to SDG&E.

RIRAT analysis of fire risks exists within the overall context of SDG&E’s Risk Management Structure, which includes a Fire Preparedness Team and a Fire Preparedness Director Steering Committee, which maintain the SDG&E Fire Prevention Plan and Community Fire Safety Program, among other activities.

As with all other categories of risk to operations, specific issues and proposed programs are vetted by utility managers and directors to assess legitimacy, and then brought to an Executive Risk Management Committee, which reviews the risk, potential impacts and mitigation alternatives. Once programs are developed to mitigate the risk, they go to the Electric T&D Capital Budget Committee for approval.

Until recently, the RIRAT group managed the capital budgets for distribution fire hardening activities, but this has now become part of FiRM. FiRM is considered similar to the Pipeline Safety Enhancement Program (PSEP) on the gas operations side of the utility.

SDG&E described the creation of FiRM as part of an evolution in its programs to assess issues related to pole-loading in fire prone areas, finding “splices, connectors, aged conductors, and overloaded poles all appeared to be risks.”²⁷ Beginning with this GRC cycle, the fire teams and associated activities have been incorporated into FiRM.

FiRM now comprises the majority of proposed capital spending for SDG&E’s Wildfire risk reduction category. As described in testimony and workpapers, there are three Phases to the program, which are actually occurring concurrently, but which target what SDG&E has determined to be the most threatened geographic zones first. The utility, however, did not provide information about exactly where these locations are, or how it expects to prioritize work within each phase.

²⁶ SDG&E-09, JDJ-7

²⁷ SDG&E-09, JDJ-10

The bulk of work associated with FiRM, according to SDG&E, will be related to pole rebuilding or replacements and reconductoring that will transition to pole loading assessment in the later phase.

Table 2 – Projected GRC Spending on FiRM Projects 2014-2016 ²⁸

FiRM (\$000)	2014 (est)	2015 (est)	2016 (est)	Total
Phase 1 & 2	13,056	12,700	12,496	38,252
Phase 3	11,045	24,323	44,950	80,318
Total	24,101	37,023	94,469	118,570

Phase 1a entails hardening of 1,200 poles located in areas where winds can exceed 100 mile per hour. Phase 1b extends pole repair or replacement and wire replacement to about 6,000 poles located in the extreme Potential Damage Zone (PDZ).

Phase 2 will replace 30,000 poles and reconductor in High Fire Risk Areas (HFRA) as had been identified under the RIRAT process.

Phase 3 will complete rebuild/preplacement and reconductoring work to an additional 40,000 poles, as well as performing pole loading assessments.

Because FiRM is a new consolidation of activities, it is difficult to assess how proposed spending differs from SDG&E’s previously recorded fire-related activities, of which a large portion were related to fire-hardening. However, in its testimony, the utility acknowledges, “While SDG&E did make the request for fire-hardening funds in the TY2012 GRC, the level of required work has increased substantially now that SDG&E has access to improved information about known local conditions and historical information about specific risks (i.e., data on hardware failures, equipment failures, wire failures), and due to changes/requirements related to pole loading.”²⁹

²⁸ SDG&E-03, pg. 7

²⁹ SDG&E-09, JDJ-24

SED is unable to ascertain the specific locations that SDG&E expects to prioritize under FiRM's phasing sequence. A more complete evaluation of this program -- whether conducted in this GRC, or as part of future accountability reports associated with the Commission's SMAP/RAMP process -- will require a more detailed work plan from SDG&E, with maps and more thorough enunciation of why specific locales were prioritized over others.

4.3.2 FERC-DRIVEN PROJECTS

The Federal Energy Regulatory Commission has ratemaking jurisdiction over high-voltage electric transmission (defined generally as lines 100 kV and above). Costs approved by FERC for the transmission function are incorporated in utilities' overall rates through a formula ratemaking process, and allocated among customers by the CPUC within the GRC proceedings. In addition, utilities incur costs on their systems that are "driven" by FERC requirements, including compliance with North American Electric Reliability Council (NERC) and California Independent System Operator (CAISO) maintenance requirements. SDG&E's describes these Transmission and FERC-Driven system upgrade costs, which include several that will contribute to reducing the risk of fires through line reconductoring and pole replacements, especially wood-to-steel conversion projects in high-fire threat areas.

As part of its Wildfire Risk reduction programs, SDG&E made particular note of several projects located in the Cleveland National Forest, which amount to approximately \$6.5 million requested in the three-year period. This is part of an ongoing fire-hardening effort scheduled to occur between 2015-2019, although the testimony reflects only distribution-related replacements expected to be placed into service by 2016.

According to SDG&E, the 2003 wildfires in the region led to repair/replacement of 324 wood poles and 45 miles of transmission lines, at a cost of \$7 million. After the 2007 fires, another 309 wooden poles and 56 miles of transmission line were replaced at a cost of \$16 million. In the past six years, SDG&E has hardened over 2,000 poles and intends

to harden the remainder over the course of the next six years. The area in question is rugged, and contains some of the highest fire risk areas in San Diego County.

Aside from converting wood pole to steel, these projects generally also involve replacing conductor with aluminum-clad steel conductor, installing larger insulators to increase spacing, and installing fiber optic line for system protection.

In addition to the Cleveland National Forest projects, SDG&E described multiple other line replacement/fire hardening projects in its testimony that similarly are expected to contribute to both improved reliability and reduced fire risk.

Among the transmission projects listed were:

- TL637 CRE-ST Wood to steel replacement along 13 miles from Creelman to Santa Ysabel substations, \$1.9 million;
- TL6914 Los Coches-Lovelend wood to steel replacement of 125 poles, 8 miles, \$2.4 million;
- TL13821 and 13828 Fanita Junction enhancements \$600,000;
- TL13833 wood to steel replacement of 6 poles between Pico and Trabuco substations, \$250,000.

4.3.3 OPERATIONS AND MAINTENANCE

In addition to capital projects described above, SDG&E's Wildfire Risk reduction spending proposal includes over \$28 million earmarked for Operation & Maintenance activities in TY2016. The utility's testimony frequently references elements of O&M that relate to fire prevention or risk mitigation – so much so that it is even more difficult to segregate fire-specific activities from reliability-oriented activities than it is for capital spending. Clearly, though, devoting personnel and resources to fire risk mitigation practices is becoming an increasingly critical component of the utility's O&M budget.

What is also clear is that the utility believes that not only is the threat of fire increasing, but that the costs of response to fires and restoration of service and damaged systems are increasing as well. The utility stated that, through May 2014, there had already been five "Red Flag" warnings in its territory signaling elevated winds and a high threat of fires

that can lead to outages affecting tens of thousands of customers. “The results of red flag warnings are unpredictable, but as history has shown, red flag conditions can be a catalyst for catastrophic wildfires...Regardless of whether there are active fires when red flag conditions materialize, SDG&E must respond to these conditions quickly to maintain safety and reliability and to address fire risks.”

Aside from red flag warning operations and fire mobilization as described above, wildfire-risk related O&M activities include: vegetation management, intrusive wood pole inspections, labor-intensive safety patrols of circuits affected by outages, construction management and other operations. Each is described in the O&M testimony and won't be repeated here.

4.3.4 WILDFIRE RISK MITIGATION ANALYSIS

Aside from the narrative provided in SDG&E testimony on Distribution Capital and O&M spending requests, the utility's response to data requests from Safety & Enforcement Division staff provided some additional insight to its risk assessment practices that resulted in ascribing a top priority to Wildfire risk reductions.

Measurement of Inherent Impact and Inherent Frequency of wildfires caused by SDG&E equipment (although potentially triggered or made worse by exogenous causes) ranked at the highest potential scores, with a resultant Inherent Risk score of 9.9. This Inherent Risk score evidently represents conditions without mitigation, or with baseline mitigations in place. Proposed mitigations are then evaluated to adjust the risk levels.

Even with a wide variety of mitigations – preventative and response – the Residual Risk Score for wildfires remained high at 7.8. This certainly contributed to SDG&E's conclusion that “Because wildfire is such a significant risk (the #1 priority risk on the enterprise risk register), risk reduction efforts in this area are typically prioritized above other categories of work.”³⁰ Further, SDG&E states “...the increasingly important

³⁰ SDG&E-09, JDJ-6

attention to fire risk mitigation threatens to overwhelm the funding available to non-fire related reliability improvements alone.”³¹

SDG&E’s method of scoring of risks to establish priorities should be considered an early approach to risk evaluation – which may be further refined in Commission consideration of Safety Model Assessment Proceedings (SMAP) beginning in May 2015. Although scoring allows for a relative assessment of risks, there remains uncertainty about what exactly the resulting numbers mean, and whether results are truly comparable across business units or among different utilities.

It is also unclear from Sempra’s testimony how values are attributed to various mitigations, whether costs are factored in and what impact the various mitigation proposals might have on the Residual Risk Score. There is no insight as to whether all or some of the listed mitigations are applied. Without more transparency, the methodology merely adds more questions than it answers.

What is also unclear from the testimony is exactly how individual projects are evaluated and prioritized. And because fire risk is directly intertwined with reliability risk and other operational considerations, it can be difficult for staff to evaluate whether a program is really primarily associated with fire risk reduction, or whether fire risk is ascribed to the project to increase its funding priority.

A more complete evaluation of this program -- whether conducted in this GRC, or as part of future accountability reports associated with the Commission’s SMAP/RAMP process – will require a more detailed work plan from SDG&E, with maps and more thorough enunciation of why specific locales were prioritized over others.

The general risk evaluation approach described by SDG&E contemplates evaluation of mitigation alternatives by a select group of managers, engineers and analysts, which then

³¹ SDG&E-03, DLG-7

goes to the Technical Review Committee and the Electric T&D Capital Committee to “select the most appropriate option to mitigate the identified risks.”³²

Although this general approach sounds reasonable, there is no demonstration in SDG&E’s testimony as to how it played out in the decisions to propose the projects included in this GRC request. Without providing some greater understanding of, say, the relative impacts and/or costs of various alternatives or combinations of alternatives, the utility appears to be asking the Commission to “trust our judgment” about whether the mitigation projects proposed are the best and why.

Certainly by the first round of RAMP applications, there will need to be a more thorough explication of how the risk mitigation evaluation process is applied to certain project decisions in order to better inform the Commission’s ability to make GRC funding determinations.

5 OTHER RISK MANAGEMENT CONSIDERATIONS

5.1 DATA AND RECORDS QUALITY ASSURANCE

Adequate, accurate data and records are critical to effective risk management and the lack of adequate record keeping in and of itself poses a substantial risk to a utility. For example, inaccurate records were identified as one of the root causes for the gas pipeline explosion in San Bruno. Separately, the Commission currently has initiated an investigation to determine if inaccurate records were contributing causes of several incidents, including an explosion in Carmel.³³ Inaccurate records and data create additional risks. Risk Management based upon inaccurate records is severely comprised. In testimony, SoCalGas recognizes this need and seeks funding for additional personnel for record-keeping and to expand its Quality Assurance program.³⁴

³² SDG&E-09. JDJ-9

³³ See, I.14-11-008

³⁴ SCG-04, Testimony of F Ayala, FBA-4,5

“SoCalGas is experiencing increased pressures associated with maintaining a highly trained and qualified workforce....To address this pressure, SoCalGas will add personnel to expand its quality assurance program, field instructors to assist with on-the-job training, compliance administrative advisors to more closely review employees’ work, and records management clerks to manage pipeline archives to safeguard data integrity. Furthermore, SoCalGas seeks to expand its Operator Qualification program to better align with recommendations from CPUC auditors and industry leading practices, as well as to comply with SB 705, which requires pipeline operators to establish a safety plan that is ‘consistent with leading practices in the gas industry and with federal pipeline safety statutes’. This includes adding new qualification elements, developing qualification materials, establishing an electronic record-keeping process, and conducting training to qualify impacted employees.”

Sempra proposes: “The new Quality Assurance program would add thirteen employees to perform all of the aforementioned audits system-wide. This request includes a Team Lead and twelve Quality Assurance Specialists. These Specialists will perform the suite of audits previously mentioned over a one-week period at each of the 52 districts throughout SoCalGas. This approach will enable Quality Assurance audits to be completed bi-monthly at each District system-wide. This incremental activity results in a \$1,339,000 incremental increase in expense reported to this workgroup in TY2016 over the 2013 adjusted recorded base.”

5.2 SAFETY PERFORMANCE METRICS

Safety Performance Metrics are another important tool in evaluating the effectiveness of risk mitigation programs and safety performance trends. Certain natural gas system performance metrics are under consideration in a proceeding to revise General order 112-

Similarly, SDG&E-4, Testimony of F Ayala, FBA-4,5

E,³⁵ and SED anticipates that Safety Performance Metrics for both gas and electric operations may be considered as part of the Commission's Rate Case Plan Rulemaking.³⁶

Selected metrics relevant to the Sempra GRC are discussed in various parts of its testimony. Sempra stated that its investments have resulted in demonstrable improvements.

“Evaluations and measures by independent third parties show that SoCalGas’ and SDG&E’s safety results compare favorably to those of peer utilities and companies. Notably, the results of recent safety surveys conducted by the National Safety Council indicate SoCalGas and SDG&E are in the 93rd percentile for safety culture.”³⁷

Another common benchmark would be statistics on Reportable incidents required by the federal Occupational Safety and Health Administration (OSHA). According to Sempra both of its utilities have documented improvements in OSHA reporting results. Over the past sixteen years the OSHA recordable incident rate at SoCalGas has improved from 8.0 in the mid-1990s to 3.5 in 2013. At SDG&E, there has been a similar improvement trend, with the rate declining from 8.6 to 2.31 in 2013.³⁸

In addition, the Commission, in an appropriate forum, may wish to consider additional types of metrics, based on industry practices and academic research.

It is SED’s understanding that Sempra participates in utility industry benchmarking of safety practices under the auspices of the American Gas Association and the Edison Electric Institute. The Commission may wish to undertake a review of these efforts to see if there are useful performance metrics that may be incorporated into GRCs or SMAP proceedings for future refinement of the utilities’ Risk Evaluation Methodologies.

A number of metrics may be used by utilities and industries as *leading* or *lagging* indicators of safety performance. In the context of process safety, The Center for

³⁵ R. 11-02-019

³⁶ R. 13-11-006

³⁷ National Safety Council Safety Barometer, March 2013, SoCalGas and SDG&E.

³⁸ Of non-fatal work-related injuries and illnesses.

Chemical Process Safety defines *Lagging Metrics* as a retrospective set of metrics that are based on incidents that meet the threshold of severity that should be reported as part of the industry-wide process safety metric. *Leading Metrics* are a forward-looking set of metrics which indicate the performance of the key work processes, operating discipline, or layers of protection that prevent incidents.³⁹

Sempra should review its data for areas of improvement and should repeat the assessment on a regular basis to help identify trends and to determine the effectiveness of safety initiatives.

Further, Sempra has undergone a shift over the years of using a greater use of contract workers. OSHA requires employers to track employee safety recordables, but not contract workers. As Sempra continues to make use of and expand its contract work force, it would be important that safety metrics be based on adequate information to permit an accurate assessment of Sempra's workforce safety, whether it be employee or contract workers.

Also, it would be important that safety and other incidents involving contract workers and the public also be reported. This will require active implementation on Sempra's part, as currently many OSHA recordables are not automatically reported to OSHA, but are only supplied to OSHA upon request.

5.3 ASSET MANAGEMENT STANDARDS

Although Sempra does not indicate whether it is considering committing to international standards for asset management, it is relevant to consider adherence to ISO 55000, an internationally recognized body of standards and practices that provide companies with guidance for how to manage their assets in a safe, reliable, effective and efficient manner. Use of such a standard provides the utilities with a reference to review their organizational structure, programs and practices, and allows for independent third-party compliance evaluation.

³⁹ http://www.aiche.org/sites/default/files/docs/pages/CCPS_ProcessSafety_Lagging_2011_2-24.pdf

5.4 UNSCORED RISKS

Sempra should continuously assess its Key Risks for unidentified risks, and emerging threats, and provide a risk-based evaluation for major threats, even if they are not considered part of the GRC proceedings.

In a November 2012 risk exposure map supplied to the Commission by Sempra, the potential closure of the San Onofre Generating Station (SONGS) was accurately identified as a major risk exposure. With the closure of the nuclear facility now permanent, SONGS has been removed from Sempa's 2016 GRC application and moved to other proceedings. SED did not find a risk ranking or scoring for SONGS in Sempra's Key Risk documents.

Decommissioning of SONGS will take decade(s) and during that time, SONGS will continue to require risk assessment, mitigation, and management, including those related to physical and cyber threats, and long term hazardous materials management. Sempra is a minority owner in SONGs, and has limited oversight over operations; however that does not reduce the impact suffered by SDG&E, its ratepayers, and the public from risks that are realized. Sempra Risk Management programs should identify, assess, and mitigate those risks.

Similarly, the Federal Energy Regulatory Commission (FERC) did not cite⁴⁰ SDG&E for the 2011 Southwest Blackout. Nevertheless, SDG&E, its ratepayers, and the public suffered from the significant impact of this blackout. FERC states, "WECC, SDG&E, and SCE did not study the impact that the SONGS separation scheme could have on BPS reliability and, thus, were unaware of its severe impact on the BPS when the scheme operated: blacking out SDG&E and CFE and leading to the loss of the SONGS generators."⁴¹ By identifying such risks, Sempra can seek mitigation measures to prevent such events that originate externally to Sempra. Potentially Sempra has addressed a

⁴⁰ FERC did cite others, including the Western Electricity Coordinating Council (WECC), of which SDG&E is a member

⁴¹ <http://www.ferc.gov/legal/staff-reports/04-27-2012-ferc-nerc-report.pdf> (Page 104).

future Southwest blackout by mitigation measures taken in Sempra's 2014 Key Risk "[Major Disturbance to Electrical Service \(e.g. Blackout\)](#)".

Further, these events highlight the importance of SDG&E Root Cause Analysis programs in learning lessons from incidents. Root Cause Analysis is an important Risk Management tool. By identifying the root causes of these events, SDG&E can implement mitigations to prevent future events. Similarly, Sempra's Cyber Security program appears to have a focus on IT Cyber Security, and less of a focus on Industrial Control Systems (ICS), Control System Design, Procurement, and Firmware Update Management. Recently, the DOE released new guidance highlighting the importance of procurement.⁴² From an Enterprise Risk Management perspective, Sempra should consider Cyber Security Risks across all of Sempra's Business Functional Areas (BFAs). Sempra's new ERM department should work with the BFAs to implement programs to identify inadequately addressed risks, assess them, and to mitigate them.

6 RECOMMENDATIONS

1. Sempra should continue to evolve its Risk Management Program. Risk Management encompasses many interrelated programs and processes that cut across many different Business Functional Areas. Given constraints, an expedient way to validate the effectiveness of these processes in managing assets in a safe, reliable, and efficient manner, would be for Sempra to demonstrate accredited 3rd party certification of compliance with the ISO 55001 Asset Management Standard.
2. Effective Risk Management is dependent upon adequate and accurate data and records. The Commission should consider supporting funding for Sempra's proposed programs to improve the quality and accuracy of these data and records.

⁴² http://energy.gov/sites/prod/files/2014/04/f15/CybersecProcurementLanguage-EnergyDeliverySystems_040714_fin.pdf
http://energy.gov/sites/prod/files/2015/01/f19/Energy%20Sector%20Cybersecurity%20Framework%20Implementation%20Guidance_FINAL_01-05-15.pdf
<http://fcw.com/articles/2014/04/29/doe-releases-cyber-procurement-guidelines.aspx>

3. Sempra should provide more detail about its formulaic approach to risk scoring, and provide examples of how it works to allow the Commission and interested Parties greater understanding of this approach.
4. Additionally, Sempra's method of using relative risk scores to establish risk mitigation priorities should be considered an early approach to risk evaluation – which may be further refined in Commission consideration of Safety Model Assessment Proceedings (SMAP) beginning in May 2015. Relative risk scoring can be useful for prioritizing risks and informing the decision-making process. In and of themselves, they do not define a level of acceptable or optimized risk mitigation. SED expects that with subsequent rate cases, Sempra's risk management approach will gain additional maturity, as reflected in improvements in data collection capability, data quality, and use of probabilistic models, with the long-term result that Sempra will eventually migrate to an expanded quantitative risk assessment approach.
5. SED is unable to ascertain the specific locations that SDG&E expects to prioritize under the FiRM program's phasing sequence for wildfire prevention projects. A more complete evaluation of this program -- whether conducted in this GRC, or as part of future accountability reports associated with the Commission's SMAP/RAMP process – will require a more detailed work plan from SDG&E, with maps and more thorough enunciation of why specific locales were prioritized over others.
6. Evaluation of the Effectiveness of Risk Management requires appropriate Metrics. Sempra should continue to conduct its safety culture survey to monitor trends. Sempra should expand its reporting of Safety Metrics in Rate Cases to include a full set of OSHA metrics and industry standard safety metrics.

Sempra should institute new requirements on contractors in order to capture contract work force safety performance.

Sempra should institute new metrics to capture public safety performance involving utility facilities.

Sempra should adopt safeguards to ensure adopted metrics do not discourage accurate reporting or assessment. For example, at least one utility places less

emphasis on the OSHA Recordable Rate metric in an attempt to address the potential risk of creating an incentive that could lead to under-reporting of employee injuries.⁴³ Similarly, OSHA prohibits safety programs that provide incentives for underreporting recordable injuries⁴⁴.

7. Sempra should audit its risk management programs to ensure it mitigates risks that may not have been accurately identified, or are otherwise inadequately addressed or mitigated.
8. Sempra participates in utility industry benchmarking of safety practices under the auspices of the American Gas Association and the Edison Electric Institute, and the Commission may wish to undertake a review of these efforts to see if there are useful performance metrics that may be incorporated into GRCs or SMAP proceedings for future refinement of the utilities' Risk Evaluation Methodologies.
9. Sempra should report on existing backlog metrics, and expand these as appropriate in order to identify areas where safety programs may be falling behind.
10. To the extent possible, Sempra should more clearly separate the costs of addressing safety risks from those of financial and regulatory/legal risks.

⁴³ <http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M065/K394/65394210.PDF> (Page 159.160)

⁴⁴ <https://www.osha.gov/as/opa/whistleblowermemo.html> (Item 4).

7 APPENDIX A - SEMPRA RISK FRAMEWORK, 5-LEVEL (FULL SIZE)

(March 2014: 5-Levels of Severity, Likelihood, Strength of Controls
from [Risk Decision Making](#) Figure 4)

		Severity				
		5	4	3	2	1
Health & Safety: Endanger workplace or public safety	Catastrophic Impact Severely harm a large number of employees or customers > 50% of customers affected	Major Impact Severely harm an employee or a customer > 25% of customers affected	Moderate Impact Cause OSHA recordable rates exceed normal levels > 10% of customers affected	Minor Impact Cause OSHA recordable rates at normal levels > 5% of customers affected	Insignificant Cause OSHA recordable rates below normal levels < 5% of customers affected	
	Operational: Disruption to company operations that could impact customers Financial : Potential financial loss (gross), including disallowance, legal actions or fines Reputation: Diminishing confidence by stakeholder groups (i.e. Employees, Contractors, Shareholders, Customers, Regulators, Politicians, Vendor/Suppliers, etc.)	Depending on the position in the risk hierarchy				
Occurrence & Frequency	> 5 years to recover; Global media coverage; Indictments/Settlements, etc.	< 5 years to recover; National media coverage; Regulatory/Legal Action	< 1 year to recover; National media coverage; Possible investigations	< 6 months to recover; Local/Regional "frontpage" media coverage; Increasing social media traction	< 1 month to recover Local "backpage" media coverage; Social media comments	
	Expected to occur at least once within the next year	Expected to occur at least once within the next 2 years	Expected to occur at least once within the next 3 years	Expected to occur at least once within the next 4 years	Not likely to occur within the next 5 years	
		Likelihood				
		5	4	3	2	1
Risk Treatment: Implementation level and effectiveness of mitigation plan	Certain Expected to occur at least once within the next year	Likely Expected to occur at least once within the next 2 years	Possible Expected to occur at least once within the next 3 years	Unlikely Expected to occur at least once within the next 4 years	Rare Not likely to occur within the next 5 years	
	Few effective controls implemented (<10%)	Partial effective controls implemented (>30%)	Intermediate effective controls implemented (>50%)	Substantial effective controls implemented (>80%)	Complete effective controls implemented (>95%)	
		Strength of Controls				
		5	4	3	2	1

8 APPENDIX B - SEMPRA RISK FRAMEWORK, 7-LEVEL (FULL SIZE)

(January 2015: 7-Levels of Severity, Likelihood, Strength of Controls

from [Risk Decision Making Figure 5](#))

	Impact						
	7	6	5	4	3	2	1
Catastrophic	Multiple fatalities or life threatening injuries; Immediate, severe, and irreversible impacts to environment	Fatality or life threatening injury; Severe and long-term impacts to environment	Many serious injuries to employees or the public; Significant and medium-term impacts to environment	Severely harm a few employees or the public; Significant and short-term impacts to environment	Result in OSHA reportable event; Moderate and short-term impacts to environment	Result in OSHA reportable event; environmental impact is immediately correctable or contained within small area	Result in OSHA reportable event; environmental impact
Operational and Reliability: Disruption to company operations that could impact customers; may be measured in quantity of impacted customers, critical locations, loss of energy flows, and/or duration	> 1 MM customers affected; or impacts an entire metropolitan area including critical customers, or disruption of service of more than a year due to permanent loss to a facility	> 100 K customers affected; or impacts multiple critical locations and customers; substantial disruption of service greater than 1 month	> 50 K customers affected; or impacts multiple critical locations or customers; substantial disruption of service greater than 10 days	> 10 K customers affected; impacts single critical location or customer; disruption of service greater than 1 day	> 1 K customers affected; impacts single critical location or customer; disruption of service for 1 day	> 100 customers affected; impacts small area with no disruption to critical location or customer; disruption of service less than 1 day	< 100 customers affected; impacts small localized area with no disruption to critical location/customer; disruption of service less than 3 hours
Regulatory, Legal, & Compliance: Diminishing relationship and increased scrutiny by regulators or government agencies; ongoing media coverage forces outreach to policy makers/regulators; increasing stakeholder revolt or objections leading to increased oversight; loss of license, exclusivity, or monopoly	Actions resulting in closure, split, sale of the company, or criminal conviction	Cease and desist orders are delivered by regulators; Critical assets and facilities are forced to be shut down; revoking license, market-based rate authority, or monopoly	Governmental regulatory investigation (including criminal), and enforcement actions lasting longer than one year; violations that result in fines/penalties and large non-financial sanctions	Violations that result in fines or penalties, or a regulator enforces non-financial sanctions, or significant new and updated regulations are enacted as a result of an event	Violations that result in fines or penalties	Self-reported or regulator identified violations with no fines or penalties	No impact to administrative impact only
Financial: Potential financial loss, including disallowance, legal actions or fines, replacement energy, remediation, damage to 3rd party properties, etc.	Loss > \$3 billion Ability to raise capital significantly impacted; or decrease in stock price greater than 25%; or potential insolvency	\$1 B - \$3 B Ability to raise capital is challenged; or decrease in stock price greater than 15%	\$100 MM - \$1 B Ability to raise capital becoming more difficult; or decrease in stock price greater than 5%	\$10 MM - \$100 MM	\$1 MM - \$10 MM	\$50 K - \$1 MM	< \$50 K
Frequency of an occurrence: How often does the risk event occur	Common > 10 times per year	Regular 1-10 times per year	Frequent Once every 1-3 years	Occasional Once every 3-10 years	Infrequent Once every 10-30 years	Rare Once every 30-100 years	Remote Once every 100+ years
Risk Treatment: implementation level and effectiveness of mitigation plan, the estimated mitigation level is shown in parentheses	Complete effective controls implemented (>95%); duplication for critical controls	Best Practice Substantial effective controls implemented (>85%)	Good Effective controls implemented (>75%)	Adequate Intermediate effective controls implemented (>50%)	Low Partial effective controls implemented (20%-50%)	Minimal Few controls implemented, not effective (<20%)	None No controls or ineffective controls