Company: Southern California Gas Company (U 904 G)/San Diego Gas & Electric Company (U 902 M)
Proceeding: 2019 General Rate Case
Application: A.17-10-007/008
Exhibit: SCG-02-R/SDG&E-02-R

**REVISED**

**SOCALGAS AND SDG&E**

**(RISK MANAGEMENT TESTIMONY VOLUME)**

***

# REVISED DIRECT TESTIMONY OF DIANA DAY

## (CHAPTER 1: RISK MANAGEMENT POLICY)

***

# DIRECT TESTIMONY OF GREGORY FLORES

## (CHAPTER 2: ENTERPRISE RISK MANAGEMENT ORGANIZATION)

***

# DIRECT TESTIMONY OF JAMIE YORK

## (CHAPTER 3: RAMP TO GRC INTEGRATION)

**December 2017**

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

SoCalGas
A Sempra Energy utility®

SDGE
A Sempra Energy utility®

# CHAPTER 1

# REVISED

# DIRECT TESTIMONY OF DIANA DAY

# (RISK MANAGEMENT POLICY)

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## APPENDICES

## SUMMARY


- Southern California Gas Company (SoCalGas) and San Diego Gas & Electric Company (SDG&E) (collectively, the Companies) present the very first risk-informed General Rate Case (GRC) application, supported by testimony that transparently demonstrates how the Companies' key safety risks have been prioritized under the California Public Utilities Commission's (CPUC or Commission) new GRC framework.
- My testimony provides an overview of how SoCalGas and SDG&E have incorporated risk management into their Test Year (TY) 2019 showing, in accordance with the Commission's new Safety Model Assessment Proceeding (S-MAP) and Risk Assessment Mitigation Phase (RAMP) processes.
- I also describe how SoCalGas and SDG&E have met their TY 2016 GRC Enterprise Risk Management commitments, and how the Companies continue to develop their risk management program.
- I also sponsor SoCalGas and SDG&E's TY 2019 GRC Enterprise Risk Management commitments. SDG&E and SoCalGas continue to be focused on the advancement of risk management principles and practices consistent with Commission direction, federal compliance, international standards, and industry leading practices integrating risk management with asset management and investment management, and will continue to:
    - Incorporate safety and security risk management as an integral part of key organizational decision-making processes;
    - Evaluate and address risks in a more systematic, structured, and transparent manner;
    - More closely integrate risk, asset and investment management; and
    - More fully inform our risk, asset and investment management decisions with qualitative and quantitative analysis.

- Finally, I describe SoCalGas and SDG&E's strong safety culture from a risk management perspective, and sponsor related information requested by the Commission for this TY 2019 GRC testimony showing.

# REVISED SOCALGAS AND SDG&E DIRECT TESTIMONY OF DIANA DAY
# RISK MANAGEMENT AND POLICY

## I. INTRODUCTION

### A. Summary of Testimony

SoCalGas and SDG&E have been committed to delivering safe and reliable utility service and exceptional service to our customers since our inception. The Companies have a long history of prioritizing safety and managing risks in their electric and gas operations proposals in their GRC proceedings before the Commission. And now, within a new GRC framework the Commission has established through its proceedings and decisions examining risk management, SoCalGas and SDG&E are presenting the very first risk-informed GRC applications, supported by testimony that transparently demonstrates how the Companies' key safety risks have been prioritized.

My testimony summarizes SoCalGas and SDG&E's risk-informed GRC presentation, providing context within which SoCalGas' and SDG&E's funding requests should be viewed. In SoCalGas' and SDG&E's TY 2016 GRC proceeding, my testimony set forth the Companies' commitments to build and refine their risk management organization and program, in light of the Commission's then-developing plans for a statewide risk-informed GRC framework. My testimony in this proceeding describes how SoCalGas and SDG&E have met their TY 2016 GRC commitments, and how the Companies continue to develop their risk management program, integrating risk with asset and investment management.

Specifically, my testimony describes how SoCalGas and SDG&E have:

(1) incorporated risk management into the TY 2019 GRC applications and supporting testimony;

(2) completed goals for developing and improving an Enterprise Risk Management organization, philosophy and program within and across both Companies;

(3) established new risk management-related goals for future years; and

(4) developed their safety culture via structures, roles and processes at various levels, to address risks associated with our operations and facilities.

The Companies' practice of risk management is continuing to evolve, while retaining necessary flexibility in light of the Commission's still-ongoing development of statewide risk management standards, processes, and methodologies. With this necessary flexibility in mind,

the Enterprise Risk Management organization addresses the Companies' ever-changing demands due to operational, compliance, regulations, and expectations, especially as it relates to risk-informed decision-making. My risk management organization generally facilitates the identification, analysis, evaluation, and prioritization of risks, with an emphasis on safety, to ultimately inform the investment decision-making process, and works to integrate risk management with asset and investment management through the creation of governance structures, competencies, and tools. The testimony of Gregory Flores (Chapter 2, herein) supports the Companies' GRC cost requests for the Enterprise Risk Management organization.

**B. Support To/From Other Witnesses**

The Enterprise Risk Management organization is not the "owner" of the Companies' risks; rather, our group facilitates and advises on the risk-related efforts of SoCalGas and SDG&E. Costs associated with my organization are being addressed in the direct testimony of Mr. Flores. Each of the Companies' identified enterprise-level risks, which are in our enterprise risk registry, has one or more risk owner(s), a member of the senior management team who is ultimately responsible and accountable for the risk, and one or more risk manager(s), who is responsible for ongoing risk assessments and overseeing implementation of risk plans. My testimony describes the risk framework through which the various risk owners and managers identified and assessed their key risks and incorporated activities to mitigate those risks through the operations witness areas in these TY 2019 GRC applications. In addition, the Companies' risk management practices are integrated with asset and investment management. Asset management is discussed in the testimony of Gas System Integrity witness Omar Rivera (Exhibits SCG-05 and SDG&E-05) and Electric Distribution – O&M witness William Speer (Exhibit SDG&E-15). A summary of the Companies' investment processes is provided in the Rate Base testimony of Patrick Moersen (Exhibit SCG-35) and R. Craig Gentes (Exhibit SDG&E-33).

My testimony also provides a roadmap of the RAMP activities included in this GRC and where (*i.e.*, in which SoCalGas and/or SDG&E testimony chapters) these activities are represented. Appendix A to my testimony identifies each TY 2019 GRC witness who sponsors

mitigation activities associated with the Companies' RAMP Reports,[1] including details on RAMP-related activities and costs. The processes used by the Companies' to integrate RAMP into the GRC is discussed in the RAMP Integration Into GRC testimony of Jamie York (Chapter 3 herein). Where appropriate, each witness also provides a discussion of how SoCalGas and SDG&E have continued to build upon a strong safety culture in every part of their organizations. For a discussion of how my testimony fits in to the Companies' overall vision and policy, please refer to the testimony of SoCalGas witness J. Bret Lane (Exhibit SCG-01) and SDG&E witness Caroline Winn (Exhibit SDG&E-01).

## II. SOCALGAS AND SDG&E PRESENT THE FIRST RISK-INFORMED GENERAL RATE CASE

This section of my testimony describes how risk, and specifically the Risk Framework Decision, shaped SoCalGas' and SDG&E's TY 2019 GRC testimony presentation. This section describes how the Companies have incorporated their GRC cost requests for risk mitigation activities into the Commission's new risk-informed GRC framework, established through Decision (D.) 14-12-025 (the Risk Framework Decision).[2] The Commission has stated that the new risk framework is intended to "result in additional transparency and participation on how the safety risks for energy utilities are prioritized … and provide accountability for how these safety risks are managed, mitigated and minimized.[3] Below, I provide a summary of the Risk Framework Decision and its requirements to establish a S-MAP, a RAMP, and Annual Accountability Reporting. These new regulatory procedures focus on risk models and tools as well as risk assessments and mitigation plans for top safety risks. Note that these GRC applications address risks and request funding for activities beyond our top safety risks (for example, reliability projects and safety risks that did not meet the minimum threshold to be included in RAMP).

[1] I.16-10-015/I.16-10-016 (cons.), November 30, 2016, "Risk Assessment and Mitigation Phase Report of San Diego Gas & Electric Company and Southern California Gas Company," (referred to herein as the RAMP Reports).
[2] The December 9, 2014, "Decision Incorporating a Risk-based Decision-making Framework into the Rate Case Plan and Modifying Appendix A of Decision 07-07-004," in Rulemaking (R.) 13-11-006.
[3] *Id.* at 3; *see also id.* at 10.

### A. The New GRC Risk Framework

The Commission adopted the Risk Framework Decision in December 2014, to incorporate a risk-informed decision-making framework into the Rate Case Plan (RCP) for the GRCs of California's investor-owned utilities (IOUs).[4] The Commission intended this framework to incorporate risk, value transparency, and place safety of the public, employees and contractors as a top priority.[5] The 2014 risk-based framework includes the addition of two new Commission proceedings – S-MAP and RAMP– which feed into the GRC applications.[6] Specifically, the Risk Framework Decision requires each IOU to take the following additional steps, as part of the GRC process:

(1) initiate utility-specific S-MAP applications and participate in a statewide S-MAP proceeding, intended to "allow the Commission and parties to examine, understand, and comment on the models that the energy utilities plan to use to prioritize risks and to mitigate risks;"[7]

(2) subsequently, initiate a request that an order instituting investigation be opened and submit a RAMP report for each upcoming GRC, describing how the IOU plans to assess, mitigate, and minimize certain key risks; and

(3) incorporate the RAMP submission, as clarified or modified in the RAMP proceeding, into the IOU's GRC filing.

SDG&E and SoCalGas' TY 2019 GRC testimony presentation is the first to fully incorporate these additional processes into their GRC showing. To integrate this process, for the past several years, the Companies have been participating in Commission proceedings and developing internal processes to incorporate the S-MAP, RAMP, and accountability reporting requirements into their operations, and GRC presentations. This work is still ongoing, as described below.

Going forward, the Commission will also require the Companies to file annually two reports, the Risk Mitigation Accountability Report and the Risk Spending Accountability

[4] California IOUs consist of SoCalGas, SDG&E, Pacific Gas and Electric Company (PG&E), and Southern California Edison Company (SCE).

[5] Decision 14-12-025 at 35-36.

[6] D.14-12-025, at 2-3.

[7] *Id.* at 21.

Report,[8] which will require the Companies to implement additional internal tracking processes and tools to measure the effectiveness of our mitigation plans, also discussed further below.

### 1. Safety Model Assessment Proceeding

SDG&E and SoCalGas, along with the other IOUs, are required to file S-MAP applications and supporting testimony beginning on May 1, 2015,[9] and "every three years thereafter unless directed otherwise by the Commission."[10] The purpose of S-MAP is "to allow the Commission and parties to examine, understand, and comment on the models that the energy utilities plan to use to prioritize risks and to mitigate risks … [and] to allow the Commission to establish the guidelines and standards for these models."[11] S-MAP applications and testimony should "set forth and describe the approaches, models, and methodologies they plan to use to assess the risks in their utility operations and systems that pose a safety risk to the public and the utility employees …"[12] Models contemplated to be presented in S-MAP include "asset condition models; enterprise risk models; data models; information gathering methods; risk taxonomy; and the development and use of a risk lexicon."[13]

In accordance with the Risk Framework Decision, SoCalGas and SDG&E filed S-MAP applications and served supporting testimony on May 1, 2015 describing the Companies' overall enterprise risk management framework (including an overview of their existing risk evaluation models, risk taxonomy, and risk lexicon) and presenting examples of models used for risk assessment. A description of the risk tools and processes currently used by the Companies are provided in section II.B.1 of my testimony. Supporting S-MAP testimony for SoCalGas included a description of models used for its transmission integrity management program (TIMP). SDG&E's showing described its wildfire risk reduction model (WRRM), which is used to provide risk analysis related to SDG&E's fire risk mitigation program (FiRM). Both SoCalGas and SDG&E provided testimony concerning their cyber security modeling.

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[8] *See id.* at 44.

[9] Application (A.) 15-05-002 (SDG&E), A.15-05-003 (PG&E), A.15-05-004 (SoCalGas), A.15-05-005 (SCE). These applications were consolidated into docket A.15-05-002.

[10] D.14-12-025 at 27.

[11] *Id.* at 21.

[12] D.14-12-025 at 30.

[13] *Id.* at 23.

Subsequent to the filing of S-MAP applications, SDG&E and SoCalGas, along with the other IOUs, have participated in numerous S-MAP workshops and meetings to educate the Commission and stakeholders on the IOU's respective risk evaluation and mitigation frameworks. On August 18, 2016, the Commission issued an interim S-MAP Phase 1 Decision (D.16-08-018) to implement the following processes:

(1) to direct the IOUs "to take steps to implement a more uniform risk management approach" by performing test drives of an intervenor-proposed risk management methodology[14] for the Commission's consideration for adoption in lieu of the IOUs' risk evaluation tools;[15]

(2) to initiate a Phase 2 of the proceeding, in which the IOUs and the stakeholders would complete test drives of any new risk management methodology prior to adoption; and

(3) to implement modifications to the RAMP procedures, which are reflected in SoCalGas' and SDG&E's TY 2019 GRC applications and supporting testimony.

Phase 2 of the S-MAP is still ongoing before the Commission.

**2. Risk Assessment Mitigation Phase**

SDG&E and SoCalGas submitted the first ever RAMP Reports on November 30, 2016,[16] in accordance with both the Risk Framework and S-MAP Phase 1 Decisions.[17] The RAMP Reports provide information about the Companies' assessment of their key safety risks and proposed programs for mitigating those risks, consistent with instructions set forth in both the Risk Framework and interim S-MAP Phase 1 Decisions.[18] The Commission's Safety and Enforcement Division (SED) issued an evaluation of the RAMP Report on March 8, 2017,[19] to which parties subsequently responded.

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[14] The Utility Reform Network, Indicated Shippers, and Energy Producers and Users Coalition jointly proposed their Multi-Attribute Approach.

[15] D.16-08-018, Ordering Paragraph (OP) 1.

[16] I.16-10-015/I.16-10-016 (cons.), November 30, 2016, "Risk Assessment and Mitigation Phase Report of San Diego Gas & Electric Company and Southern California Gas Company."

[17] D.14-12-025 at 31-32 and D.16-08-018 at 151-152.

[18] D.14-12-025 at 36 and D.16-08-018 at 5.

[19] *See* I.16-10-015, Attachment A of the March 9, 2017, "Administrative Law Judge's Ruling Including Safety and Enforcement Division Report into Record and Scheduling Comments" (the SED Report).

A summary of the Companies' process of integrating their RAMP Reports and SED/stakeholder input into the TY 2019 GRC testimony showing is provided further below.

### 3. Annual Accountability Reports

SoCalGas and SDG&E have also provided with this TY 2019 GRC presentation an Interim Spending Accountability Report for years 2014 through 2016, in accordance with D.16-06-054 and D.17-01-012.[20] In the future, the Companies will file annually two reports, the Risk Mitigation Accountability Report and the Risk Spending Accountability Report, in accordance with the Risk Framework Decision. The Companies anticipate filing their first annual accountability reports in 2020, following the approval of various RAMP-related activities and authorized funding amounts in this TY 2019 GRC proceeding. As described in the Risk Framework Decision:[21]

> … the Risk Mitigation Accountability Report would compare the utility's GRC projections of the benefits and costs of the risk mitigation programs adopted in the GRC to the actual benefits and costs, and to explain any discrepancies between the projected risk mitigation and the actual risk mitigation.
>
> …
>
> The Risk Spending Accountability Report would compare the utility's GRC projected spending for approved risk mitigation projects to the actual spending on those projects, and to explain any discrepancies between the two.

These reports will be "filed and served by the utility in its applicable GRC proceeding in which funding for the risk mitigation activities and spending was authorized" by July 31 for SoCalGas and September 30 for SDG&E.[22]

The accountability reports were discussed in the first phase of the S-MAP proceeding in public workshops and working group calls. However, "the approach to analyzing the reports has not yet been determined. During Phase Two of this proceeding, Commission staff and parties may focus not only on the content and format of these reports, but also on methods for analyzing the accountability reports."[23] As mentioned above, Phase 2 of the S-MAP is currently underway.

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[20] *See* discussion in and Appendix C of the testimony of Jamie York, Exhibits SCG-45/SDG&E-44.

[21] D.14-12-025 at 44.

[22] *Id.* at 46-47.

[23] D.16-08-018 at 158-159.

## B. The Components of SoCalGas and SDG&E's Risk Showing in the GRC

The RAMP Report was the Companies' first, formal filing of key, enterprise-level safety risks and mitigation plans to address such risks. While this was the first RAMP Report, the Companies have been investing in safety-related activities and managing risk for decades. Nonetheless, the tremendous efforts that went into the filing of this RAMP Report resulted in increased risk awareness at the Companies and provided a risk-focused perspective. Below, I provide a summary description of the component steps that were involved in developing SoCalGas' and SDG&E's RAMP showing in this case:

(1) the risk management framework that our Enterprise Risk Management organization implemented at SoCalGas and SDG&E, which enabled the Companies to be able to produce their RAMP Reports for this TY 2109 GRC showing;

(2) a summary of the Companies' RAMP Reports; and

(3) a summary of the RAMP showing in the TY 2019 GRC.

### 1. The Risk Management Framework of SoCalGas and SDG&E

In developing this risk-informed TY 2019 GRC testimony, the Companies relied upon their risk framework that is modeled after ISO 31000, an internationally recognized risk management standard. This framework consists of an enterprise risk management governance structure, which addresses the roles of employees at various levels ranging up to the Companies' Board of Directors, as well as risk processes and tools.

One such process is the six-step enterprise risk management process that is foundational in the Companies' annual planning process. This six-step process is aligned with the Cycla Corporation's 10-Step Evaluation Method,[24] which was adopted by the Commission in the S-MAP Phase 1 Decision.[25] SoCalGas and SDG&E identify, manage and mitigate enterprise risks using their risk management process that aims to provide consistent, transparent, and repeatable results. The six distinct steps of the risk management process are shown in Figure DD-1 below.

[24] A.15-05-002/004, Prepared Direct Testimony of Jorge M. DaSilva, served on May 1, 2015.

[25] D.16-08-018, OP 4.

**Figure DD-1: Risk Management Process**


*Annual Risk Refresh Process*

To begin the six-step process, the Enterprise Risk Management organization annually reaches out to the various business units across the Companies to update existing risk information and identify enterprise-level risks that emerged since the prior assessment. The result of the six-step process is an enterprise risk registry for each company. The risk registry summarizes the annual enterprise risk assessment completed within each company at a snapshot in time. The enterprise risk management process is both a "bottoms-up" and "top-down" approach, by taking input from the risk managers and the risk owners to ultimately finalize the risk registry. As with any useful risk assessment, the enterprise risk registry is not intended to be static; it must be refreshed on an annual basis. Risks are dynamic; risks that were consolidated together may be separated out, new risks may appear, and the level of the risk may change over time.

As part of the annual risk registry process, the Enterprise Risk Management organization facilities sessions among the Companies' risk owners (*i.e.*, officers) to identify, evaluate and prioritize risks, review mitigation plans, and consider how investments align with risk priorities. Typically, each year, three sessions are held at each Company, as follows:

1. Risk Assessment Session – the risk owners discuss their risks, changes in the risk frequency or impact, challenges, and elements of the previous year's mitigation

2. plan implemented. The officers collectively evaluate the enterprise risk registry and consider whether all material risks are identified.

3. Risk Prioritization Session – the risk owners discuss the relative ranking of each company's enterprise risks and achieve consensus around risk priorities. During this session, officers leverage insights gained from the first Risk Assessment Session to ask questions and deepen awareness of the risks nuances and potential impact across the organization. Arriving at a risk prioritization can be an iterative process; risks that may be very different are compared to one another in order to determine a relative ranking (for example, evaluating an IT risk to a customer service risk).

4. Risk Mitigation Planning Session – an in-depth discussion of mitigation plans for enterprise-level risks, which occurs prior to moving into the annual investment planning process. The session continues to highlight risk priorities so officers are informed of the key risks as they make funding and resource allocation decisions.

The product of the annual risk management meetings described above becomes an input into the Companies' investment planning process. At least one member of the risk organization participates in the investment planning process, together with many of the risk owners and risk managers, to align the efforts undertaken on the risk front with decisions made from an operational and financial perspective. The Companies current investment processes are discussed in the testimony of Mr. Moersen (Exhibit SCG-35) and Mr. Gentes (Exhibit SDG&E-33).

The formalized risk officer sessions have become an important platform for cross-departmental dialogue and understanding. These sessions facilitate the integration of risk management into the day-to-day decision-making and managing of our business, and further add value by enhancing the development of SoCalGas and SDG&E's risk-aware culture.

*Risk Tools*

Through the enterprise risk management process, the Companies refresh their respective risk registries by modifying (as necessary) risk scores to reflect any changes to the various risk levels, and by identifying and evaluating new and emerging risks that must be managed by the Companies. During the process shown in Figure DD-1, primarily in the Risk Evaluation and Prioritization step, the Companies utilize a risk evaluation tool, known as the 7X7 matrix, to help

guide risk owners and managers through evaluating their risks. The Companies 7X7 matrix is provided in Appendix B of my testimony. The 7X7 matrix includes criteria to distinguish between a score of a level one from that of a level seven and all integers in between. A risk owner/manager provides a score (one through seven) for four impact areas and frequency using the 7X7 matrix. The four impact areas are:

1. Health, Safety, and Environmental;
2. Operational and Reliability;
3. Regulatory, Legal, and Compliance; and
4. Financial.

Using the levels defined in the 7X7 matrix, the risk owners/managers apply empirical data to the extent it is available and/or their expertise to determine a score for each of four residual impact areas and the frequency of occurrence of the risk. The scores of the risk owners/managers are designed to reflect the controls, sometimes referred to as baseline mitigations, in place at the time the risk assessment occurred. This is referred to as the residual risk.

The scores provided by the risk owners/managers are used by the risk management organization to calculate a residual risk score based on a risk algorithm, another risk tool. To do so, each of the four impact areas are assigned a weight. Because safety of the Companies' employees, contractors, and the public is a top priority, the Health, Safety, and Environmental impact area is weighted twice as much as the other impact areas. The remaining impact areas are given equal weights. The risk score is represented by a single number, which can provide a relative comparison against other risks in the enterprise risk registry.

Other risk-related tools the Companies use include a risk taxonomy to better classify risks, a risk lexicon to develop a common understanding of risk-related terms, and a visual summary of the risk known as a "bow-tie" analysis. The left side of the bow tie illustrates potential drivers that lead to a risk event and the right side shows the potential consequences of a risk event. An example of a risk bow tie is provided in Appendix B of my testimony.

**2. Summary of SoCalGas and SDG&E RAMP Reports**

The RAMP Report consisted of 28 of the Companies' key safety risks, 11 at SoCalGas and 17 at SDG&E, and plans for mitigating those risks. The Companies included risks in the RAMP that were ranked four or higher on their 7X7 matrix in the Health, Safety, and Environmental impact category based on the 2015 enterprise risk registries, based on the

Commission's ruling in D.16-08-018 (for SoCalGas and SDG&E only) and on discussions with the Commission's Safety and Enforcement Division and with stakeholders during the third workshop in the S-MAP.[26] The 7X7 matrix defined a four in the Health, Safety, and Environmental impact category as "Permanent/Serious Injuries or Illnesses: Few serious injuries or illnesses to the public or employees. Significant and short-term impacts to environment." The 2015 enterprise risk registries, completed in September 2015, were used as the basis for identifying the RAMP risks, because it was the most current risk registry available at the time the Companies were preparing the RAMP Report. A summary of the RAMP risks is provided in Figure DD-2 below:

[26] A.15-05-002, *et al*. (consolidated), S-MAP Workshop #3, October 6, 2015.

**Figure DD-2: Safety Risks Addressed in SoCalGas and SDG&E's RAMP Report**

| | Gas | Electric | Cross-Cutting |
|---|---|---|---|
| SDG&E | Catastrophic Damage Involving Third Party Dig-Ins | Wildfires Caused by SDG&E Equipment (Including Third Party Pole Attachments) | Employee, Contractor, and Public Safety |
| | Catastrophic Damage Involving High-Pressure Gas Pipeline Failure | Distributed Energy Resources – Safety and Operational Concerns | Cyber Security |
| | Catastrophic Damage Involving Medium-Pressure Gas Pipeline Failure | Major Disturbance to Electrical Service (e.g., Blackout) | Workplace Violence |
| | | Fail to Blackstart | Records Management |
| | | Aviation Incident | Climate Change Adaptation |
| | | Unmanned Aircraft System Incident | Workforce Planning |
| | | Electric Infrastructure Integrity | |
| | | Public Safety Events - Electric | |
| SoCalGas | Catastrophic Damage Involving Third Party Dig-Ins | | Employee, Contractor, Customer, and Public Safety |
| | Catastrophic Damage Involving High-Pressure Gas Pipeline Failure | | Cyber Security |
| | Physical Security of Critical Gas Infrastructure | | Workplace Violence |
| | Catastrophic Damage Involving Medium-Pressure Gas Pipeline Failure | | Workforce Planning |
| | Catastrophic Event Related to Storage Well Integrity | | Records Management |
| | | | Climate Change Adaptation |

Consistent with the Companies' enterprise risk taxonomy, the RAMP risks were categorized as gas, electric, and cross-cutting. Cross-cutting risks exist throughout the Companies and are not specific to a commodity, asset, or business unit; for example, Records Management and Workplace Planning. Rather, cross-cutting risks affect various assets and operations across the Company.

The RAMP Report was an activity-based risk showing, meaning that risk plans were addressed by describing the activities intended to mitigate them. The RAMP Report presented information in compliance with Commission requirements, as well as in accordance with the Companies' risk framework and operations. Each of the 28 risks had a dedicated risk chapter in the RAMP Report, which included the following information:[27]

- Purpose – The definition of the risk.
- Background –Additional information to provide factual and where appropriate, legal context for the RAMP risk.

[27] Additional details regarding the safety risks and the mitigations plans put forth in the Companies' RAMP Report can be found on the Companies' websites: https://www.sdge.com/regulatory-filing/20016/risk-assessment-and-mitigation-phase-report-sdge-socalgas.

- Risk Information – Description of the risk classification, potential risk drivers, and potential consequences, and how these components work into each respective risk bow tie.
- Risk Score – Description of the reasonable worst-case scenario (event) chosen to develop the risk score, an explanation of the assigned risk scores by impact area and frequency.
- Baseline Risk Pan – The controls and mitigations established as of 2015 to address the risk.
- Proposed Risk Plan – The controls and mitigations proposed to enhance or expand risk management activities.
- Summary of Mitigations – The baseline (2015) and forecast (in 2015 dollars) range of costs to implement the controls and mitigations.
- Risk Spend Efficiency – An explanation of the estimated annual risk reduction as applied to the specific risk, the calculation of the Risk Spend Efficiency (RSE), and the RSE results.
- Alternatives – The two alternatives considered as part of the risk evaluation.

The Commission required the RSE (or risk reduction benefits) showing referenced above to "[p]resent an early stage 'risk mitigated to cost ratio' or related 'risk reduction per dollar spent.'"[28] The Companies developed and piloted RSE calculations to comply with the requirements of the RAMP filing. The RSEs provided in the RAMP Report quantified the amount of risk reduction attributable to a mitigation in risk points rather than in hard dollar savings. The quantification of the RSEs was "new territory," challenging, and required "many assumptions."[29]

The RAMP Report used 2015 as its "base year" for each risk's Baseline Risk Plan and the same forecast period as the TY 2019 GRC for each risk's Proposed Risk Plan, 2017 through 2019. The Base Year for this TY 2019 GRC is 2016. Although the RAMP Report presented

[28] D.16-08-018, at 151.

[29] I.16-10-015/I.16-10-016 Risk Assessment and Mitigation Phase Report of San Diego Gas & Electric Company and Southern California Gas Company, November 30, 2016, RAMP Chapter Lessons Learned (RAMP – F), at SDGE/SCG F-3.

costs for the identified activities in 2015 nominal dollars (and ranges of dollars for the Proposed Risk Plans), the purpose of RAMP was not to request funding. As the Companies noted in their RAMP Reports, "[a]ny funding requests will be made in the GRC. RAMP mitigation forecasts are provided only to estimate a range that will be refined with supporting testimony in the GRC."[30] Additionally: "The reader should not assume the same level of precision in the RAMP filing as there is with a GRC request."[31]

### 3. Addressing Feedback From the RAMP Process[32]

On March 8, 2017, the Commission's SED issued its Risk and Safety Aspects of RAMP Report of SDG&E and SoCalGas (SED Evaluation Report).[33] The SED Evaluation Report assessed the Companies' RAMP Reports for completeness, consistency and compliance with the criteria established in Commission directives. The SED Evaluation Report states "Staff's main job is to assess how well the utilities have described their approach and outcomes, not to make a determination of whether projected funding for mitigations is reasonable."[34] In its report, SED expressed that it "is encouraged by the effort that the Sempra Utilities have put into this RAMP filing to follow the Commission's guidance and provide parties to the GRC with a better understanding of how risks are identified, prioritized and evaluated. Although some gaps remain, SED recognizes that this is an evolving process."[35]

The SED Evaluation Report provided feedback on the Companies' RAMP Report. SED's feedback included observations on the scope of the risks themselves, risk scores, and metrics. SED expressed concerns regarding the "assumptions made and the data used to develop

[30] *Id.*, RAMP Chapter Overview and Approach (RAMP-A), at SDGE/SCG A-2.

[31] *Id.*, RAMP Chapter Overview and Approach (RAMP-A), at SDGE/SCG A-11.

[32] This section addresses the Risk Framework Decision instruction that the utility's GRC showing should provide "information on how it addressed or incorporated the concerns expressed in the RAMP application by SED, and by other parties." D.14-12-025 at 40. *See also* the Compliance testimony of Ms. York (Exhibit SCG-45/SDG&E-44).

[33] Risk and Safety Aspects of Risk Assessment and Mitigation Phase Report of San Diego Gas & Electric Company and Southern California Gas Company Investigation 16-10-015 and I.16-10-016, March 8, 2017.

[34] *Id.* at 4.

[35] *Id.* at 3.

the risk score and to calculate the RSEs"[36] and suggested certain consequences be added for certain risks.[37] SED also commented on the "broad and cross-cutting"[38] nature of the Employee, Contractor, Customer, and Public Safety risk.[39] Intervenors' comments largely echoed feedback provided by SED.

As discussed in the foregoing sections, the Companies' enterprise risk management process annually reviews the scope of current risks, existing risk levels, new mitigations, and new risk drivers and/or consequences, where appropriate. For the RAMP risk of Employee, Contractor, Customer, and Public Safety in particular, we agree with SED's comment. In each company's 2016 risk registry, this risk was split into three distinct risks: employee safety, contractor safety, and customer safety.

SED also commented that:

- "SoCalGas should further develop metrics for gauging the performance of safety programs/projects for all control categories,"[40]
- "In the future, utilities should provide 1) technical documentation of risk modeling 2) have independent review of model results,"[41] and
- "Additional data which could assist in determining current effectiveness of damage prevention programs would be to trend SoCalGas and SDG&E dig-ins per 1000 miles of main per year, and segregate high-pressure dig-

[36] *Id.* at 30. Several intervenors also commented on the reliance of subject matter expert input, need for further quantification, and disagreement of the risk scores. *See* I.16-10-015/I.16-10-016. Office of Ratepayer Advocates Opening (April 24, 2017) and Reply Comments (May 9, 2017) at 2; Office of Safety Advocates Opening Comments (April 17, 2017) at 4; and Utility Consumers' Action Network Opening (April 24, 2017) and Reply Comments (May 9, 2017), at 8 and 4 respectively.

[37] *Id.* at 63. Coalition of California Utility Employees also commented that "the utilities should include excessive overtime as a risk driver for employee, contractor and public safety." *See* I.16-10-015/I.16-10-016. Opening Comments (April 17, 2017), at 5.

[38] *Id.* at 41.

[39] Office of Safety Advocates stated that it "found the Employee, Contractor, Customer, and Public Safety risk area to be somewhat broad, potentially incorporating many different utility departments and aspects of the utilities' operations." *See* I.16-10-015/I.16-10-016. Opening Comments (April 17, 2017), at 6.

[40] *Id.* at 36.

[41] I.16-10-015/016. RAMP Workshop. SED Review. March 15, 2017, at slide 20.

ins from medium-pressure dig-ins and service line dig ins, against total cost of the damage prevention programs per year."[42]

Exploring performance metrics to be used for evaluating risks as well as additional data collection to support the metric efforts is in scope of the S-MAP. The S-MAP is also the venue which the Companies will provide technical documentation of risk modeling. As described in section IV, the Companies are expanding the use of probabilistic modeling and quantification. The Companies incorporated SED's suggestion regarding the segregation between high-pressure and medium-pressure dig-ins in the interim spending accountability report being submitted concurrently with this GRC, as described in the Compliance testimony of Ms. York (Exhibit SCG-45/SDG&E-44).

Shortcomings were also identified in the SED Evaluation Report, including the "lack of clearly defined mitigation alternatives, and the lack of risk-reduction analysis and RSE calculations for these alternatives when included."[43] Regarding the RSE calculations, SED further states, "The concept of Risk-Spend Efficiency (RSE) has not been completely developed in the S-MAP proceeding… Because of the novelty of the approach, staff feels it is something that needs to be further reviewed and refined. Or, given the attempts in S-MAP to provide a more quantifiable methodology, perhaps it will be supplanted by some other process."[44]

Through the SED Evaluation Report and comments submitted in response to both the SED Evaluation Report and the Companies' RAMP Report, stakeholders agreed that the RSEs are evolving, should be further refined in the S-MAP, and have limited usefulness in their current state.[45] SoCalGas and SDG&E explicitly stated in their comments on the SED Evaluation

[42] SED Evaluation Report at 33.

[43] *Id*. at 115.

[44] *Id.* at 6.

[45] I.16-10-015/I.16-10-016. *See* SoCalGas and SDG&E Reply Comments (May 9, 2017), at 5-6; Office of Safety Advocates Opening Comments (April 17, 2017), at 13; Joint Opening Comments of Indicated Shippers and Southern California Generation Coalition (April 24, 2017), at 3; Coalition of California Utility Employees Opening Comments (April 17, 2017), at 4; Utility Consumers' Action Network Opening Comments (April 24, 2017), at 14; and Office of Ratepayer Advocates Opening Comments (April 24, 2017), at 1-2, 27.

Report in the RAMP proceeding that they "do not plan to include their nascent RSE calculations in the upcoming TY 2019 GRC."[46]

Some parties commented on the Companies' risk evaluation methodology and changes to the RAMP requirements. For example, the Indicated Shippers and Southern California Generation Coalition argued risk scores should be based on the most likely scenario rather than the reasonable worst case.[47] The Office of Safety Advocates recommended risks that scored a level of three in the Health, Safety, and Environmental impact area should be included in the RAMP Report, rather than a level four in accordance with the S-MAP Phase 1 Decision.[48] Such items, including adding or modifying any RAMP requirements, are "poised to receive further direction pending the outcome of a Phase Two decision in this [the S-MAP] proceeding."[49]

**4. RAMP in the TY 2019 GRC**

SoCalGas and SDG&E are the first utilities to formally and fully incorporate the risk-informed framework into their respective GRC showings, as a result of the Risk Framework Decision. Thus, this GRC represents a shift from how the Companies have presented their GRCs in the past. The RAMP process involved multiple organizations throughout the Companies reviewing, assessing, and analyzing the safety risks and associated mitigation plans in significant detail, which provided a new risk perspective in the context of GRC preparation. This multi-organizational evaluation during the RAMP and GRC planning processes revealed some risk exposure that may be mitigated by implementing new projects or expanding existing projects or programs.

In that sense, the RAMP process, and the models presented in the S-MAP, worked as intended and was constructive in identifying potential mitigants to further reduce risk to employees, contractors, and the public. The analysis resulting from the RAMP process helped shape this GRC request, and the Companies are seeking funding for incremental activities to provide additional risk mitigation, as referenced in Appendix A of my testimony.

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[46] I.16-10-015/I.16-10-016. SoCalGas and SDG&E Opening Comments (April 24, 2017), at 4-5; and SoCalGas and SDG&E Reply Comments (May 9, 2017), at 6-8.

[47] I.16-10-015/I.16-10-016. Indicated Shippers and Southern California Generation Coalition Opening Comments (April 24, 2017), at 9.

[48] I.16-10-015/I.16-10-016. Office of Safety Advocates Opening Comments (April 17, 2017), at 5.

[49] D.16-08-018, at 151; A.15-05-002 (consolidated), Scoping Memo and Ruling of Assigned Commissioner, (December 13, 2016), at 9.

Besides the incremental activities resulting from the RAMP process, a large percentage of the ongoing work already being performed today is associated with risk mitigation for safety items. For example, the Companies currently perform fire hardening efforts, vegetation management, cable replacements, leak surveys, various inspections, field observations, training programs, and other activities that are mitigants to various enterprise-level risks.

These TY 2019 GRC applications and supporting testimony provide specific requests related to the activities presented in the RAMP Report as a risk control or a proposed mitigation. Prior to inclusion in this GRC, mitigation activities presented in the RAMP were re-visited, as part of our annual risk assessment process. In that sense, the Companies' evaluation of the risk mitigation efforts did not stop on November 30, 2016, with the submission of the RAMP Report. The Companies continued assessing their existing and emerging risks through their annual enterprise risk management process, discussed in section II.B.1 above, and incorporated the updated knowledge into the GRC requests. The process used by the Companies to incorporate RAMP mitigation activities into the GRC is addressed by Ms. York in Chapter 3 of this Exhibit.

The testimony of each witness area with RAMP-related requests provides a discussion of the risks, associated mitigation efforts, and estimated costs. Appendix A of my testimony presents summary tables demonstrating our RAMP-related request and the witness area testimonies where those requests can be found. SoCalGas and SDG&E TY 2019 GRC witnesses address specific RAMP mitigation activities in a dedicated testimony section and in the discussion of sponsored costs. Further, the GRC witnesses that are sponsoring RAMP activities discuss the expected benefits of their respective mitigation activities and any alternatives that were considered.

### C. Maturity and Progress of Risk, Asset, and Investment Management Processes

The Companies' risk management programs have matured since the TY 2016 GRC, and we strive for continuous improvement. This measurement of progress is evidenced by a third-party maturity assessment completed in 2017 of risk-related practices at both SoCalGas and SDG&E, attached hereto as Appendices C and D, respectively.

The maturity assessment was based on the following four dimensions:

1. Risk Management Maturity;
2. Asset Management Maturity;

3. Investment Management Maturity; and

4. Integration Maturity.

The maturity assessment not only compared the Companies' progress over time (from 2014 to 2017), but also assessed the Companies' maturity relative to other utilities' level of maturity in the industry. The level of maturity in the utility industry was defined largely by conformance with International Organization for Standardization (ISO) 31000, Risk Management.

According to the maturity assessment, the Companies have made progress in all four dimensions. The key findings of the maturity assessment are that the Companies have:

- Developed consistent frameworks for management risks across the Company to inform the development of asset plans and making investment decisions;
- Enhanced the integration of risk in to the Company's operations and decision-making processes;
- Piloted methodologies to enhance risk assessments; and
- Committed to developing a comprehensive asset management system that aligns with industry-leading practices.[50]

Lastly, the maturity assessment identified opportunities for the Companies to continue to develop their risk, asset, and investment management processes. Many of the identified areas for further improvement are initiatives that the Companies are already working towards, or that are in scope of the S-MAP, which will be handled in a statewide proceeding (metrics and risk tolerance, for example). The Companies have incorporated the maturity assessment in the updated strategic trajectory, Figure DD-4, provided in Section IV of my testimony.

The Companies continue to evolve their risk management programs and must do so while navigating the changing, uncertain environment of S-MAP and future RAMP requirements. Nonetheless, the Companies' current and planned initiatives demonstrate our commitment to continue to mature.

[50] Risk Maturity and Integration of Risk, Asset, and Investment Management at SoCalGas: An Assessment Report, at 5. Risk Maturity and Integration of Risk, Asset, and Investment Management at SDG&E: An Assessment Report, at 5. Prepared by Davies Consulting, Accenture Consulting.

## III. ACCOMPLISHMENTS OF TEST YEAR 2016 GRC COMMITMENTS

In the prior GRC (TY 2016), the Companies' risk showing comprised my risk management and policy testimony and the operations risk management testimonies of Douglas Schneider and David Geier. These testimony chapters provided an early look at the risks and funding requests included in the TY 2016 GRC that focused on safety, reliability, and security risk mitigations. My TY 2016 GRC testimony[51] included a strategic planning trajectory, shown in Figure DD-3 below, for the Companies' GRC cycles (TY and Post-Test Year [PTY]).

**Figure DD-3: TY 2016 GRC**

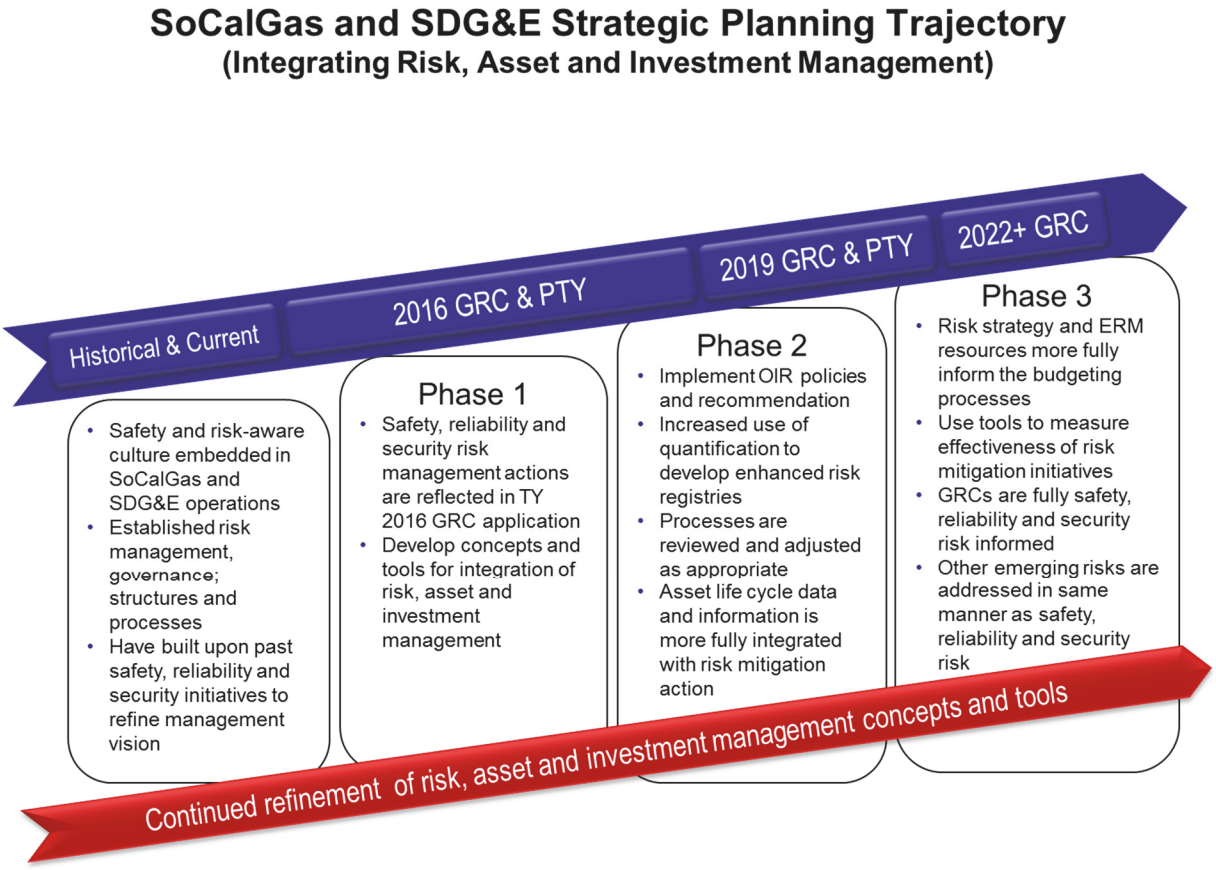



Figure DD-3 was created in 2014, when the Companies' risk management programs and organizations were in their infancies, and prior to the issuance of the Risk Framework Decision. Thus, the prior strategic trajectory described high-level goals. The Companies have now met the

[51] A.14-11-003/004 (consolidated), Direct Testimony of Diana Day (Ex. SDG&E-02), November 2014, at DD-9.

prior commitments shown in Figure DD-3, under the "Historical & Current" and "2016 GRC & PTY" headings.

*Building a Risk Culture*

The landscape has noticeably changed over these last three years, with a focus on managing risk. A risk culture has been created by the Enterprise Risk Management organization partnering with operations (i.e., gas and electric operations) as well as the financial and regulatory organizations. For example, we have an Operational Risk Management group, which focuses on operational and asset-related risk initiatives, and an Enterprise Risk Management group that works on strategic and financial-related risk initiatives. We also hired employees in our Enterprise Risk Management organization with operational knowledge and financial expertise. With a structured risk organization, the right people, and strong partnerships, the Companies have experienced many accomplishments from a risk perspective, including value-added refinements of the enterprise risk management process and risk tools, completion of pilots of risk initiatives, increased quantification, and additional advisory opportunities.

*Continuous Improvement of Risk Processes*

Each year, the Companies strive for continuous improvements with their enterprise risk management process, discussed in section II.B.1. An example of these improvements are the documentation of risk scenarios in 2016. Risk scenarios provide context for the risk score and allow others to understand what the risk manager was thinking when scoring the risk. In addition, the risk managers are now asked to provide data to explicitly support risk scores to increase the use of data and quantification. This has been used to calibrate expert opinion and to ensure that a higher level of data-based judgment is used to develop risk scores. An additional officer session, the Risk Planning Session, has been initiated as a part of the annual enterprise risk management process as an attempt to more transparently link our risk management process to our investment planning process. A description of the Risk Planning Session is provided in section II.B.1 above.

As the management of risk has developed, the Companies now use more systematic, structured, and transparent tools to address risk. As an example, a risk taxonomy has been implemented to provide a framework for identifying, organizing, and studying risks in a systematic manner. In addition to the risk taxonomy, the Companies have implemented a common risk lexicon in accordance with the Commission's direction in the S-MAP. These tools

and processes have allowed for risks to be addressed in a systematic, transparent and repeatable manner.

*Continued Integration of Risk, Asset, and Investment Management*

Pilots were also conducted by the risk organization to further the integration of risk, asset, and investment management. In 2016, the Companies started an initiative to further embed risk management into the Companies' operations by piloting the creation of two operating unit risk registries – one within Gas Operations and one within Electric Operations. Operating units are either defined by assets or functions that the Companies have in place. The difference between operating unit risk registries and the enterprise risk registry is that the operating unit risk registries are intended to capture risks that pertain to each operating unit at a more granular and specific level, while the enterprise risk registry is intended to provide leadership with a broad view of the Company's risk profile and key risks that may have significant adverse effects at the business unit (company) level.

The operating unit risk registries are intended to provide each operating unit with a tool to capture its specific risks and enable a more structured management of lower consequence risks that occur more frequently and are dealt with at the operating unit levels. As the operating unit risk registries evolve and mature, they will inform the assessment of risks at the enterprise level and provide improved risk quantification and granularity across the Company. The effort is intended to improve the identification and assessment of risks within various operating units across the Companies, and will facilitate the integration of risk management with asset management. Although formal asset management practices and initiatives are still developing, it is a current focus of the Companies, as discussed in more detail in section IV below.

*Increase Use of Quantification*

The Companies are working towards increased quantification regarding risk modeling, risk scoring support, and risk reduction. The Companies have been using data and quantitative approaches, including Monte-Carlo analysis and probabilistic modeling, to address specific risks.[52] Moreover, the Companies use both internal and third-party data to support risk scores

[52] An example is SDG&E's analysis, undertaken to determine whether the increased safety benefit (risk reduction) from purchasing a twin-engine helicopter was greater than the incremental cost. This example was presented to stakeholders in the S-MAP during a Joint Utilities' Approach Workshop held at the Commission on February 15, 2017, in A.15-05-002 (consolidated).

and quantify the potential risk reduction of safety risks. The Companies are also participating in a technical working group for performance metrics as part of the S-MAP in which preliminary risk metrics have been developed. The Companies' are tracking and documenting those metrics internally. These examples reflect the Companies' commitment to continue expanding the use of quantitative analysis in day-to-day business practices and analyzing risks.

*Advisory Support*

The Enterprise Risk Management organization is involved in safety and operational meetings throughout the Companies and serve as advisors on risk-related topics. For example, representatives from the risk organization sit on various internal committees including SDG&E Fire Council, Capital Allocation Core Team, Corrective Maintenance Program Council, Corporate Compliance Council, Corporate Asset Security Team, and Climate Adaption. Representatives from the Enterprise Risk Management Organization are also involved in the development of the audit plan of Sempra Energy's Audit Services department, which is a risk-informed plan. The idea is for Audit Services to be aware of the Companies' top risks and focus auditing resources and efforts on those areas. The risk organization also provides ad hoc support for Company initiatives, such as providing guidance on how a particular project may align with or impact our Companies' risks, facilitating a risk assessment of the "problem" the project at hand is solving, or performing risk modeling efforts to provide further risk-based quantification for an internal department.

Further discussion regarding SoCalGas and SDG&E's risk culture is provided in Appendix E, which contains information responsive to certain filing requirements listed in D.16-06-054.[53] A discussion of the Companies' safety culture as it relates to risk management is provided in section V.

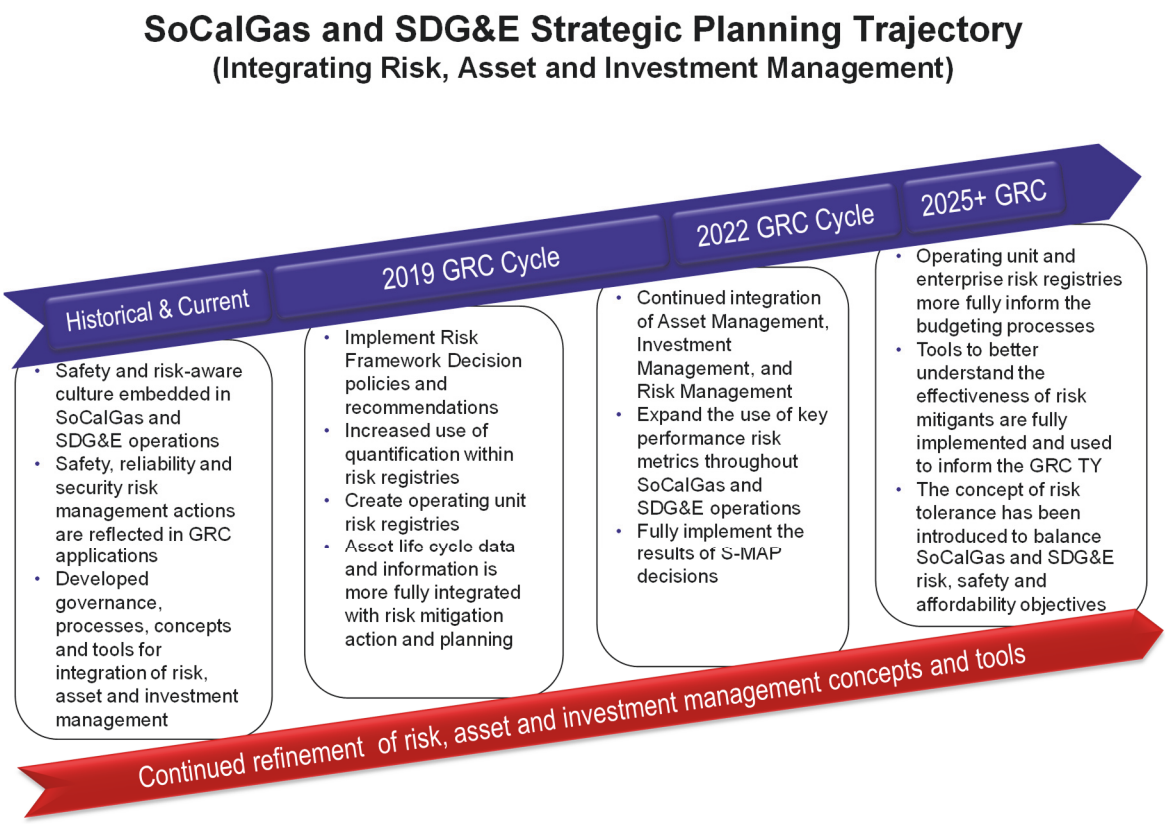
## IV. PROSPECTIVE VISION AND FUTURE COMMITMENTS

The Companies continue to build on the progress made thus far to develop their risk, asset, and investment management programs and the overall integration of the three (see maturity assessments in Appendices C and D). Efforts over the next GRC cycles will focus on continuing to develop repeatable, consistent, and transparent processes. The strategic trajectory presented in my TY 2016 GRC testimony has been updated in Figure DD-4 below to reflect new

[53] D.16-06-054 at 156-57, Items 7 and 8.

commitments we intend to achieve in upcoming GRC cycles. Of course, our priorities and commitments may be shaped by the regulatory direction in S-MAP.

**Figure DD-4: TY 2019 GRC**




As shown in Figure DD-4 above, the Companies believe there are additional opportunities to increase the maturity of risk, asset, and investment management and integration into the Companies' culture.

### A. Future Risk Management Initiatives

This is the first GRC cycle subject to the new risk-informed framework established by the Commission. The Companies have filed S-MAP applications, a RAMP Report, and now a risk-informed GRC. However, the annual accountability reports remain to fully implement the framework and policies adopted by the Commission. We are committed to working with stakeholders during this GRC cycle, and beyond, to meet Commission directives. Figure DD-4 is the trajectory of our plans for continued refinement of risk, asset, and investment management concepts and tools.

The Companies will expand the piloted efforts by implementing operating unit risk registries for all business units between 2017 and the end of 2019. This will better integrate our risk management practices with asset management, with the intent to develop better risk-informed investment decision-making. SoCalGas and SDG&E leadership are supporting this effort because of their commitment to continue to drive risk management philosophy and practices through the respective organizations, and to continue to strengthen our safety culture.

The Companies are committed to work with the Commission and all parties to enhance the focus on safety. As part of this commitment, SoCalGas and SDG&E will continue to expand the use of probabilistic models, data and quantification. SDG&E is proud of the sophisticated modeling developed to assess the risk of wildfires. While this level of quantification may not be appropriate for all risks Company-wide, we are committed to exploring areas where further quantification will be helpful in addressing other enterprise-level risks.

Over the next few years, the ERM department is committed to developing metrics that can be used to measure the effectiveness of our risk management efforts. This may include performance metrics to measure particular risks, methods of evaluating the effectiveness of risk mitigants, or overarching metrics, such as a risk reduction per dollar spent. We believe that such metrics can be used as a valuable input into our investment processes. This is further discussed in Section IV.C below.

The second phase of the first S-MAP, which is currently pending before the Commission, includes many risk-related items in scope of the proceeding. These items include risk management methodology, performance metrics including risk spend efficiency, risk lexicon, accountability reporting procedures, and more. When a final decision on the first S-MAP is issued, the Companies will implement the Commission's orders. Depending on the outcome, these implementation efforts may take considerable time, resources, and change management. In accordance with the Risk Framework Decision, the second S-MAP applications are scheduled to be filed on May 1, 2018. The second S-MAP is expected to address risk tolerance.

### B. Future Asset Management Initiatives

Many efforts are underway with regards to asset management and the Companies are committed to moving forward with a more formalized asset management program. This commitment is demonstrated through newly named Asset Management Vice Presidencies with dedicated Asset Management organizations at each company as well as initiatives to enhance our

asset information systems and analytics. Specifically, SoCalGas and SDG&E plan to implement API 1173 Public Safety Management System and ISO 55000 Asset Management standards, respectively. Both of these efforts are multi-year initiatives that will strengthen our risk, asset, and investment management processes. Gas System Integrity witness Mr. Rivera (Exhibits SCG-05 and SDG&E-05) and Electric Distribution O&M witness Mr. Speer (Exhibit SDG&E-15) will address their respective initiatives and the funding requested to support the implementations.

### C. Future Investment Management Initiatives

As the Companies enhance risk and asset management, it will provide information to inform investment management. Transparency and accountability of risk mitigation efforts and quantification of risk reduction benefits are priorities of the Companies. RSE and accountability reporting are being addressed in the currently pending S-MAP.

We see value in the concept of measuring efficiency of risk mitigations to help prioritize spending and provide input into investment decision-making. The RSE, also referred to as risk reduction per dollar spent, is "a ratio developed to quantify and compare the estimated effectiveness of a mitigation at reducing risk to other mitigations for the same risk… The calculation of the RSE includes the quantification of the amount of Risk Reduction attributable to a mitigation, and the identification of the anticipated costs to achieve the reduction."[54] The Companies strive to improve the measurement of risk efficiency in the future through continuously building experience of quantifying benefits and stronger inputs/data. We further aspire to connect the risks from the enterprise risk registry (informed by the operating unit risk registers) with investment decisions and to prioritize the risk mitigations with the ultimate goal of optimizing portfolios.

As we progress on the risk-development trajectory first presented in our TY 2016 GRC (shown in DD-3), we anticipate further improvement of our risk programs to track performance metrics. The Companies view this as necessary step in order to measure mitigation results, which will be required for the production of the Risk Mitigation Accountability Report, discussed in Section II above. Requests with respect to the increased internal resources needed

[54] I.16-10-015/I.16-10-016 Risk Assessment and Mitigation Phase Report of San Diego Gas & Electric Company and Southern California Gas Company, November 30, 2016, RAMP Chapter Overview and Approach (RAMP – A), at SDGE/SCG A-7.

to produce the Risk Spending Accountability Report are addressed in the testimony of Accounting and Finance/Legal/Regulatory Affairs/External Affairs witnesses Stacey Lee (Exhibit SCG-33) and Sandra Hrna (Exhibit SDG&E-31).

## V. RISK MANAGEMENT INFORMS OUR SAFETY CULTURE

Safety is a core value of the Companies. We treat safety as a way of life. Core values are those behaviors that define a company culture, and the Commission has stated that "An effective safety culture is a prerequisite to a utility's positive safety performance record."[55] The Commission defines "Safety Culture" as follows:[56]

> [T]he collective set of that organization's values, principles, beliefs, and norms, which are manifested in the planning, behaviors, and actions of all individuals leading and associated with the organization, and where the effectiveness of the culture is judged and measured by the organization's performance and results in the world (reality). Various governmental studies and federal agencies rely on this definition of organizational culture to define "safety culture."

SDG&E and SoCalGas' leadership hold regular safety meetings at many levels, including Executive Safety Council meetings, which have been in place for well over a decade, and annual Contractor Safety Summits, which have included hundreds of participants, representatives from other California utilities and the Safety and Enforcement Division of the CPUC. Our executive management, and specifically the Companies' Executive Safety Councils, is committed to and accountable for the development and maintenance of safety culture. The Companies put safety first and have an aspirational goal to have zero safety incidents for every task, every job, every day. This is aligned with the Commission's overarching safety mission: "Ultimately we are striving to achieve a goal of zero accidents and injuries across all the utilities and businesses we regulate, and within our own workplace."[57] SoCalGas and SDG&E have developed their shared attitudes, values, goals, and practices for a safety culture throughout their history as a compilation of the Companies' experiences, programs, policies, procedures, guidelines, and best practices, to improve the safety of its service and performance.

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[55] I.15-08-019 (Order Instituting Investigation of Pacific Gas and Electric Company's Safety Culture, August 27, 2015), at 4.

[56] Id.

[57] Safety Policy Statement of the California Public Utilities Commission, http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Safety/VisionZero4Final621014_5_2.pdf.

Effective risk management practices help to reinforce a strong and positive safety culture. As noted above in section III, both SoCalGas and SDG&E have undertaken a thoughtful and measured approach to the adoption of risk management structures and processes at all levels, to further the development of a risk-aware culture. As discussed in section II.B.1, safety is a component of our risk scoring tool, weighted twice as much as the other impact areas, and the Companies consider safety as we evaluate risks across the organization.

The Companies' strong safety culture reflects the development, integration, and activities of a variety of components and characteristics from within an organization, including risk management practices. Our Companies strive to exhibit consistent attention to safety and security in everyday operations, which practice is strengthened by proven employee-based programs, safety training programs and education of our workforce.[58] The risk mitigation activities described in the RAMP Reports (such as the Behavior Based Safety program, Stop the Job, and employee training programs) as well as other mitigation activities evaluated as part of our risk management process help to foster and result in our strong safety culture.[59] The Companies have implemented the Environmental & Safety Compliance Management Program (ESCMP), which is an environmental, health and safety management system to plan, set priorities, inspect, educate, train, and monitor the effectiveness of environmental, health and safety activities. As a measurement of safety culture, SoCalGas and SDG&E regularly assess their safety culture through the National Safety Council Barometer Safety Culture Survey, which measures the overall health of the Companies' safety climate and identifies areas of opportunity to eliminate injuries and improve focus and commitment to safety. The Companies share results, develop targets, implement plans and measure progress through routine surveys. And, as shown in the testimony of Ms. Taylor (Exhibit SDG&E-30) and Mr. Speer (Exhibit SDG&E-15), SDG&E is in the process of implementing the Operational Field & Emergency Readiness (OFER) Program, which will align operational groups on a flexible, sustainable, and measurable scene management process, utilized on all worksites, incidents, and emergencies, where SDG&E personnel, facilities, and infrastructure are impacted. More information regarding the

[58] *See* the Human Resources, Disability and Workers Compensation and Safety testimony chapters of Tashonda Taylor (SDG&E-30) and Mary Gevorkian (SCG-32) provide additional information regarding these programs.

[59] *See, e.g.,* RAMP Chapters SCG-2 "Employee, Contractor, Customer, and Public Safety" and SDG&E-3 "Employee, Contractor and Public Safety."

Companies' employee-based safety training programs and workforce education can be found in Ms. Gevorkian's and Ms. Taylor's testimony chapters, and throughout other operational witnesses' testimony chapters.

The Companies' commitment to safety culture through compensation-related metrics and key performance indicators to drive improved safety performance is also demonstrated in the testimony of Compensation and Benefits witness Debbie Robinson (Exhibit SCG-30/SDG&E-28), as well as in the Companies' governance showing regarding compensation. Metrics are also discussed in Appendix E.

Throughout the Companies' TY 2019 testimony showing, SDG&E and SoCalGas witnesses provide detail regarding how each organization contributes to driving safety culture through their respective operations.

## VI. CONCLUSION

With our TY 2019 GRC applications and supporting testimony, SoCalGas and SDG&E have put forth the first formal risk-informed GRC, a paradigm shift from the traditional GRC presentation. We will continue to support the Commission's efforts to improve the management and mitigation of safety, reliability and security risks through demonstrating transparent, repeatable, and consistent processes. SoCalGas and SDG&E have made progress to enhance the maturity of their respective risk, asset, and investment management processes and are committed to further progression.

This concludes my testimony.

## VII. WITNESS QUALIFICATIONS

My name is Diana L. Day, and my business address is 8330 Century Park Court, San Diego, California 92123.

In June 2014, I was appointed Vice President, Enterprise Risk Management for SoCalGas and SDG&E. In that role, I am responsible for setting the policy, governance, structures, process, and guidelines for SoCalGas' and SDG&E's risk management practices.

I have held various positions with the Sempra companies since 1997, including Assistant General Counsel – Commercial of SDG&E (until June 2014), General Counsel of Sempra Energy Global Enterprises and Vice President and Associate General Counsel of Sempra Energy.

I received a bachelor's degree in economics (summa cum laude) from Washington State University. I received a juris doctor degree from the University of Virginia School of Law. Prior to joining Sempra Energy, I was an attorney with the San Diego office of Latham & Watkins, where I served on that firm's Equal Employment Opportunity Committee. I am a trustee of the Fleet Science Center in San Diego, where I serve as Treasurer, and on the Executive Committee.

I have previously testified before the Commission.

## GLOSSARY OF TERMS

| Acronym | Definition |
|---|---|
| Commission | California Public Utilities Commission |
| CPUC | California Public Utilities Commission |
| D. | Decision |
| DERs | Distributed Energy Resources |
| EHS&T | Environmental, Health, Safety and Technology |
| ESCMP | Environmental & Safety Compliance Management Program |
| FiRM | Fire Risk Mitigation Program |
| GARP | Generally Accepted Records Keeping Principles |
| GRC | General Rate Case |
| IOU | Investor-Owned Utilities |
| ISO | International Organization for Standardization |
| OFER | Operational Field & Emergency Readiness |
| OP | Ordering Paragraph |
| PG&E | Pacific Gas & Electric Company |
| PTY | Post-Test Year |
| R. | Rulemaking |
| RAMP | Risk Assessment Mitigation Phase |
| RCP | Rate Case Plan |
| RSE | Risk Spend Efficiency |
| SCE | Southern California Edison Company |
| SDG&E | San Diego Gas & Electric Company |
| SED | Safety and Enforcement Division |
| S-MAP | Safety Model Assessment Proceeding |
| SoCalGas | Southern California Gas Company |
| TIMP | Transmission Integrity Management Program |
| TY | Test Year |
| UAS | Unmanned Aircraft System |
| WRRM | Wildfire Risk Reduction Model |

# APPENDIX A.1

# Mapping of RAMP Risks in the TY 2019 GRC

# APPENDIX A.1

## Mapping of RAMP Risks in the TY 2019 GRC

## SoCalGas O&M

| RAMP Report Chapter Number | RAMP Risk | GRC Witness | GRC Testimony Exhibit Number |
|---|---|---|---|
| SCG-01 | Catastrophic Damage Involving Third Party Dig-Ins | Gina Orozco-Mejia | SCG-04 |
| | | Omar Rivera | SCG-05 |
| SCG-02 | Employee, Contractor, Customer, and Public Safety | Andrew Cheung | SCG-20 |
| | | Carmen Herrera | SCG-23 |
| | | Darrell Johnson | SCG-25 |
| | | Devin Zornizer | SCG-13 |
| | | Gina Orozco-Mejia | SCG-04 |
| | | Gwen Marelli | SCG-18 |
| | | Mary Gevorkian | SCG-32 |
| | | Michael Baldwin | SCG-19 |
| | | Omar Rivera | SCG-05 |
| | | Rene Garcia | SCG-17 |
| SCG-03 | Cyber Security | Gavin Worden | SCG-27 |
| SCG-04 | Catastrophic Damage Involving High-Pressure Gas Pipeline Failure | Devin Zornizer | SCG-13 |
| | | Elizabeth Musich | SCG-06 |
| | | Gina Orozco-Mejia | SCG-04 |
| | | Maria Martinez | SCG-14 |
| | | Neil Navin | SCG-10 |
| | | Omar Rivera | SCG-05 |
| | | Richard Phillips | SCG-15 |
| SCG-05 | Workplace Violence | Carmen Herrera | SCG-23 |
| | | Mia DeMontigny | SCG-26 |
| SCG-06 | Physical Security of Critical Gas Infrastructure | Carmen Herrera | SCG-23 |
| | | Neil Navin | SCG-10 |
| SCG-07 | Workforce Planning | Gina Orozco-Mejia | SCG-04 |
| | | Mary Gevorkian | SCG-32 |
| | | Omar Rivera | SCG-05 |
| SCG-08 | Records Management | Deanna Haines | SCG-09 |
| | | Maria Martinez | SCG-14 |
| | | Mia DeMontigny | SCG-26 |
| | | Omar Rivera | SCG-05 |
| | | Stacey Lee | SCG-33 |
| SCG-09 | Climate Change Adaptation | Deanna Haines | SCG-09 |
| SCG-10 | Catastrophic Damage Involving Medium-Pressure Gas Pipeline Failure | Gina Orozco-Mejia | SCG-04 |
| | | Maria Martinez | SCG-14 |
| | | Michael Bermel | SCG-08 |
| | | Omar Rivera | SCG-05 |
| SCG-11 | Catastrophic Event Related to Storage Well Integrity | Neil Navin | SCG-10 |

# SoCalGas Capital

| RAMP Report Chapter Number | RAMP Risk | GRC Witness | GRC Testimony Exhibit Number |
|---|---|---|---|
| SCG-01 | Catastrophic Damage Involving Third Party Dig-Ins | Gina Orozco-Mejia | SCG-04 |
| SCG-02 | Employee, Contractor, Customer, and Public Safety | Christopher Olmsted | SCG-26 |
| | | Gina Orozco-Mejia | SCG-04 |
| SCG-03 | Cyber Security | Gavin Worden | SCG-27 |
| SCG-04 | Catastrophic Damage Involving High-Pressure Gas Pipeline Failure | Deanna Haines | SCG-09 |
| | | Michael Bermel & Elizabeth Musich | SCG-07 |
| | | Gina Orozco-Mejia | SCG-04 |
| | | Maria Martinez | SCG-14 |
| | | Richard Phillips | SCG-15 |
| SCG-05 | Workplace Violence | Carmen Herrera | SCG-23 |
| SCG-06 | Physical Security of Critical Gas Infrastructure | Michael Bermel & Elizabeth Musich | SCG-07 |
| SCG-08 | Records Management | Christopher Olmsted | SCG-26 |
| | | Maria Martinez | SCG-14 |
| SCG-09 | Climate Change Adaptation | Michael Bermel & Elizabeth Musich | SCG-07 |
| | | Neil Navin | SCG-10 |
| SCG-10 | Catastrophic Damage Involving Medium-Pressure Gas Pipeline Failure | Gina Orozco-Mejia | SCG-04 |
| | | Maria Martinez | SCG-14 |
| | | Michael Bermel | SCG-08 |
| SCG-11 | Catastrophic Event Related to Storage Well Integrity | Neil Navin | SCG-10 |

# SDG&E O&M

| RAMP Report Chapter Number | RAMP Risk | GRC Witness | GRC Testimony Exhibit Number |
|---|---|---|---|
| SDG&E-01 | Wildfires Caused by SDG&E Equipment (Including Third Party Pole Attachments) | William Speer | SDG&E-15 |
| SDG&E-02 | Catastrophic Damage Involving Third Party Dig-Ins | Deanna Haines | SDG&E-09 |
| | | Gina Orozco-Mejia | SDG&E-04 |
| | | Omar Rivera | SDG&E-05 |
| SDG&E-03 | Employee, Contractor and Public Safety | Gina Orozco-Mejia | SDG&E-04 |
| | | Gwen Marelli | SDG&E-17 |
| | | Jerry Stewart | SDG&E-18 |
| | | Lisa Davidson | SDG&E-19 |
| | | Omar Rivera | SDG&E-05 |
| | | R. Dale Tattersall | SDG&E-22 |
| | | Tashonda Taylor | SDG&E-30 |
| | | William Speer | SDG&E-15 |
| SDG&E-04 | Distributed Energy Resources – Safety and Operational Concerns | William Speer | SDG&E-15 |
| SDG&E-06 | Fail to Blackstart | Daniel Baerman | SDG&E-16 |
| | | William Speer | SDG&E-15 |
| SDG&E-07 | Cyber Security | Gavin Worden | SDG&E-25 |
| SDG&E-08 | Aviation Incident | William Speer | SDG&E-15 |
| SDG&E-09 | Workplace Violence | Mia DeMontigny | SDG&E-26 |
| | | R. Dale Tattersall | SDG&E-22 |
| SDG&E-10 | Catastrophic Damage Involving High-Pressure Gas Pipeline Failure | Elizabeth Musich | SDG&E-06 |
| | | Maria Martinez | SDG&E-11 |
| SDG&E-11 | Unmanned Aircraft System Incident | William Speer | SDG&E-15 |
| SDG&E-12 | Electric Infrastructure Integrity | William Speer | SDG&E-15 |
| SDG&E-13 | Records Management | Deanna Haines | SDG&E-09 |
| | | Mia DeMontigny | SDG&E-26 |
| | | Omar Rivera | SDG&E-05 |
| | | Sandra Hrna | SDG&E-31 |
| | | William Speer | SDG&E-15 |
| SDG&E-14 | Climate Change Adaptation | William Speer | SDG&E-15 |
| SDG&E-15 | Public Safety Events - Electric | R. Dale Tattersall | SDG&E-22 |
| | | William Speer | SDG&E-15 |
| SDG&E-16 | Catastrophic Damage Involving Medium-Pressure Gas Pipeline Failure | Gina Orozco-Mejia | SDG&E-04 |
| | | Maria Martinez | SDG&E-11 |
| SDG&E-17 | Workforce Planning | Gina Orozco-Mejia | SDG&E-04 |
| | | Jerry Stewart | SDG&E-18 |
| | | Tashonda Taylor | SDG&E-30 |
| | | William Speer | SDG&E-15 |

# SDG&E Capital

| RAMP Report Chapter Number | RAMP Risk | GRC Witness | GRC Testimony Exhibit Number |
|---|---|---|---|
| SDG&E-01 | Wildfires Caused by SDG&E Equipment (Including Third Party Pole Attachments) | Alan Colton | SDG&E-14 |
| SDG&E-02 | Catastrophic Damage Involving Third Party Dig-Ins | Gina Orozco-Mejia | SDG&E-04 |
| SDG&E-03 | Employee, Contractor, and Public Safety | Alan Colton | SDG&E-14 |
| | | Gina Orozco-Mejia | SDG&E-04 |
| | | R. Dale Tattersall | SDG&E-22 |
| SDG&E-04 | Distributed Energy Resources – Safety and Operational Concerns | Alan Colton | SDG&E-14 |
| SDG&E-05 | Major Disturbance to Electrical Service (e.g., Blackout) | R. Dale Tattersall | SDG&E-22 |
| SDG&E-06 | Fail to Blackstart | Daniel Baerman | SDG&E-16 |
| | | R. Dale Tattersall | SDG&E-22 |
| SDG&E-07 | Cyber Security | Gavin Worden | SDG&E-25 |
| SDG&E-08 | Aviation Incident | Alan Colton | SDG&E-14 |
| SDG&E-09 | Workplace Violence | R. Dale Tattersall | SDG&E-22 |
| SDG&E-10 | Catastrophic Damage Involving High-Pressure Gas Pipeline Failure | Michael Bermel & Elizabeth Musich | SDG&E-07 |
| | | Maria Martinez | SDG&E-11 |
| SDG&E-12 | Electric Infrastructure Integrity | Alan Colton | SDG&E-14 |
| SDG&E-13 | Records Management | Christopher Olmsted | SDG&E-24 |
| SDG&E-16 | Catastrophic Damage Involving Medium-Pressure Gas Pipeline Failure | Gina Orozco-Mejia | SDG&E-04 |
| | | Maria Martinez | SDG&E-11 |

# APPENDIX A.2

## Mapping of GRC Witnesses Sponsoring RAMP Costs in the TY 2019 GRC

## APPENDIX A.2

## Mapping of GRC Witnesses Sponsoring RAMP Costs in the TY 2019 GRC

### SoCalGas O&M

| GRC Witness Area | GRC Witness Name | Exhibit Number | 2016 Embedded Base Costs (000s) | TY 2019 Estimated Incremental (000s) | Total |
|---|---|---|---|---|---|
| ACCOUNTING AND FINANCE, LEGAL, REG AFFAIRS AND EXTERNAL AFFAIRS | Stacey Lee | SCG-33 | 665 | 200 | 865 |
| ADVANCED METERING | Rene Garcia | SCG-17 | 0 | 456 | 456 |
| CORPORATE CENTER - GENERAL ADMINISTRATION | Mia DeMontigny | SCG-28 | 444 | 304 | 748 |
| CS - FIELD & METER READING | Gwen Marelli | SCG-18 | 48,102 | 9,350 | 57,452 |
| CS - INFORMATION | Andrew Cheung | SCG-20 | 1,489 | 1,237 | 2,726 |
| CS - OFFICE OPERATIONS | Michael Baldwin | SCG-19 | 1,057 | 1,474 | 2,531 |
| CYBER SECURITY | Gavin Worden | SCG-27 | 239 | 470 | 709 |
| ENVIRONMENTAL | Darrell Johnson | SCG-25 | 2,582 | 0 | 2,582 |
| FLEET & FACILITIES | Carmen Herrera | SCG-23 | 0 | 1,232 | 1,232 |
| GAS CONTROL & SYSTEM OPERATIONS/PLANNING | Devin Zornizer | SCG-13 | 3,122 | 2,586 | 5,708 |
| GAS DISTRIBUTION | Gina Orozco-Mejia | SCG-04 | 50,481 | 11,526 | 62,007 |
| GAS ENGINEERING | Deanna Haines | SCG-09 | 5,672 | 1,812 | 7,484 |
| GAS MAJOR PROJECTS | Michael Bermel | SCG-08 | 0 | 1,398 | 1,398 |
| GAS SYSTEM INTEGRITY | Omar Rivera | SCG-05 | 7,840 | 14,913 | 22,753 |
| GAS TRANSMISSION | Elizabeth Musich | SCG-06 | 6,923 | 17,000 | 23,923 |
| HR, DISABILITY, WORKERS COMP & SAFETY | Mary Gevorkian | SCG-32 | 7,174 | 7,292 | 14,466 |
| PIPELINE SAFETY ENHANCEMENT PLAN | Richard Phillips | SCG-15 | 0 | 83,156 | 83,156 |
| TIMP & DIMP | Maria Martinez | SCG-14 | 77,683 | 8,317 | 86,000 |
| UNDERGROUND STORAGE | Neil Navin | SCG-10 | 20,086 | 7,546 | 27,632 |
| **Total O&M - SCG** | | | **233,559** | **170,269** | **403,828** |

## SoCalGas Capital

| GRC Witness Area | GRC Witness Name | Exhibit Number | 2017 Estimated RAMP Total (000s) | 2018 Estimated RAMP Total (000s) | 2019 Estimated RAMP Total (000s) |
|---|---|---|---|---|---|
| CYBER SECURITY | Gavin Worden | SCG-27 | 17,844 | 19,476 | 22,731 |
| FLEET SERVICES & FACILITY OPERATIONS | Carmen Herrera | SCG-23 | 0 | 600 | 600 |
| GAS DISTRIBUTION | Gina Orozco-Mejia | SCG-04 | 14,074 | 13,498 | 10,682 |
| GAS ENGINEERING | Deanna Haines | SCG-09 | 2,245 | 2,245 | 2,245 |
| GAS MAJOR PROJECTS | Michael Bermel | SCG-08 | 400 | 3,156 | 25,901 |
| GAS TRANSMISSION | Michael Bermel & Elizabeth Musich | SCG-07 | 8,735 | 15,951 | 11,509 |
| INFORMATION TECHNOLOGY | Christopher Olmsted | SCG-26 | 34,970 | 40,082 | 36,315 |
| PIPELINE SAFETY ENHANCEMENT PLAN | Richard Phillips | SCG-15 | 5,587 | 8,867 | 89,927 |
| TIMP & DIMP | Maria Martinez | SCG-14 | 125,184 | 125,184 | 215,000 |
| UNDERGROUND STORAGE | Neil Navin | SCG-10 | 144,270 | 131,995 | 113,601 |
| **Total Capital - SCG** | | | **353,309** | **361,054** | **528,511** |

## SDG&E O&M

| GRC Witness Area | GRC Witness Name | Exhibit Number | 2016 Embedded Base Costs (000s) | TY 2019 Estimated Incremental (000s) | Total |
|---|---|---|---|---|---|
| ACCOUNTING AND FINANCE, LEGAL, REG AFFAIRS AND EXTERNAL AFFAIRS | Sandra Hrna | SDG&E-31 | 591 | 200 | 791 |
| CORPORATE CENTER - GENERAL ADMINISTRATION | Mia DeMontigny | SDG&E-26 | 252 | 195 | 447 |
| CS - FIELD | Gwen Marelli | SDG&E-17 | 4,570 | 277 | 4,847 |
| CS - INFORMATION & TECHNOLOGIES | Lisa Davidson | SDG&E-19 | 693 | 241 | 934 |
| CS - OFFICE OPERATIONS | Jerry Stewart | SDG&E-18 | 705 | 237 | 942 |
| CYBER SECURITY | Gavin Worden | SDG&E-25 | 4,198 | 3,740 | 7,938 |
| ELECTRIC DISTRIBUTION | William Speer | SDG&E-15 | 71,930 | 31,105 | 103,035 |
| ELECTRIC GENERATION & SONGS | Daniel Baerman | SDG&E-16 | 20 | 20 | 40 |
| GAS DISTRIBUTION | Gina Orozco-Mejia | SDG&E-04 | 13,519 | 1,096 | 14,615 |
| GAS SYSTEM INTEGRITY | Omar Rivera | SDG&E-05 | 125 | 1,227 | 1,352 |
| GAS TRANSMISSION | Elizabeth Musich | SDG&E-06 | 194 | 0 | 194 |
| HR, DISABILITY, WORKERS COMP & SAFETY | Tashonda Taylor | SDG&E-30 | 5,112 | 1,055 | 6,167 |
| REAL ESTATE & FACILITIES | R. Dale Tattersall | SDG&E-22 | 2,643 | 931 | 3,574 |
| TIMP & DIMP | Maria Martinez | SDG&E-11 | 7,744 | 3,256 | 11,000 |
| **Total O&M - SDG&E** | | | **112,296** | **43,580** | **155,876** |

## SDG&E Capital

| GRC Witness Area | GRC Witness Name | Exhibit Number | 2017 Estimated RAMP Total (000s) | 2018 Estimated RAMP Total (000s) | 2019 Estimated RAMP Total (000s) |
|---|---|---|---|---|---|
| CYBER SECURITY | Gavin Worden | SDG&E-25 | 6,146 | 7,232 | 5,618 |
| ELECTRIC DISTRIBUTION | Alan Colton | SDG&E-14 | 180,566 | 269,078 | 341,438 |
| REAL ESTATE, LAND SERVICES AND FACILITIES | R. Dale Tattersall | SDG&E-22 | 10,208 | 16,037 | 6,193 |
| GAS DISTRIBUTION | Gina Orozco-Mejia | SDG&E-04 | 14,037 | 51,466 | 71,521 |
| GAS TRANSMISSION | Michael Bermel & Elizabeth Musich | SDG&E-07 | 1,689 | 1,689 | 1,689 |
| INFORMATION TECHNOLOGY | Christopher Olmsted | SDG&E-24 | 20,422 | 26,129 | 21,657 |
| ELECTRIC GENERATION & SONGS | Daniel Baerman | SDG&E-16 | 300 | 806 | 0 |
| TIMP & DIMP | Maria Martinez | SDG&E-11 | 24,216 | 24,216 | 49,000 |
| **Total Capital - SDG&E** | | | **257,584** | **396,653** | **497,116** |

# APPENDIX B

## Samples of Risk Tools

# APPENDIX B

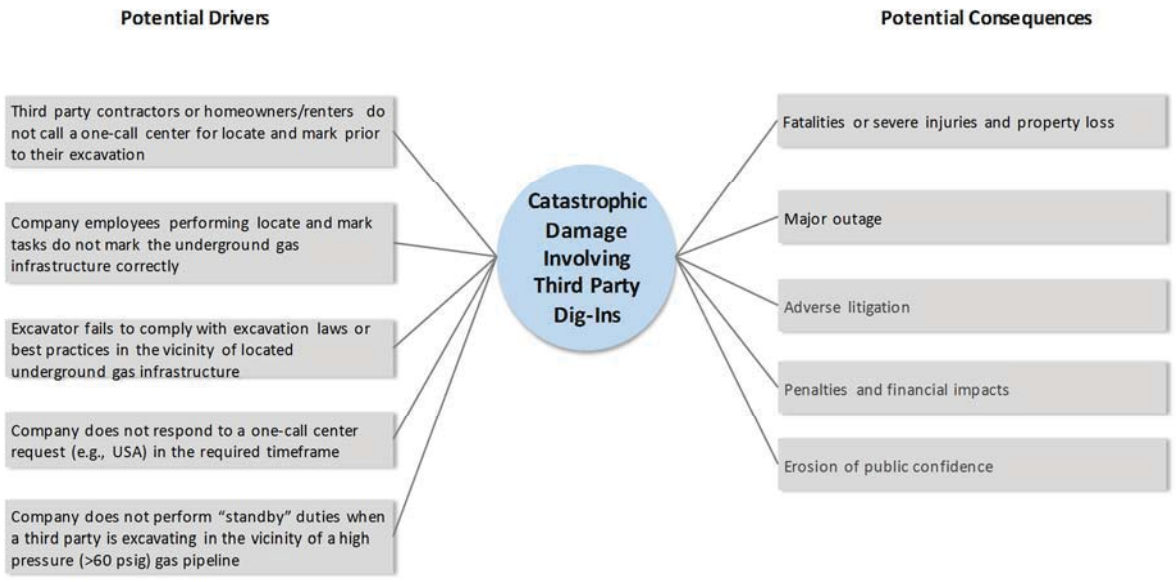
## Samples of Risk Tools

## Enterprise Risk Evaluation Tool: 7X7 Matrix of SoCalGas and SDG&E

| | Impact | | | | | | |
|---|---|---|---|---|---|---|---|
| | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| | Catastrophic | Severe | Extensive | Major | Moderate | Minor | Negligible |
| ***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 | Fatalities: Many fatalities and life threatening injuries to the public or employees.<br><br>Immediate, severe, and irreversible impacts to environment | Fatalities: Few fatalities and life threatening injuries to the public or employees.<br><br>Severe and long-term impacts to environment | Permanent/Serious Injuries or Illnesses: Many serious injuries or illnesses to the public or employees.<br><br>Significant and medium-term impacts to environment | Permanent/Serious Injuries or Illnesses: Few serious injuries or illnesses to the public or employees.<br><br>Significant and short-term impacts to environment | Minor Injuries or Illnesses: Minor injuries or illnesses to many public members or employees.<br><br>Moderate and short-term impacts to environment | Minor Injuries or Illnesses: Minor injuries or illnesses to few public members or employees.<br><br>Environmental impact is immediately correctable or contained within small area | No injury or illness or up to an un-reported negligible injury.<br><br>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 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 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 |

| | Frequency/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 |

## Risk Bow Tie[60]




[60] This example risk bow tie was originally provided in the RAMP Report, SoCalGas risk chapter of Catastrophic Damage Involving Third-Party Dig-Ins (SCG-01).

# APPENDIX C

# Risk Maturity and Integration of Risk, Asset, and Investment Management at SoCalGas: An Assessment Report

# Risk Maturity and Integration of Risk, Asset, and Investment Management at SoCalGas: An Assessment Report

July 2017

## PREPARED BY:

# CONTENTS

# 1 EXECUTIVE SUMMARY

## 1.1 OBJECTIVE

SoCalGas has stated its commitment to integrating risk management into the Company's operations and implementing qualitative and quantitative processes to assess its risks and measure the results of its risk management efforts.[1] The objective of the Company's Enterprise Risk Management (ERM) program is to "create a consistent methodology for evaluating risk across SoCalGas' businesses that integrates risk with asset and investment management using a combination of bottom-up and top-down processes."[2] With a continued commitment to achieving its objective of maturing its processes, SoCalGas engaged Davies Consulting to assess the evolution of the Company's risk, asset and investment management processes.

The objectives of the assessment of SoCalGas' risk, asset and investment management processes, procedures and practices were to:

- Provide SoCalGas leadership with an independent assessment of the company's risk, asset, and investment management processes and methodologies;
- Evaluate the integration of its risk, asset, and investment management areas;
- Assess the maturity and integration levels across SoCalGas of its risk, asset, and investment management using Davies Consulting's defined maturity model; and
- Present SoCalGas with specific improvement opportunities to assist the company as it continues to mature its methodologies.

## 1.2 APPROACH

Davies Consulting used its proprietary Integrated Strategic Management Maturity Model (ISM$^3$)™ evaluation framework, incorporating applicable international standards, to assess the maturity of SoCalGas' risk, asset, and investment management. The evaluation focused on the processes, methods, and tools used in Gas Operations and identified potential opportunities for continued improvement, allowing SoCalGas to make fact-based decisions on how to mature its processes and risk mitigation prioritization efforts. In conducting its assessment, Davies Consulting focused on the following questions:

- How well does SoCalGas integrate risk, asset, and investment management into its strategic and operational decision-making processes?
- How mature are SoCalGas' methodologies and tools?
- Are SoCalGas' methodologies and tools applied transparently and consistently?
- How does SoCalGas compare to the current state of the utility industry?

## 1.3 FINDINGS

Davies Consulting observed that SoCalGas had matured over the past few years in in integrating its risk, asset and investment management processes and demonstrated a

[1] 2016 GRC – Testimony of Diana Day pg. DD-7

[2] 2016 GRC – Testimony of Diana Day pg. DD-9

commitment to continuing its evolution. This was evident in SoCalGas recognizing opportunities for improvement and developing initiatives to continue its path toward developing more mature processes to guide decision-making across the Company.

Davies Consulting's major findings are discussed in greater detail in Sections 6 and 7, but in summary, SoCalGas has:

- Developed consistent frameworks for managing risks across the Company to inform the development of asset plans and making investment decisions;
- Enhanced the integration of risk into the Company's operations and decision-making processes;
- Piloted methodologies to enhance risk assessments and
- Committed to developing a comprehensive asset management system that aligns with industry-leading practices.

## 1.4 Report Organization

The report is organized as follows:

- Section 1 is the Executive Summary.
- Section 2 (Introduction) frames the background, scope, and objectives of the assessment.
- Section 3 (Assessment Methodology and Approach) outlines the methodology used by Davies Consulting to perform its assessment of SoCalGas.
- Section 4 (Assessment of the Utility Industry) provides a brief overview of the risk, asset, and investment management maturity of the utility industry. This section identifies some leading practices in the industry and describes an aspirational evolution of the industry to a state where risk, asset, and investment management are fully integrated.
- Section 5 (Risk, Asset, and Investment Management at SoCalGas) discusses SoCalGas' practices in risk, asset, and investment management.
- Section 6 (Current Maturity Assessment) provides an assessment of SoCalGas' maturity in risk, asset, and investment management, and examines SoCalGas' practices in Gas Operations.
- Section 7 (Evolution of Integrated Risk, Asset, and Investment Management at SoCalGas) discusses areas for further maturity at SoCalGas in risk, asset, and investment management and identifies demonstrated efforts at SoCalGas to achieve greater maturity.

# 2 INTRODUCTION

## 2.1 BACKGROUND

Although energy utilities have implicitly been managing risks that are inherent in their operations, the explicit focus on making funding decisions based on risk management is a relatively new model of operations that the California utilities are conforming to.

In 2012, with an increased focus on linking safety risk management efforts to funding requests, the California Public Utilities Commission (CPUC) began this evolution by asking one of the largest California utilities to support its General Rate Case (GRC) with a "risk-informed" submission.

Since then, the CPUC has adopted several new elements to promote risk-informed rate setting in California including proceedings to provide guidance on risk modeling methodologies, new requirements for risk mitigation reporting and increased scrutiny of risk management accountability for utilities.

SoCalGas has been involved in this regulatory evolution and has taken steps to enhance its processes to meet future expectations. In 2014, SoCalGas engaged Davies Consulting to assess the maturity of its processes and provide insights on industry risk management practices and potential improvements that the Company can make to more closely integrate its risk, asset and investment management processes.

With a continued commitment to improve its practices, SoCalGas engaged Davies Consulting in 2017 to perform a detailed maturity assessment of its processes and procedures to understand where the Company has improved since the 2014 assessment and where further opportunities exist to continue its evolution.

In reviewing this document, it is important to define and understand several key terms to provide context for this report and establish a baseline insight of Davies Consulting's methodology:

- **Risk Management** is "the process whereby organizations methodically address the risks attaching to their activities with the goal of achieving sustained benefit within each activity and across the portfolio of all activities."[3] More specifically, risk management is the identification, evaluation, analysis, and prioritization of risks and the corresponding effort to minimize, monitor, and control their probability and/or impacts.[4] Risk management has traditionally been formalized as Enterprise Risk Management (ERM) which is typically a function the Chief Financial Officer (CFO) or Chief Risk Officer (CRO).
- **Asset Management** is the "coordinated activity of an organization to realize value from assets."[5] It includes understanding asset classes and their respective condition. Asset management has traditionally been viewed as an operational responsibility in utilities.

[3] Ibid.

[4] Paraphrased from International Organization for Standardization, ISO 31000: Risk management – principles and guidelines (Geneva, Switzerland: 2009), 1-2.

[5] ISO 55000 "Asset management — Overview, principles and terminology," International Organization for Standardization.

- **Investment Management** concerns the allocation of financial resources to address identified, evaluated, and optimized operational and strategic risks. Investment management has tended to be a role of the CFO.
- **Integration**, in the context of risk, asset, and investment management, is the use of optimized investment management to fund risk mitigation efforts, which are informed by asset management processes, within a constrained resource environment. As noted on page 18, "Integration of risk, asset, and investment management is visible when a company identifies its risks, including risks associated with operational assets, develops mitigations that include the asset strategies to address failures and make investments based on the risks identified." The inputs and outputs of each area informs and supports the others.

## 2.2 Assessment Scope and Objectives

### 2.2.1 Scope

In preparation for its 2019 GRC, SoCalGas sought to assess the evolution of its risk, asset, and investment management processes. SoCalGas engaged Davies Consulting to assess:

- SoCalGas' risk and asset management practices across gas transmission and distribution;
- the investment management process across the entire enterprise; and
- the evolution of SoCalGas' Enterprise Risk Management (ERM) process across the company.

Davies Consulting focused on the following questions:

- How well does SoCalGas integrate risk, asset, and investment management into its strategic and operational decision-making processes?
- How does SoCalGas measure the effectiveness of its risk management evolution?
- How mature are SoCalGas' methodologies and tools?
- Are SoCalGas' methodologies and tools transparent, consistent, auditable, and repeatable?
- How does SoCalGas compare to the current state of the utility industry?

### 2.2.2 Objectives

The objectives of Davies Consulting's assessment of SoCalGas' risk, asset, and investment management processes, procedures, and methodologies were to:

- Provide SoCalGas leadership with an independent assessment of the company's risk, asset, and investment management processes and methodologies;
- Evaluate the integration of its risk, asset, and investment management areas;
- Assess the maturity and integration levels across SoCalGas of its risk, asset, and investment management using Davies Consulting's defined maturity model; and
- Present SoCalGas with specific improvement opportunities to assist the company as it continues to mature its methodologies.

# 3 ASSESSMENT METHODOLOGY AND APPROACH

Davies Consulting used its Integrated Strategic Management Maturity Model (ISM$^3$)™, incorporating applicable international standards, to evaluate the maturity of SoCalGas' investment, asset, and risk processes. In addition to assessing *what* SoCalGas is doing, based on existing guidelines and standards, from an investment, asset, and risk management perspective, the ISM$^3$™ framework allowed Davies Consulting to evaluate *how* SoCalGas has implemented applicable standards and *how* the three processes have been integrated. The assessment identifies potential improvement opportunities, allowing SoCalGas to make fact-based decisions on how to mature its processes and prioritize mitigation efforts under constrained resources and timelines.

Davies Consulting's assessment framework captures the current state of the assessed company against a set standard evaluation and identifies areas for process and methodology improvement that allow a utility to establish a vision for the company's evolution of its risk, asset, and investment management practices.

## 3.1 RISK, ASSET AND INVESTMENT MANAGEMENT EVALUATION

Davies Consulting uses ISM$^3$™ to evaluate a utility's maturity in three areas; risk management, asset management, and investment management on a 5-level maturity scale. The maturity scale is based on Davies Consulting's expertise, knowledge of the industry, and recognized international standards such as the International Standardization Organization's (ISO) standards for Risk and Asset Management (ISO 31000 and ISO 55000, respectively) and the State Government of Victoria, Australia's *Guide to Investment Planning Process.*[6] The maturity scale captures the current state of the utility industry and provides a vision for the evolution of risk, asset, and investment management practices. Although descriptions of maturity levels vary in each evaluation area, they are generally[7]:

- Level 0 – no standard, no process
- Level 1 – Ad-Hoc, Initiating, Initial
- Level 2 – Beginner, Enabling, Managed
- Level 3 – Intermediate, Integrating, Defined
- Level 4 – Advanced, Optimizing, Quantitatively Managed
- Level 5 – Leading, Pioneering, Optimized

Table 1, Table 2, and Table 3 contain specific descriptions for each maturity level in each of the following areas:

- Risk Management
- Asset Management

[6] Guide to Investment Planning Process, Overview, at http://www.dtf.vic.gov.au/Investment-Planning-andEvaluation/Understanding-investment-planning-and-review/Guide-to-the-investment-planning-process, accessed on May 31, 2015.

[7] A 2005 article described the levels of process maturity as: Initial (Level 1), Managed (Level 2), Defined (Level 3), Quantitatively managed (Level 4), and Optimizing (Level 5). See Charles McKinney, "Capability Maturity Models and Outsourcing: A Case for Sourcing Risk Management," Information Systems Control Journal 5, (2005): 28-34.

- Investment Management

## ISM³™ Risk Management Maturity Definitions

*Table 1 Risk Management Maturity*

| Level | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Characteristics<br><br> | No Formal Process or Methodology | Not part of the organizational culture. Risk Management isolated, undocumented and is characterized by as one that is not repeatable. Not established in a formal process or repetitive timeline. Some evidence exists that risks are discussed and considered, but the results are not codified or used across the enterprise. | Not part of the organizational culture. Risk Management isolated as an annual process conducted to inform at the Board of Director level and based upon an ad hoc process. A single corporate risk registry may exist, but inputs are subjective in nature with no evidence of data to support the inputs. Operational risks are managed separately at the business unit level with limited process of communication, understanding, or relationship to other business units. Risk Identification, Evaluation, Analysis and Prioritization are subject matter expertise driven and do not account for uncertainty or interrelationships of risks. No metrics are used to measure performance. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published standards. Most/all business units of the enterprise maintain their own risk registers and use those to communicate enterprise and operational risks across the enterprise. Risk assessment is characterized by a more qualitative/subjective approach. Risk identification, evaluation, analysis and prioritization are subject matter expertise driven and do not account for uncertainty or interrelationships of risks. Lagging performance metrics are used to measure performance. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published standards. Business unit enterprise and operational risks are communicated across the enterprise and are characterized by a balance of quantitative and qualitative/subjective approach. Risk Identification, Evaluation, Analysis, and Prioritization are primarily subject matter expertise driven, attempt to account for uncertainty and the interrelationships of risks. Deterministic methods of risk characterize the risk-informed decisions. Lagging performance measure are predominantly used to measure performance. Evaluates risk mitigation alternatives. Validates the effectiveness of risk mitigations. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published standards. All levels of the organization provide input. Business unit enterprise and operational risks are communicated across the enterprise and are characterized by a qualitative and probabilistic analysis. Risk Identification, Evaluation, Analysis and Prioritization are data driven, account for uncertainty, and interrelationships of risks. Leading and lagging performance metrics are used to evaluate risk management effectiveness and are monitored continually. Tolerance levels of risk are associated potential loss exceedance. Operational and investment decisions are risk-based and focused on the risk exposure reduction. Noted as industry leader and used as a benchmark by other companies |

## ISM³™ Asset Management Maturity Definitions

*Table 2 Asset Management Maturity*

| Level | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Characteristics<br><br> | No Formal Process or Methodology | Evidence of Asset Management only at operational unit level. Ad hoc process established in some business units. Critical assets understood and prioritized based upon subject matter expertise. Asset Management Plans and Strategies are not developed or codified. Asset management efforts are resourced annually. There is no evidence of review and improvement on a cyclical basis. Asset management reactive in nature. | An ad hoc but formalized and documented process is established for business units. Critical assets are understood and prioritized based upon subject matter expertise. Individual asset alternative strategies are evaluated using subject matter expertise. Asset Management Plans and Strategies are developed for individual assets. Asset strategies are resourced annually. Evidence is present that the Asset Management process is monitored and continually improved. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published international standards. Certified or provides evidence of adhering to international standards. Critical assets understood and Asset Management alternative strategies are evaluated using subject matter expertise. Asset Management Plans and Strategies are developed for individual assets and implemented. Asset strategies are resourced annually. Asset Management is continually improved. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published international standards. Certified or provides evidence of adhering to international standards. Critical assets understood and Asset Management alternative strategies are evaluated using subject matter expertise. Resource constraints are accounted for in lifecycle plans. Asset Management Plans and Strategies are developed as an integrated system, codified, implemented, and monitored with a short and long term view. Asset Management is continually improved. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published international standards. Certified or provides evidence of adhering to international standards. Mature Asset Life Cycle for critical assets understood and Asset Management alternative strategies are evaluated in a probabilistic environment that enables understanding of uncertainty, and interrelationships of asset failures. Asset Management Plans and Strategies are developed as an integrated system, codified, implemented, and monitored with a short and long term view. Benefits of AM program can be demonstrated and measured. Asset Management is continually improved. |

## ISM3™ Investment Management Maturity Definitions

*Table 3 Investment Management Maturity*

| Level | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Characteristics<br><br> | No Formal Process or Methodology | Characterized as a Bunch of Staff Sitting Around a Table (BOSSAT). Decisions based on judgement. Process is not transparent, repeatable, consistent or auditable. | Objectives and priorities are communicated, but a formal auditable process is still not present. Decisions remain judgment based in terms of the value to the company and allocation remains within business unit silos. | Transparent, repeatable, and consistent method that is in business unit silos. Allocations are made at an Executive Level based on judgment but are tied to corporate objectives. Investments are prioritized against a value definition. | Transparent, repeatable, consistent, and auditable method across the enterprise that is based upon subject matter expertise and is deterministic in nature of evaluation. Allocations are based upon an optimal objective function of that seeks to maximize the return of an objective within the constrained resources. Investment alternatives evaluated objectively. Accountability for the claimed investment benefit is documented and tracked. Investments are aligned with strategy. | Transparent, repeatable, consistent, and auditable method across the enterprise that is data drive and uncertainty in investments are accounted for. Allocations are based upon an optimal objective function that seeks to maximize the return of an objective within the constrained resources. Investment alternatives evaluated objectively. Accountability for the claimed investment benefit is documented and tracked. Investments are aligned with strategy. |

The ISM$^3$™ Scorecard's objective is to initiate discussions with executive leadership concerning specific areas where an opportunity exists to mature methodologies, processes, and procedures. Moving from one level to another takes time, resource commitment, and cultural shifts with a well-defined change management process. Discussions surrounding the evaluation and maturity process should focus on elements to support an evolution, as opposed to the ranking or categorization. An organization that can achieve the elements defined in the highest category will achieve a level of sophistication and maturity that will result in efficient and optimal resource allocation.

## 3.2 INTEGRATION EVALUATION

Risk, asset, and investment management can reach high levels of maturity in any given utility but without integration of those three, a utility will not achieve a high overall maturity. The lack of overall maturity can be evident, for instance, in a utility's inability to manage its risks and assets effectively to make informed investment decisions.

As such, the fourth dimension of Davies Consulting's maturity assessment model is the integration of risk, asset, and investment management. Integration is a more significant attribute than the other three elements. Its maturity aligns with corporate governance, establishment of aligned priorities and demonstrates a utility's overall maturity.

Table 4 provides specific descriptions for the five maturity levels of integration.

## ISM³™ Integration Maturity Definitions

*Table 4 Integration Maturity*

| Level | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Characteristics<br><br> | Risk, Asset, and Investment management are not integrated at all, even if they exist. | Some evidence that risk, asset, or investment management may inform one of the other areas, but the information is not used to make decisions | Two areas demonstrate integration to inform and make decisions. Typically, this includes asset management informing the investment selection and risk management isolated at the enterprise level. Additionally, portfolio selection is project and programs based and value is determined outside of any risk management assessment or mitigation evaluation. There is no formal process for integration and there is no demonstration of evaluation of improvement. | Data and information are available to inform processes and procedures. Decision making process demonstrate an awareness and an attempt to incorporate unified information and data. Integration is not a repeatable methodology and any attempts are qualitative in nature. Decisions are informed within business and prioritized to enhance the performance of the business unit. There is evidence of evaluation and improvement of the integration. | Data and information Inform the all processes and procedures and are incorporated into most decision-making processes. Integration is qualitatively driven to communicate the asset, operational and enterprise risk profile of the utility. Decisions are informed across business and prioritized to enhance the performance of the enterprise. All processes are continually monitored and improved. | Data and information inform all areas and are unified into all decision-making processes. Uncertainty and the interrelationships associated within and across programs inform a complete awareness to leadership. Integration is quantitatively driven, communicates the asset, operational and enterprise risk profile of the utility, accounts for uncertainty and the interrelationships of risks, addresses subject matter expert bias and produces and optimized portfolio of investments that estimates the risk reduction from the portfolio of investments using probabilistic and rigorous analytic methods. Decisions are informed across business and optimized for the performance of the enterprise. All processes are continually monitored and improved. |

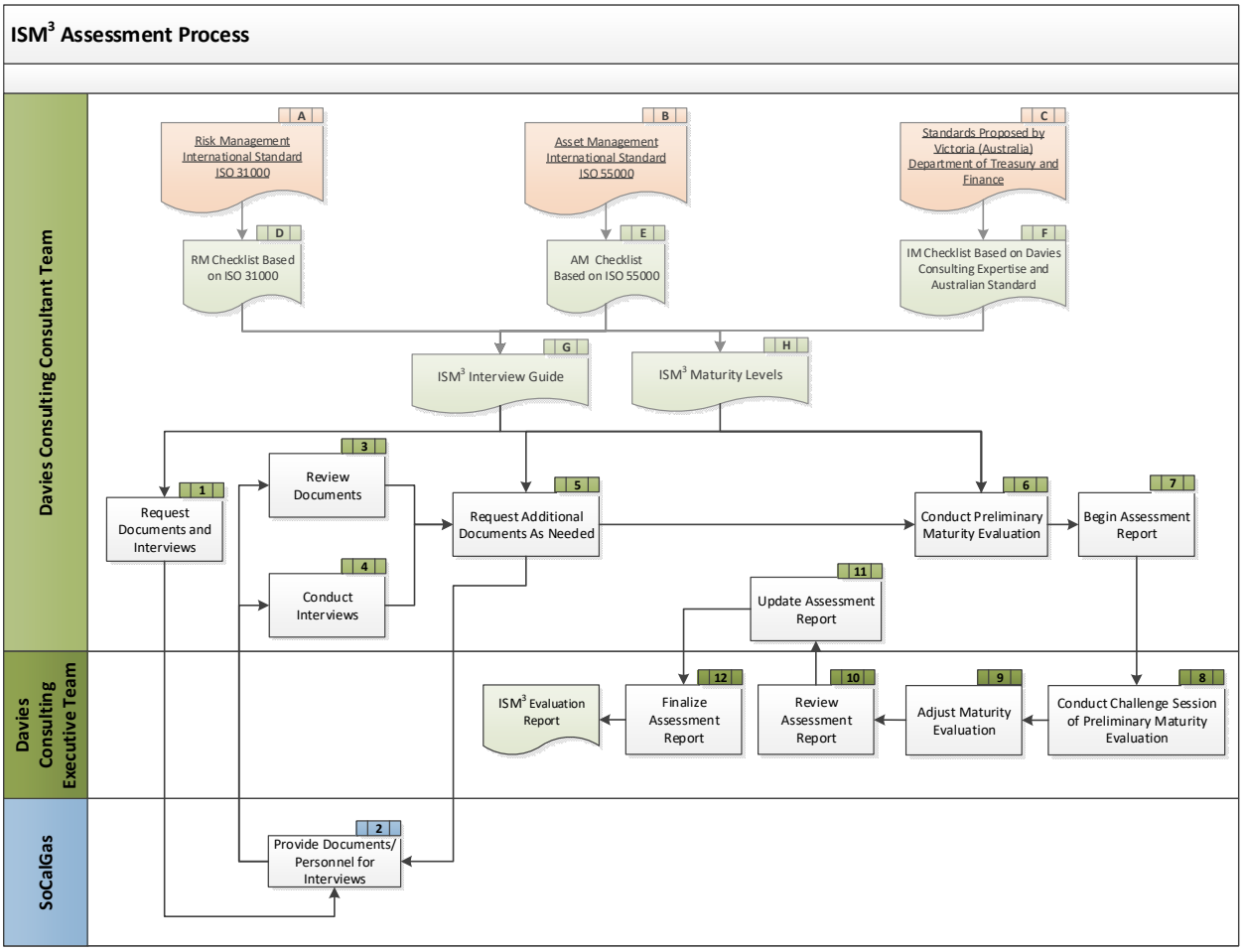
## 3.3 ASSESSMENT APPROACH

Davies Consulting's assessment process is comprised of three key phases, detailed in the sections below:

1. Collect and review data;
2. Evaluate maturity; and
3. Produce report.

Figure 1 depicts the detailed tasks incorporated into the three steps listed above. While some components of each phase are sequential, several parts of the three phases run in parallel to each other.

*Figure 1 ISM³™ Assessment Process™*




### 3.3.1 Collect and Review Data

The first phase of the assessment involves the collection and review of data and information through document requests and interviews with key utility personnel who have roles in the three evaluation areas. To initiate the data collection and review process, Davies Consulting examined existing documentation on company policies, processes, and procedures. SoCalGas personnel provided these documents ahead of the Davies Consulting team interviews. Primary sources of information reviewed by the team included the Company's risk management

documentation such as the Enterprise Risk Management Framework, the Enterprise Risk Management Handbook, the Company's most recent Risk Assessment and Mitigation Phase (RAMP) report as well as various documented policies and procedures on asset management. These materials constitute the major components of SoCalGas' Planning Process.

As part of the data collection and review process, Davies Consulting met with over 20 members of the organization in various interviews and meetings over a period of two months. Davies Consulting used its proprietary guide in all interviews. At least two Davies Consulting personnel were present for each interview. Interviewees also provided Davies Consulting with additional documents or provided demonstrations of tools and processes. The breadth and depth of interviews provided a more comprehensive view of SoCalGas' risk processes across Gas Operations than the initial document review.

### 3.3.2 Evaluate Maturity

The second phase of the assessment is where information collected through interviews and document reviews is used to evaluate the subject utility's maturity in risk management, asset management, investment management, and the integration of those three management processes. Davies Consulting developed a preliminary evaluation of SoCalGas' processes against the evaluation framework described above. In initial comprehensive review working sessions, Davies Consulting assigned maturity scores to SoCalGas across the key areas identified in the evaluation framework. At this session, the team also identified areas where its understanding was incomplete. To address these knowledge gaps, Davies Consulting requested additional documentation and follow-up interviews from SoCalGas. Davies Consulting completed its assessment with additional review working sessions and then conducted a final internal challenge session with a team of Davies Consulting consultants who were not part of the preliminary assessment team. This widened the range of insights and critique and helped the team consider additional aspects of the evaluation to ensure the completion of a fair and responsible assessment.

### 3.3.3 Produce Report

The assessment's third phase is the development of this assessment report. The assessment report synthesizes the team's findings about SoCalGas' risk, asset, and investment management practices.

# 4 ASSESSMENT OF THE UTILITY INDUSTRY

Davies Consulting established the ISM3™ evaluation framework founded on international standards and informed by its more than 25 years of consulting practice and the hundreds of client engagements. While the scorecard methodology allows for a continual growth to a very mature level of individual risk, asset and investment processes and the integration of them, Davies Consulting determined that the current level of maturity demonstrated throughout the utility industry, at its best, is at the Maturity Level 3. Some utilities have demonstrated efforts to evolve to levels 4 and 5 but those efforts are at their infancy and have not yet been embedded or established as standard operating procedures for those utilities. While some would question that a mid-point maturity level is not "good enough," it must be pointed out that the Institute for Asset Management standard alignment for maturity, that Davies Consulting supports, has the Maturity Level 3 defined as meeting the requirements to be ISO 55000 compliant. Indeed, the additional levels of maturity are opportunities for all industries to continually mature processes and methods. Davies Consulting's definitions for Levels 4 and 5 provide detail as to how processes are performed to achieve a level that results in optimal management processes.

## 4.1 RISK MANAGEMENT

Most utilities conduct risk management at an enterprise level and in isolation from key operational processes. Some utilities see risk management as an annual reporting requirement that does not inform decision-making through all levels of a given company. Utilities also face challenges with quantification and communication of risk, risk mitigation and reduction benefits, and overall effectiveness of risk management programs. While some utilities have identified Key Risk Indicators (KRIs) and Key Performance Indicators (KPIs) as metrics to track overall risk management performance, many struggle with quantifying specific risk reduction benefits at the project or program levels. These approaches leave most utilities at maturity Levels 1 or 2.

## 4.2 ASSET MANAGEMENT

Many utilities have developed asset management programs, which vary widely in sophistication. The most advanced programs embrace the tenets of ISO 55000, which aligns with a maturity level of 3 in ISM3™. More specifically, the ISM3™ framework describes Level 3 maturity in asset management as demonstrating the tenets (but not necessarily the formal certification) of ISO 55000. The ISM3™ framework aligns here with the Institute of Asset Management (IAM)'s asset management maturity framework, which also characterizes Level 3 as the satisfaction of ISO 55000 requirements. If governance, disciplines, and processes are well-defined and implemented, the value of ISO 55000 will be realized, regardless of external certification. Currently, only a few utilities fall in ISM3™ Level 3 maturity and most utilities range in maturity between Levels 0 and 2.

## 4.3 INVESTMENT MANAGEMENT

Most utilities lack a formalized and consistent process for making investment decision, mostly using subject matter experts (SMEs) on an ad-hoc basis to prioritize investments with limited communication of objectives and strategic priorities. Davies Consulting has seen demonstrations of a maturity level 3 in application, but the predominant process in the industry

is more ad hoc and not transparent, repeatable, auditable or consistent. This approach leaves most utilities within maturity Levels 1 and 2.

## 4.4 INTEGRATION

Integration of risk, asset, and investment management is visible when a company identifies its risks, including risks associated with operational assets, develops mitigations that include the asset strategies to address failures and make investments based on the risks identified. The integration is an area that presents more challenges because it requires the most change management to implement. In the current state of the industry, integration is minimal to non-existent in most companies. Some utilities can demonstrate integration of two areas while others subjectively tie the three areas. For instance, some utilities can discuss connections between asset, risk and investment management but with minimal to no demonstration of data and information flows between the three management areas. No utility has reached a full integration maturity level. Davies Consulting has seen demonstrations of a maturity level 3 in application, but for the most part most utilities fall between 0 and 2 in the maturity of integration of risk, asset, and investment management, as illustrated in the tables below.

*Table 5 Assessment of the Utility Industry - Risk Management*

## ISM³ Risk Management Maturity Definitions

| Current Utility Industry Levels of Maturity Demonstrated | | | | | Maturity Opportunity for Industry Evolution | |
|---|---|---|---|---|---|---|
| Level | 0 | 1 | 2 | 3 | 4 | 5 |
| Characteristics | No Formal Process or Methodology | Not part of the organizational culture. Risk Management isolated, undocumented and is characterized by as one that is not repeatable. Not established in a formal process or repetitive timeline. Some evidence does exists that risks are discussed and considered, but the results are not codified or used across the enterprise. | Not part of the organizational culture. Risk Management isolated as an annual process conducted to inform at the Board of Director level and based upon an ad hoc process. A single corporate risk registry may exist, but inputs are subjective in nature with no evidence of data to support the inputs. Operational risks are managed separately at the business unit level with limited process of communication, understanding, or relationship to other business units. Risk Identification, Evaluation, Analysis and Prioritization are subject matter expertise driven and do not account for uncertainty or interrelationships of risks. No metrics are used to measure performance. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published standards. Most/all business units of the enterprise maintain their own risk registers and use those to communicate enterprise and operational risks across the enterprise. Risk assessment is characterized by a more qualitative/subjective approach. Risk identification, evaluation, analysis and prioritization are subject matter expertise driven and do not account for uncertainty or interrelationships of risks. Lagging performance metrics are used to measure performance. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published standards. Business unit enterprise and operational risks are communicated across the enterprise and are characterized by a balance of quantitative and qualitative/subjective approach. Risk Identification, Evaluation, Analysis, and Prioritization are primarily subject matter expertise driven, attempt to account for uncertainty and the interrelationships of risks. Deterministic methods of risk characterize the risk-informed decisions. Lagging performance measure are predominantly used to measure performance. Evaluates risk mitigation alternatives. Validates the effectiveness of risk mitigations. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published standards. All levels of the organization provide input. Business unit enterprise and operational risks are communicated across the enterprise and are characterized by a qualitative and probabilistic analysis. Risk Identification, Evaluation, Analysis and Prioritization are data driven, account for uncertainty, and interrelationships of risks. Leading and lagging performance metrics are used to evaluate risk management effectiveness and are monitored continually. Tolerance levels of risk are associated potential loss exceedance. Operational and investment decisions are risk-based and focused on the risk exposure reduction. Noted as industry leader and used as a benchmark by other companies |
|  | | | | | | |

*Table 6 Assessment of the Utility Industry - Asset Management*

## ISM³ Asset Management Maturity Definitions

| Current Utility Industry Levels of Maturity Demonstrated | | | | | Maturity Opportunity for Industry Evolution | |
|---|---|---|---|---|---|---|
| Level | 0 | 1 | 2 | 3 | 4 | 5 |
| Characteristics | No Formal Process or Methodology | Evidence of Asset Management only at operational unit level. Ad hoc process established in some business units. Critical assets understood and prioritized based upon subject matter expertise. Asset Management Plans and Strategies are not developed or codified. Asset management efforts are resourced annually. There is no evidence of review and improvement on a cyclical basis. Asset management reactive in nature. | An ad hoc but formalized and documented process is established for business units. Critical assets are understood and prioritized based upon subject matter expertise. Individual asset alternative strategies are evaluated using subject matter expertise. Asset Management Plans and Strategies are developed for individual assets. Asset strategies are resourced annually. Evidence is present that the Asset Management process is monitored and continually improved. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published international standards. Certified or provides evidence of adhering to international standards. Critical assets understood and Asset Management alternative strategies are evaluated using subject matter expertise. Asset Management Plans and Strategies are developed for individual assets and implemented. Asset strategies are resourced annually. Asset Management is continually improved. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published international standards. Certified or provides evidence of adhering to international standards. Critical assets understood and Asset Management alternative strategies are evaluated using subject matter expertise. Resource constraints are accounted for in lifecycle plans. Asset Management Plans and Strategies are developed as an integrated system, codified, implemented, and monitored with a short and long term view. Asset Management is continually improved. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published international standards. Certified or provides evidence of adhering to international standards. Mature Asset Life Cycle for critical assets understood and Asset Management alternative strategies are evaluated in a probabilistic environment that enables understanding of uncertainty, and interrelationships of asset failures. Asset Management Plans and Strategies are developed as an integrated system, codified, implemented, and monitored with a short and long term view. Benefits of AM program can be demonstrated and measured. Asset Management is continually improved. |
|  | | | | | | |

*Table 7 Assessment of the Utility Industry - Investment Management*

**ISM³ Investment Management Maturity Definitions**

| Current Utility Industry Levels of Maturity Demonstrated | | | | | Maturity Opportunity for Industry Evolution | |
|---|---|---|---|---|---|---|
| Level | 0 | 1 | 2 | 3 | 4 | 5 |
| Characteristics | No Formal Process or Methodology | Characterized as a Bunch of Staff Sitting Around a Table (BOSSAT). Decisions based on judgement. Process is not transparent, repeatable, consistent or auditable. | Objectives and priorities are communicated, but a formal auditable process is still not present. Decisions remain judgment based in terms of the value to the company and allocation remains within business unit silos. | Transparent, repeatable, and consistent method that is in business unit silos. Allocations are made at an Executive Level based on judgment but are tied to corporate objectives. Investments are prioritized against a value definition. | Transparent, repeatable, consistent, and auditable method across the enterprise that is based upon subject matter expertise and is deterministic in nature of evaluation. Allocations are based upon an optimal objective function of that seeks to maximize the return of an objective within the constrained resources. Investment alternatives evaluated objectively. Accountability for the claimed investment benefit is documented and tracked. Investments are aligned with strategy. | Transparent, repeatable, consistent, and auditable method across the enterprise that is data drive and uncertainty in investments are accounted for. Allocations are based upon an optimal objective function that seeks to maximize the return of an objective within the constrained resources. Investment alternatives evaluated objectively. Accountability for the claimed investment benefit is documented and tracked. Investments are aligned with strategy. |



*Table 8 Assessment of the Utility Industry - Integration*

**ISM³ Integration Maturity Definitions**

| Current Utility Industry Levels of Maturity Demonstrated | | | | | Maturity Opportunity for Industry Evolution | |
|---|---|---|---|---|---|---|
| Level | 0 | 1 | 2 | 3 | 4 | 5 |
| Characteristics | Risk, Asset, and Investment management are not integrated at all, even if they exist. | Some evidence that risk, asset, or investment management may inform one of the other areas, but the information is not used to make decisions | Two areas demonstrate integration to inform and make decisions. Typically, this includes asset management informing the investment selection and risk management isolated at the enterprise level. Additionally, portfolio selection is project and programs based and value is determined outside of any risk management assessment or mitigation evaluation. There is no formal process for Integration and there is no demonstration of evaluation of improvement. | Data and information are available to inform processes and procedures. Decision making process demonstrate an awareness and an attempt to incorporate unified information and data. Integration is not a repeatable methodology and any attempts are qualitative in nature. Decisions are informed within business and prioritized to enhance the performance of the business unit. There is evidence of evaluation and improvement of the integration. | Data and information Inform the all processes and procedures and are incorporated into most decision-making processes. Integration is qualitatively driven to communicate the asset, operational and enterprise risk profile of the utility. Decisions are informed across business and prioritized to enhance the performance of the enterprise. All processes are continually monitored and improved. | Data and information inform all areas and are unified into all decision-making processes. Uncertainty and the interrelationships associated within and across programs inform a complete awareness to leadership. Integration is quantitatively driven, communicates the asset, operational and enterprise risk profile of the utility, accounts for uncertainty and the interrelationships of risks, addresses subject matter expert bias and produces and optimized portfolio of investments that estimates the risk reduction from the portfolio of investments using probabilistic and rigorous analytic methods. Decisions are informed across business and optimized for the performance of the enterprise. All processes are continually monitored and improved. |

## 4.5 Evaluation Method Against the Industry Assessment – Current

As described above, the current industry maturity levels range from 0 to 3 in risk, asset, and investment management and the integration of those three. Therefore, the remainder of the assessment report focuses on the "Current Utility Industry Levels of Maturity Demonstrated" (Level 0-3) and not the "Maturity Opportunity for Industry Evolution" (levels 4 and 5). Currently, Level 3 can be characterized as leading practice. Comparing against the current level of the industry allows us to identify areas where a utility is leading as well as areas where it is aligned with industry peers.

## 4.6 Evaluation Method Against the Industry Assessment – Opportunity

The industry's evolving regulatory landscape is heavily influencing the evolution of risk, asset, and investment management practices. Recent developments highlight the importance of moving to more sophisticated modeling capabilities to improve risk, asset, and investment management in the utility industry. Among these are the CPUC's Order Instituting a Rulemaking (OIR) to develop a risk-based decision-making framework.[8]

Levels 4 and 5 of Davies Consulting's ISM$^3$™ scorecard support this evolution and highlight characteristics that demonstrate movement towards more quantitative approaches for managing risks, assets, and investment decisions. Evaluating a utility against these aspirational levels of maturity allows us to identify areas for further improvement and communicate opportunities for doing so.

[8] Decision 14-12-025, Order Instituting Rulemaking to Develop a Risk-Based Decision-Making Framework to Evaluate Safety and Reliability Improvements and Revise the General Rate Case Plan for Energy Utilities, Rulemaking 13-11-006, December 4, 2014.

# 5 RISK, ASSET AND INVESTMENT MANAGEMENT AT SOCALGAS

## 5.1 COMPANY OVERVIEW

Southern California Gas Company (SoCalGas) is the nation's largest natural gas distributor and provides service for approximately 21.6 million customers, covering roughly two-thirds of California by land area. San Diego Gas and Electric (SDG&E) is a regulated electric and natural gas distribution utility providing service to 3.6 million consumers across 4,100 square miles from Orange County to the Mexican border. Together, the two Companies operate approximately 115,800 miles of natural gas pipelines.

Based in Los Angeles, SoCalGas is a Sempra Energy utility that is regulated by the California Public Utilities Commission (CPUC) and employs more than 8,000 employees who deliver natural gas services to its customers.

SoCalGas' leadership has stated its commitment to managing risks and providing services to its customer with the priority of ensuring the safety of the public and its workforce of employees and contractors. One if SoCalGas' stated core values is to "treat safety as a way of life."[9] This commitment has been proven with actions over the years through leadership's commitment to evolving and continuously improving the Company's risk management practices as will be discussed in this report.

Over the years, SoCalGas has matured its risk, asset and investment management processes and its safety culture. As a part of its commitment to safety, the Company has been participating in the National Safety Council's (NCS) safety survey since 2013. The survey compares SoCalGas' safety culture to other companies using NCS's "Safety Barometer" database. Most recently, SoCalGas' results showed that it was among the top 6% of the 580 companies that took the survey.[10]

SoCalGas has established a Natural Gas System Operator Safety Plan that conveys the safety performance expectations of SoCalGas' Senior Management Team, and describes all of the safety plans, programs, policies, standards, and procedures that are designed to accomplish those expectations.[11]

With an eye toward maintaining and operating a safe system, SoCalGas utilizes comprehensive processes and methodologies for managing the integrity of its pipeline system as demonstrated in the Company's Transmission Integrity Management Program (TIMP) and the Distribution Integrity Management Program (DIMP). These programs drive the Company's risk-informed decision-making by prioritizing maintenance and replacement activities on a risk-basis to address identified threats.

In 2014, the CPUC approved SoCalGas' Pipeline Safety and Enhancement Plan (PSEP) to identify pipeline sections throughout the system that have no records for pressure-testing, and

[9] 2016 GRC Application – Risk Policy Testimony. DD-4

[10] SoCalGas RAMP Report - SCG 2-14

[11] SoCalGas' Natural Gas System Operator Safety Plan – 1.

slate them to be pressure-tested or replaced. The plan also proposes to upgrade, replace, or retrofit hundreds of mainline valves in the system with technology that allows them to be opened or closed remotely by system operators from a central control location, or that automatically shuts off the flow of natural gas in the event of a large pressure drop.[12]

In addition to the continuous improvement of its risk management process, in 2015, the Company conducted a third-party assessment of its asset management practices and how well they conform to API RP 1173 and ISO 55000. As a result, the Company identified a Director to lead the implementation of the recommended tenets in those standards to enhance the safety of its gas operations and centralize the management of its gas assets.

[12] SoCalGas Website - PSEP

## 5.2 RISK MANAGEMENT AT SOCALGAS

Characteristics of an effective risk management process, that produces demonstrable risk reduction, include transparency, repeatability, and consistency. The process should be continually reviewed, risks must be monitored, and emergent risks identified to ensure each is being mitigated. To do so, an organization should establish robust processes and methodologies that are a part of organizational culture.

### 5.2.1 Background

To formalize risk management at SoCalGas, the Company launched its Enterprise Risk Management (ERM) efforts in 2009. As a start, the ERM organization conducted several interviews with various Company leaders to identify and document key risks that the Company manages as a part of its operations. As a part of the process, the ERM organization established and formalized the Company's risk registry which became the central hub for the Company's risk management information and the foundation for annual risk reporting to the Company's Board of Directors.

In 2014, the Company expanded its ERM program by growing the ERM team and adding substantial knowledge and expertise to bolster the Company's approach to risk management. The organizational changes included the appointment of a new VP of risk management and two new directors with operational and financial backgrounds to enable the integration of risk management into the Company's operations and investment planning. Since then, the Company has invested in risk management training and the addition of risk managers to support the evolution of risk management and the development of more advanced risk assessment approaches.

Building on the Company's existing process which is based on ISO 31000, the internationally recognized risk management standard, the new VP and directors of risk management continued the process of formalizing and structuring risk management at the Company. This included the development of a formal overarching risk management framework that states the Company's risk management policy, identifies risk management roles and responsibilities and outlines the Risk Management Policy Committee (RMPC) charter.

Additionally, the new organization formalized the Company's risk management handbook which documents the Company's risk management process and is used as a general guide for risk management training purposes.

Over the past few years, the Company has continued to enhance its risk management practices by developing operational risk management, creating new risk management sessions, improving the Company's risk registry and risk evaluation mythologies and investing in new tools to more systematically manage the Company's risks.

### 5.2.2 ERM Framework

SoCalGas' Board of Directors has oversight of the Company's risk management process and is supported by the Company's Risk Management Policy Committee (RMPC).

The RMPC is made up of the Company's Chief Executive Officer, Chief Operating Officer and General Counsel and is chaired by the Vice President of Enterprise Risk Management and Compliance. In addition to overseeing the overall risk management framework, the RMPC meets regularly to oversee the identification, assessment and mitigation of the Company's risks

to achieve its objective of providing safe and reliable services to its customers at affordable rates.

SoCalGas' risk management governance structure also includes a Leadership Risk Team which is comprised of officers and directors from all business functional areas who are responsible for leading periodic risk and mitigation dialogues, ensuring a holistic view of risk management at the Company and the review of the assessment of the Company's key risks and mitigation plans.

SoCalGas' VP of ERM and Compliance is responsible for leading ERM. ERM's primary responsibilities include:

- Facilitation and review of key risk assessments;
- Development of appropriate risk management tools;
- Facilitation and review of key risk mitigation plans; and
- Maintenance of the enterprise risk registry.

Typically, the ownership and oversight of risks identified in each business functional area belong to the Officers of those areas and they assign specific risk management responsibilities to directors and managers in their organizations. The ERM governance structure is depicted in Figure 2.

*Figure 2 SoCalGas' Enterprise Risk Management Governance Structure*


In addition to this existing ERM governance structure and framework, the ERM organization is facilitating the development of operational risk management where each business functional area will be responsible for developing and maintaining its own risk registry and utilizing it to drive decision-making. To date, the Company has developed a preliminary operational risk registry for medium-pressure pipeline and is in the process of improving it and conducting the same effort across the Company.

The purpose of this effort is to further embed risk management into the Company's operations and identify and assess risks at a more granular level. In the future, operating unit risk registers will support the identification and management of enterprise-level risks. Figure 3 depicts a vision of how operational risk management will be integrated with enterprise risk management at SoCalGas.

*Figure 3 Implementing Operational Risk Management*


### 5.2.3 ERM Process

In accordance with ISO 31000, SoCalGas established its 6-step risk management process and built it into its annual planning process. Figure 4 depicts the Company's risk management process.

*Figure 4 SoCalGas' Risk Management Process*


Every year, the ERM team reaches out to the various operating units across the Company to update existing risk information and identify emerging risks. Through the process, the ERM team refreshes the Company's risk registry by modifying as necessary the current risk scores to reflect any changes to the various risk levels, and identifying and evaluating new and emerging risks that the Company must manage.

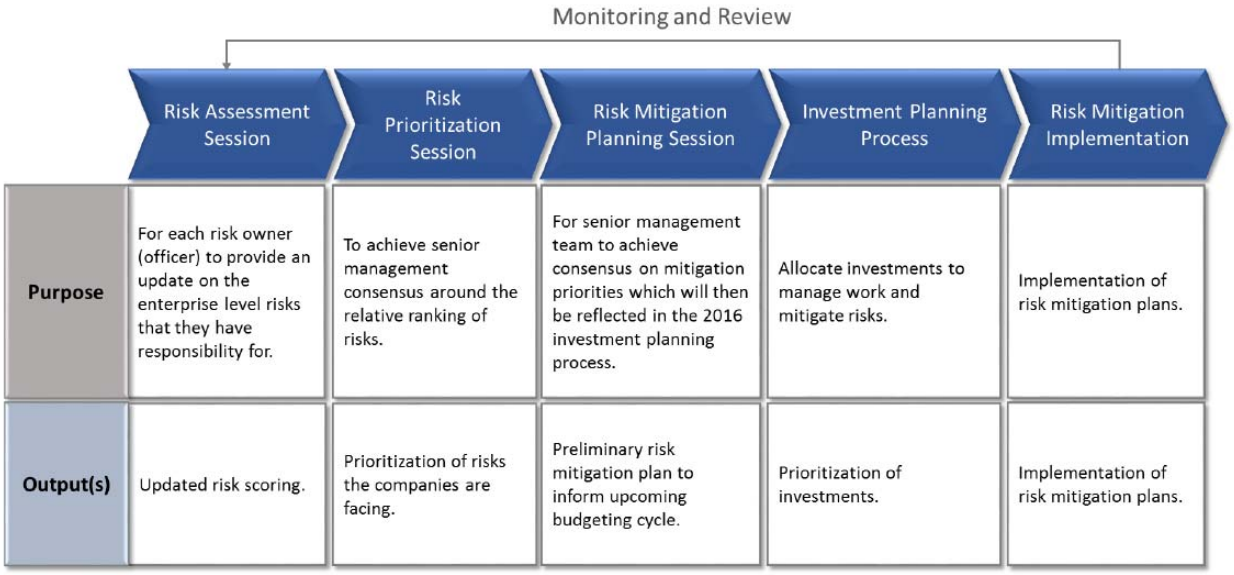
Over the past few years, SoCalGas has made efforts to more transparently and explicitly link its financial planning process to its ERM process.

In 2014, the ERM group established 3 key officer sessions as a part of the annual risk management process. The Risk Assessment Session, the Risk Prioritization Session and the Risk Mitigation Planning Session. In these sessions, risks are identified, assessed and prioritized to determine the Company's top risks and discuss current efforts to control those risks and mitigations that may be needed to further reduce them.

These risk sessions provide the necessary risk information that feeds into the investment planning process. As a part of the investment planning process, the Company's enterprise risk registry is used as an input to the discussions that take place at the Executive Finance Committee (EFC) where funding allocation decisions are made to meet compliance requirements and address safety and reliability concerns that the Company must manage as a part of running its operations.

This high-level view of the annual planning process is depicted in Figure 5 below and is further discussed in the following sections.

*Figure 5 Annual Planning Process*[13]




The role of these three key risk sessions is further described below:

1. Risk Assessment Session, where each risk owner discusses their risk, the progress they've made in reducing it and elements of the previous year's mitigation plan that have been implemented. The output of this session is a refresh to the risk scores using the Company's Risk Evaluation Framework (REF) which is further described in section 5.2.4.3.

[13] S-MAP Workshop 1 – SoCalGas and SDG&E presentation

2. Risk Prioritization Session, where risk owners discuss the relative ranking of each utility's enterprise risks with senior management and achieve consensus around risk priorities.
3. Risk Mitigation Planning Session, where risk owners present their key risk mitigation plans and alternatives considered to the senior management team and discuss the feasibility and prudency of their proposed plans. This session helps shape the utility's priorities going into the annual investment planning process and helps identify gaps and/or areas of overlap in risk mitigation plans.

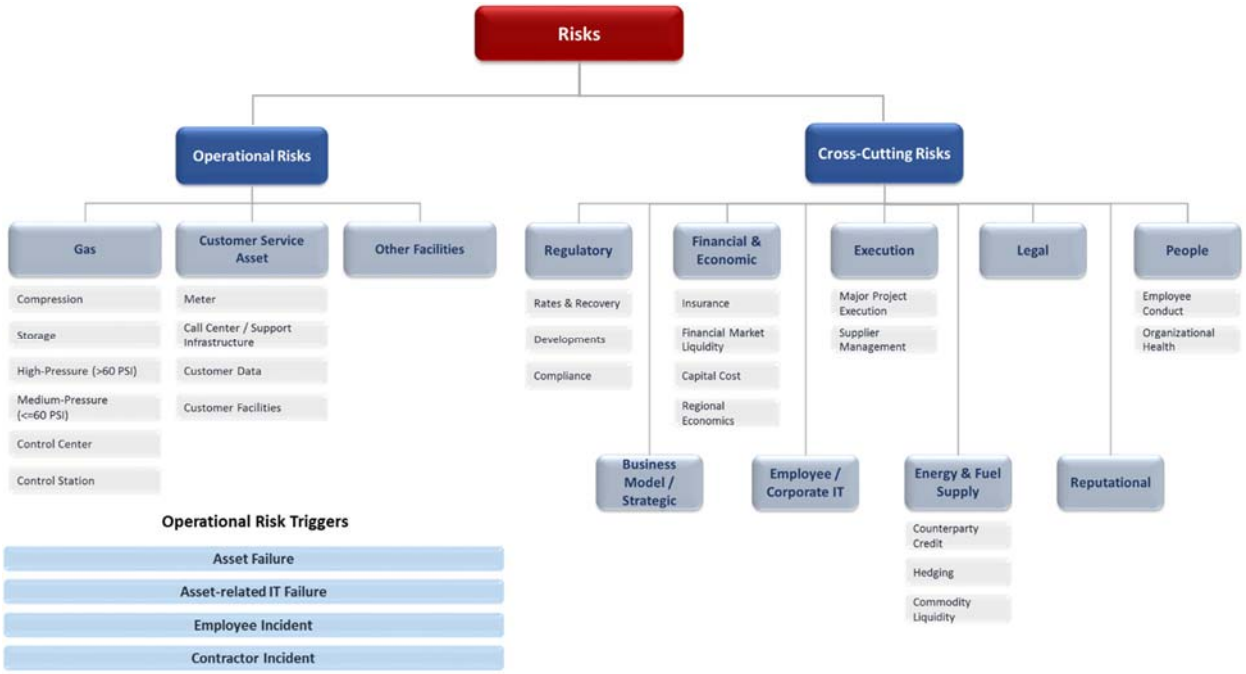
### 5.2.4 ERM Tools

SoCalGas has developed and implemented several tools that are used to support the risk management process. These tools include the risk taxonomy, risk bowties, the Risk Evaluation Framework (REF) as well as various tools to assess risk treatments and monitor risk management progress.

#### *5.2.4.1 Risk Taxonomy*

In 2015, SoCalGas developed its risk taxonomy the purpose of which is to provide a framework for identifying, organizing and studying risks in a more systematic and comprehensive manner. SoCalGas' taxonomy categorizes risks as either operational or cross-cutting. Operational risks are associated with specific assets; whereas cross-cutting risks are not linked to specific assets and may affect a range of assets. This structured way of identifying and studying risks helps ensure that various risk scenarios are considered when conducting risk assessments. Figure 6 depicts SoCalGas' risk taxonomy.

*Figure 6 SoCalGas' Risk Taxonomy*[14]



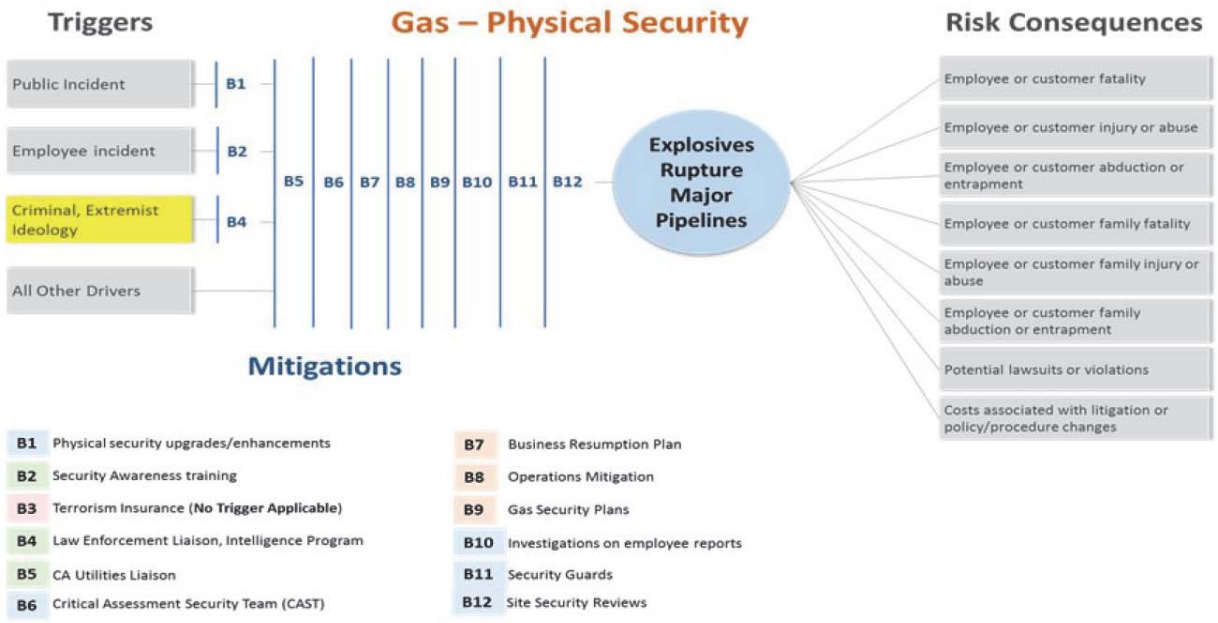

[14] SDGE SCG RAMP Report, pg. SDGE/SCG B-3.

### *5.2.4.2 Risk Bowties*

Risk bowties are used in various industries to conduct risk analyses and are recognized as a commonly used risk analysis practice in ISO 31010. Risk bowtie analysis supports the identification of the risk drivers and the potential consequences that the risk event might result in. Risk bowties are useful tools for determining what risk mitigation measures should be put in place. They enable risk managers to identify and document risk drivers (or triggers) that can lead to an undesirable event. Risk managers can then identify potential mitigations that could reduce the likelihood or frequency of a driver triggering the undesirable event.

An illustrative example of a risk bowtie analysis conducted by SoCalGas for one of its top safety risks is depicted in Figure 7 below. The figure shows the risk event as the center of the bow-tie with risk consequences on the right side and risk triggers on the left with multiple lines depicting several risk controls that address those risk triggers.

*Figure 7 Illustrative Risk Bowtie Analysis*[15]




### *5.2.4.3 Risk Evaluation Framework (REF)*

SoCalGas uses a 7x7 risk evaluation matrix to assess and prioritize risks by scoring them on two dimensions; the likelihood of the risk occurring and the various levels of consequences it may lead to. The REF enables a consistent, transparent and repeatable way of evaluating and comparing risks across the Company.

As depicted in Figure 8 below, the REF is used to establish a weighted score by evaluating the likelihood of each risk event and the consequences of the risks in terms of four attributes:

[15] SDGE SCG RAMP Report, pg. SDGE/SCG A-5.

- Safety, health and environmental impacts;
- Operational and reliability impacts;
- Regulatory, legal and compliance impacts; and
- Financial impacts.

In its enterprise risk registry, SoCalGas identifies the reasonable, worst case scenario[16] for each risk event and scores that representative scenario for the potential magnitude of the risk event. As a part of developing operating unit risk registers in 2016, SoCalGas began piloting the assessment of more likely[17] as well as reasonable, worst case risk scenarios in an early step to move towards more probabilistic risk evaluations.

Over the years, SoCalGas has incorporated lessons learned from using the REF into updated versions of it. In 2014, it changed from a 5x5 to a 7x7 evaluation matrix and in 2015, it updated its risk scoring algorithm to allow for better distinction and comparison between risks by more appropriately reflecting the magnitude of risks.

[16] The reasonable, worst case scenario is typically defined by the most severe potential outcomes of a risk that can reasonably be expected to occur. Such scenarios are typically associated with low frequency high consequence events such as pipeline ruptures leading to explosions.

[17] The more likely scenario is typically defined by the potential outcomes of a risk that are more likely to occur. Often, it is reflective of higher frequency, lower consequence risk events when compared with the reasonable, worst case such as pipeline leaks that may not lead to explosions.

*Figure 8 SoCalGas' Risk Evaluation Framework*

| | Impact | | | | | | |
|---|---|---|---|---|---|---|---|
| | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| | **Catastrophic** | **Severe** | **Extensive** | **Major** | **Moderate** | **Minor** | **Negligible** |
| ***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 | Fatalities: Many fatalities and life threatening injuries to the public or employees.<br><br>Immediate, severe, and irreversible impacts to environment | Fatalities: Few fatalities and life threatening injuries to the public or employees.<br><br>Severe and long-term impacts to environment | Permanent/Serious Injuries or Illnesses: Many serious injuries or illnesses to the public or employees.<br><br>Significant and medium-term impacts to environment | Permanent/Serious Injuries or Illnesses: Few serious injuries or illnesses to the public or employees.<br><br>Significant and short-term impacts to environment | Minor Injuries or Illnesses: Minor injuries or illnesses to many public members or employees.<br><br>Moderate and short-term impacts to environment | Minor Injuries or Illnesses: Minor injuries or illnesses to few public members or employees.<br><br>Environmental impact is immediately correctable or contained within small area | No injury or illness or up to an un-reported negligible injury.<br><br>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 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 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 |

| | Frequency/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 |

#### *5.2.4.4 Risk Treatment and Monitoring*

In 2016, SoCalGas filed the State's first Risk Assessment and Mitigation Phase (RAMP) report at the CPUC where it documented its top safety risk treatment plans for which it intends to seek funding for in its next rate case. The report displayed early steps towards piloting a methodology to quantify risk reduction benefits achieved by the Company's existing risk control measures and proposed risk mitigation plans. The methodology introduced the concept of prioritizing funds using a risk reduction per dollar metric referred to as the "Risk Spend Efficiency" (RSE).

The CPUC's Safety Enforcement Division (SED) commended the effort the Company went through to develop its RAMP report, noting that there remain improvements that need to take place strengthen the methodology and the fact that the on-going Safety Model Assessment Proceeding (S-MAP) is still in the process of defining standards for such models to be applied in the future. Following is an excerpt from the SED response:

> *"Staff recognizes that this RAMP filing is the first of its kind and that it has been difficult to quantify risk reductions in a manner that will fully support RSE calculations. Staff commends Sempra utilities, as well as the other utilities, for their efforts to gather the data necessary to make more quantitative predictions of risk reduction in future filings, as an ongoing aspect of the S-MAP proceedings."*[18]

Though the Company has not yet adopted the methodology or developed a fully working model that can be used as a part of the annual planning process, several examples of such efforts are worthy of noting here.

In some areas of the Company, risk-based prioritization tools are used to determine an appropriate ranking of spend based on various metrics that take safety and reliability impacts into account. One example of such an approach is used in gas distribution operations where the Distribution Risk Evaluation and Management System (DREAMS) analyzes medium pressure pipe segments using relative assessment of probabilities and consequences of pipeline risk events to prioritize risk mitigation efforts on a segment-by-segment basis.[19]

There may be opportunities to adapt or develop similar analysis models other risks; however, these are not likely feasible for all risks across the various operating units of the Company as they target very specific operational issues and require significant amounts of data. Thus, the Company primarily relies on its high-level prioritization process to broadly allocate funds to projects and programs by evaluating their impact to safety, reliability as well as other factors after which operating units are responsible for further prioritizing their allocated budgets at a more granular level using their own methodologies and in some cases specific models such as DREAMS.

While there are various metrics being tracked and monitored at SDG&E, the integration of those metrics with the Company's risk registry is primarily facilitated by the ERM group. In 2016, the Company identified existing metrics that can be used to monitor risk performance as a part of

[18] SED report on SoCalGas' RAMP application – pg. 7

[19] SoCalGas' RAMP Application – SDGE/SCG D-19

the on-going S-MAP and in its 2017 ERM process, it began to formally incorporate those metrics in the risk discussions and document them in the Company's updated risk registry.

## 5.3 ASSET MANAGEMENT AT SOCALGAS

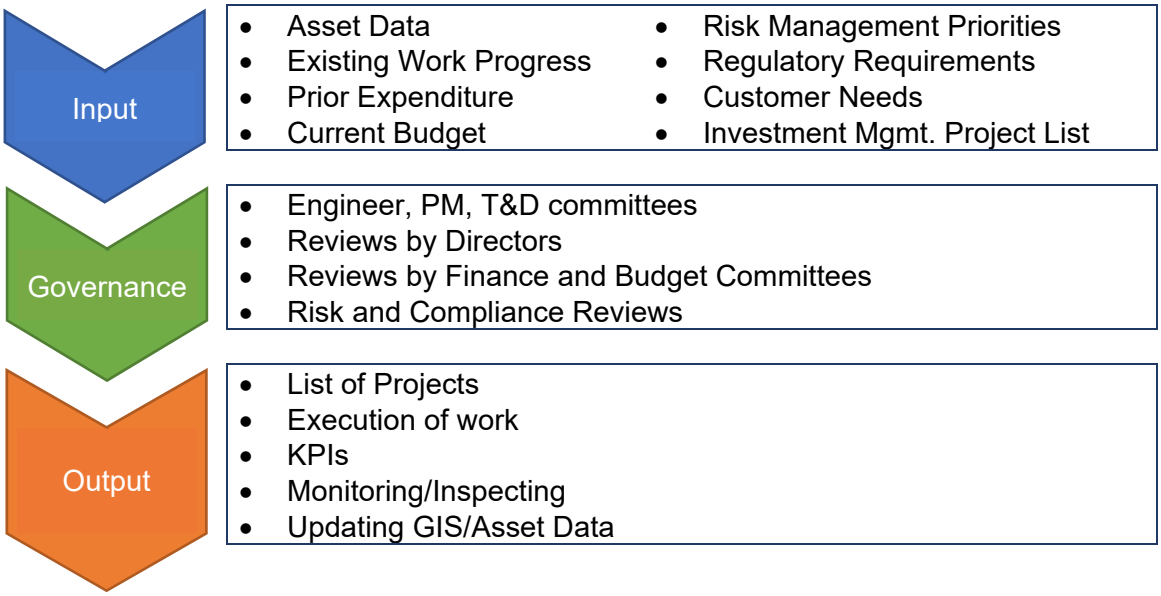
SoCalGas has established a Natural Gas System Operator Safety Plan that conveys the safety performance expectations of SoCalGas' Senior Management Team, and describes the safety plans, programs, policies, standards, and procedures that are designed to accomplish those expectations.[20]

Over the years, SoCalGas has matured its risk, asset and investment management processes and its safety culture. In addition to the continuous improvement of its risk management process, in 2015, the Company conducted a third-party assessment of its asset management practices and how well they conform to API RP 1173 and ISO 55000. Based on the assessment, the Company identified a Director to lead the implementation of the recommendations to enhance the safety of its gas operations and comprehensively manage its gas assets in conformance with API1173 and ISO 55000.

The process for asset management can be broadly characterized as 3-stage process, depicted in Figure 9.

1. Input: Several inputs and considerations are taken, depending upon the asset group;
2. Governance: These inputs are then applied through an internal governance process;
3. Output: This creates work plans and operational output.

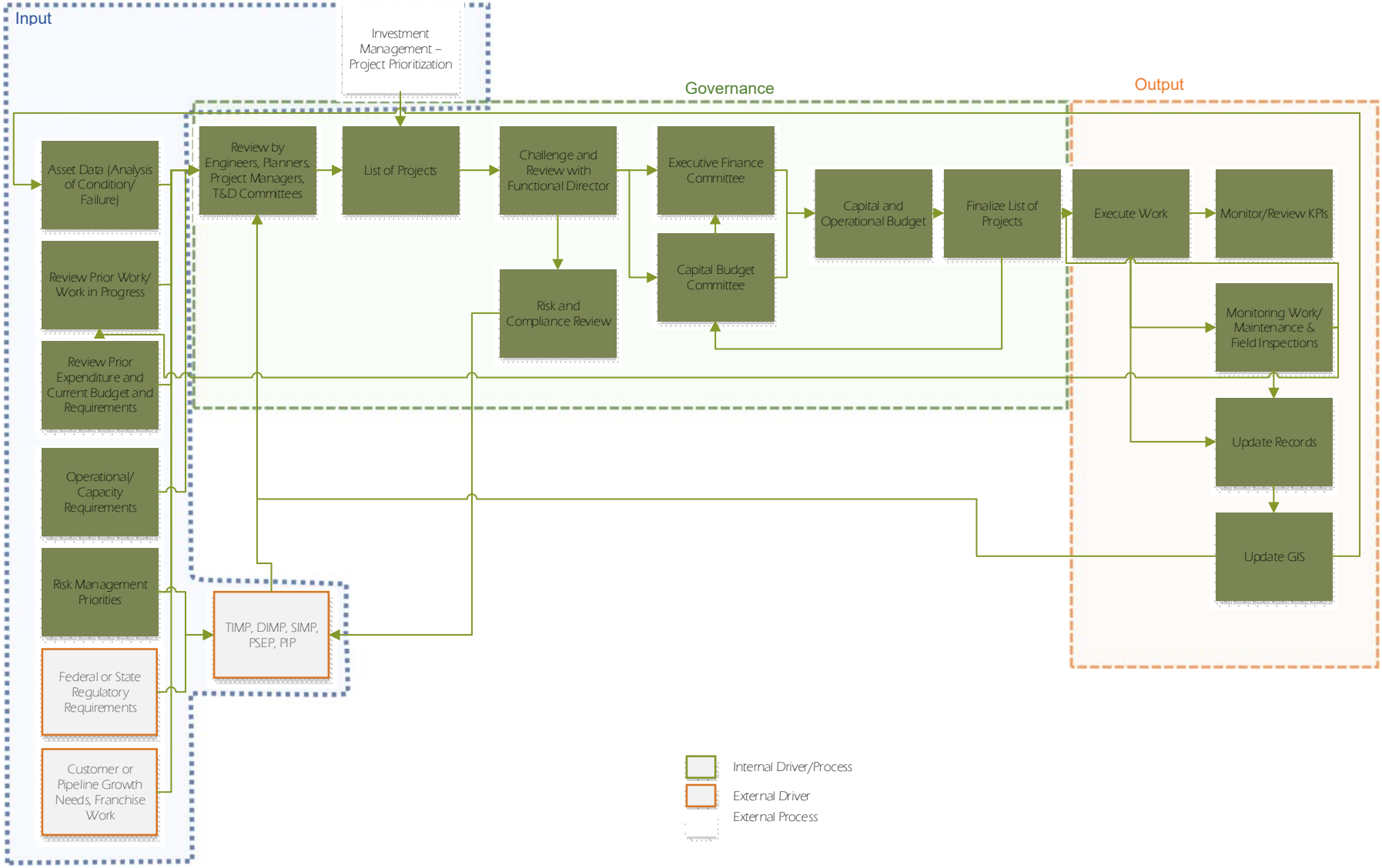
*Figure 9: Three-stage High Level Asset Management Process*




Similar to the recommended process in API 1173, the Company follows a "plan-do-check-act" framework as presented in Figure 10 which is further described below.

[20] SoCalGas Natural Gas System Operator Safety Plan – 1.

*Figure 10: SoCalGas' Gas Operations Asset Management*



As Figure 10 shows, the Company's Asset Management program can be viewed, at a high level, in three phases, and while this program is comprised of many processes that fit together linearly, there are several cyclical elements that ensure Asset Management in an ongoing process. Inputs are comprised of drivers and processes, such as asset data, prior and existing work and budgets, and capacity requirements; external drivers, such as regulatory requirements and customer needs; and the results of the investment management prioritization process, which is external to the Asset Management program.

The combination of these inputs informs the Engineering and Planning Departments, the T&D Committee, as well as pertinent personnel such as project managers. These groups generate a list of projects that are then submitted for consideration through the Company's investment management process for prioritization. The prioritized list of projects is submitted for challenge and reviewed by various committees prior to the creation of a finalized project list.

Once the finalized list of projects is endorsed by leadership, the list is provided to groups such as Operations and Construction for execution. Throughout the execution of the work, each operating area monitors and inspects work, tracks KPIs, and maintains and updates records. The asset management loop is not closed until the asset data systems such as GIS are updated with the data and records of the work that was carried out including any findings from field inspections.

## 5.4 INVESTMENT MANAGEMENT AT SOCALGAS

SoCalGas' planning process starts with a 5-year strategic plan that is established by Senior Leadership to provide executive guidance on budgets based on authorized funds and estimated needs identified by various functional areas in the organization. Each functional area has a committee that oversees the identification of funding needs and prioritization of work within that area. These committees at SoCalGas are identified as follows:

- Gas operations
- IT
- Facilities
- Customer service

On an annual basis, these various committees submit a prioritized list of funding needs to the Financial & Operational Planning Group. The Financial and Operational Planning Group then evaluates all requests from all functional committees to determine funding levels considering the following categories of work:

- In-flight: project construction is underway and/or planning work has been completed and is ready for scheduling
- Safety: work required to mitigate or address emergency response incidents, equipment and/or pipeline failures, employee working conditions, data/system
- Compliance: work necessary to comply with rules/regulations of local, state and federal governing agencies
- security issues, etc.
- Balanced: work with approved balancing account or other regulatory cost recovery mechanism (e.g. TIMP, DIMP, SIMP, etc.)
- Obligation to Serve: work compelled by a customer contract, agency commitment or general utility obligation
- Other: all other type of work that does not fall into any of the above categories

All identified work gets submitted to Financial and Operational Planning using Excel-based templates to document various information pertaining to the requested funding and is discussed within and across the various functional capital committees. The discussions consider how the funding requested impacts the company's priorities in the context of safety, system improvements, cost efficiencies and other factors. Financial and Operational Planning uses the information collected in the Excel templates as guidance to develop a preliminary prioritization of proposed projects.

Once Financial and Operational Planning determines an appropriate funding level that addresses key risks and needs of the organization, it produces a proposed portfolio to the Capital Committee. The Capital Committee is comprised of directors and financial representatives from each of the functional areas and is responsible for having cross-functional discussions of funding needs and determining the appropriate prioritization of work. Challenge sessions take place at the Capital Committee level where project managers are given an opportunity to present their business cases for the funding they seek. Once the Capital Committee goes through its annual meeting, it may re-prioritize the investment portfolio as deemed necessary by the members of the committee.

Financial and Operational Planning then facilitates the annual Executive Finance Committee (EFC) meeting where the final investment decisions are made. The EFC is comprised of officers that represent various functions across the Company and meets annually to discuss the proposed investment portfolio and determine the final set of programs and projects that the Company should fund the following year. In addition to the annual EFC meeting to determine appropriate funding levels and set budgets for the functional organizations at the Company, the EFC meets on a quarterly basis to determine any needs to re-prioritize or re-allocate funds based on emerging risks or operational constraints. An overview of this process and the interactions between the various entities involved in investment planning are depicted in Figure 11 and Figure 12 below.

*Figure 11 Investment Planning Overview*

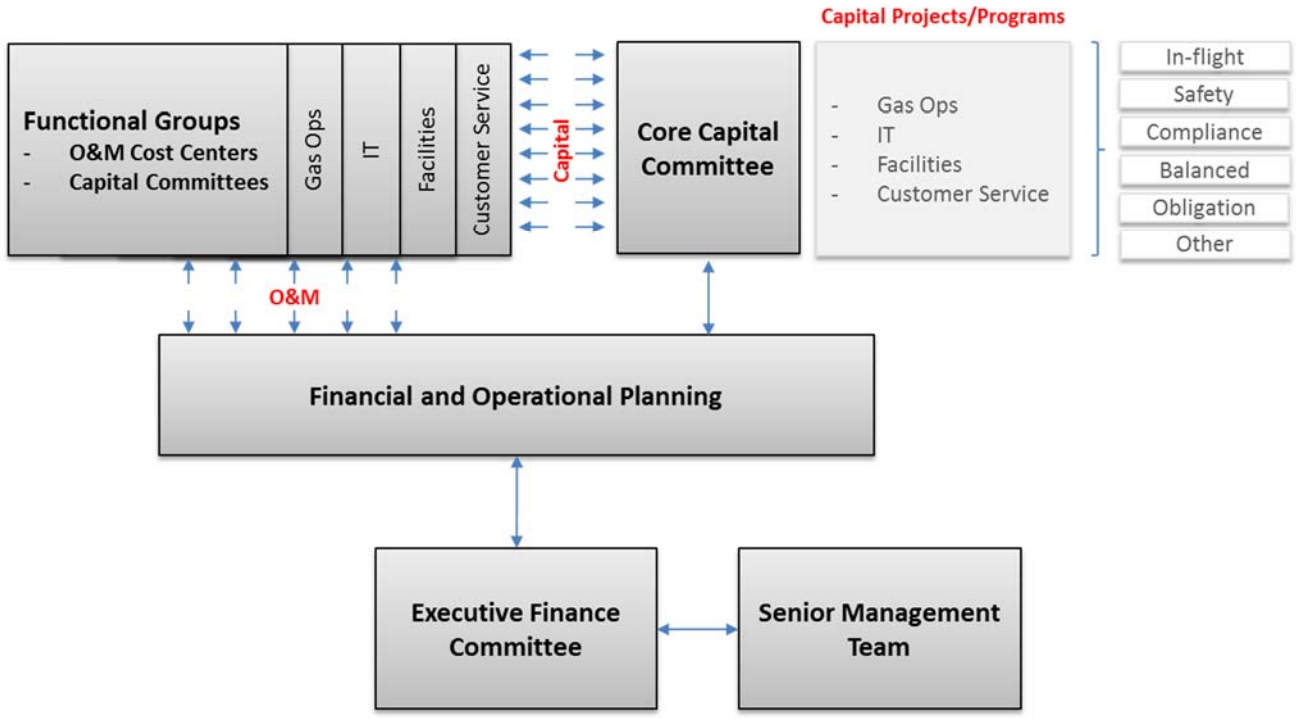
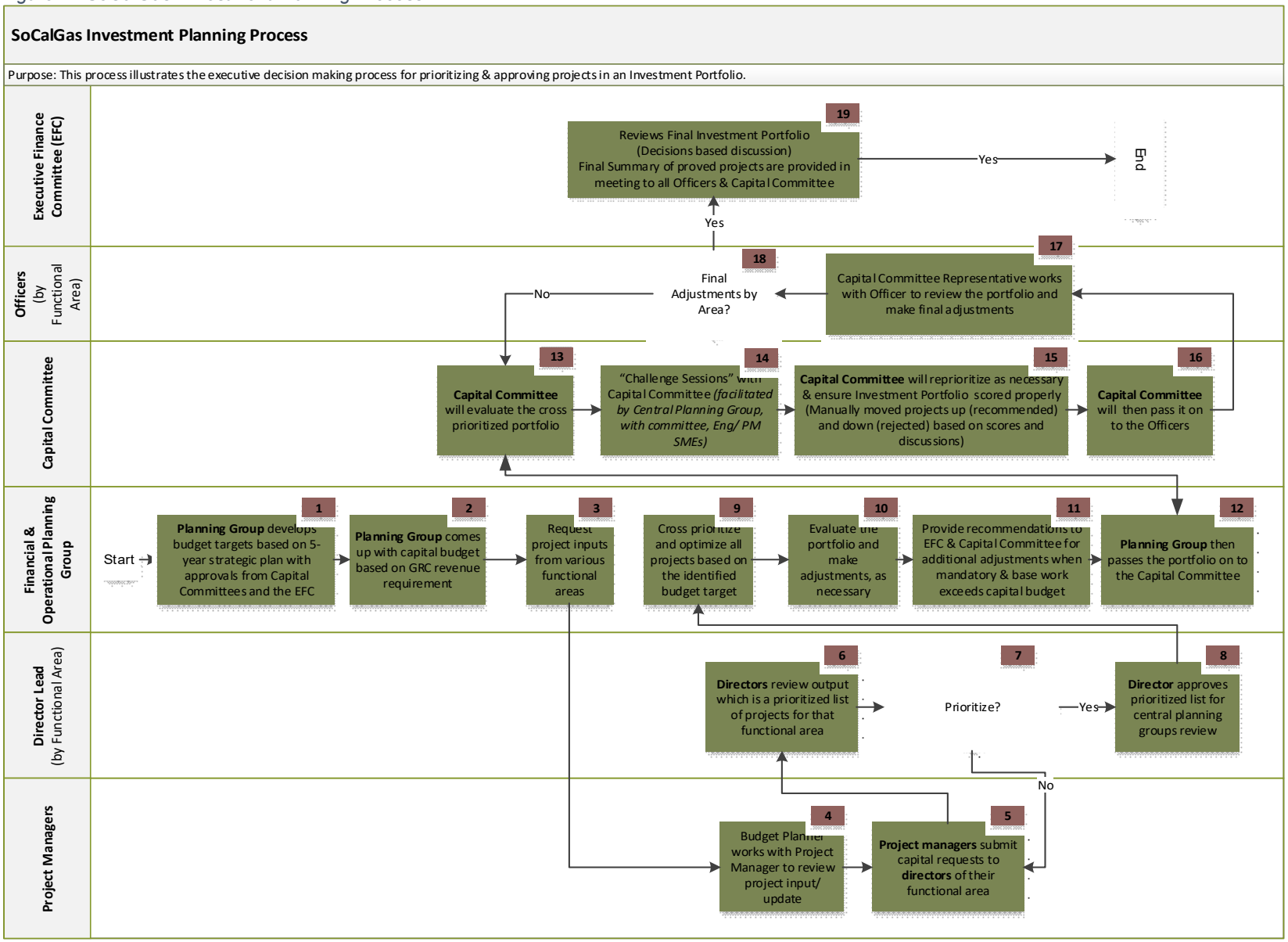


*Figure 12 SoCalGas' Investment Planning Process*



# 6 MATURITY ASSESSMENT

Davies Consulting conducted its maturity evaluations of SoCalGas' processes, procedures, and methodologies across the company. Early on, Davies Consulting determined that the Company had relied upon a uniform process and methodology for risk and investment management.

Use of a uniform process and methodology across SoCalGas aligns with the CPUC's request that utilities demonstrate in their GRCs that risks are being managed across the enterprise such that resources are being allocated appropriately across risks.

In contrast, asset management methodologies and processes vary across the company depending on the assets and the functional areas carrying out the processes and will be discussed accordingly in the following sections.

## 6.1 OVERALL ASSESSMENT

Over the past few years, SoCalGas' risk management processes and methodologies have matured where risk management has been embedded in the Company's culture and is consistently applied across the organization with its well-established and documented process and tools. The ERM process occurs annually and involves appropriate experts from various functional areas across the Company. While there remains room for improvement in terms of integrating risk into operations and decision making, the Company has begun that process through the piloting of operating unit risk registers and developing a roadmap to establish operational risk management over the next few years.

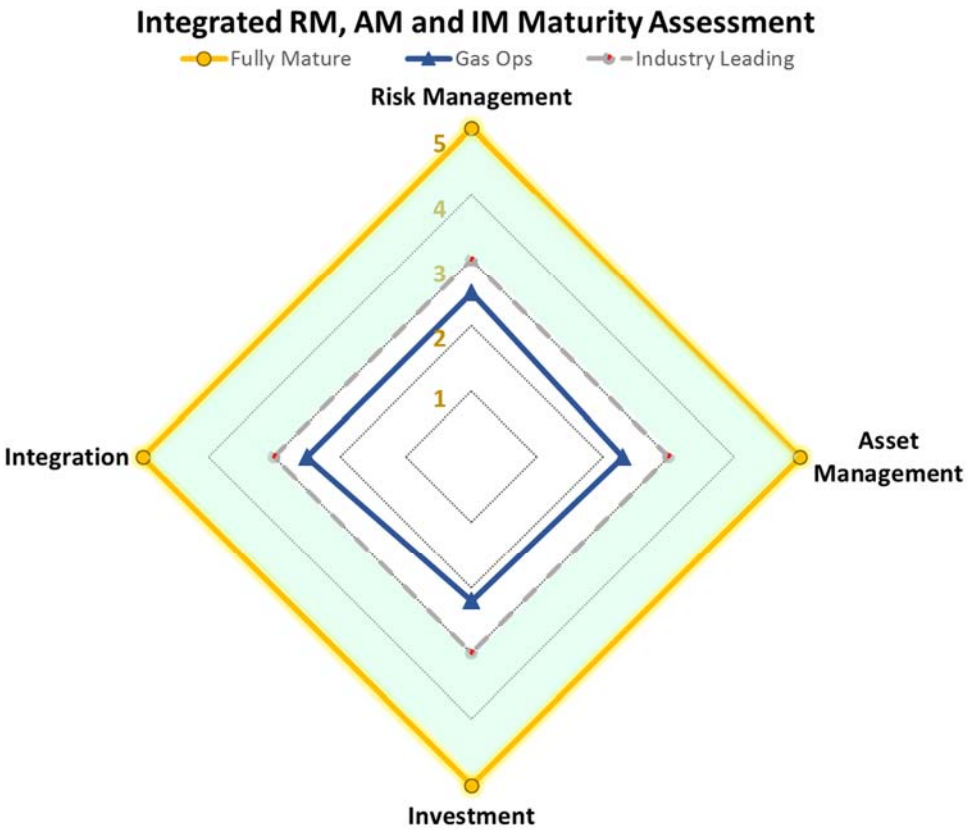
SoCalGas' asset management system is and, consequently, its asset management plans are, primarily driven by compliance and regulatory requirements. The momentum behind asset management improvement is increasing as evidenced by the appointment of dedicated internal teams and leaders to the implementation of API 1173. As this work progresses, the abilities of the organization should increase in multiple areas such as asset management planning, integration of operations with risk, and continuous improvement. The results of these improvements will ultimately lead to an improvement in safety and safety culture moving the company closer towards its vision.

SoCalGas' investment management process is well-structured with various committees representing different functional areas at the Company and appropriate forums to enable cross-functional discussions to take place to determine appropriate funding levels for the Company's various investments. However, the process is primarily subject-matter expertise driven with minimal and isolated use of data to drive investment decisions based on risk. The methodology that is currently used to prioritize work can be enhanced to address that.

SoCalGas' efforts to integrate risk, asset and investment management have increased over the past few years and are primarily driven by the risk management evolution. The ERM department has taken steps towards embedding risk management into the organization through its operating risk registries efforts and has begun to link risks to investments through the officer risk sessions that feed the annual planning process. However, the Company has yet to develop a more integrated approach to decision-making that considers the risks that the Company has identified in its ERM process and the various asset management plans in place.

Figure 13 below is a graphical representation of the Company's maturity levels relative to the current state of the industry.

*Figure 13 Integrated Maturity Assessment*




Note: Aviation, e-Commerce, Banking, Insurance and Space industries typically operate in shaded areas levels 4 and 5

## 6.2 RISK MANAGEMENT MATURITY

### 6.2.1 Overall Maturity

SoCalGas has established and implemented a uniform risk management framework and process that involves all functional areas of the Company. While there are opportunities to improve risk management in terms of probabilistic modeling, assessing interrelationships of risks and better-integrating risk management into decision-making, SoCalGas has successfully evolved its risk culture over the past few years and has embedded it into its operations.

Early steps towards building operational risk management are evident in the development of risk registers across identified asset families and functional areas of the organization. This effort is at an early stage of maturity and has not yet achieved the intended level of integration of risk management and decision-making. Achieving that level of integration takes several years to accomplish and SoCalGas is working diligently towards that goal.

Additionally, Risk assessments are primarily driven by subject-matter expertise and have yet to evolve to more rigorous analytics based on data to more strongly support risk scoring and monitor risk performance over time using metrics. To that end, the Company has started to document some risk metrics and incorporate them in its risk assessment discussions as demonstrated in its RAMP application.

Overall, SoCalGas has achieved a maturity level of 2, as illustrated in Table 9, but has demonstrated progress towards achieving leading utility-industry practices by embarking on the development of operational risk management and enhancing the use of data in its risk assessments. To achieve a level 3, SoCalGas will need to complete its operational risk management initiative and fully establish risk management governance in each operational unit across the Company to ensure risk management is embedded into its culture at all levels down to its field operations.

*Table 9 SoCalGas Evaluation - Risk Management Maturity*

| Current Utility Industry Levels of Maturity Demonstrated | | | | | Maturity Opportunity for Industry Evolution | |
|---|---|---|---|---|---|---|
| | | | SoCalGas ◆ | | | |
| Level | 0 | 1 | 2 | 3 | 4 | 5 |
| Characteristics | No Formal Process or Methodology | Not part of the organizational culture. Risk Management isolated, undocumented and is characterized by as one that is not repeatable. Not established in a formal process or repetitive timeline. Some evidence does exist that risks are discussed and considered, but the results are not codified or used across the enterprise. | Not part of the organizational culture. Risk Management isolated as an annual process conducted to inform at the Board of Director level and based upon an ad hoc process. A single corporate risk registry may exist, but inputs are subjective in nature with no evidence of data to support the inputs. Operational risks are managed separately at the business unit level with limited process of communication, understanding, or relationship to other business units. Risk Identification, Evaluation, Analysis and Prioritization are subject matter expertise driven and do not account for uncertainty or interrelationships of risks. No metrics are used to measure performance. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published standards. Most/all business units of the enterprise maintain their own risk registers and use those to communicate enterprise and operational risks across the enterprise. Risk assessment is characterized by a more qualitative/subjective approach. Risk identification, evaluation, analysis and prioritization are subject matter expertise driven and do not account for uncertainty or interrelationships of risks. Lagging performance metrics are used to measure performance. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published standards. Business unit enterprise and operational risks are communicated across the enterprise and are characterized by a balance of quantitative and qualitative/subjective approach. Risk Identification, Evaluation, Analysis, and Prioritization are primarily subject matter expertise driven, attempt to account for uncertainty and the interrelationships of risks. Deterministic methods of risk characterize the risk-informed decisions. Lagging performance measure are predominantly used to measure performance. Evaluates risk mitigation alternatives. Validates the effectiveness of risk mitigations. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published standards. All levels of the organization provide input. Business unit enterprise and operational risks are communicated across the enterprise and are characterized by a qualitative and probabilistic analysis. Risk Identification, Evaluation, Analysis and Prioritization are data driven, account for uncertainty, and interrelationships of risks. Leading and lagging performance metrics are used to evaluate risk management effectiveness and are monitored continually. Tolerance levels of risk are associated potential loss exceedance. Operational and investment decisions are risk-based and focused on the risk exposure reduction. Noted as industry leader and used as a benchmark by other companies |

### 6.2.2 Detailed Maturity

#### *6.2.2.1 Risk Management Framework*

The risk management framework is a set of components that provide the foundations and organizational arrangements for designing, implementing, monitoring, reviewing, and continually improving risk management throughout an organization.[21]

SoCalGas' risk management framework was established in alignment with ISO 31000 to promote and embed risk management into the Company's operations. As such, SoCalGas has a documented risk management framework that states the Company's risk management policy, clearly identifies risk management roles and responsibilities and establishes governance and accountability of risk management across the Company.

Additionally, the Company has committed resources to risk management as an essential element of developing its framework. Over the past few years, the Company expanded its ERM organization and added personnel with various operational and analytical backgrounds to support its objectives of building a leading risk management practice for the Company.

An important element of establishing a risk management framework is having a consistent method for communicating risks across an organization and with external stakeholders. SoCalGas' internal risk management communications follow a consistent format through the material that is developed as a part of its four risk sessions and in its enterprise risk registry. Externally, the Company has developed well-documented risk mitigation plans that have been publicly filed with the CPUC in its most recent RAMP application.

To monitor and improve its risk management framework, SoCalGas participates in industry events and forums such as Deloitte's annual risk roundtable to share and obtain knowledge on leading risk management practices. SoCalGas is also a member of the risk management committees at both Edison Electric Institute (EEI) and the American Gas Association (AGA). Furthermore, the Company has developed risk management training material and forums to continue to cultivate its risk management culture and share risk management knowledge across the organization. The Company has also started to develop metrics that can be used to monitor its risk management performance as an indicator of the strength of its risk management framework and where improvements need to be made.

Opportunities for improvement of its risk management framework exist in the development of an operational risk management approach that will enable further integration of risk management into day-to-day operations. SoCalGas has taken the first steps towards implementing this framework by piloting the development of two operating unit risk registers and developing a roll-out plan to further develop such registers for all operating units across the Company.

#### *6.2.2.2 Risk Management Scope/Context*

Establishing the risk management scope entails the identification and communication of organizational objectives, strategic priorities, internal and external factors that will influence the evaluation and mitigation of risks and the criteria against which risks will be evaluated.

[21] International Organization for Standardization, ISO 73: Risk management – Vocabulary (Geneva, Switzerland: 2009), 1-24.

SoCalGas' organizational objectives are clearly identified and communicated across the Company and its risk management process considers various internal and external factors that influence its risk management actions. Internally, the Company has established objectives and priorities around which risks should be managed and externally, SoCalGas monitors its regulatory context and enhances its risk management practices to align with regulatory expectations and changing risk environments.

As a part of establishing its context, the Company has a risk management handbook that clearly frames the scope of its risk management process. In its handbook, the Company has an established risk lexicon that is aligned with the lexicon established at the CPUC for California utilities along with a risk taxonomy that was developed to clearly structure and organize the Company's risk identification process.

Additionally, SoCalGas' risk criteria have been established and are consistently applied in its process through the Company's REF where the various consequences of risks are defined and consistently used to assess the Company's risk profile.

There remains room for improving the Company's risk management scope and context through the establishment and use of risk tolerance to guide risk management decisions and the consideration of how interactive risks and threats affect the Company's risk profile. Such practices are considered pioneering and have been implemented primarily in more advanced industries such as nuclear and aviation.

#### *6.2.2.3 Risk Identification, Analysis, Evaluation and Prioritization Process*

Risk identification is the process of finding, recognizing and describing risks.[22] SoCalGas' risk identification process is guided by the ERM organization and follows a consistent methodology to clearly identify the risk events along with the various drivers of the risk and the potential consequences a risk event may lead to. In addition to the use of risk bowties to identify risk components such as the risk event, the drivers and its consequences, another useful tool that the Company has developed for risk identification is the risk taxonomy which has proven valuable in guiding risk discussions to define risks within given categories of assets, functions and related sources of the risk. The taxonomy helps enable comprehensive consideration of various risk scenarios that may occur.

Risk analysis is a process for comprehending the nature of risk and to determine the level of risk.[23] SoCalGas' risk analysis is primarily driven by subjective input from appropriate experts who are engaged throughout the risk management process to provide their insights. For its top safety risks, the Company conducted and documented risk bowtie analyses as demonstrated in its filed RAMP application.

Risk evaluation is a process of comparing the results of risk analysis with risk criteria to determine whether the risk and/or its magnitude is acceptable or tolerable.[24] At SoCalGas risk evaluation is done using the Company's well-established REF where every risk is evaluated in terms of its likelihood and the severity of the various consequences it might lead to. Using its

[22] International Organization for Standardization, ISO 73, 5.

[23] Ibid., 6.

[24] Ibid., 8.

REF model and algorithm, SoCalGas calculates a risk score and uses that score to prioritize the Company's risks.

In general, SoCalGas' process for identifying, analyzing and evaluating risks can be further improved with the use of data and the application of more probabilistic assessments to capture and communicate the uncertainty associated with risks. One of the early steps that SoCalGas has taken towards that is in the identification and assessment of not only a reasonable, worst case scenario but also a more likely scenario in the piloting of operating unit risk registers. Moving away from using a single point to represent risks is an early demonstration of capturing uncertainty and paving the way for more probabilistic modeling in the future.

#### *6.2.2.4 Risk Treatment and Monitoring*

Risk treatment is the process of evaluating and implementing measures to address identified risks. SoCalGas utilizes its Risk Mitigation Planning sessions to develop risk treatment plans and monitor their implementation. However, the process of evaluating risk controls and mitigations has not yet been integrated with the Company's investment planning process. The current investment planning process evaluates projects and programs with minimal and anecdotal links to the Company's identified risks making it challenging to capture and track all aspects of risk management from identification to treatment and monitoring.

Although SoCalGas has made efforts to bring risks to the table when discussing the allocation of funds, it has not yet formalized a process to use the Company's risk registry as a starting point for developing its investment portfolio. However, the Company has piloted such a process and methodology as presented in its RAMP application where Risk Spend Efficiencies (RSEs) were calculated for risk controls and mitigations as a way of communicating the effectiveness of risk treatment measures at reducing the Company's risks. SoCalGas is now capturing lessons learned from that pilot and from on-going regulatory proceedings (e.g. S-MAP) to develop an appropriate methodology to better-integrate risks and investments in the future.

### 6.2.3 Specific Highlights

In addition to the overall assessment of risk management described above, there has been a growing level of understanding, knowledge and application of risk management within the gas organization, the RAMP process has been a major contributing factor for this transition.

In addition to the changing regulatory requirements several improvements have been made that allow for a greater level of program maturity. The continued usage of models and tools such as DREAMS and the integrity management processes in Transmission Integrity Management (TIMP) and Distribution Integrity Management (DIMP) provide risk insight and the ability to make higher resolution risk-based decisions.

In 2016, as a part of its operational risk management pilots, ERM facilitated the development of the Company's first gas-specific risk register representing the medium-pressure system. ERM's plans for the next few years is to continue to develop such registers for all gas assets and other functions across the Company.

## 6.3 ASSET MANAGEMENT MATURITY

### 6.3.1 Overall Maturity

Within Gas Operations, asset management is primarily focused on addressing pipeline integrity and no group has holistic oversight for addressing all gas asset types in a consistent and comprehensive manner. Thus, SoCalGas' Asset Management maturity is at Level 2 as depicted in Table 10.

A key reason for the maturity score is the duration over which the program has been formally in place within the Company. The recent moves to create dedicated organizations for asset management, including creation of the Integrity Management and staff programs, to roll out API 1173, will better formalize asset management. These teams, however, need to continue to grow in size and influence to build the drive required to meet API 1173 conformance.

As the teams are established, SoCalGas should clearly define the scope of the asset management system (i.e., which asset groups are included and which are excluded from the official scope of the system). An asset management policy, once established will set out the overall intent behind which the Company will operate its assets and set out the foundation for assigning asset families, asset family owners, and the creation and implementation of asset management plans.

*Table 10 SoCalGas Evaluation - Asset Management Maturity*

| Current Utility Industry Levels of Maturity Demonstrated | | | | | Maturity Opportunity for Industry Evolution | |
|---|---|---|---|---|---|---|
| | | | SoCalGas ◆ | | | |
| Level | 0 | 1 | 2 | 3 | 4 | 5 |
| Characteristics | No Formal Process or Methodology | Evidence of Asset Management only at operational unit level. Ad hoc process established in some business units. Critical assets understood and prioritized based upon subject matter expertise. Asset Management Plans and Strategies are not developed or codified. Asset management efforts are resourced annually. There is no evidence of review and improvement on a cyclical basis. Asset management reactive in nature. | An ad hoc but formalized and documented process is established for business units. Critical assets are understood and prioritized based upon subject matter expertise. Individual asset alternative strategies are evaluated using subject matter expertise. Asset Management Plans and Strategies are developed for individual assets. Asset strategies are resourced annually. Evidence is present that the Asset Management process is monitored and continually improved. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published international standards. Certified or provides evidence of adhering to international standards. Critical assets understood and Asset Management alternative strategies are evaluated using subject matter expertise. Asset Management Plans and Strategies are developed for individual assets and implemented. Asset strategies are resourced annually. Asset Management is continually improved. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published international standards. Certified or provides evidence of adhering to international standards. Critical assets understood and Asset Management alternative strategies are evaluated using subject matter expertise. Resource constraints are accounted for in lifecycle plans. Asset Management Plans and Strategies are developed as an integrated system, codified, implemented, and monitored with a short and long term view. Asset Management is continually improved. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published international standards. Certified or provides evidence of adhering to international standards. Mature Asset Life Cycle for critical assets understood and Asset Management alternative strategies are evaluated in a probabilistic environment that enables understanding of uncertainty, and interrelationships of asset failures. Asset Management Plans and Strategies are developed as an integrated system, codified, implemented, and monitored with a short and long term view. Benefits of AM program can be demonstrated and measured. Asset Management is continually improved. |

### 6.3.2 Detailed Maturity

#### *6.3.2.1 Asset Management System/Program*

An asset management system is a set of interrelated and interacting elements of an organization, whose function is to establish the asset management policy and asset management objectives, and the processes, needed to achieve those objectives.[25]

During this assessment, Gas Operations established a formalized structure for implementing API 1173 and, under the guidance of the Director of Integrity Staff and Programs, initiated the process of API 1173 conformance. This is a positive development as it clearly signals organizational intent to enhance the maturity of practices with the backing of the senior leadership team. This builds upon the position of the recently-created Asset Management Vice President role.

There are relatively mature practices in place within Gas Operations that allow for enhanced decision making. Examples of this include certain asset family groups making better use of data and converting that data into information and asset management insight. The compressor group exhibits this practice effectively. SCADA-based telemetry provides real time information that allows operators and managers to assess asset health through the use of devices such as strain gauges, vibration sensors, and performance monitors. To ensure reliability, the compressor group considers the commercial and technical obsolescence of some compressors and then makes judgements, looks for patterns of failure, and tries to predict when failures will occur. This approach supports timely and cost-effective acquisition and strategic spares. This example illustrates the practices of more advanced asset management within the organization.

Another example of advanced practice is demonstrated within the smart metering division. As resources haven been placed under increasing pressure, the organization responsible for the management of the smart metering fleet has taken a more proactive stance at understanding the current state and condition of their assets. This allows the smart metering division to come up with more strategic and holistic views of how the smart metering assets can be managed. For example, the smart meter system is 7 years old and the asset life is 10-12 years. The smart metering team knows the systems are on the cusp of seeing failures across the family. Therefore, the team have become more proactive in understanding asset health and asset information. They do this by collecting data and trending failure types, modes, manufacturers, locations etc. This allows them to predict asset failure volumes and be more proactive in managing the system. An example is that the smart metering team has their own QA/QC function that follows behind the work of operations to test the quality of workmanship, customer satisfaction etc. This information is fed back to management for review that feeds into investment plans

Integrity Management has been a long-standing program within the company. The continued application of TIMP and DIMP allows the company to make decisions in a more repeatable and consistent manner. These integrity programs are well documented through procedures with a clear vision regarding how they are to be used, the variables that are important, and the way in which the results are used to make decisions within the business unit.

[25] ISO 55000, 4.

Due to the emergent nature of the Asset Management program, there is no formal documentation that describes the scope of the Asset Management System. A scoping document would allow for the articulation of an Asset Management Policy and Strategy with a clear linkage to asset management objectives and individual asset management plans. The company does have a suite of guidance documents (e.g. gas standards, the operator safety manual, etc.) which support asset safety and asset management; however, these documents do not address a holistic plan, encompassing cost, risk, asset performance, for the life-cycle of the assets. Once in place, the asset management policy, strategy and plans would guide how work is planned and risks are mitigated. The integration of asset risk and asset investment processes would provide the means for asset strategies and plans to drive operational work plans. The resulting work plans would support a more optimal asset management system.

#### *6.3.2.2 Role of Senior Leadership*

ISO 55000 maintains that "leadership and commitment from all managerial levels is essential for successfully establishing, operating, and improving asset management within the organization."[26] All managerial levels are responsible for ensuring that appropriate resources are in place to support the asset management system. Senior leaders should also create the vision and values that guide the policy and promote those values,[27] in defining roles and responsibilities.

Leadership has demonstrated a commitment to promoting industry-leading asset management values by investing in initiatives to maintain compliance with commitments, regulations, and corporate safety objectives. This has been exemplified in the appointment of the Asset Management Vice President as well as the Director of Integrity Staff and Programs within Gas Operations and in the investment in pipeline integrity assessment tools as well as the most recent initiative to implement API 1173.

As described in section 6.3.2.1, the asset management program within the company is in its early stages of development. The interview process revealed that the level of understanding around asset management is also at an early stage. However, the API 1173 program has begun implementation and is expected to drive a common understanding of the meaning and purpose of asset management throughout the organization.

There are areas of the organization in which leadership is communicating the need to be more proactive, and conversations regarding work and asset management are more frequently taking place. For example, the RAMP process for risk management elevated the conversation regarding asset management, and the tightening of budgets in some areas has forced a greater consideration of asset performance trending.

In addition, there was evidence through the interview process that inconsistency over the term asset management was present. This is, in part, due to the lack of a common lexicon on asset management. As the recently established program team gains momentum, frequent and consistent support messaging from appropriate levels within the business will help establish that knowledge and drive consistency across the Company. Over time, there should be a gradual cascade of company-wide goals related to the implementation of API 1173 and ISO 55000 into the goals of teams and individuals that play a contributing and supporting role. Doing so should

[26] ISO55000:2014

[27] Ibid., 7.

promote alignment over the strategic intent of the program and increase employee understanding of the associated terminology.

As the quality and quantity of asset management related information increases to employees within the organization there should be a corresponding change in the way resources are allocated and managed. For example, today there is limited comparison and optimization across asset groups and most of the investment and risk management decisions are at best optimized within an asset family such as Transmission pipe. With increasing maturity of the company's asset management practices, there should be greater financial and operational flexibility in sharing and allocating resources across the company.

#### *6.3.2.3 Development of Plans to Manage Assets*

Per ISO 55000, asset management plans "should define the activities to be undertaken on assets, and should have specific and measurable objectives."[28] These objectives should be based on risk and the criticality of the assets.[29] [30]

Certain asset groups such as Transmission pipe are utilizing risk-based asset management plans. Similarly, for the Distribution pipe asset family, information pertaining to asset performance such as 3rd party dig ins, leaks, etc. are utilized to construct investment plans and there is evidence of prioritization within the asset group.

There is opportunity to improve the way in which the various groups prioritize and optimize asset plans. For example, there is opportunity for more consistency in the way in which models are used to gather information to make asset management decisions. The DREAMS tool used in the Distribution asset family provides a level of risk-granularity not seen in other asset groups such as valves.

In addition, there appears to be opportunity to better understand the physical locations and condition of the asset groups. There has been a major program around the implementation of a GIS system; but, interviews revealed a lack of confidence over the quality of data within the GIS system. Additionally, geo-location appears to only cover a subset of the asset groups. This may be an intentional limitation that reflects a balance of cost and risk, but consideration should be given to address any gaps in asset knowledge. At a foundational level having clear line-of-sight to this basic data will make a major difference in the understanding of the assets. Once this information is collected the connection with GIS systems will allow for improved connection with the future asset management strategies and plans.

The absence of a formalized and integrated methodology to capture and assess asset non-conformities, safety issues and opportunities is having a downward impact on the maturity score within the business. This however is being addressed by a recently introduced corrective action system called Safety Observation Reporting System (SORS) which allows employees to raise issues observed through daily operations. As SORS is implemented further and socialized throughout the organization, it will enable methodical non-punitive issue capturing, risk-based assessment, trending and closure of issues, and allow for actions and lessons to be

[28] Ibid, 9.

[29] ISO 55002, 9

[30] Ibid., 12

institutionalized in a more systematic and systemic way. This will ultimately improve the safety culture of the organization.

#### *6.3.2.4 Data, Information and Resource Requirements*

To conform to ISO 55000, the Company needs to determine the necessary support elements required for the development and implementation of the asset management plans and objectives. This includes resources, competence, awareness, communications, documentation, and information systems.

There are a number of initiatives underway to support the organizations data, information and resource needs. One such initiative is the Enterprise Asset Management (EAM) which is intended to integrate the disparate systems that house and manage asset data, such as SAP and GIS. This initiative will continue to drive maturity for the organization as asset management data becomes more centralized and accessible.

However, this area of the assessment showed multiple opportunities for improvement. Data availability and quality vary depending upon the asset family. Through the interview process there were multiple references to the increasing usage and proliferation of KPIs within the organization. Examples of KPIs include: average time to respond to an emergency, number of job observations per employee, and total pipeline replaced. Interview feedback suggested, however, that KPIs do not always drive asset-related decision making and are often based on task completion (e.g. miles of pipeline installed) and cost (i.e. budget). Supplementing such KPIs with those that address asset health and performance would improve the Company's maturity level in this area.

As the organization develops, it should consider both refining the number of KPIs in use and more importantly developing a clearer line of sight to how these KPIs drive decision making.

Once the asset families are structured and established, there should be an opportunity to closely link the asset data needs with the IT program and roadmap. Critical questions would be addressed and the IT roadmap could be recast as necessary to satisfy the data needs of the asset family.

During the interviews, respondents referred to the way in which resources are allocated to various asset groups and how work is executed. Through a more comprehensive assessment of asset management needs over a longer time horizon, the Company could achieve a more effective and efficient balance of labor supply with work demand within practical constraints. Exceptions appear to be in the PSEP and major project organizations where there is a longer-term resource management view set up to drive greater work planning and execution efficiency. This appears to have been accomplished through taking a programmatic view of the needs over multiple years. When taking such a perspective it is easier to balance supply and demand from a resourcing perspective as well as apply lessons learned from one year to the next. The Company should consider how these features can be applied elsewhere to achieve similar benefit.

Contingent workforce and retirees create a concern regarding knowledge management in the organization. As employees retire and demands increase, the employees are spread thinner with a greater reliance on contractors, such as in the engineering organization. The Company may develop a strategy to maintain critical organizational knowledge through adequate hiring

and training practices to counterbalance the turnover of employees equipped with needed knowledge and skills.

#### *6.3.2.5 Implementation of Asset Management Plans*

According to ISO 55000, the organization should establish operational planning and control processes to support effective delivery of the activities contained in the asset management plans.

Some asset groups, particularly pipelines, represent reasonable levels of effectiveness in terms of documenting approaches, desired outcomes and results. Examples are the integrity management programs of TIMP and DIMP. These programs have clearly defined roles and responsibilities, risk-informed analysis techniques that leverage prior year inspection results, process/program metrics and controls, externally-focused communication protocols, and formalized processes and standards (e.g. gas standards).

However, the current level of asset management maturity means that the foundational strategic structure of a comprehensive asset management policy, strategy, objectives and plans are not yet in place. The closure of this gap will allow for the development and implementation of a more strategic view of planning, prioritizing and executing on work.

As the existing plans are converted in accordance with the standards of ISO 55000 and API 1173, they should be made more holistic to align with a complete life-cycle view for all asset types. To increase the effectiveness of current practices, the Company should implement robust governance processes, define objectives, and create asset plans that consider the entire asset management cycle for all asset types, while balancing performance, risk, and investment to best achieve corporate objectives.

#### *6.3.2.6 Maintenance, Monitoring, Review and Continuous Improvement*

ISO 55000 asserts that an "organization should evaluate the performance of its assets, its asset management and its asset management system."[31] The Company should develop a set of performance indicators to measure the asset management activity and outcomes.

The Company has several monitoring and continuous improvement processes, including:

- DIMP Chapter 6 which provides for code-required "Measure Performance, Monitor Results, and Evaluate Effectiveness" tasks;
- The documented process for incident investigations in Gas Standards 191.01 and 223.0030.

The Company also has in place an extensive auditing process with several lines of defense (e.g. functional unit self-audits, company internal audits and regulatory audits) to ensure compliance across all lines of business. Many of the interviewees noted a strong commitment by management to resolve issues discovered during the audits. Continuous improvement is part of the pipeline safety programs, gas standard administration, and the Gas Safety Plan.

The central philosophy to API 1173, ISO 55000 and other asset and safety management systems is the plan-do-check-act cycle. This implies that the system be continually improving. These improvements should be closely monitored by the central program team for delivery as

[31] Ibid, 9.

well as integration across the various areas (e.g. operational improvements with asset management improvements).

If the company is to adopt this plan-do-check-act philosophy and formalize the vehicles in which this will be captured, it can expect positive changes to the safety culture within the business. For example, the thoughtful introduction of new or revised tools and technology because of employee feedback, can have a positive engagement impact across the organization. Ultimately, the improvement of safety and safety culture is the principal objective of applying a safety management system within the organization, which can be accomplished via a continuously improving system.

Because the asset management program within the organization is in the early stages of its development, there are expected gaps in how the overall system is assessed from a performance perspective. Consideration should be given to better understand how the various governance committees in place drive the monitoring and the improvement of the overall asset management system. Consideration should be given to expand existing and/or create new approaches that ensure clear understanding of maintenance and monitoring of the system and its performance. For example, having a forum where asset family owners could communicate the performance and any needs they may have would further increase the level of awareness but also drive cross-asset family integration.

## 6.4 Investment Management Maturity

### 6.4.1 Overall Maturity

As discussed earlier, SoCalGas has established a uniform and repeatable process for making investment decisions with a well-established governance structure that has defined various committees that support the decision-making process.

Additionally, the Company has in place a methodology that is used to evaluate proposed programs and projects that considers a set of risk attributes similar to those used to evaluate the Company's enterprise risks.

Over the past few years, the Company has also enhanced its investment planning discussions by further integrating its ERM process with its investment planning process through the development of the Risk Mitigation Planning session and the inclusion of ERM representatives in the Company's financial planning committees.

While the process is well-defined and structured, decisions are still primarily subjective in nature and the prioritization of funding across all programs and projects is not necessarily consistent or repeatable. Furthermore, the methodology that the Company currently uses to evaluate benefit of investments is primarily used for guidance and thus, funds are typically allocated to functional areas and those functional areas determine how to best prioritize their budgets using separate and varying tools tailored to their specific areas and needs.

Overall maturity of the investment management process at SoCalGas can be classified as a level 2 as depicted in Table 11.

*Table 11 SoCalGas Evaluation - Investment Management Maturity*

| Current Utility Industry Levels of Maturity Demonstrated | | | | | Maturity Opportunity for Industry Evolution | |
|---|---|---|---|---|---|---|
| | | | SoCalGas ◆ | | | |
| Level | 0 | 1 | 2 | 3 | 4 | 5 |
| Characteristics | No Formal Process or Methodology | Characterized as a Bunch of Guys Sitting Around a Table (BOGSAT). Decisions based on judgement. Process is not transparent, repeatable, consistent or auditable. | Objectives and priorities are communicated, but a formal auditable process is still not present. Decisions remain judgment based in terms of the value to the company and allocation remains within business unit silos. | Transparent, repeatable, and consistent method that is in business unit silos. Allocations are made at an Executive Level based on judgment but are tied to corporate objectives. Investments are prioritized against a value definition. | Transparent, repeatable, consistent, and auditable method across the enterprise that is based upon subject matter expertise and is deterministic in nature of evaluation. Allocations are based upon an optimal objective function of that seeks to maximize the return of an objective within the constrained resources. Investment alternatives evaluated objectively. Accountability for the claimed investment benefit is documented and tracked. Investments are aligned with strategy. | Transparent, repeatable, consistent, and auditable method across the enterprise that is data drive and uncertainty in investments are accounted for. Allocations are based upon an optimal objective function that seeks to maximize the return of an objective within the constrained resources. Investment alternatives evaluated objectively. Accountability for the claimed investment benefit is documented and tracked. Investments are aligned with strategy. |

### 6.4.2 Detailed Maturity

#### *6.4.2.1 Process and Evaluation*

The investment planning process at SoCalGas follows a consistent framework with well-structured committees that represent the various functional areas of the Company and allow for cross-functional funding discussions to take place.

Furthermore, the existence of common templates that are consistently used by all functional areas provide a common platform for communicating funding needs to senior management.

However, as previously mentioned, risks identified in the ERM process are not the starting point for strategic planning and investment allocation. Instead, templates for seeking funding are populated in isolation of the Company's risk priorities established in the ERM process and risks are qualitatively included to guide discussions but are not used to quantify potential risk reductions that may be achieved by proposed investments.

#### *6.4.2.2 Investment Review Process*

SoCalGas has put in place templates for capturing funding needs based on the different categories it established as a part of its process. Over the past few years, SoCalGas has enhanced its review process for these categories of funding by challenging funding requests and seeking further documentation to support the needs identified by the various functional areas. Most recently, the Company started to link its enterprise risks to funding requests by adding a section in the template to specify which risk the project/program is mitigating and describe the impact of not funding the project/program. These measures enhance accountability in the process and improve the Company's review of funding allocations.

Overall, the Company utilizes this Excel template to evaluate the benefit of proposed investments using a set of risk attributes similar to those used in the ERM process to score risks but the outputs of the tool are primarily used as a general guidance for discussions and not a quantitative representation of optimal portfolios.

Furthermore, the correlation between the set of projects/programs that are produced at the end of this allocation process and the risk treatment activities discussed in the Risk Mitigation Planning Session is not clear and can be further improved.

#### *6.4.2.3 Investment Documentation and Communication*

While SoCalGas has established a template for developing and documenting business cases for proposed projects/programs, the template has not been consistently applied across the Company and different functional areas apply different levels of rigor and sophistication in developing their business cases.

However, the Company's most recent RAMP application can be highlighted as a strength for documenting and communicating well-structured business cases for proposed investments using risk information from the ERM process.

#### *6.4.2.4 Optimal Portfolio Determination*

SoCalGas determines its optimal portfolio of investments primarily through the discussions that take place at the various financial committees that share system needs, risks and funding needs across the Company. The discussions include various inputs from stakeholders and experts in the organization and may use outputs of the investment prioritization methodology to guide the

discussion but the final determinations are primarily based on subject matter expertise with minimal documentation of quantifiable benefits of investments.

#### *6.4.2.5 Investment Monitoring*

Investment monitoring primarily occurs through the regular EFC meetings where progress on approved investments is tracked and discussed and the need for re-prioritization of funding is determined on a quarterly basis.

Further monitoring capabilities are currently being established as a part of meeting accountability tracking requirements set forth by the CPUC. SoCalGas just filed its first accountability report showing approved funding from the CPUC and actual spend by the Company.

However, due to the lack of quantifiable metrics to demonstrate benefit of approved investments, there is minimal monitoring and communication of the benefits of implemented projects and programs in terms of reducing risks to the Company and meeting strategic objectives.

#### *6.4.2.6 Effectiveness Review Process*

SoCalGas has made slight modifications to its investment planning process over the years. Some examples of that were previously mentioned where risk assessment requirements were built into the funding request templates.

Additionally, the Company has piloted a methodology for quantifying the benefit of investments using a risk reduction metric that is based on ERM's process and methodologies. This methodology was demonstrated in the Company's RAMP application but has not been modified and developed as an enterprise solution. Lessons learned from that pilot have been captured and the Company continues to gain insights from other on-going regulatory proceedings to better determine how best to modify its investment planning tools.

### 6.4.3 Specific Highlights

In addition to the overall assessment of investment management described above, some areas of the company demonstrated specific practices worth highlighting in this section.

Investment management is closely tied with risk and asset management practices in certain examples. Positive instances exist where investment decisions are made under a more holistic setting. For example, the communication with field operations in the accumulation of asset opportunities formally make their way into the budget approval process. This review of operations not only moves investment management away for a purely theoretical process but also engaged with employees to seek their feedback on previous, current and future risk and investment effectiveness.

Within the smart metering organization historical trending of asset failures, spend and implied spend efficiency is used as an opportunity to make total whole life cycle cost choices. This type of investment management paves a strong foundation to move away from establishing budgets that are mostly an extension of previous years' work and spend levels. In addition, this type of analysis has shown to enhance business cases that are constructed to inform the various leaders and committees on making investment choices.

Additionally, gas distribution conducts condition-based risk evaluation through the Distribution Risk Evaluation and Monitoring System (DREAMS) to identify and prioritize high risk pipelines in need of replacement. Using these systems, they consider factors such as pipe location, operating pressure, and material in evaluating pipe risk.

## 6.5 INTEGRATION MATURITY

Based on Davies Consulting's review of SoCalGas' risk, asset, and investment management processes, methods and experience in the electric and gas utility industry, SoCalGas is considered at a level 2 in integrating these processes where the Company's primary integration is evident in its asset management plans being integrated in how investment portfolios are developed.

Over the past few years, the Company has initiated several efforts to more explicitly and formally integrate risk management into its asset and investment planning processes. This was evident the ERM organization that has grown to include operational and financial experts who have proven valuable in integrating risk into the Company's decision-making processes. ERM's integration efforts have materialized in the form of the Company's RAMP report where asset risks were clearly linked to investment priorities and in the development of operating unit risk registers across the Company to further embed risk management into the Company's culture.

To move to a level 3 of integration, SoCalGas will need to demonstrate further integration of risk into all its processes.

Table 12 SoCalGas Evaluation - Integrationdepicts where SoCalGas is currently on the integration maturity scale.

*Table 12 SoCalGas Evaluation - Integration*

| Current Utility Industry Levels of Maturity Demonstrated | | | | | Maturity Opportunity for Industry Evolution | |
|---|---|---|---|---|---|---|
| | | | SoCalGas ◆ | | | |
| Level | 0 | 1 | 2 | 3 | 4 | 5 |
| Characteristics | Risk, Asset, and Investment management are not integrated at all, even if they exist. | Some evidence that risk, asset, or investment management may inform one of the other areas, but the information is not used to make decisions | Two areas demonstrate integration to inform and make decisions. Typically, this includes asset management informing the investment selection and risk management isolated at the enterprise level. Additionally, portfolio selection is project and programs based and value is determined outside of any risk management assessment or mitigation evaluation. There is no formal process for integration and there is no demonstration of evaluation of improvement. | Data and information are available to inform processes and procedures. Decision making process demonstrate an awareness and an attempt to incorporate unified information and data. Integration is not a repeatable methodology and any attempts are qualitative in nature. Decisions are informed within business and prioritized to enhance the performance of the business unit. There is evidence of evaluation and improvement of the integration. | Data and information Inform the all processes and procedures and are incorporated into most decision-making processes. Integration is qualitatively driven to communicate the asset, operational and enterprise risk profile of the utility. Decisions are informed across business and prioritized to enhance the performance of the enterprise. All processes are continually monitored and improved. | Data and information inform all areas and are unified into all decision-making processes. Uncertainty and the interrelationships associated within and across programs inform a complete awareness to leadership. Integration is quantitatively driven, communicates the asset, operational and enterprise risk profile of the utility, accounts for uncertainty and the interrelationships of risks, addresses subject matter expert bias and produces and optimized portfolio of investments that estimates the risk reduction from the portfolio of investments using probabilistic and rigorous analytic methods. Decisions are informed across business and optimized for the performance of the enterprise. All processes are continually monitored and improved. |

# 7 EVOLUTION OF INTEGRATED RISK, ASSET AND INVESTMENT MANAGEMENT

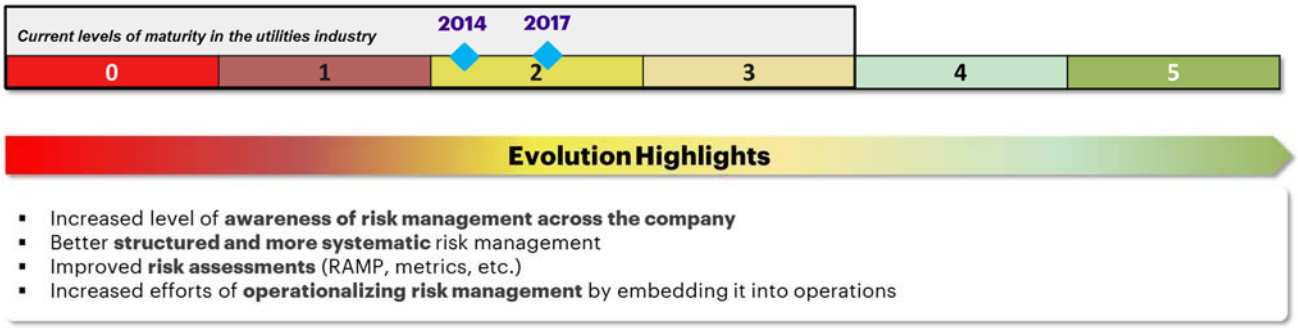
## 7.1 MATURITY EVOLUTION - 2014 TO 2017

As previously mentioned, SoCalGas initially engaged Davies Consulting in 2014 to conduct a baseline maturity assessment of the same areas of risk, asset and investment management and how well they're integrated.

Through the current 2017 assessment, Davies Consulting recognized the maturity evolution that took place at SoCalGas over the past few years. In 2014, the ERM organization was at the early stages of development where there was an annual process in place to refresh the ERM risk registry but the Company did not have a formalized and documented ERM policy, process and procedures. Now, the Company follows a consistent process with defined officer risk sessions (Risk Assessment, Risk Prioritization and Risk Mitigation Planning sessions) and has documented its framework, governance and processes to embed risk management in the organization. In 2016, the Company documented risk mitigation plans for its top safety risk as presented in its RAMP report. The Company also enhanced and developed new risk management tools over the years. In 2014, its REF used a 5x5 matrix for risk scoring, now the Company has a 7x7 matrix with an enhanced algorithm to allow for better distinction and separation between risks. In 2015, the Company developed its risk taxonomy to more systematically identify risks that the Company is facing. Above all, the Company has embarked on a new initiative to develop risk registries at the operational levels in 2016 and will continue this effort over the next few years.

As such, the Company's risk management maturity in 2014 was at the early stages of level 2 in the ISM[3] scale and has shown progress within that level to move the Company towards a level 3 maturity as depicted in Figure 14 below.

*Figure 14 Risk Management Evolution 2014 - 2017*



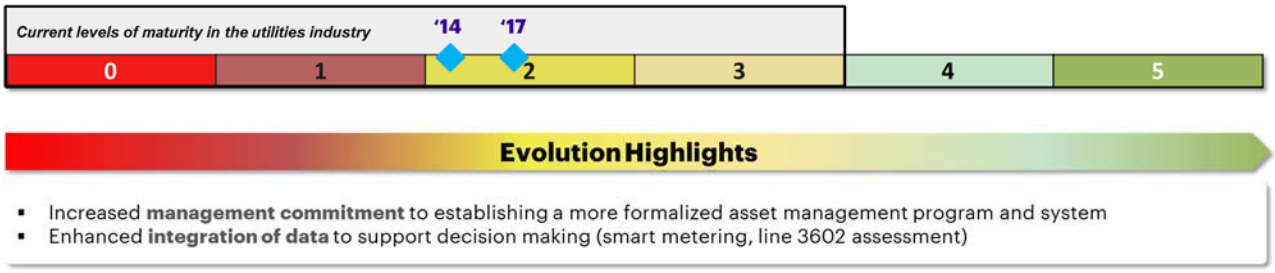

In 2014, asset management practices were strong as demonstrated in the Company's pipeline integrity management programs such as TIMP and DIMP. However, these practices were limited to a few key asset types. There were varying degrees of sophistication in the identification of critical assets, collection of asset health data and documentation of plans for managing those assets. Additionally, there was minimal evidence of a vision to build a

comprehensive asset management system that closely integrates the Company's operations and allows for enhanced utilization of data to drive systematic decision-making.

In the 2017 assessment, Davies Consulting noticed a movement toward higher levels of maturity where integration of asset data and the development of risk-based asset management plans started to take place in more areas at the Company as evidenced in continuing to enhance and utilize risk-based assessments in the pipeline integrity programs as well as other areas such as smart metering. More importantly, the Company has now committed resources to developing a comprehensive and centralized asset management system that aligns with leading industry-standards such as ISO 55000 and API 1173.

As previously mentioned, the asset management maturity levels were based on ISO 55000 and a level 3 corresponds to full conformance to all tenets of the standards. Based on that, Davies Consulting found that SoCalGas' asset management maturity fit in the level 2 and movement within that level from 2014 to 2017 shows progress toward conforming with ISO 55000 practices as depicted in Figure 15 below.

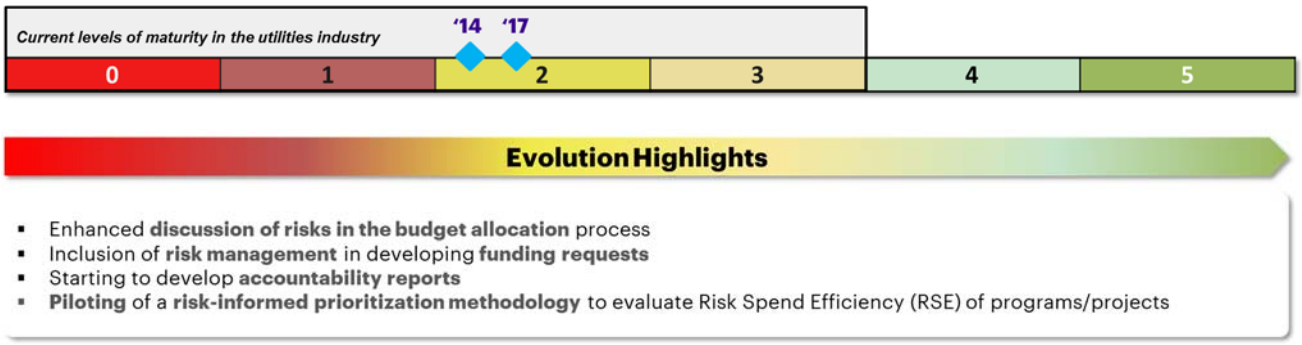
*Figure 15 Gas Operations Asset Management Evolution 2014 - 2017*




Davies Consulting found that SoCalGas' investment management process was well-defined and established in 2014 as demonstrated by the various committees in place that enable cross-functional prioritization of funds. However, in 2014, the process was primarily driven by subject matter expertise input and was not as risk-informed as it is today. In the 2017 assessment, Davies Consulting found that SoCalGas had started to more explicitly incorporate risks into the annual investment planning process through the risk mitigation planning session, the increased involvement of ERM in the financial committees and the development of risk-informed plans such as those presented in the RAMP report. Most recently, the internal funding request process and methodology now requires project managers to identify which of the ERM risks they are affecting with their proposed projects and programs, and explain the consequences of not funding their proposed work. In 2016, SoCalGas also introduced a pilot for prioritizing funds based on risk using the RSE metric as an input to guide decisions and in 2017, the Company filed its first accountability reports to better-track approved funding and has started to identify system modification needs to enhance risk funding accountability for the future.

Investment management maturity level 3 in ISM[3] is defined by an enhanced level of transparency, repeatability and consistency that is highlighted by the utilization of a defined value to guide prioritization of funding. Davies Consulting found that SoCalGas' process though repeatable and defined, is still driven by subjective inputs and that it does not use a value function to guide decisions but progress was made over the past few years that demonstrates movement within the level 2 maturity toward a level 3 as depicted in Figure 16 below.

*Figure 16 Investment Management Maturity Evolution 2014 - 2017*

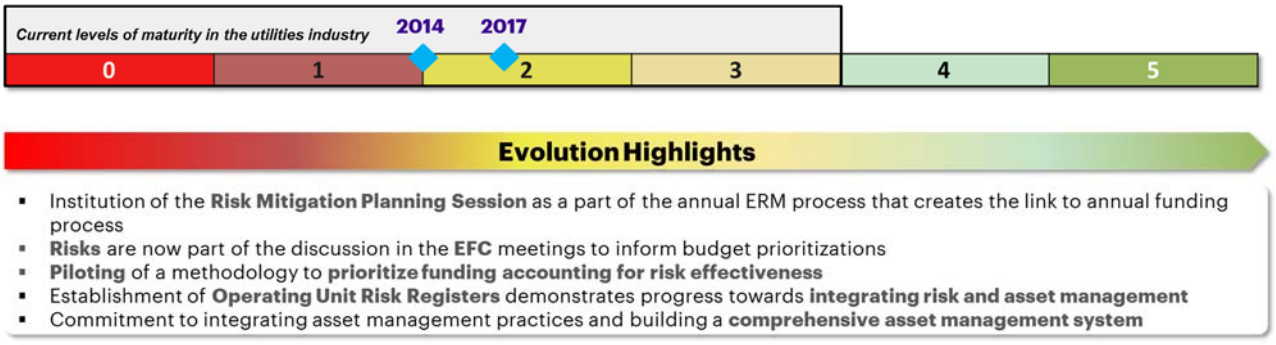



Finally, SoCalGas has shown an increased level of integration of risk, asset and investment management since the 2014 assessment. In 2014, Davies Consulting found that the ERM process was more isolated from funding decisions and the explicit discussion of risks to drive decision-making was minimal and not formalized. Since then, SoCalGas had implemented several processes and embarked on several initiatives to drive that integration. These new processes and initiatives include the previously mentioned Risk Mitigation Planning Session which provides a platform for risk-informed funding decisions, the development of operating unit risk registers to embed risk management into decision-making at all levels, the piloting of risk-informed decision-support concepts such as the RSE and the newly-developed centralized asset management organization.

Davies Consulting concluded that SoCalGas has shown a positive movement in the level 2 maturity in terms of integration with a movement toward a level 3 as depicted in

Figure 17 below.

*Figure 17 Integration Maturity Evolution 2014 - 2017*




## 7.2 Areas for Further Improvement

Davies Consulting's assessment process highlighted SoCalGas' good practices as well as areas where opportunities for further improvement exist. This section of the report summarizes improvement opportunities in each evaluation area and highlights demonstrated efforts to achieve those improvements.

### 7.2.1 Risk Management Improvement

SoCalGas' operations have been implicitly managing safety, security and operational risks for many years and have more recently established an explicit framework for managing risks across the Company. While several improvements have been accomplished over the past three years, SoCalGas' risk management practices have yet to meet leading maturity levels in the utility industry and going above and beyond to more advanced industries.

A key initiative that SoCalGas should undertake is the establishment of operational risk management across the Company. While the Company has started that process, it is still in its infancy and risk management has not yet been fully embedded in operating units to drive decision-making at all levels. Each operating unit should maintain its own risk registry and develop a governance structure specific to that unit to establish its operational risk management roles and responsibilities and develop regular forums to discuss risks and further integrate them into operations. This will improve the identification of risks from the field and enhance feedback loops in the overall risk management process.

Furthermore, SoCalGas should consider clearly establishing its risk tolerance as a part of its risk management policy to guide its risk management process and drive more transparent risk-informed decision-making. To that end, Davies Consulting recognizes the challenges with determining appropriate risk tolerances and the on-going regulatory proceedings that may influence the establishment of risk management methodologies that consider risk tolerance and thus understands that this improvement is an evolutionary process that may take some time to achieve.

Finally, SoCalGas can further improve its risk assessments by incorporating data to support its findings. While company data may not be readily available, especially for high consequence, low likelihood events, industry data can be used as a proxy to determine appropriate risk levels in lieu of subjective input that may be biased.

### 7.2.2 Asset Management Improvement

There are multiple areas for asset-management improvement and potential for the Company. SoCalGas should first create an asset management scope with the details of the asset management system clearly documented, supporting the creation of an asset management policy. This asset management policy will establish a set of criteria and a set of principles that would allow for the creation of a holistic asset management strategy. This asset management strategy will pave the way for the creation of asset management plans by asset family. These plans will be holistic in nature and detail the current and future state of condition, risk and performance and the investments associated with reaching the target level of state in each of those factors.

The implementation of these asset management plans provides a great opportunity for the organization to really integrate with field operations component of the business by leveraging them and their knowledge real life operating experience and data that can be turned in to asset information with the support all of the information systems such as GIS, to drive an enhancement and understanding of asset management and the subsequent quality of decisions that can be made with greater access to enhanced information. Over time this improved information will allow asset family owners to make future decisions based upon a longer horizon of higher quality data by moving towards a whole life cycle costing analysis methodology. This type of analysis will force a more rigorous debate on capital and operational budgets on a much

more granular level reducing the reliance upon subject matter expertize to one where you have a great balance between operator knowledge as well as objective quantitative information that will ultimately enhance decision-making.

Another area of asset-management improvement potential comes in the form of utilizing lessons learned from incidents and events. Every time an incident or an event takes place there are opportunities to conduct causal evaluation depending on severity levels. The results of these causal evaluations then feed into the creation of corrective actions. Once corrective actions are put into place there's an opportunity to conduct extent of condition analysis that will allow for the application of these lessons learned on a much larger scale there by creating the landscape not only of continuous improvement but to also drive company-wide asset management decisions and reducing the risk of repeat incidents and events taking place. These corrective action type programs are very popular and widespread with an industry such as the aviation industry and the nuclear industry. The application in to Sempra will present a great opportunity to not only institutionalize lessons-learnt but also to drive a greater level of employee engagement towards asset management and risk management.

Another area of major improvement potential is in the integration of asset management and linking those with the current and future roadmap for information systems and IT programs and projects. There is clearly a significant amount of investment that is targeted towards improving the IT infrastructure within the organization, linking this road map to the needs of the asset families will go farther to enhance the levels of integration within the business and ultimately provide the asset families with improved levels of asset data and asset information that by establishing a more solid foundation to which to base risk and asset management decisions.

Lastly there is an opportunity to formalize the way in which continuous improvement is conducted at the organization. The continuous improvement requirements for API 1173 encourages a systemic and systematic program that considers the past, current and future asset performance.  With the performance expectations ‘delta’ understood programs and projects are created to continue to enhance the ability of the organization to balance cost risk and asset performance. Thought should be given to how this can be demonstrated by formally putting into place a CI program that links directly to the needs of the asset families thereby improving the organizations ability to make optimized decisions that continually improve the performance of its asset management system.

### 7.2.3 Investment Management Improvement

As noted earlier, SoCalGas can further improve its investment planning process by strengthening its investment review process. This can be done through improvement of its current methodology for valuating investment benefits and moving towards more data-driven approaches to quantify the value of proposed projects and programs. Additionally, more directly linking risks identified in the ERM process to the projects and programs in the Company’s investment portfolio and using risk reduction as an input in determining appropriate funding allocations will further enhance the Company’s efforts to more transparently develop quantitative risk-informed portfolios.

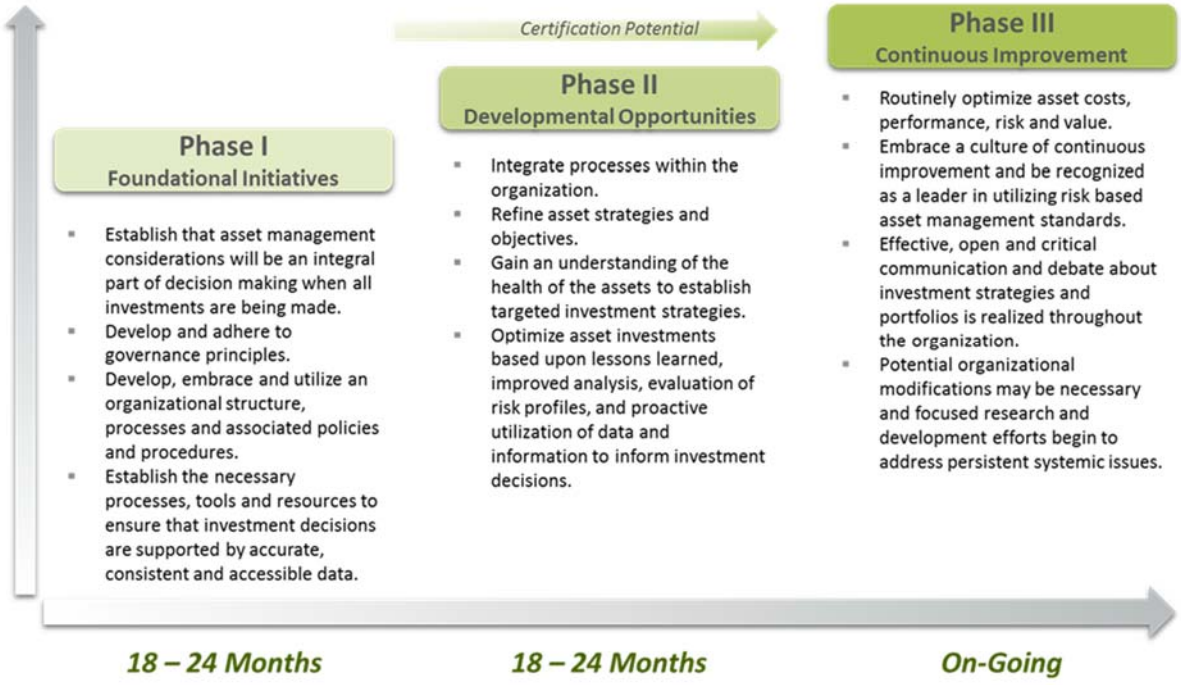
## 7.3 Demonstration of Potential to Advance Current Maturity Level

Across SoCalGas, there has been a few initiatives that if successfully implemented, could move the Company towards leading maturity levels. Some of these initiatives are either just starting or are on-going in various internal and external forums.

SoCalGas has improved its risk management process over the past three years. Since 2014, SoCalGas has demonstrated increasing levels of integrating risk into the Company's culture. Its most recent effort being ERM's operational risk management project which started in 2016 and is forecasted to continue to 2019. This effort will not only develop operating unit risk registers across the Company but continue to embed risk management into the Company's operations. As a part of this effort, SoCalGas is also moving towards more probabilistic risk assessments by beginning to evaluate multiple scenarios for a given risk event. This effort once completed, will take the Company to a leading position in the utilities industry.

Additionally, there are number of current initiatives that will help close the gaps in the asset management maturity. The most important of these is the recent establishment of the API 1173 project team within the company and the decision to drive towards conformance to API 1173. The appointment of a dedicated project team will go a long way to socialize the importance of API 1173 and its conformance within the organization. As a part of that effort, the Company has established a preliminary roadmap depicted in Figure 18 to implementing its asset management system and is currently working on developing the details of that initiative.

*Figure 18 SoCalGas Asset Management Roadmap*[32]




This extensive effort is expected to take a few years to implement and will ensure the Company implements leading asset management practices. Along with the risk management initiatives,

[32] This is a preliminary roadmap and defining its elements is still a work-in-progress.

these efforts are foundational to developing a more systematic and transparent risk-informed decision-making process across the Company.

# APPENDIX D

# Risk Maturity and Integration of Risk, Asset, and Investment Management at SDG&E: An Assessment Report

# Risk Maturity and Integration of Risk, Asset, and Investment Management at SDG&E: An Assessment Report

July 2017

PREPARED BY:

# CONTENTS

# 1 EXECUTIVE SUMMARY

## 1.1 OBJECTIVE

SDG&E has stated its commitment to integrating risk management into the Company's operations and implementing qualitative and quantitative processes to assess its risks and measure the results of its risk management efforts.[1] The objective of the Company's Enterprise Risk Management (ERM) program is to "create a consistent methodology for evaluating risk across SDG&E's businesses that integrates risk with asset and investment management using a combination of bottom-up and top-down processes."[2] With a continued commitment to achieving its objective of maturing its processes, SDG&E engaged Davies Consulting to assess the evolution of the Company's risk, asset and investment management processes.

The objectives of the assessment of SDG&E's risk, asset and investment management processes, procedures and practices were to:

- Provide SDG&E leadership with an independent assessment of the company's risk, asset, and investment management processes and methodologies;
- Evaluate the integration of its risk, asset, and investment management areas;
- Assess the maturity and integration levels across SDG&E of its risk, asset, and investment management using Davies Consulting's defined maturity model; and
- Present SDG&E with specific improvement opportunities to assist the company as it continues to mature its methodologies.

## 1.2 APPROACH

Davies Consulting used its proprietary Integrated Strategic Management Maturity Model (ISM$^3$)™ evaluation framework, incorporating applicable international standards, to assess the maturity of SDG&E's risk, asset, and investment management. The evaluation focused on the processes, methods, and tools used in Electric Operations and Gas Operations, and identified potential opportunities for continued improvement, allowing SDG&E to make fact-based decisions on how to mature its processes and risk mitigation prioritization efforts. In conducting its assessment, Davies Consulting focused on the following questions:

- How well does SDG&E integrate risk, asset, and investment management into its strategic and operational decision-making processes?
- How mature are SDG&E's methodologies and tools?
- Are SDG&E's methodologies and tools applied transparently and consistently?
- How does SDG&E compare to the current state of the utility industry?

## 1.3 FINDINGS

Davies Consulting observed that SDG&E had matured over the past few years in integrating its risk, asset and investment management processes and demonstrated a commitment to

[1] 2016 GRC – Testimony of Diana Day pg. DD-7

[2] 2016 GRC – Testimony of Diana Day pg. DD-9

continuing its evolution. This was evident in SDG&E recognizing opportunities for improvement and developing initiatives to continue its path toward developing more mature processes to guide decision-making across the Company.

Davies Consulting's major findings are discussed in greater detail in Sections 6 and 7, but in summary, SDG&E has:

- Developed consistent frameworks for managing risks across the Company to inform the development of asset plans and making investment decisions;
- Enhanced the integration of risk into the Company's operations and decision-making processes;
- Piloted methodologies to enhance risk assessments and
- Committed to developing a comprehensive asset management system that aligns with industry-leading practices.

## 1.4 Report Organization

The report is organized as follows:

- Section 1 is the Executive Summary.
- Section 2 (Introduction) frames the background, scope, and objectives of the assessment.
- Section 3 (Assessment Methodology and Approach) outlines the methodology used by Davies Consulting to perform its assessment of SDG&E.
- Section 4 (Assessment of the Utility Industry) provides a brief overview of the risk, asset, and investment management maturity of the utility industry. This section identifies some leading practices in the industry and describes an aspirational evolution of the industry to a state where risk, asset, and investment management are fully integrated.
- Section 5 (Risk, Asset, and Investment Management at SDG&E) discusses SDG&E's practices in risk, asset, and investment management.
- Section 6 (Current Maturity Assessment) provides an assessment of SDG&E's maturity in risk, asset, and investment management, and examines SDG&E's practices in Gas Operations and Electric Operations.
- Section 7 (Evolution of Integrated Risk, Asset, and Investment Management at SDG&E) discusses areas for further maturity at SDG&E in risk, asset, and investment management and identifies demonstrated efforts at SDG&E to achieve greater maturity.

# 2 INTRODUCTION

## 2.1 BACKGROUND

Although energy utilities have implicitly been managing risks that are inherent in their operations, the explicit focus on making funding decisions based on risk management is a relatively new model of operations that the California utilities are conforming to.

In 2012, with an increased focus on linking safety risk management efforts to funding requests, the California Public Utilities Commission (CPUC) began this evolution by asking one of the largest California utilities to support its General Rate Case (GRC) with a "risk-informed" submission.

Since then, the CPUC has adopted several new elements to promote risk-informed rate setting in California including proceedings to provide guidance on risk modeling methodologies, new requirements for risk mitigation reporting and increased scrutiny of risk management accountability for utilities.

SDG&E has been involved in this regulatory evolution and has taken steps to enhance its processes to meet future expectations. In 2014, SDG&E engaged Davies Consulting to assess the maturity of its processes and provide insights on industry risk management practices and potential improvements that the Company can make to more closely integrate its risk, asset and investment management processes.

With a continued commitment to improve its practices, SDG&E engaged Davies Consulting in 2017 to perform a detailed maturity assessment of its processes and procedures to understand where the Company has improved since the 2014 assessment and where further opportunities exist to continue its evolution.

In reviewing this document, it is important to define and understand several key terms to provide context for this report and establish a baseline insight of Davies Consulting's methodology:

- **Risk Management** is "the process whereby organizations methodically address the risks attaching to their activities with the goal of achieving sustained benefit within each activity and across the portfolio of all activities."[3] More specifically, risk management is the identification, evaluation, analysis, and prioritization of risks and the corresponding effort to minimize, monitor, and control their probability and/or impacts.[4] Risk management has traditionally been formalized as Enterprise Risk Management (ERM) which is typically a function the Chief Financial Officer (CFO) or Chief Risk Officer (CRO).
- **Asset Management** is the "coordinated activity of an organization to realize value from assets."[5] It includes understanding asset classes and their respective condition. Asset management has traditionally been viewed as an operational responsibility in utilities.

[3] Ibid.

[4] Paraphrased from International Organization for Standardization, ISO 31000: Risk management – principles and guidelines (Geneva, Switzerland: 2009), 1-2.

[5] ISO 55000 "Asset management — Overview, principles and terminology," International Organization for Standardization.

- **Investment Management** concerns the allocation of financial resources to address identified, evaluated, and optimized operational and strategic risks. Investment management has tended to be a role of the CFO.
- **Integration**, in the context of risk, asset, and investment management, is the use of optimized investment management to fund risk mitigation efforts, which are informed by asset management processes, within a constrained resource environment. As noted on page 18, "Integration of risk, asset, and investment management is visible when a company identifies its risks, including risks associated with operational assets, develops mitigations that include the asset strategies to address failures and make investments based on the risks identified." The inputs and outputs of each area informs and supports the others.

## 2.2 Assessment Scope and Objectives

### 2.2.1 Scope

In preparation for its 2019 GRC, SDG&E sought to assess the evolution of its risk, asset, and investment management processes. SDG&E engaged Davies Consulting to assess:

- SDG&E's risk and asset management practices within and across its gas and electric operations;
- the investment management process across the entire enterprise; and
- the evolution of SDG&E's Enterprise Risk Management (ERM) process across the company.

Davies Consulting focused on the following questions:

- How well does SDG&E integrate risk, asset, and investment management into its strategic and operational decision-making processes?
- How mature are SDG&E's methodologies and tools?
- Are SDG&E's methodologies and tools applied transparently and consistently?
- How does SDG&E compare to the current state of the utility industry?

### 2.2.2 Objectives

The objectives of Davies Consulting's assessment of SDG&E's risk, asset, and investment management processes, procedures, and methodologies were to:

- Provide SDG&E leadership with an independent assessment of the company's risk, asset, and investment management processes and methodologies;
- Evaluate the integration of its risk, asset, and investment management areas;
- Assess the maturity and integration levels across SDG&E of its risk, asset, and investment management using Davies Consulting's defined maturity model; and
- Present SDG&E with specific improvement opportunities to assist the company as it continues to mature its methodologies.

# 3 ASSESSMENT METHODOLOGY AND APPROACH

Davies Consulting used its Integrated Strategic Management Maturity Model (ISM$^3$)™, incorporating applicable international standards, to evaluate the maturity of SDG&E's investment, asset, and risk processes. In addition to assessing *what* SDG&E is doing, based on existing guidelines and standards, from an investment, asset, and risk management perspective, the ISM$^3$™ framework allowed Davies Consulting to evaluate *how* SDG&E has implemented applicable standards and *how* the three processes have been integrated. The assessment identifies potential improvement opportunities, allowing SDG&E to make fact-based decisions on how to mature its processes and prioritize mitigation efforts under constrained resources and timelines.

Davies Consulting's assessment framework captures the current state of the assessed company against a set standard evaluation and identifies areas for process and methodology improvement that allow a utility to establish a vision for the company's evolution of its risk, asset, and investment management practices.

## 3.1 RISK, ASSET AND INVESTMENT MANAGEMENT EVALUATION

Davies Consulting uses ISM$^3$™ to evaluate a utility's maturity in three areas; risk management, asset management, and investment management on a 5-level maturity scale. The maturity scale is based on Davies Consulting's expertise, knowledge of the industry, and recognized international standards, particularly, the International Standardization Organization's (ISO) standards for Risk and Asset Management (ISO 31000 and ISO 55000, respectively) and the State Government of Victoria, Australia's *Guide to Investment Planning Process.*[6] The maturity scale captures the current state of the utility industry and provides a vision for the evolution of risk, asset, and investment management practices. Although descriptions of maturity levels vary in each evaluation area, they are generally[7]:

- Level 0 – no standard, no process
- Level 1 – Ad-Hoc, Initiating, Initial
- Level 2 – Beginner, Enabling, Managed
- Level 3 – Intermediate, Integrating, Defined
- Level 4 – Advanced, Optimizing, Quantitatively Managed
- Level 5 – Leading, Pioneering, Optimized

Table 1, Table 2, and Table 3 contain specific descriptions for each maturity level in each of the following areas:

- Risk Management
- Asset Management

[6] Guide to Investment Planning Process, Overview, at http://www.dtf.vic.gov.au/Investment-Planning-andEvaluation/Understanding-investment-planning-and-review/Guide-to-the-investment-planning-process, accessed on May 31, 2015.

[7] A 2005 article described the levels of process maturity as: Initial (Level 1), Managed (Level 2), Defined (Level 3), Quantitatively managed (Level 4), and Optimizing (Level 5). See Charles McKinney, "Capability Maturity Models and Outsourcing: A Case for Sourcing Risk Management," Information Systems Control Journal 5, (2005): 28-34.

- Investment Management

## ISM³™ Risk Management Maturity Definitions

*Table 1 Risk Management Maturity*

| Level | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Characteristics<br><br> | No Formal Process or Methodology | Not part of the organizational culture. Risk Management isolated, undocumented and is characterized by as one that is not repeatable. Not established in a formal process or repetitive timeline. Some evidence exists that risks are discussed and considered, but the results are not codified or used across the enterprise. | Not part of the organizational culture. Risk Management isolated as an annual process conducted to inform at the Board of Director level and based upon an ad hoc process. A single corporate risk registry may exist, but inputs are subjective in nature with no evidence of data to support the inputs. Operational risks are managed separately at the business unit level with limited process of communication, understanding, or relationship to other business units. Risk Identification, Evaluation, Analysis and Prioritization are subject matter expertise driven and do not account for uncertainty or interrelationships of risks. No metrics are used to measure performance. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published standards. Most/all business units of the enterprise maintain their own risk registers and use those to communicate enterprise and operational risks across the enterprise. Risk assessment is characterized by a more qualitative/subjective approach. Risk identification, evaluation, analysis and prioritization are subject matter expertise driven and do not account for uncertainty or interrelationships of risks. Lagging performance metrics are used to measure performance. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published standards. Business unit enterprise and operational risks are communicated across the enterprise and are characterized by a balance of quantitative and qualitative/subjective approach. Risk Identification, Evaluation, Analysis, and Prioritization are primarily subject matter expertise driven, attempt to account for uncertainty and the interrelationships of risks. Deterministic methods of risk characterize the risk-informed decisions. Lagging performance measure are predominantly used to measure performance. Evaluates risk mitigation alternatives. Validates the effectiveness of risk mitigations. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published standards. All levels of the organization provide input. Business unit enterprise and operational risks are communicated across the enterprise and are characterized by a qualitative and probabilistic analysis. Risk Identification, Evaluation, Analysis and Prioritization are data driven, account for uncertainty, and interrelationships of risks. Leading and lagging performance metrics are used to evaluate risk management effectiveness and are monitored continually. Tolerance levels of risk are associated potential loss exceedance. Operational and investment decisions are risk-based and focused on the risk exposure reduction. Noted as industry leader and used as a benchmark by other companies |

## ISM³™ Asset Management Maturity Definitions

*Table 2 Asset Management Maturity*

| Level | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Characteristics<br><br> | No Formal Process or Methodology | Evidence of Asset Management only at operational unit level. Ad hoc process established in some business units. Critical assets understood and prioritized based upon subject matter expertise. Asset Management Plans and Strategies are not developed or codified. Asset management efforts are resourced annually. There is no evidence of review and improvement on a cyclical basis. Asset management reactive in nature. | An ad hoc but formalized and documented process is established for business units. Critical assets are understood and prioritized based upon subject matter expertise. Individual asset alternative strategies are evaluated using subject matter expertise. Asset Management Plans and Strategies are developed for individual assets. Asset strategies are resourced annually. Evidence is present that the Asset Management process is monitored and continually improved. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published international standards. Certified or provides evidence of adhering to international standards. Critical assets understood and Asset Management alternative strategies are evaluated using subject matter expertise. Asset Management Plans and Strategies are developed for individual assets and implemented. Asset strategies are resourced annually. Asset Management is continually improved. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published international standards. Certified or provides evidence of adhering to international standards. Critical assets understood and Asset Management alternative strategies are evaluated using subject matter expertise. Resource constraints are accounted for in lifecycle plans. Asset Management Plans and Strategies are developed as an integrated system, codified, implemented, and monitored with a short and long term view. Asset Management is continually improved. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published international standards. Certified or provides evidence of adhering to international standards. Mature Asset Life Cycle for critical assets understood and Asset Management alternative strategies are evaluated in a probabilistic environment that enables understanding of uncertainty, and interrelationships of asset failures. Asset Management Plans and Strategies are developed as an integrated system, codified, implemented, and monitored with a short and long term view. Benefits of AM program can be demonstrated and measured. Asset Management is continually improved. |

## ISM3™ Investment Management Maturity Definitions

*Table 3 Investment Management Maturity*

| Level | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Characteristics<br><br> | No Formal Process or Methodology | Characterized as a Bunch of Staff Sitting Around a Table (BOSSAT). Decisions based on judgement. Process is not transparent, repeatable, consistent or auditable. | Objectives and priorities are communicated, but a formal auditable process is still not present. Decisions remain judgment based in terms of the value to the company and allocation remains within business unit silos. | Transparent, repeatable, and consistent method that is in business unit silos. Allocations are made at an Executive Level based on judgment but are tied to corporate objectives. Investments are prioritized against a value definition. | Transparent, repeatable, consistent, and auditable method across the enterprise that is based upon subject matter expertise and is deterministic in nature of evaluation. Allocations are based upon an optimal objective function of that seeks to maximize the return of an objective within the constrained resources. Investment alternatives evaluated objectively. Accountability for the claimed investment benefit is documented and tracked. Investments are aligned with strategy. | Transparent, repeatable, consistent, and auditable method across the enterprise that is data drive and uncertainty in investments are accounted for. Allocations are based upon an optimal objective function that seeks to maximize the return of an objective within the constrained resources. Investment alternatives evaluated objectively. Accountability for the claimed investment benefit is documented and tracked. Investments are aligned with strategy. |

The ISM$^3$™ Scorecard's objective is to initiate discussions with executive leadership concerning specific areas where an opportunity exists to mature methodologies, processes, and procedures. Moving from one level to another takes time, resource commitment, and cultural shifts with a well-defined change management process. Discussions surrounding the evaluation and maturity process should focus on elements to support an evolution, as opposed to the ranking or categorization. An organization that can achieve the elements defined in the highest category will achieve a level of sophistication and maturity that will result in efficient and optimal resource allocation.

## 3.2 INTEGRATION EVALUATION

Risk, asset, and investment management can reach high levels of maturity in any given utility but without integration of those three, a utility will not achieve a high overall maturity. The lack of overall maturity can be evident, for instance, in a utility's inability to manage its risks and assets effectively to make informed investment decisions.

As such, the fourth dimension of Davies Consulting's maturity assessment model is the integration of risk, asset, and investment management. Integration is a more significant attribute than the other three elements. Its maturity aligns with corporate governance, establishment of aligned priorities and demonstrates a utility's overall maturity.

Table 4 provides specific descriptions for the five maturity levels of integration.

## ISM³™ Integration Maturity Definitions

*Table 4 Integration Maturity*

| Level | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Characteristics<br><br> | Risk, Asset, and Investment management are not integrated at all, even if they exist. | Some evidence that risk, asset, or investment management may inform one of the other areas, but the information is not used to make decisions | Two areas demonstrate integration to inform and make decisions. Typically, this includes asset management informing the investment selection and risk management isolated at the enterprise level. Additionally, portfolio selection is project and programs based and value is determined outside of any risk management assessment or mitigation evaluation. There is no formal process for integration and there is no demonstration of evaluation of improvement. | Data and information are available to inform processes and procedures. Decision making process demonstrate an awareness and an attempt to incorporate unified information and data. Integration is not a repeatable methodology and any attempts are qualitative in nature. Decisions are informed within business and prioritized to enhance the performance of the business unit. There is evidence of evaluation and improvement of the integration. | Data and information Inform the all processes and procedures and are incorporated into most decision-making processes. Integration is qualitatively driven to communicate the asset, operational and enterprise risk profile of the utility. Decisions are informed across business and prioritized to enhance the performance of the enterprise. All processes are continually monitored and improved. | Data and information inform all areas and are unified into all decision-making processes. Uncertainty and the interrelationships associated within and across programs inform a complete awareness to leadership. Integration is quantitatively driven, communicates the asset, operational and enterprise risk profile of the utility, accounts for uncertainty and the interrelationships of risks, addresses subject matter expert bias and produces and optimized portfolio of investments that estimates the risk reduction from the portfolio of investments using probabilistic and rigorous analytic methods. Decisions are informed across business and optimized for the performance of the enterprise. All processes are continually monitored and improved. |

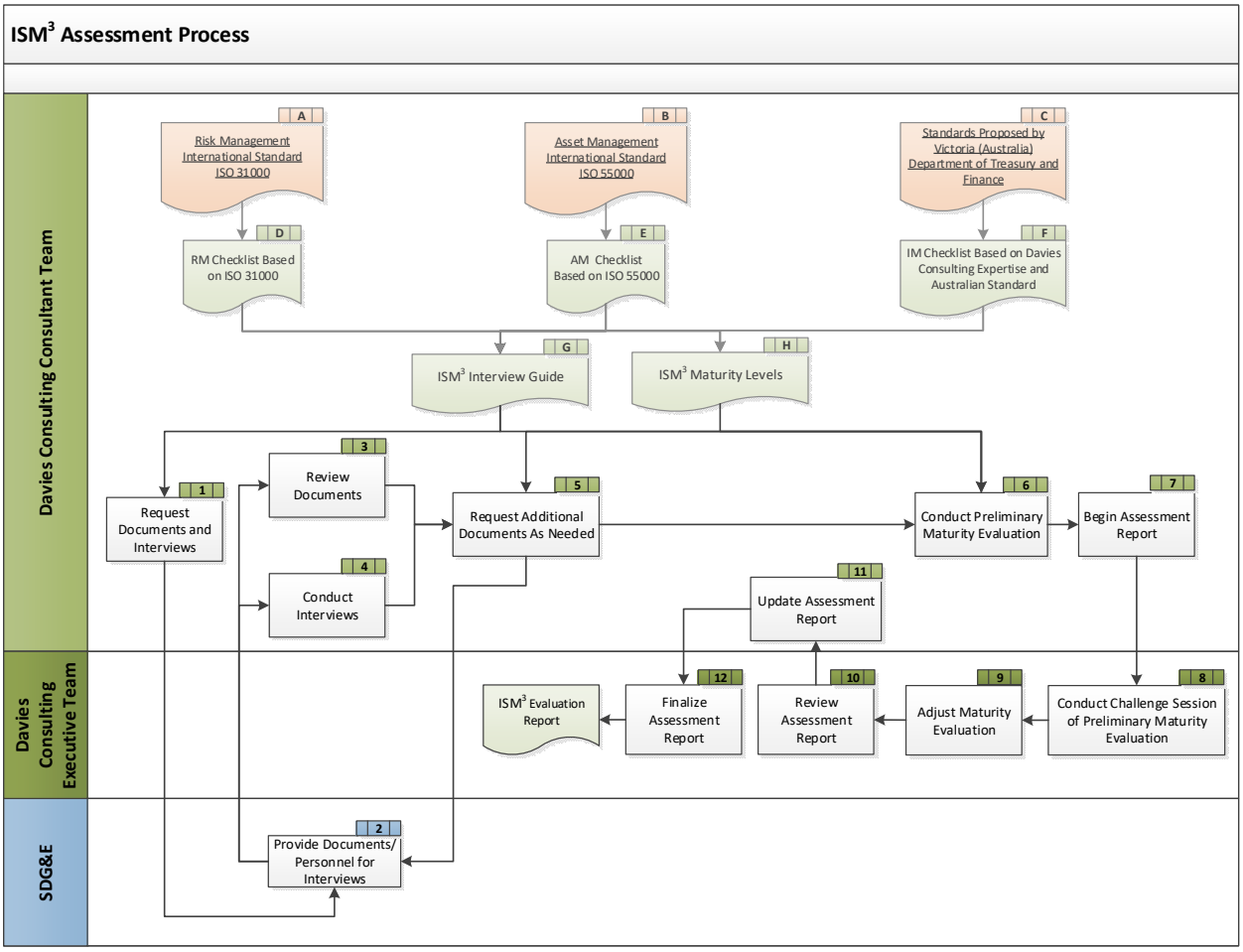
## 3.3 ASSESSMENT APPROACH

Davies Consulting's assessment process is comprised of three key phases, detailed in the sections below:

1. Collect and review data;
2. Evaluate maturity; and
3. Produce report.

Figure 1 depicts the detailed tasks incorporated into the three steps listed above. While some components of each phase are sequential, several parts of the three phases run in parallel to each other.

*Figure 1 ISM³™ Assessment Process™*




### 3.3.1 Collect and Review Data

The first phase of the assessment involves the collection and review of data and information through document requests and interviews with key utility personnel who have roles in the three evaluation areas. To initiate the data collection and review process, Davies Consulting examined existing documentation on company policies, processes, and procedures. SDG&E personnel provided these documents ahead of the Davies Consulting team interviews. Primary sources of information reviewed by the team included the Company's risk management

documentation such as the Enterprise Risk Management Framework, the Enterprise Risk Management Handbook, the Company's most recent Risk Assessment and Mitigation Phase (RAMP) report as well as various documented policies and procedures on asset management. These materials constitute the major components of SDG&E's Planning Process.

As part of the data collection and review process, Davies Consulting met with over 25 members of the organization in various interviews and meetings over a period of two months. Davies Consulting used its proprietary guide in all interviews. At least two Davies Consulting personnel were present for each interview. Interviewees also provided Davies Consulting with additional documents or provided demonstrations of tools and processes. The breadth and depth of interviews provided a more comprehensive view of SDG&E's risk processes across Electric Operations and Gas Operations than the initial document review.

### 3.3.2 Evaluate Maturity

The second phase of the assessment is where information collected through interviews and document reviews is used to evaluate the subject utility's maturity in risk management, asset management, investment management, and the integration of those three management processes. Davies Consulting developed a preliminary evaluation of SDG&E's processes against the evaluation framework described above. In initial comprehensive review working sessions, Davies Consulting assigned maturity scores to SDG&E across the key areas identified in the evaluation framework. At this session, the team also identified areas where its understanding was incomplete. To address these knowledge gaps, Davies Consulting requested additional documentation and follow-up interviews from SDG&E. Davies Consulting completed its assessment with additional review working sessions and then conducted a final internal challenge session with a team of Davies Consulting consultants who were not part of the preliminary assessment team. This widened the range of insights and critique and helped the team consider additional aspects of the evaluation to ensure the completion of a fair and responsible assessment.

### 3.3.3 Produce Report

The assessment's third phase is the development of this assessment report. The assessment report synthesizes the team's findings about SDG&E's risk, asset, and investment management practices.

# 4 ASSESSMENT OF THE UTILITY INDUSTRY

Davies Consulting established the ISM3™ evaluation framework founded on international standards and informed by its more than 25 years of consulting practice and the hundreds of client engagements. While the scorecard methodology allows for a continual growth to a very mature level of individual risk, asset and investment processes and the integration of them, Davies Consulting determined that the current level of maturity demonstrated throughout the utility industry, at its best, is at the Maturity Level 3. Some utilities have demonstrated efforts to evolve to levels 4 and 5 but those efforts are at their infancy and have not yet been embedded or established as standard operating procedures for those utilities. While some would question that a mid-point maturity level is not "good enough," it must be pointed out that the Institute for Asset Management standard alignment for maturity, that Davies Consulting supports, has the Maturity Level 3 defined as meeting the requirements to be ISO 55000 compliant. Indeed, the additional levels of maturity are opportunities for all industries to continually mature processes and methods. Davies Consulting's definitions for Levels 4 and 5 provide detail as to how processes are performed to achieve a level that results in optimal management processes.

## 4.1 RISK MANAGEMENT

Most utilities conduct risk management at an enterprise level and in isolation from key operational processes. Some utilities see risk management as an annual reporting requirement that does not inform decision-making through all levels of a given company. Utilities also face challenges with quantification and communication of risk, risk mitigation and reduction benefits, and overall effectiveness of risk management programs. While some utilities have identified Key Risk Indicators (KRIs) and Key Performance Indicators (KPIs) as metrics to track overall risk management performance, many struggle with quantifying specific risk reduction benefits at the project or program levels. These approaches leave most utilities at maturity Levels 1 or 2.

## 4.2 ASSET MANAGEMENT

Many utilities have developed asset management programs, which vary widely in sophistication. The most advanced programs embrace the tenets of ISO 55000, which aligns with a maturity level of 3 in ISM3™. More specifically, the ISM3™ framework describes Level 3 maturity in asset management as demonstrating the tenets (but not necessarily the formal certification) of ISO 55000. The ISM3™ framework aligns here with the Institute of Asset Management (IAM)'s asset management maturity framework, which also characterizes Level 3 as the satisfaction of ISO 55000 requirements. If governance, disciplines, and processes are well-defined and implemented, the value of ISO 55000 will be realized, regardless of external certification. Currently, only a few utilities fall in ISM3™ Level 3 maturity and most utilities range in maturity between Levels 0 and 2.

## 4.3 INVESTMENT MANAGEMENT

Most utilities lack a formalized and consistent process for making investment decision, mostly using subject matter experts (SMEs) on an ad-hoc basis to prioritize investments with limited communication of objectives and strategic priorities. Davies Consulting has seen demonstrations of a maturity level 3 in application, but the predominant process in the industry

is more ad hoc and not transparent, repeatable, auditable or consistent. This approach leaves most utilities within maturity Levels 1 and 2.

## 4.4 INTEGRATION

Integration of risk, asset, and investment management is visible when a company identifies its risks, including risks associated with operational assets, develops mitigations that include the asset strategies to address failures and make investments based on the risks identified. The integration is an area that presents more challenges because it requires the most change management to implement. In the current state of the industry, integration is minimal to non-existent in most companies. Some utilities can demonstrate integration of two areas while others subjectively tie the three areas. For instance, some utilities can discuss connections between asset, risk and investment management but with minimal to no demonstration of data and information flows between the three management areas. No utility has reached a full integration maturity level. Davies Consulting has seen demonstrations of a maturity level 3 in application, but for the most part most utilities fall between 0 and 2 in the maturity of integration of risk, asset, and investment management, as illustrated in the tables below.

*Table 5 Assessment of the Utility Industry - Risk Management*

## ISM³ Risk Management Maturity Definitions

| Current Utility Industry Levels of Maturity Demonstrated | | | | | Maturity Opportunity for Industry Evolution | |
|---|---|---|---|---|---|---|
| Level | 0 | 1 | 2 | 3 | 4 | 5 |
| Characteristics | No Formal Process or Methodology | Not part of the organizational culture. Risk Management isolated, undocumented and is characterized by as one that is not repeatable. Not established in a formal process or repetitive timeline. Some evidence does exists that risks are discussed and considered, but the results are not codified or used across the enterprise. | Not part of the organizational culture. Risk Management isolated as an annual process conducted to inform at the Board of Director level and based upon an ad hoc process. A single corporate risk registry may exist, but inputs are subjective in nature with no evidence of data to support the inputs. Operational risks are managed separately at the business unit level with limited process of communication, understanding, or relationship to other business units. Risk Identification, Evaluation, Analysis and Prioritization are subject matter expertise driven and do not account for uncertainty or interrelationships of risks. No metrics are used to measure performance. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published standards. Most/all business units of the enterprise maintain their own risk registers and use those to communicate enterprise and operational risks across the enterprise. Risk assessment is characterized by a more qualitative/subjective approach. Risk identification, evaluation, analysis and prioritization are subject matter expertise driven and do not account for uncertainty or interrelationships of risks. Lagging performance metrics are used to measure performance. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published standards. Business unit enterprise and operational risks are communicated across the enterprise and are characterized by a balance of quantitative and qualitative/subjective approach. Risk Identification, Evaluation, Analysis, and Prioritization are primarily subject matter expertise driven, attempt to account for uncertainty and the interrelationships of risks. Deterministic methods of risk characterize the risk-informed decisions. Lagging performance measure are predominantly used to measure performance. Evaluates risk mitigation alternatives. Validates the effectiveness of risk mitigations. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published standards. All levels of the organization provide input. Business unit enterprise and operational risks are communicated across the enterprise and are characterized by a qualitative and probabilistic analysis. Risk Identification, Evaluation, Analysis and Prioritization are data driven, account for uncertainty, and interrelationships of risks. Leading and lagging performance metrics are used to evaluate risk management effectiveness and are monitored continually. Tolerance levels of risk are associated potential loss exceedance. Operational and investment decisions are risk-based and focused on the risk exposure reduction. Noted as industry leader and used as a benchmark by other companies |
|  | | | | | | |

*Table 6 Assessment of the Utility Industry - Asset Management*

## ISM³ Asset Management Maturity Definitions

| Current Utility Industry Levels of Maturity Demonstrated | | | | | Maturity Opportunity for Industry Evolution | |
|---|---|---|---|---|---|---|
| Level | 0 | 1 | 2 | 3 | 4 | 5 |
| Characteristics | No Formal Process or Methodology | Evidence of Asset Management only at operational unit level. Ad hoc process established in some business units. Critical assets understood and prioritized based upon subject matter expertise. Asset Management Plans and Strategies are not developed or codified. Asset management efforts are resourced annually. There is no evidence of review and improvement on a cyclical basis. Asset management reactive in nature. | An ad hoc but formalized and documented process is established for business units. Critical assets are understood and prioritized based upon subject matter expertise. Individual asset alternative strategies are evaluated using subject matter expertise. Asset Management Plans and Strategies are developed for individual assets. Asset strategies are resourced annually. Evidence is present that the Asset Management process is monitored and continually improved. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published international standards. Certified or provides evidence of adhering to international standards. Critical assets understood and Asset Management alternative strategies are evaluated using subject matter expertise. Asset Management Plans and Strategies are developed for individual assets and implemented. Asset strategies are resourced annually. Asset Management is continually improved. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published international standards. Certified or provides evidence of adhering to international standards. Critical assets understood and Asset Management alternative strategies are evaluated using subject matter expertise. Resource constraints are accounted for in lifecycle plans. Asset Management Plans and Strategies are developed as an integrated system, codified, implemented, and monitored with a short and long term view. Asset Management is continually improved. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published international standards. Certified or provides evidence of adhering to international standards. Mature Asset Life Cycle for critical assets understood and Asset Management alternative strategies are evaluated in a probabilistic environment that enables understanding of uncertainty, and interrelationships of asset failures. Asset Management Plans and Strategies are developed as an integrated system, codified, implemented, and monitored with a short and long term view. Benefits of AM program can be demonstrated and measured. Asset Management is continually improved. |
|  | | | | | | |

*Table 7 Assessment of the Utility Industry - Investment Management*

**ISM³ Investment Management Maturity Definitions**

| Current Utility Industry Levels of Maturity Demonstrated | | | | | Maturity Opportunity for Industry Evolution | |
|---|---|---|---|---|---|---|
| Level | 0 | 1 | 2 | 3 | 4 | 5 |
| Characteristics | No Formal Process or Methodology | Characterized as a Bunch of Staff Sitting Around a Table (BOSSAT). Decisions based on judgement. Process is not transparent, repeatable, consistent or auditable. | Objectives and priorities are communicated, but a formal auditable process is still not present. Decisions remain judgment based in terms of the value to the company and allocation remains within business unit silos. | Transparent, repeatable, and consistent method that is in business unit silos. Allocations are made at an Executive Level based on judgment but are tied to corporate objectives. Investments are prioritized against a value definition. | Transparent, repeatable, consistent, and auditable method across the enterprise that is based upon subject matter expertise and is deterministic in nature of evaluation. Allocations are based upon an optimal objective function of that seeks to maximize the return of an objective within the constrained resources. Investment alternatives evaluated objectively. Accountability for the claimed investment benefit is documented and tracked. Investments are aligned with strategy. | Transparent, repeatable, consistent, and auditable method across the enterprise that is data drive and uncertainty in investments are accounted for. Allocations are based upon an optimal objective function that seeks to maximize the return of an objective within the constrained resources. Investment alternatives evaluated objectively. Accountability for the claimed investment benefit is documented and tracked. Investments are aligned with strategy. |



*Table 8 Assessment of the Utility Industry - Integration*

**ISM³ Integration Maturity Definitions**

| Current Utility Industry Levels of Maturity Demonstrated | | | | | Maturity Opportunity for Industry Evolution | |
|---|---|---|---|---|---|---|
| Level | 0 | 1 | 2 | 3 | 4 | 5 |
| Characteristics | Risk, Asset, and Investment management are not integrated at all, even if they exist. | Some evidence that risk, asset, or investment management may inform one of the other areas, but the information is not used to make decisions | Two areas demonstrate integration to inform and make decisions. Typically, this includes asset management informing the investment selection and risk management isolated at the enterprise level. Additionally, portfolio selection is project and programs based and value is determined outside of any risk management assessment or mitigation evaluation. There is no formal process for Integration and there is no demonstration of evaluation of improvement. | Data and information are available to inform processes and procedures. Decision making process demonstrate an awareness and an attempt to incorporate unified information and data. Integration is not a repeatable methodology and any attempts are qualitative in nature. Decisions are informed within business and prioritized to enhance the performance of the business unit. There is evidence of evaluation and improvement of the integration. | Data and information Inform the all processes and procedures and are incorporated into most decision-making processes. Integration is qualitatively driven to communicate the asset, operational and enterprise risk profile of the utility. Decisions are informed across business and prioritized to enhance the performance of the enterprise. All processes are continually monitored and improved. | Data and information inform all areas and are unified into all decision-making processes. Uncertainty and the interrelationships associated within and across programs inform a complete awareness to leadership. Integration is quantitatively driven, communicates the asset, operational and enterprise risk profile of the utility, accounts for uncertainty and the interrelationships of risks, addresses subject matter expert bias and produces and optimized portfolio of investments that estimates the risk reduction from the portfolio of investments using probabilistic and rigorous analytic methods. Decisions are informed across business and optimized for the performance of the enterprise. All processes are continually monitored and improved. |

## 4.5 Evaluation Method Against the Industry Assessment – Current

As described above, the current industry maturity levels range from 0 to 3 in risk, asset, and investment management and the integration of those three. Therefore, the remainder of the assessment report focuses on the "Current Utility Industry Levels of Maturity Demonstrated" (Level 0-3) and not the "Maturity Opportunity for Industry Evolution" (levels 4 and 5). Currently, Level 3 can be characterized as leading practice. Comparing against the current level of the industry allows us to identify areas where a utility is leading as well as areas where it is aligned with industry peers.

## 4.6 Evaluation Method Against the Industry Assessment – Opportunity

The industry's evolving regulatory landscape is heavily influencing the evolution of risk, asset, and investment management practices. Recent developments highlight the importance of moving to more sophisticated modeling capabilities to improve risk, asset, and investment management in the utility industry. Among these are the CPUC's Order Instituting a Rulemaking (OIR) to develop a risk-based decision-making framework.[8]

Levels 4 and 5 of Davies Consulting's ISM$^3$™ scorecard support this evolution and highlight characteristics that demonstrate movement towards more quantitative approaches for managing risks, assets, and investment decisions. Evaluating a utility against these aspirational levels of maturity allows us to identify areas for further improvement and communicate opportunities for doing so.

[8] Decision 14-12-025, Order Instituting Rulemaking to Develop a Risk-Based Decision-Making Framework to Evaluate Safety and Reliability Improvements and Revise the General Rate Case Plan for Energy Utilities, Rulemaking 13-11-006, December 4, 2014.

# 5 RISK, ASSET AND INVESTMENT MANAGEMENT AT SDG&E

## 5.1 COMPANY OVERVIEW

SDG&E provides energy services to San Diego County and southern Orange County in California. It serves 3.6 million people through 1.4 million electric meters and 873,000 natural gas meters over a service area of 4,100 square miles.

Based in San Diego, SDG&E is a Sempra Energy utility that is regulated by the California Public Utilities Commission and employs more than 4,000 employees who deliver energy services to its customers.

SDG&E's leadership has stated its commitment to managing risks and providing services to its customer with the priority of ensuring the safety of the public and its workforce of employees and contractors. One of SDG&E's stated core values is to "treat safety as a way of life."[9] This commitment has been proven with actions over the years through leadership's commitment to evolving and continuously improving the Company's risk management practices as will be discussed in this report.

As a part of its commitment to safety, the Company has been participating in the National Safety Council's (NCS) safety survey since 2013. The survey compares SDG&E's safety culture to other companies using NCS's "Safety Barometer" database. Most recently, SDG&E's results showed that it was among the leaders at the 85$^{th}$ percentile for safety culture.[10]

### 5.1.1 Gas Operations Overview

SDG&E operates 14,000 miles of natural gas transmission and distribution pipelines across its service territory,[11] selling and transporting approximately 327 million cubic feet of gas per day (MMCF/day).[12]

With an eye toward maintaining and operating a safe system, Gas operations at SDG&E utilize comprehensive processes and methodologies for managing the integrity of its pipeline system as demonstrated in the Company's Transmission Integrity Management Program (TIMP) and the Distribution Integrity Management Program (DIMP). These programs drive the Company's risk-informed decision-making by prioritizing maintenance and replacement activities on a risk-basis to address identified threats.

In 2014, the CPUC approved SDG&E's Pipeline Safety and Enhancement Plan (PSEP) to identify pipeline sections throughout the system that have not been pressure-tested, or for which records of pressure-testing are missing, and slate them to be pressure-tested or replaced. The plan also proposes to upgrade, replace, or retrofit about 30 mainline valves in the system with technology that allows them to be opened or closed remotely by system operators from a

[9] 2016 GRC Application – Risk Policy Testimony. DD-4

[10] SDG&E RAMP Report - SDGE/SCG C-2

[11] SDG&E website, PSEP.

[12] 2016 California Gas Report – p109.

central control location, or that automatically shuts off the flow of natural gas in the event of a large pressure drop.[13]

Most recently, the Company identified enhancements that the Company can make to meet tenets of API 1173 and ISO 55000. In 2017, under the guidance of the Company's new asset management organization and in coordination with SoCalGas, SDG&E initiated the project to close the gaps identified in the assessment.

### 5.1.2 Electric Operations Overview

SDG&E operates and maintains an electric system that serves approximately 3.5 million customers through 1.4 million meters across its service territory.

Electric operations at SDG&E have evolved over the years with the goal of providing safe, reliable and affordable service to SDG&E customers. For example, in 2016, SDG&E received its 11th consecutive award for Outstanding Reliability Performance among utilities in the western United States and Canada by PA Consulting Group.[14]

In addition to consistently winning reliability awards for outstanding performance, the Company has heavily invested in reducing risks to the public and increasing the safety of its customers and workforce. Over the past 10 years, the Company installed the nation's largest and most advanced utility weather sensor network as a key risk management investment to mitigate the risk of wildfires[15] and, in 2017, the Company announced a new Senior Vice President of Asset Management overseeing the management of SDG&E's electric assets with the goal of maintaining its reliability performance and more systematically managing asset-related risks across its system.

[13] SDG&E Website - PSEP

[14] SDG&E Website – News http://sdgenews.com/reliable/sdge-begins-another-decade-%E2%80%9Cbest-west%E2%80%9D-delivering-reliable-service-0

[15] SDG&E Website – Weather Stations Fact Sheet http://sdgenews.com/reliable/sdge-begins-another-decade-%E2%80%9Cbest-west%E2%80%9D-delivering-reliable-service-0

## 5.2 RISK MANAGEMENT AT SDG&E

Characteristics of an effective risk management process that produces demonstrable risk reduction include transparency, repeatability, and consistency. The process should be continually reviewed, risks must be monitored, and emergent risks identified to ensure each is being mitigated. To do so, an organization should establish robust processes and methodologies that are a part of organizational culture.

### 5.2.1 Background

To formalize risk management at SDG&E, the Company launched its Enterprise Risk Management (ERM) efforts in 2009. As a start, the ERM organization conducted several interviews with various Company leaders to identify and document key risks that the Company manages as a part of its operations. As a part of the process, the ERM organization established and formalized the Company's risk registry which became the central hub for the Company's risk management information and the foundation for annual risk reporting to the Company's Board of Directors.

In 2014, the Company expanded its ERM program by growing the ERM team and adding substantial knowledge and expertise to bolster the Company's approach to risk management. The organizational changes included the appointment of a new VP of risk management and two new directors with operational and financial backgrounds to enable the integration of risk management into the Company's operations and investment planning. Since then, the Company has invested in risk management training and the addition of risk managers to support the evolution of risk management and the development of more advanced risk assessment approaches.

Building on the Company's existing process which is based on ISO 31000, the internationally recognized risk management standard, the new VP and directors of risk management continued the process of formalizing and structuring risk management at the Company. This included the development of a formal overarching risk management framework that states the Company's risk management policy, identifies risk management roles and responsibilities and outlines the Risk Management Policy Committee (RMPC) charter.

Additionally, the new organization formalized the Company's risk management handbook which documents the Company's risk management process and is used as a general guide for risk management training purposes.

Over the past few years, the Company has continued to enhance its risk management practices by developing operational risk management, creating new risk management sessions, improving the Company's risk registry and risk evaluation mythologies and investing in new tools to more systematically manage the Company's risks.

### 5.2.2 ERM Framework

SDG&E's Board of Directors has oversight of the Company's risk management process and is supported by the Company's Risk Management Policy Committee (RMPC).

The RMPC is made up of the Company's Chief Executive Officer, Chief Operating Officer and General Counsel and is chaired by the Vice President of Enterprise Risk Management and Compliance. In addition to overseeing the overall risk management framework, the RMPC meets regularly to oversee the identification, assessment and mitigation of the Company's risks

to achieve its objective of providing safe and reliable services to its customers at affordable rates.

SDG&E's risk management governance structure also includes a Leadership Risk Team which is comprised of officers and directors from all business functional areas who are responsible for leading periodic risk and mitigation dialogues, ensuring a holistic view of risk management at the Company and the review of the assessment of the Company's key risks and mitigation plans.

SDG&E's VP of ERM and Compliance is responsible for leading ERM. ERM's primary responsibilities include:

- Facilitation and review of key risk assessments;
- Development of appropriate risk management tools;
- Facilitation and review of key risk mitigation plans; and
- Maintenance of the enterprise risk registry.

Typically, the ownership and oversight of risks identified in each business functional area belong to the Officers of those areas and they assign specific risk management responsibilities to directors and managers in their organizations. The ERM governance structure is depicted in Figure 2.

*Figure 2 SDG&E's Enterprise Risk Management Governance Structure*


In addition to this existing ERM governance structure and framework, the ERM organization is facilitating the development of operational risk management where each business functional area will be responsible for developing and maintaining its own risk registry and utilizing it to drive decision-making. To date, the Company has developed preliminary operational risk registries for electric substations and medium-pressure pipeline and is in the process of improving those registries and conducting the same effort across the Company.

The purpose of this effort is to further embed risk management into the Company's operations and identify and assess risks at a more granular level. In the future, operating unit risk registers will support the identification and management of enterprise-level risks. Figure 3 depicts a vision of how operational risk management will be integrated with enterprise risk management at SDG&E.

*Figure 3 Implementing Operational Risk Management*


### 5.2.3 ERM Process

In accordance with ISO 31000, SDG&E established its 6-step risk management process and built it into its annual planning process. Figure 4 depicts the Company's risk management process.

*Figure 4 SDG&E's Risk Management Process*


Every year, the ERM team reaches out to the various operating units across the Company to update existing risk information and identify emerging risks. Through the process, the ERM team refreshes the Company's risk registry by modifying as necessary the current risk scores to reflect any changes to the various risk levels, and identifying and evaluating new and emerging risks that the Company must manage.

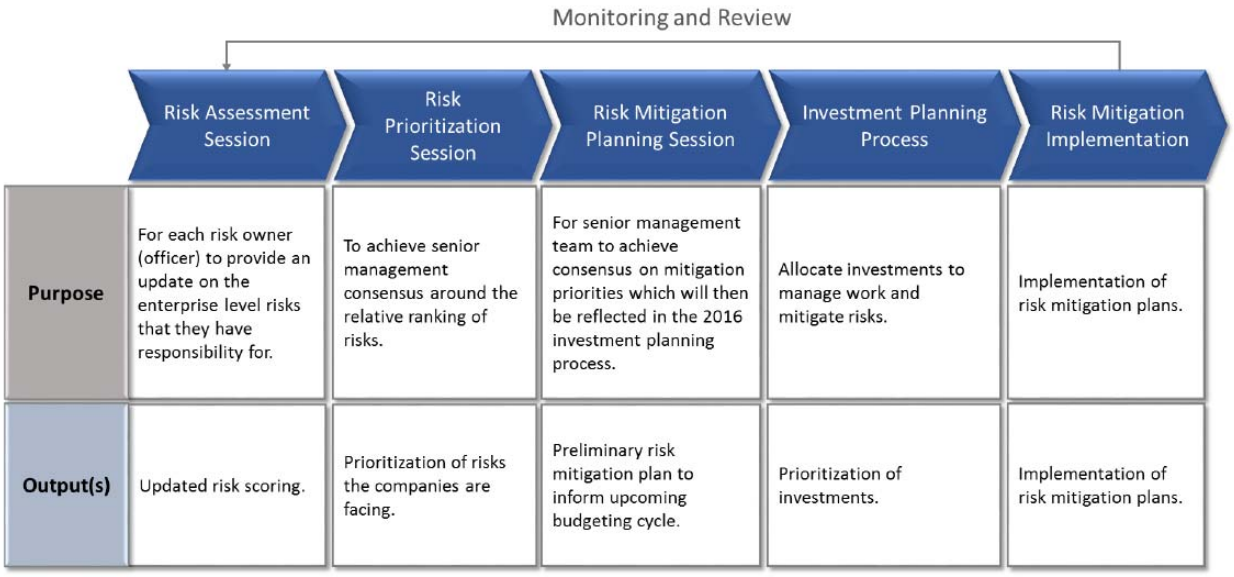
Over the past few years, SDG&E has made efforts to more transparently and explicitly link its financial planning process to its ERM process.

In 2014, the ERM group established 3 key officer sessions as a part of the annual risk management process. The Risk Assessment Session, the Risk Prioritization Session and the Risk Mitigation Planning Session. In these sessions, risks are identified, assessed and prioritized to determine the Company's top risks and discuss current efforts to control those risks and mitigations that may be needed to further reduce them.

These risk sessions provide the necessary risk information that feeds into the investment planning process. As a part of the investment planning process, the Company's enterprise risk registry is used as an input to the discussions that take place at the Executive Finance Committee (EFC) where funding allocation decisions are made to meet compliance requirements and address safety and reliability concerns that the Company must manage as a part of running its operations.

This high-level view of the annual planning process is depicted in Figure 5 below and is further discussed in the following sections.

*Figure 5 Annual Planning Process*[16]




The role of these three key risk sessions is further described below:

1. Risk Assessment Session, where each risk owner discusses their risk, the progress they've made in reducing it and elements of the previous year's mitigation plan that have been implemented. The output of this session is a refresh to the risk scores using the Company's Risk Evaluation Framework (REF) which is further described in section 5.2.4.3.
2. Risk Prioritization Session, where risk owners discuss the relative ranking of each utility's enterprise risks with senior management and achieve consensus around risk priorities.

[16] S-MAP Workshop 1 – SoCalGas and SDG&E presentation

3. Risk Mitigation Planning Session, where risk owners present their key risk mitigation plans and alternatives considered to the senior management team and discuss the feasibility and prudency of their proposed plans. This session helps shape the utility's priorities going into the annual investment planning process and helps identify gaps and/or areas of overlap in risk mitigation plans.

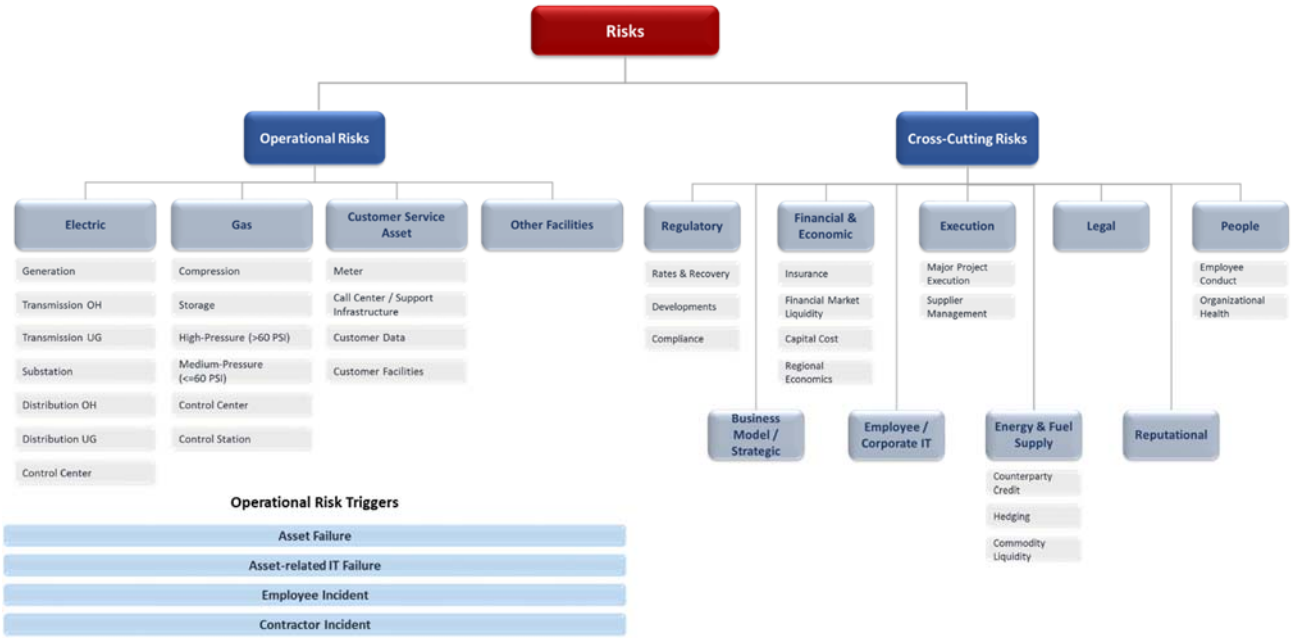
### 5.2.4 ERM Tools

SDG&E has developed and implemented several tools that are used to support the risk management process. These tools include the risk taxonomy, risk bowties, the Risk Evaluation Framework (REF) as well as various tools to assess risk treatments and monitor risk management progress.

#### *5.2.4.1 Risk Taxonomy*

In 2015, SDG&E developed its risk taxonomy the purpose of which is to provide a framework for identifying, organizing and studying risks in a more systematic and comprehensive manner. SDG&E's taxonomy categorizes risks as either operational or cross-cutting. Operational risks are associate with specific assets; whereas, cross-cutting risks are not linked to specific assets and may affect a range of assets. This structured way of identifying and studying risks helps ensure that various risk scenarios are considered when conducting risk assessments. Figure 6 depicts SDG&E's risk taxonomy.

*Figure 6 SDG&E's Risk Taxonomy*[17]




#### *5.2.4.2 Risk Bowties*

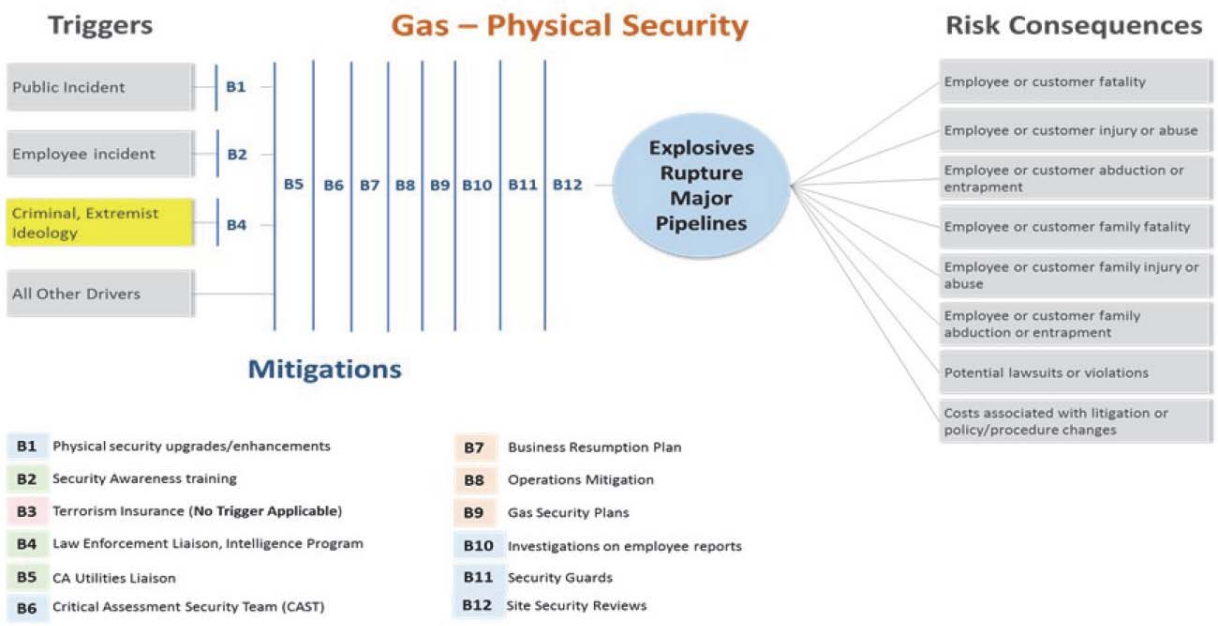
Risk bowties are used in various industries to conduct risk analyses and are recognized as a commonly used risk analysis practice in ISO 31010. Risk bowtie analysis supports the identification of the risk drivers and the potential consequences that the risk event might result in. Risk bowties are useful tools for determining what risk mitigation measures should be put in

[17] SDGE SCG RAMP Report, pg. SDGE/SCG B-3.

place. They enable risk managers to identify and document risk drivers (or triggers) that can lead to an undesirable event. Risk managers can then identify potential mitigations that could reduce the likelihood or frequency of a driver triggering the undesirable event.

An illustrative example of a risk bowtie analysis conducted by SDG&E for one of its top safety risks is depicted in Figure 7 below. The figure shows the risk event as the center of the bowtie with risk consequences on the right side and risk triggers on the left with multiple lines depicting several risk controls that address those risk triggers.

*Figure 7 Illustrative Risk Bowtie Analysis*[18]




### *5.2.4.3 Risk Evaluation Framework (REF)*

SDG&E uses a 7x7 risk evaluation matrix to assess and prioritize risks by scoring them on two dimensions; the likelihood of the risk occurring and the various levels of consequences it may lead to. The REF enables a consistent, transparent and repeatable way of evaluating and comparing risks across the Company.

As depicted in Figure 8 below, the REF is used to establish a weighted score by evaluating the likelihood of each risk event and the consequences of the risks in terms of four attributes:

- Safety, health and environmental impacts;
- Operational and reliability impacts;
- Regulatory, legal and compliance impacts; and
- Financial impacts.

[18] SDGE SCG RAMP Report, pg. SDGE/SCG A-5.

In its enterprise risk registry, SDG&E identifies the reasonable, worst-case scenario[19] for each risk event and scores that representative scenario for the potential magnitude of the risk event. As a part of developing operating unit risk registers in 2016, SDG&E began piloting the assessment of more likely[20] as well as reasonable, worst case risk scenarios in an early step to move towards more probabilistic risk evaluations.

Over the years, SDG&E has incorporated lessons learned from using the REF into updated versions of it. In 2014, it changed from a 5x5 to a 7x7 evaluation matrix and in 2015, it updated its risk scoring algorithm to allow for better distinction and comparison between risks by more appropriately reflecting the magnitude of risks.

[19] The reasonable, worst case scenario is typically defined by the most severe potential outcomes of a risk that can reasonably be expected to occur. Such scenarios are typically associated with low frequency high consequence events such as pipeline ruptures leading to explosions.

[20] The more likely scenario is typically defined by the potential outcomes of a risk that are more likely to occur. Often, it is reflective of higher frequency, lower consequence risk events when compared with the reasonable, worst case such as pipeline leaks that may not lead to explosions.

*Figure 8 SDG&E's Risk Evaluation Framework*

| | Impact | | | | | | |
|---|---|---|---|---|---|---|---|
| | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| | **Catastrophic** | **Severe** | **Extensive** | **Major** | **Moderate** | **Minor** | **Negligible** |
| ***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 | Fatalities: Many fatalities and life threatening injuries to the public or employees.<br><br>Immediate, severe, and irreversible impacts to environment | Fatalities: Few fatalities and life threatening injuries to the public or employees.<br><br>Severe and long-term impacts to environment | Permanent/Serious Injuries or Illnesses: Many serious injuries or illnesses to the public or employees.<br><br>Significant and medium-term impacts to environment | Permanent/Serious Injuries or Illnesses: Few serious injuries or illnesses to the public or employees.<br><br>Significant and short-term impacts to environment | Minor Injuries or Illnesses: Minor injuries or illnesses to many public members or employees.<br><br>Moderate and short-term impacts to environment | Minor Injuries or Illnesses: Minor injuries or illnesses to few public members or employees.<br><br>Environmental impact is immediately correctable or contained within small area | No injury or illness or up to an un-reported negligible injury.<br><br>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 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 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 |

| | Frequency/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 |

#### *5.2.4.4 Risk Treatment and Monitoring*

In 2016, SDG&E filed the State's first Risk Assessment and Mitigation Phase (RAMP) report at the CPUC where it documented its top safety risk treatment plans for which it intends to seek funding for in its next rate case. The report displayed early steps toward piloting a methodology to quantify risk reduction benefits achieved by the Company's existing risk control measures and proposed risk mitigation plans. The methodology introduced the concept of prioritizing funds using a risk reduction per dollar metric referred to as the "Risk Spend Efficiency" (RSE).

The CPUC's Safety Enforcement Division (SED) commended the effort the Company went through to develop its RAMP report, noting that there remain improvements that need to take place to strengthen the methodology and the fact that the on-going Safety Model Assessment Proceeding (S-MAP) is still in the process of defining standards for such models to be applied in the future. Following is an excerpt from the SED response:

> *"Staff recognizes that this RAMP filing is the first of its kind and that it has been difficult to quantify risk reductions in a manner that will fully support RSE calculations. Staff commends Sempra utilities, as well as the other utilities, for their efforts to gather the data necessary to make more quantitative predictions of risk reduction in future filings, as an ongoing aspect of the S-MAP proceedings."*[21]

Though the Company has not yet adopted the methodology or developed a fully working model that can be used as a part of the annual planning process, several examples of such efforts are worthy of noting here.

In various areas of the Company, risk-based prioritization tools are used to determine an appropriate ranking of spend based on various metrics that take safety and reliability impacts into account. For instance, in its fire risk mitigation program, SDG&E developed a tool called Wildfire Risk Reduction Model (WRRM) to focus on equipment failures that lead to ignitions, and how those ignitions spread due to vegetation and weather. The model determines likelihood of failures at each pole and it calculates which poles, and which improvements, lead to the largest reduction of risk per dollar spent allowing the Company to better prioritize its pole replacement efforts.[22]

Another example of such an approach is used in gas distribution operations where the Distribution Risk Evaluation and Management System (DREAMS) analyzes medium pressure pipe segments using relative assessment of probabilities and consequences of pipeline risk events to prioritize risk mitigation efforts on a segment-by-segment basis.[23]

There may be opportunities to adapt or develop similar analysis models for other risks; however, these are not likely feasible for all risks across the various operating units of the Company as they target very specific operational issues and require significant amounts of data. Thus, the Company primarily relies on its high-level prioritization process to broadly allocate funds to projects and programs by evaluating their impact to safety, reliability as well as other factors after which operating units are responsible for further prioritizing their allocated budgets at a

[21] SED report on SDG&E's RAMP application – pg. 7

[22] SDG&E's RAMP Application – SDG&E/SCG D-15

[23] SDG&E's RAMP Application – SDGE/SCG D-19

more granular level using their own methodologies and in some cases specific models such as WRRM or DREAMS.

While there are various metrics being tracked and monitored at SDG&E, the integration of those metrics with the Company's risk registry is primarily facilitated by the ERM group. In 2016, the Company identified existing metrics that can be used to monitor risk performance as a part of the on-going S-MAP and in its 2017 ERM process, it began to formally incorporate those metrics in the risk discussions and document them in the Company's updated risk registry. One of the Company's most advanced metrics is in the fire risk area where the Company collects information through its large weather network to effectively and proactively monitor the potential of any ignition and appropriately prepare to respond to the risk of a wildfire.

## 5.3 ASSET MANAGEMENT AT SDG&E

### 5.3.1 Gas Operations Asset Management

SDG&E operates 14,000 miles of natural gas transmission and distribution pipelines across its service territory[24] selling and transporting approximately 327 million cubic feet of gas per day (MMCF/day).[25]

SDG&E has established a Natural Gas System Operator Safety Plan that conveys the safety performance expectations of SDG&E's Senior Management Team, and describes the safety plans, programs, policies, standards, and procedures that are designed to accomplish those expectations.[26]

Over the years, SDG&E has matured its risk, asset and investment management processes and its safety culture. In addition to the continuous improvement of its risk management process, in 2015, the Company conducted a third-party assessment of its asset management practices and how well they conform to API RP 1173 and ISO 55000. Based on the assessment, the Company identified a Director to lead the implementation of the recommendations to enhance the safety of its gas operations and comprehensively manage its gas assets in conformance with API 1173 and ISO 55000.

The process for asset management can be broadly characterized as 3-stage process, depicted in Figure 9.

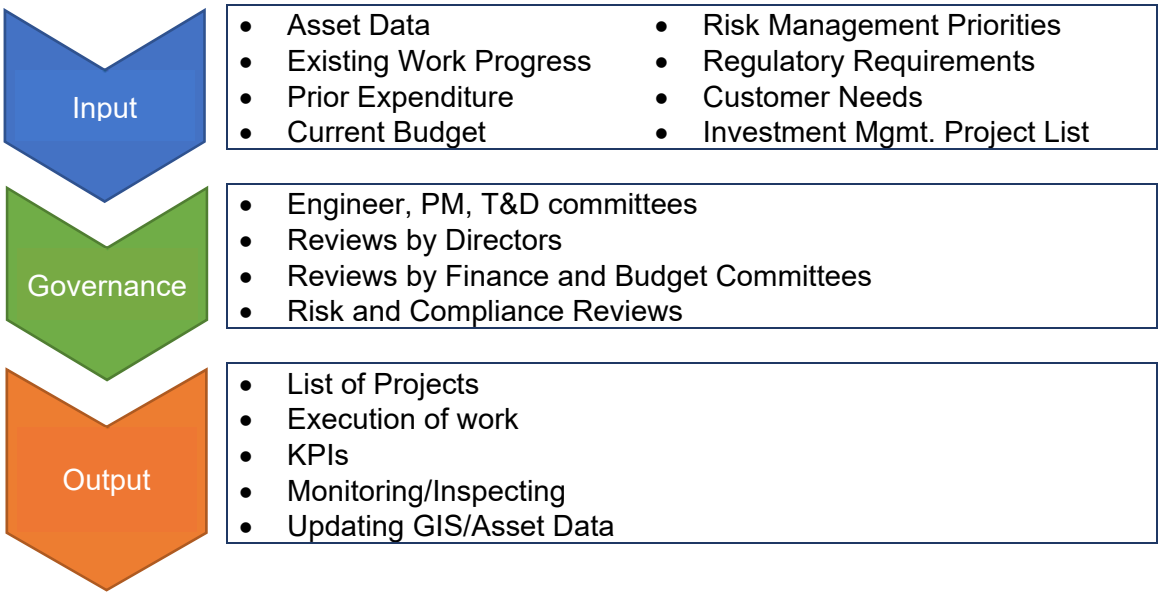
1. Input: Several inputs and considerations are taken, depending upon the asset group;
2. Governance: These inputs are then applied through an internal governance process;
3. Output: This creates work plans and operational output.

[24] SDG&E website, PSEP.

[25] 2016 California Gas Report – p109.

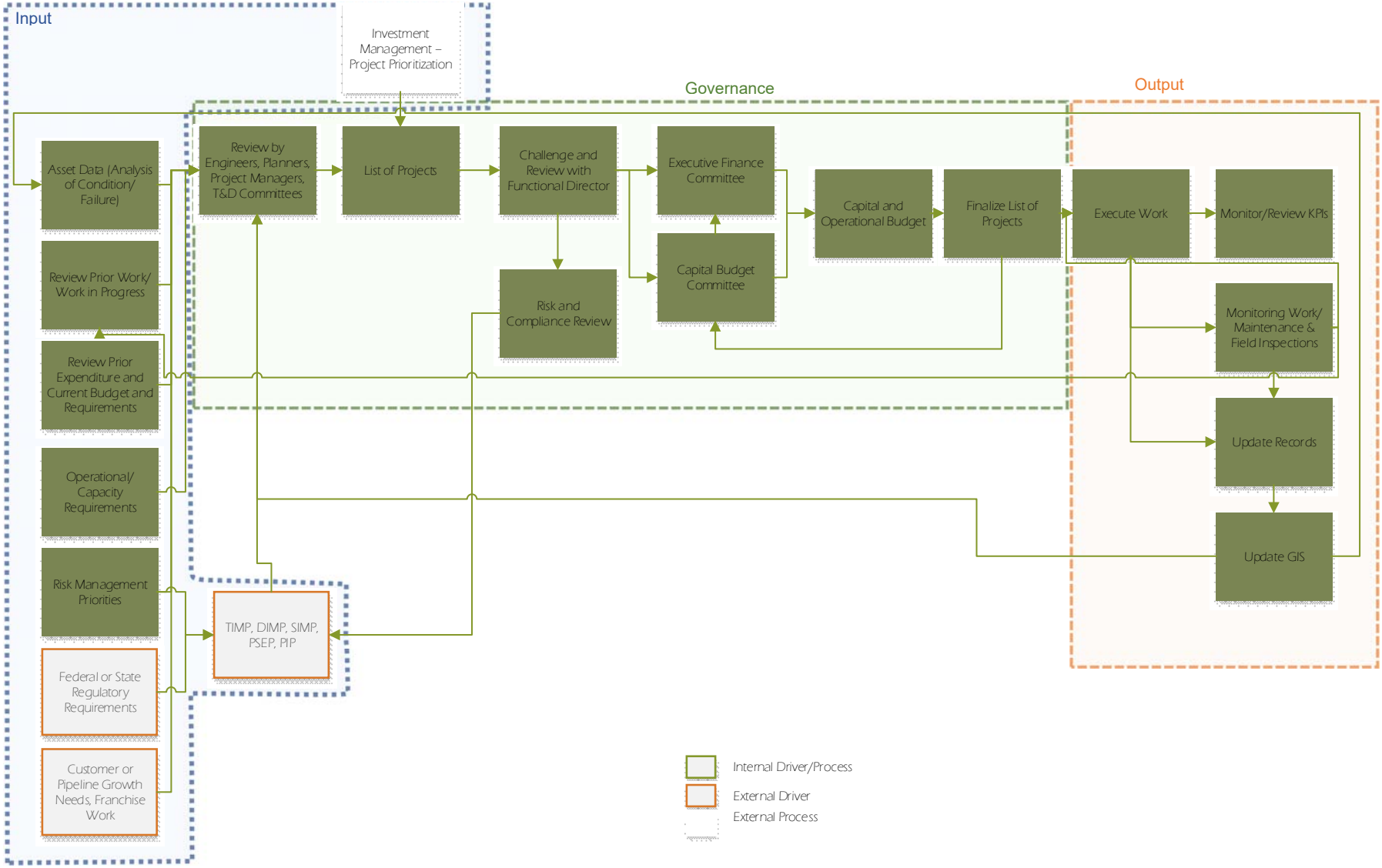
[26] SDG&E Natural Gas System Operator Safety Plan – 1.

*Figure 9: Three-stage High Level Asset Management Process*




Similar to the recommended process in API 1173, the Company follows a “plan-do-check-act” framework as presented in Figure 10 which is further described below.

*Figure 10: SDG&E's Gas Operations Asset Management*



As Figure 10 shows, the Company's Asset Management program can be viewed, at a high level, in three phases, and while this program is comprised of many processes that fit together linearly, there are several cyclical elements that ensure Asset Management is an ongoing process. Inputs are comprised of drivers and processes, such as asset data, prior and existing work and budgets, and capacity requirements; external drivers, such as regulatory requirements and customer needs; and the results of the investment management prioritization process, which is external to the Asset Management program.

The combination of these inputs informs the Engineering and Planning Departments, the T&D Committee, as well as pertinent personnel such as project managers. These groups generate a list of projects that are then submitted for consideration through the Company's investment management process for prioritization (described in 5.4). The prioritized list of projects is submitted for challenge and reviewed by various committees prior to the creation of a finalized project list.

Once the finalized list of projects is endorsed by leadership, the list is provided to groups such as Operations and Construction for execution. Throughout the execution of the work, each operating area monitors and inspects work, tracks KPIs, and maintains and updates records. The asset management loop is not closed until the asset data systems such as GIS are updated with the data and records of the work that was carried out including any findings from field inspections.

### 5.3.2 Electric Operations Asset Management

SDG&E currently has several processes for managing its assets, which have contributed to the Company being named "Best in the West,"[27] and allowing the Company to consistently meet compliance requirements and financial targets. The Company's asset management functions include:

- Capacity planning – to manage the impact of load growth on the assets;
- Reliability management – to improve performance and availability of the assets;
- Standards development – to ensure equipment and activities on the assets are consistent and meet requirements;
- Asset investment process (described in 5.4) – for determining funding of work on the assets;
- Construction program implementation – to implement the programs and plans; and
- Inspections and maintenance program development –to inspect and maintain the assets and ensure regulatory compliance when applicable.

In addition to the functions noted above, SDG&E has implemented and relies on tools to support its asset management program, including models for system planning, decision support tools, and asset information systems:

- SAP and GIS: GIS provides mainly geographical information and maps, including location, connectivity and other attributes. SAP contains financial and asset attribute information. Combined, these systems contain most of the Company's asset management information.

[27] PA Consulting Group ReliabilityOne Awards for outstanding reliability performance among utilities in the western states and Canada.

- CASCADE: Mostly used in the Substations organization, captures attributes and maintenance information
- SCADA and CBM: SCADA provides critical and usually real-time information for the operation of the grid and controls assets, such as breakers. The Condition Based Monitoring system (CBM), is used by the Substation organization to provide asset condition information on critical asset types, such as substation transformers to allow scheduling of maintenance based on need rather than static cycles.
- System simulation tools to evaluate the impact of load growth or contingencies on the system, mostly used by the transmission and distribution engineering planning groups.

At SDG&E, electric asset investments can be generally categorized as follows:

- Capacity projects that are done to meet forecasted demand
- System reliability that target poor-performing assets to improve reliability
- Specific asset health programs that are done across various assets using different models to address asset issues and maintain long-term system integrity

Transmission capacity work is driven by NERC and FERC requirements and this type of investment may be generated either from SDG&E's load forecasting model or may come directly from FERC where load forecasting may identify needs to expand targeted capacity constraints through capital investments.

Distribution capacity work is identified by running the Company's internal load forecasting model that looks at 10-year capacity needs and considers the integration of Distributed Energy Resources (DERs) and how they impact the system.

System reliability work starts with reliability assessments conducted by expert teams in the Company who look at the Company's performance in terms of SAIFI (Average total number of outages per customer), SAIDI (Average total duration of outages per customer), and CAIDI (Average duration per outage) and determine where investments need to be made to meet reliability targets.

In addition to that, the Company has various assessments and models that specifically look at asset health and determine targeted investments to reduce risks related to those assets. Examples of such work includes the Company's cable failure analysis program, its newly developed pole-loading program, the fire risk mitigation program as well as its Corrective Maintenance Program (CMP) which ensures that major asset types, such as poles, are inspected and maintained according to General Order requirements and remedial actions are taken on a timely basis commensurate with the severity of the issue.

In substations, the Company has a dedicated Substation Equipment Analysis Team (SEAT) that focuses on identifying and prioritizing substation asset risks and mitigating them. Additionally, the Company invested in moving towards Condition-Based Monitoring (CBM) to enable more proactive asset management particularly for the management of transformer risks.

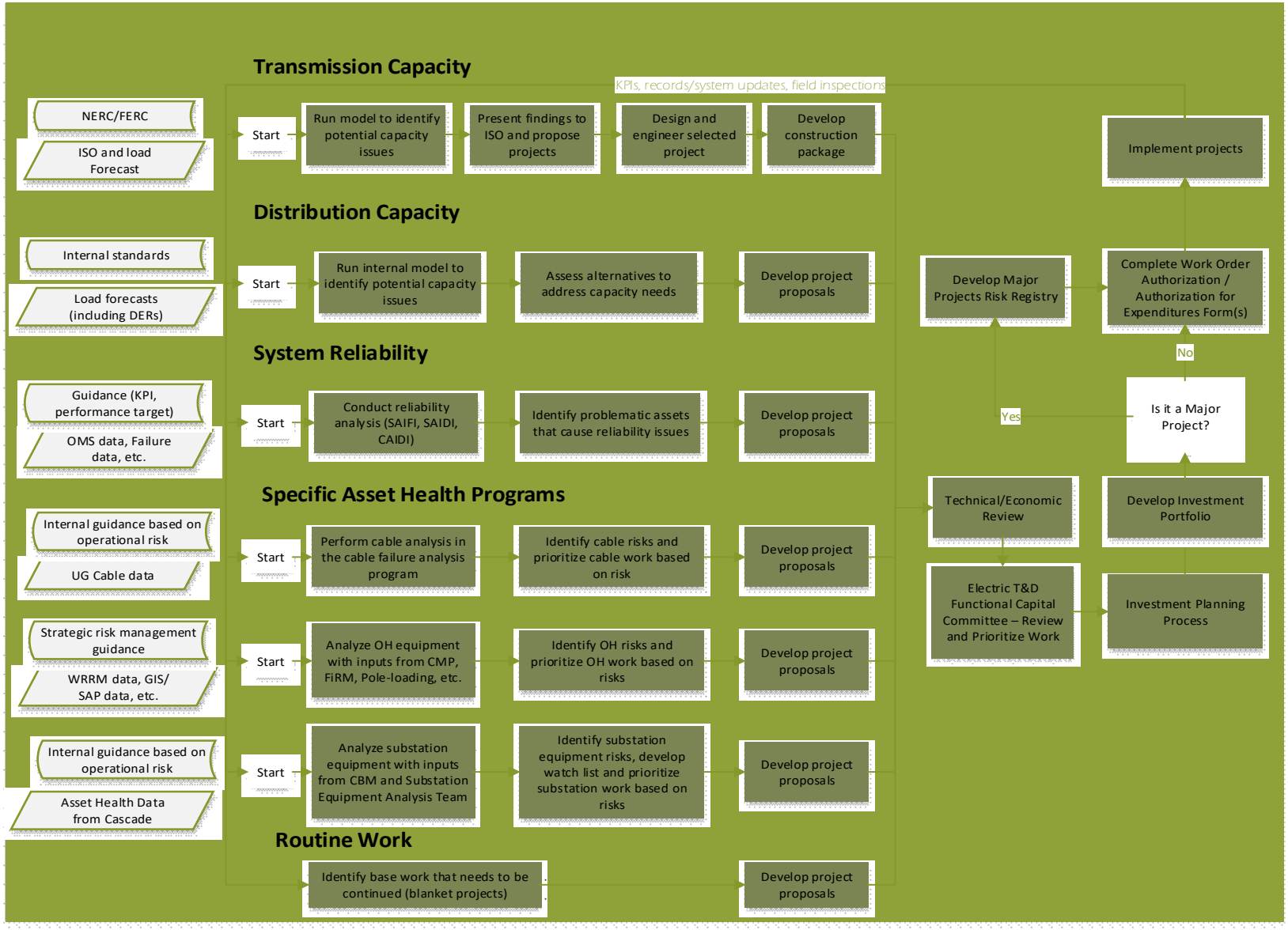
Any work that is generated through the various functions within electric operations at SDG&E goes through Central Planning where cross-functional committees discuss the various needs across the system and prioritize the allocation of funding. The process for determining funding levels across the Company is further described below.

Once projects and programs are funded through the annual investment planning process, the Company identifies major projects that are typically larger in size and go through an elevated level of accountability and oversight through the Major Projects organization which develops and maintains risk registries for major projects. These registries not only identify typical projects risks related to budgeting and scheduling, they also identify and monitor operational risks of doing and not doing the projects.

SDG&E uses Work Order Authorization (WOA) and Authorization of Expenditure (AOE) forms for final approval, recording and monitoring of costs for its projects.

An overview of how asset management is currently done at SDG&E is depicted in Figure 11 below.

*Figure 11 SDG&E's Electric Operations Asset Management*



## 5.4 INVESTMENT MANAGEMENT AT SDG&E

SDG&E's planning process starts with a 5-year strategic plan that is established by Senior Leadership to provide executive guidance on budgets based on authorized funds and estimated needs identified by various functional areas in the organization. Each functional area has a committee that oversees the identification of funding needs and prioritization of work within that area. These committees at SDG&E are identified as follows:

- Electric operations
- Gas operations
- Generation
- IT
- Facilities
- Customer service

On an annual basis, these various committees submit a prioritized list of funding needs to the Central Planning Group. The Central Planning Group then evaluates all requests from all functional committees to determine funding levels considering the following categories of work:

- Mandatory: work/spend needed to meet regulatory requirements and mandates
- Base: routine work/spend needed to maintain system operations and provide service (e.g. blanket budgets such as pole replacement programs)
- In-flight: projects that are currently in progress and additional funding is needed to complete them
- Elective: work the utility has flexibility over when or if to implement it. It has no regulatory or compliance repercussions

Mandatory, base and in-flight work gets submitted to Central Planning using Excel-based templates to document various information pertaining to the requested funding and gets discussed within and across the various functional capital committees. Elective work is submitted through a prioritization model that evaluates the benefits of each proposal based on how it impacts the company's priorities in the context of safety, security, reliability, environment, economic benefits and customer experience. The model produces a prioritized list of the proposed projects based on a calculated score that is referred to as the "Combined Risk Reduction" (CRR) and an efficiency metric that considers the cost of each project in addition to the CRR.[28] The outputs of this model are used primarily as guidance in the decision-making process.

Once Central Planning determines an appropriate funding level that addresses key risks and needs of organization, it produces a proposed portfolio to the Capital Committee. The Capital Committee is comprised of directors and financial representatives from each of the functional areas and is responsible for having cross-functional discussions of funding needs and determining the appropriate prioritization of work. Challenge sessions take place at the Capital Committee level where project managers are given an opportunity to present their business cases for the funding they seek. Once the Capital Committee goes through its annual meeting, it

[28] This model is different from the Company's Risk Evaluation Framework (REF) and the "Risk Spend Efficiency" concept that the Company introduced in its RAMP report.

may re-prioritize the investment portfolio as deemed necessary by the members of the committee.

Central Planning then facilitates the annual Executive Finance Committee (EFC) meeting where the final investment decisions are made. The EFC is comprised of officers that represent various functions across the Company and meets annually to discuss the proposed investment portfolio and determine the final set of programs and projects that the Company should fund the following year. In addition to the annual EFC meeting to determine appropriate funding levels and set budgets for the functional organizations at the Company, the EFC meets on a quarterly basis to determine any needs to re-prioritize or re-allocate funds based on emerging risks or operational constraints. An overview of this process and the interactions between the various entities involved in investment planning are depicted in Figure 12 and Figure 13 below.

*Figure 12 Investment Planning Overview*

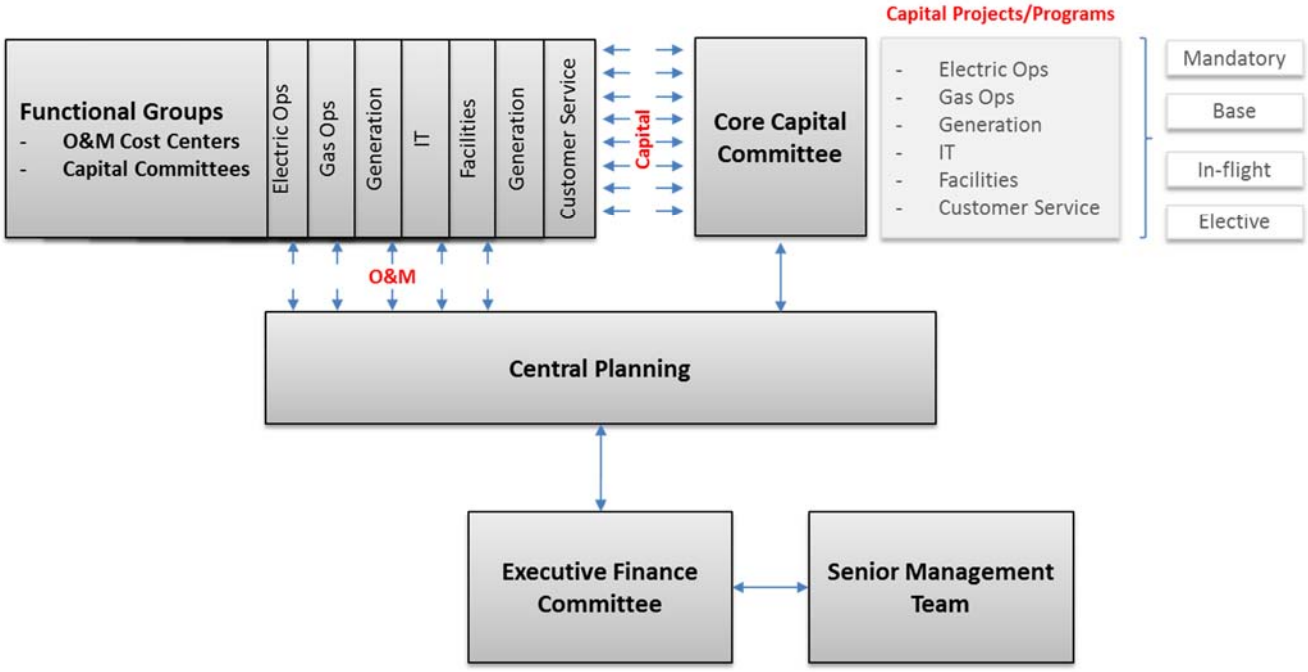
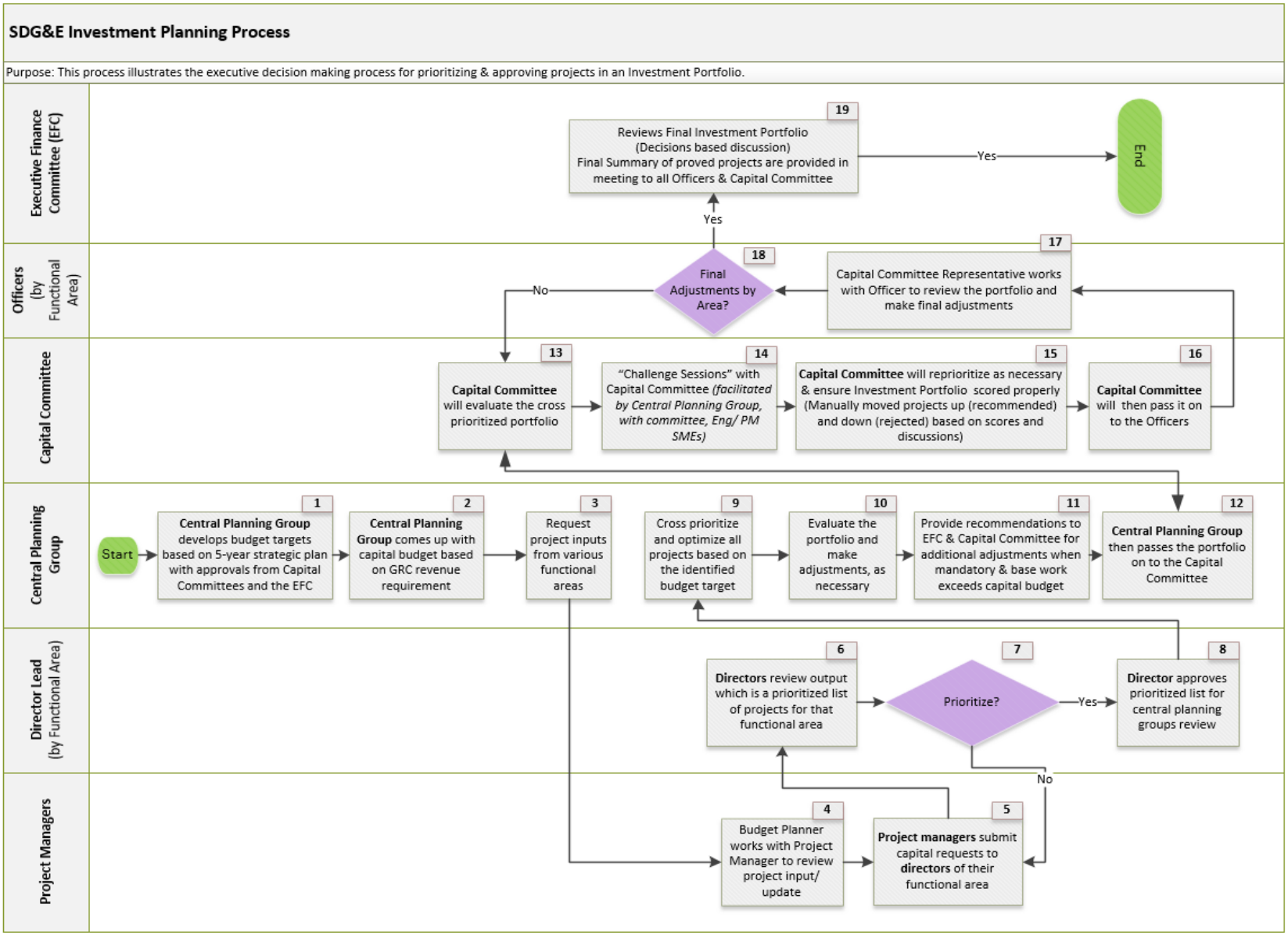


*Figure 13 SDG&E's Investment Planning Process*



# 6 MATURITY ASSESSMENT

Davies Consulting conducted its maturity evaluations of SDG&E's processes, procedures, and methodologies across the company. Early on, Davies Consulting determined that the Company had relied upon a uniform process and methodology for risk and investment management.

Use of a uniform process and methodology across SDG&E aligns with the CPUC's request that utilities demonstrate in their GRCs that risks are being managed across the enterprise such that resources are being allocated appropriately across risks.

In contrast, asset management methodologies and processes vary across the company depending on the commodity and asset types and will be discussed accordingly in the following sections.

## 6.1 OVERALL ASSESSMENT

Over the past few years, SDG&E's risk management processes and methodologies have matured where risk management has been embedded in the Company's culture and is consistently applied across the organization with its well-established and documented process and tools. The ERM process occurs annually and involves appropriate experts from various functional areas across the Company. While there remains room for improvement in terms of integrating risk into operations and decision making, the Company has begun that process through the piloting of operating unit risk registers and developing a roadmap to establish operational risk management over the next few years.

SDG&E's investment management process is well-structured with various committees representing different functional areas at the Company and appropriate forums to enable cross-functional discussions to take place to determine appropriate funding levels for the Company's various investments. However, the process is primarily subject-matter expertise driven with minimal and isolated use of data to drive investment decisions based on risk. Additionally, the methodology used to prioritize elective work does not necessarily produce results that align with the Company's strategy and as such, it is used only for general guidance in the final decisions. These drawbacks can potentially be addressed by enhancing the existing model to more closely align with the Company's strategic priorities and utilizing it on a broader level to incorporate all projects/programs.

SDG&E's asset management system is and, consequently, its asset management plans are, primarily driven by compliance and regulatory requirements. The management of electric assets remains siloed with varying degrees of sophistication in the use of data and models to manage the system. To address that, the Company has shown progress towards improving its asset management practices and better integrating its systems and developing more comprehensive asset management plans. This is highlighted by the establishment of a new asset management organization with the vision of establishing an industry-leading asset management program for the Company guided by ISO 55000.

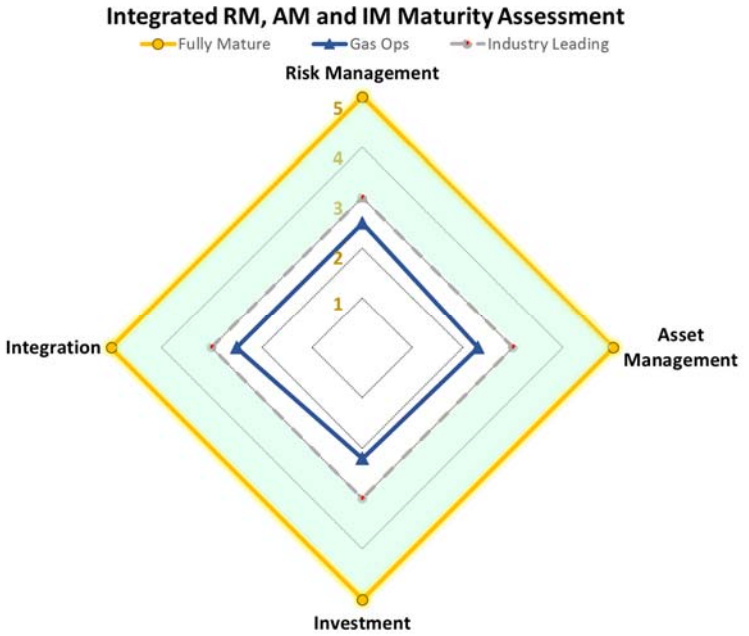
In Gas Operations, the momentum behind asset management improvement is increasing as evidenced by the appointment of dedicated internal teams and leaders to the implementation of API 1173 and ISO 55000. As this work progresses, the abilities of the organization should increase in multiple areas such as asset management planning, integration of operations with

risk, and continuous improvement. The results of these improvements will ultimately lead to an improvement in safety and safety culture moving the company closer towards its vision.

SDG&E's efforts to integrate risk, asset and investment management have increased over the past few years and are primarily driven by the risk management evolution. The ERM department has taken steps towards embedding risk management into the organization through its operating risk registries efforts and has begun to link risks to investments through the officer risk sessions that feed the annual planning process. However, the Company has yet to develop a more integrated approach to decision-making that considers the risks that the Company has identified in its ERM process and the various asset management plans in place.

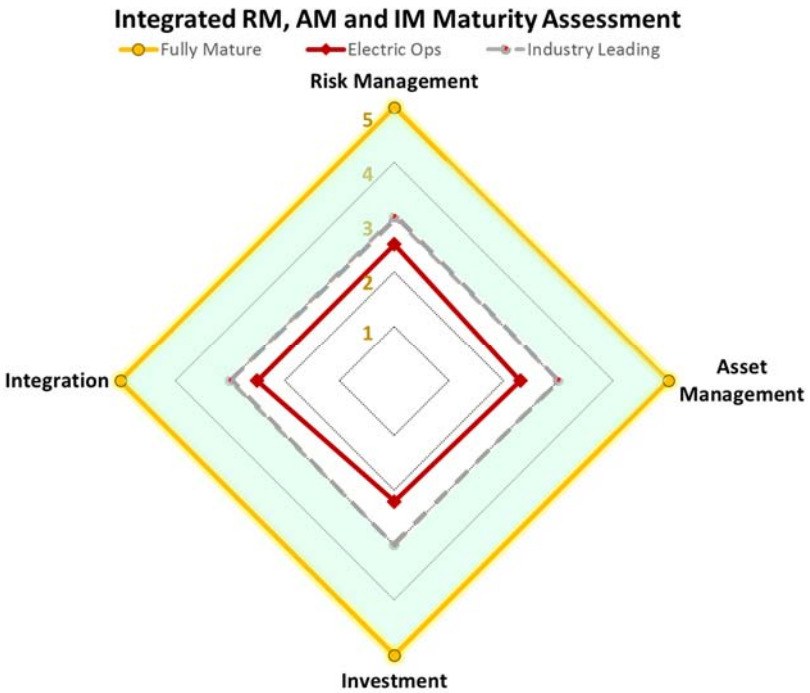
Figure 14 and Figure 15 below are graphical representations of the Company's Gas and Electric Operations maturity levels relative to the current state of the industry.

*Figure 14: Integrated Maturity Assessment – Gas Operations*




Note: Aviation, e-Commerce, Banking, Insurance and Space industries typically operate in shaded areas levels 4 and 5

*Figure 15: Integrated Maturity Assessment - Electric Operations*



## 6.2 RISK MANAGEMENT MATURITY

### 6.2.1 Overall Maturity

SDG&E has established and implemented a uniform risk management framework and process that involves all functional areas of the Company. While there are opportunities to improve risk management in terms of probabilistic modeling, assessing interrelationships of risks and better-integrating risk management into decision-making, SDG&E has successfully evolved its risk culture over the past few years and has embedded it into its operations.

Early steps towards building operational risk management are evident in the development of risk registers across identified asset families and functional areas of the organization. This effort is at an early stage of maturity and has not yet achieved the intended level of integration of risk management and decision-making. Achieving that level of integration takes several years to accomplish and SDG&E is working diligently towards that goal.

Additionally, Risk assessments are primarily driven by subject-matter expertise and have yet to evolve to more rigorous analytics based on data to more strongly support risk scoring and monitor risk performance over time using metrics. To that end, the Company has started to document some risk metrics and incorporate them in its risk assessment discussions as demonstrated in its RAMP application.

Overall, SDG&E has achieved a maturity level of 2, as illustrated in Table 9 but has demonstrated progress towards achieving leading utility-industry practices by embarking on the development of operational risk management and enhancing the use of data in its risk assessments. To achieve a level 3, SDG&E will need to complete its operational risk management initiative and fully establish risk management governance in each operational unit across the Company to ensure risk management is embedded into its culture at all levels down to its field operations.

*Table 9 SDG&E Evaluation - Risk Management Maturity*

| Current Utility Industry Levels of Maturity Demonstrated | | | | | Maturity Opportunity for Industry Evolution | |
|---|---|---|---|---|---|---|
| | | | SDG&E | | | |
| Level | 0 | 1 | 2 | 3 | 4 | 5 |
| Characteristics | No Formal Process or Methodology | Not part of the organizational culture. Risk Management isolated, undocumented and is characterized by as one that is not repeatable. Not established in a formal process or repetitive timeline. Some evidence does exist that risks are discussed and considered, but the results are not codified or used across the enterprise. | Not part of the organizational culture. Risk Management isolated as an annual process conducted to inform at the Board of Director level and based upon an ad hoc process. A single corporate risk registry may exist, but inputs are subjective in nature with no evidence of data to support the inputs. Operational risks are managed separately at the business unit level with limited process of communication, understanding, or relationship to other business units. Risk Identification, Evaluation, Analysis and Prioritization are subject matter expertise driven and do not account for uncertainty or interrelationships of risks. No metrics are used to measure performance. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published standards. Most/all business units of the enterprise maintain their own risk registers and use those to communicate enterprise and operational risks across the enterprise. Risk assessment is characterized by a more qualitative/subjective approach. Risk identification, evaluation, analysis and prioritization are subject matter expertise driven and do not account for uncertainty or interrelationships of risks. Lagging performance metrics are used to measure performance. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published standards. Business unit enterprise and operational risks are communicated across the enterprise and are characterized by a balance of quantitative and qualitative/subjective approach. Risk Identification, Evaluation, Analysis, and Prioritization are primarily subject matter expertise driven, attempt to account for uncertainty and the interrelationships of risks. Deterministic methods of risk characterize the risk-informed decisions. Lagging performance measure are predominantly used to measure performance. Evaluates risk mitigation alternatives. Validates the effectiveness of risk mitigations. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published standards. All levels of the organization provide input. Business unit enterprise and operational risks are communicated across the enterprise and are characterized by a qualitative and probabilistic analysis. Risk Identification, Evaluation, Analysis and Prioritization are data driven, account for uncertainty, and interrelationships of risks. Leading and lagging performance metrics are used to evaluate risk management effectiveness and are monitored continually. Tolerance levels of risk are associated potential loss exceedance. Operational and investment decisions are risk-based and focused on the risk exposure reduction. Noted as industry leader and used as a benchmark by other companies |

### 6.2.2 Detailed Maturity

#### *6.2.2.1 Risk Management Framework*

The risk management framework is a set of components that provide the foundations and organizational arrangements for designing, implementing, monitoring, reviewing, and continually improving risk management throughout an organization.[29]

SDG&E's risk management framework was established in alignment with ISO 31000 to promote and embed risk management into the Company's operations. As such, SDG&E has a documented risk management framework that states the Company's risk management policy, clearly identifies risk management roles and responsibilities and establishes governance and accountability of risk management across the Company.

Additionally, the Company has committed resources to risk management as an essential element of developing its framework. Over the past few years, the Company expanded its ERM organization and added personnel with various operational and analytical backgrounds to support its objectives of building a leading risk management practice for the Company.

An important element of establishing a risk management framework is having a consistent method for communicating risks across an organization and with external stakeholders. SDG&E's internal risk management communications follow a consistent format through the material that is developed as a part of its four risk sessions and in its enterprise risk registry. Externally, the Company has developed well-documented risk mitigation plans that have been publicly filed with the CPUC in its most recent RAMP application.

To monitor and improve its risk management framework, SDG&E participates in industry events and forums such as Deloitte's annual risk roundtable to share and obtain knowledge on leading risk management practices. SDG&E is also a member of the risk management committees at both Edison Electric Institute (EEI) and the American Gas Association (AGA). Furthermore, the Company has developed risk management training material and forums to continue to cultivate its risk management culture and share risk management knowledge across the organization. The Company has also started to develop metrics that can be used to monitor its risk management performance as an indicator of the strength of its risk management framework and where improvements need to be made.

In addition to the Company's established annual ERM process, SDG&E's COO launched a series of risk sessions titled "Know Your Risk" to further engrain risk management in the Company's culture by engaging various areas of the Company in discussing their current risks and ways to mitigate them.

Opportunities for improvement of its risk management framework exist in the development of an operational risk management approach that will enable further integration of risk management into day-to-day operations. SDG&E has taken the first steps towards implementing this framework by piloting the development of two operating unit risk registers and developing a roll-out plan to further develop such registers for all operating units across the Company.

[29] International Organization for Standardization, ISO 73: Risk management – Vocabulary (Geneva, Switzerland: 2009), 1-24.

#### *6.2.2.2 Risk Management Scope/Context*

Establishing the risk management scope entails the identification and communication of organizational objectives, strategic priorities, internal and external factors that will influence the evaluation and mitigation of risks and the criteria against which risks will be evaluated.

SDG&E's organizational objectives are clearly identified and communicated across the Company and its risk management process considers various internal and external factors that influence its risk management actions. Internally, the Company has established objectives and priorities around which risks should be managed and externally, SDG&E monitors its regulatory context and enhances its risk management practices to align with regulatory expectations and changing risk environments.

As a part of establishing its context, the Company has a risk management handbook that clearly frames the scope of its risk management process. In its handbook, the Company has an established risk lexicon that is aligned with the lexicon established at the CPUC for California utilities along with a risk taxonomy that was developed to clearly structure and organize the Company's risk identification process.

Additionally, SDG&E's risk criteria have been established and are consistently applied in its process through the Company's REF where the various consequences of risks are defined and consistently used to assess the Company's risk profile.

There remains room for improving the Company's risk management scope and context through the establishment and use of risk tolerance to guide risk management decisions and the consideration of how interactive risks and threats affect the Company's risk profile. Such practices are considered pioneering and have been implemented primarily in more advanced industries such as nuclear and aviation.

#### *6.2.2.3 Risk Identification, Analysis, Evaluation and Prioritization Process*

Risk identification is the process of finding, recognizing and describing risks.[30] SDG&E's risk identification process is guided by the ERM organization and follows a consistent methodology to clearly identify the risk events along with the various drivers of the risk and the potential consequences a risk event may lead to. In addition to the use of risk bowties to identify risk components such as the risk event, the drivers and its consequences, another useful tool that the Company has developed for risk identification is the risk taxonomy which has proven valuable in guiding risk discussions to define risks within given categories of assets, functions and related sources of the risk. The taxonomy helps enable comprehensive consideration of various risk scenarios that may occur.

Risk analysis is a process for comprehending the nature of risk and to determine the level of risk.[31] SDG&E's risk analysis is primarily driven by subjective input from appropriate experts who are engaged throughout the risk management process to provide their insights. For its top safety risks, the Company conducted and documented risk bowtie analyses as demonstrated in its filed RAMP application.

[30] International Organization for Standardization, ISO 73, 5.

[31] Ibid., 6.

Risk evaluation is a process of comparing the results of risk analysis with risk criteria to determine whether the risk and/or its magnitude is acceptable or tolerable.[32] At SDG&E risk evaluation is done using the Company's well-established REF where every risk is evaluated in terms of its likelihood and the severity of the various consequences it might lead to. Using its REF model and algorithm, SDG&E calculates a risk score and uses that score to prioritize the Company's risks.

In general, SDG&E's process for identifying, analyzing and evaluating risks can be further improved with the use of data and the application of more probabilistic assessments to capture and communicate the uncertainty associated with risks. One of the early steps that SDG&E has taken towards that is in the identification and assessment of not only a reasonable, worst case scenario but also a more likely scenario in the piloting of operating unit risk registers. Moving away from using a single point to represent risks is an early demonstration of capturing uncertainty and paving the way for more probabilistic modeling in the future.

#### *6.2.2.4 Risk Treatment and Monitoring*

Risk treatment is the process of evaluating and implementing measures to address identified risks. SDG&E utilizes its Risk Mitigation Planning and Risk Accountability sessions to develop risk treatment plans and monitor their implementation. However, the process of evaluating risk controls and mitigations has not yet been integrated with the Company's investment planning process. The current investment planning process evaluates projects and programs with minimal and anecdotal links to the Company's identified risks making it challenging to capture and track all aspects of risk management from identification to treatment and monitoring.

Although SDG&E has made efforts to bring risks to the table when discussing the allocation of funds, it has not yet formalized a process to use the Company's risk registry as a starting point for developing its investment portfolio. However, the Company has piloted such a process and methodology as presented in its RAMP application where Risk Spend Efficiencies (RSEs) were calculated for risk controls and mitigations as a way of communicating the effectiveness of risk treatment measures at reducing the Company's risks. SDG&E is now capturing lessons learned from that pilot and from on-going regulatory proceedings (e.g. S-MAP) to develop an appropriate methodology to better-integrate risks and investments in the future.

### 6.2.3 Specific Highlights

In addition to the overall assessment of risk management described above, LOBs demonstrated some specific practices worth highlighting in this section.

#### *6.2.3.1 Gas Operations*

In addition to the overall assessment of risk management described above, there has been a growing level of understanding, knowledge and application of risk management within the gas organization, the RAMP process has been a major contributing factor for this transition.

In addition to the changing regulatory requirements several improvements have been made that allow for a greater level of program maturity. The continued usage of models and tools such as DREAMS and the integrity management processes in Transmission Integrity Management Program (TIMP) and Distribution Integrity Management Program (DIMP) provide risk insight and the ability to make higher resolution risk-based decisions.

[32] Ibid., 8.

In 2016, as a part of its operational risk management pilots, ERM facilitated the development of the Company's first gas-specific risk register representing the medium-pressure system. ERM's plans for the next few years is to continue to develop such registers for all gas assets and other functions across the Company.

#### *6.2.3.2 Electric Operations*

Electric Operations has various processes and analytical methodologies in place to manage risk. One example of more mature risk management practices in Electric Operations is in the Company's Fire Risk Mitigation (FiRM) program where the Company leverages various analytics to identify asset risk failures and their potential impact on wildfires.

Another area that utilizes analytics to identify and prioritize asset-related risks is in substations where the Substation Equipment Analysis Team identifies asset-risks and determines prioritization of mitigations based on those identified risks.

In 2016, as a part of its operational risk management pilots, ERM facilitated the development of the Company's first electric-specific risk register representing substations. ERM's plans for the next few years is to continue to develop such registers for all electric assets and other functions across the Company.

## 6.3 ASSET MANAGEMENT MATURITY

### 6.3.1 Overall Maturity

At SDG&E, asset management processes are generally not integrated, comprehensive, or documented.

In Electric Operations, SDG&E's asset management processes are primarily focused on addressing one business objective (e.g., the Corrective Maintenance Program) or focused on only one phase of the life cycle, such as system planning. For example, SDG&E's distribution asset inspection/maintenance program (CMP) and distribution engineering do not share the same asset management objectives. While CMP is primarily focused on compliance, engineering is primarily focused on asset reliability. Therefore, while each department is focused on a single stage of the asset life cycle or a single objective, there are no plans for or groups with holistic oversight of the asset management process from cradle to grave.

Within Gas Operations, asset management is primarily focused on addressing pipeline integrity and no group has holistic oversight for addressing all gas asset types in a consistent and comprehensive manner.

Implementing robust governance, defining objectives, and creating asset plans that consider the entire asset management cycle while balancing performance, risk, and investments to best achieve corporate objectives is necessary to increase the effectiveness of SDG&E's current asset management practices.

The company has demonstrated efforts toward improving its asset management maturity by assessing its practices against ISO 55000 and API 1173, as well as developing a roadmap to close the identified gaps. As a first step towards implementing that roadmap, SDG&E announced a new Senior Vice President of Asset Management and has kicked-off the implementation project which will take several years to fully align the Company with the tenets of these asset management standards.

Thus, SDG&E's Asset Management maturity is level 2 as depicted in Table 10. To move to a level 3, the Company should establish a comprehensive asset management system that conforms to ISO 55000 and API 1173.

*Table 10 SDG&E Evaluation - Asset Management Maturity*

| Current Utility Industry Levels of Maturity Demonstrated | | | | | Maturity Opportunity for Industry Evolution | |
|---|---|---|---|---|---|---|
| SDG&E | | | | | | |
| Level | 0 | 1 | 2 | 3 | 4 | 5 |
| Characteristics | No Formal Process or Methodology | Evidence of Asset Management only at operational unit level. Ad hoc process established in some business units. Critical assets understood and prioritized based upon subject matter expertise. Asset Management Plans and Strategies are not developed or codified. Asset management efforts are resourced annually. There is no evidence of review and improvement on a cyclical basis. Asset management reactive in nature. | An ad hoc but formalized and documented process is established for business units. Critical assets are understood and prioritized based upon subject matter expertise. Individual asset alternative strategies are evaluated using subject matter expertise. Asset Management Plans and Strategies are developed for individual assets. Asset strategies are resourced annually. Evidence is present that the Asset Management process is monitored and continually improved. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published international standards. Certified or provides evidence of adhering to international standards. Critical assets understood and Asset Management alternative strategies are evaluated using subject matter expertise. Asset Management Plans and Strategies are developed for individual assets and implemented. Asset strategies are resourced annually. Asset Management is continually improved. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published international standards. Certified or provides evidence of adhering to international standards. Critical assets understood and Asset Management alternative strategies are evaluated using subject matter expertise. Resource constraints are accounted for in lifecycle plans. Asset Management Plans and Strategies are developed as an integrated system, codified, implemented, and monitored with a short and long term view. Asset Management is continually improved. | Part of the organizational culture. One formalized and documented process established across all business units that is grounded on published international standards. Certified or provides evidence of adhering to international standards. Mature Asset Life Cycle for critical assets understood and Asset Management alternative strategies are evaluated in a probabilistic environment that enables understanding of uncertainty, and interrelationships of asset failures. Asset Management Plans and Strategies are developed as an integrated system, codified, implemented, and monitored with a short and long term view. Benefits of AM program can be demonstrated and measured. Asset Management is continually improved. |

### 6.3.2 Detailed Maturity - Gas Operations

#### *6.3.2.1 Asset Management System/Program*

An asset management system is a set of interrelated and interacting elements of an organization, whose function is to establish the asset management policy and asset management objectives, and the processes, needed to achieve those objectives.[33]

During this assessment, Gas Operations established a formalized structure for implementing API 1173 and, under the guidance of the Director of Integrity Staff and Programs, initiated the process of API 1173 conformance. This is a positive development as it clearly signals organizational intent to enhance the maturity of practices with the backing of the senior leadership team. This builds upon the position of the recently-created Asset Management Vice President role.

There are relatively mature practices in place within Gas Operations that allow for enhanced decision making. Examples of this include certain asset family groups making better use of data and converting that data into information and asset management insight. The compressor group exhibits this practice effectively. SCADA-based telemetry provides real time information that allows operators and managers to assess asset health through the use of devices such as strain gauges, vibration sensors, and performance monitors. To ensure reliability, the compressor group considers the commercial and technical obsolescence of some compressors and then makes judgements, looks for patterns of failure, and tries to predict when failures will occur. This approach supports timely and cost-effective acquisition and strategic spares. This example illustrates the practices of more advanced asset management within the organization.

Another example of advanced practice is demonstrated within the smart metering division. As resources haven been placed under increasing pressure, the organization responsible for the management of the smart metering fleet has taken a more proactive stance at understanding the current state and condition of their assets. This allows the smart metering division to come up with more strategic and holistic views of how the smart metering assets can be managed. For example, the smart meter system is 7 years old and the asset life is 10-12 years. The smart metering team knows the systems are on the cusp of seeing failures across the family. Therefore, the team have become more proactive in understanding asset health and asset information. They do this by collecting data and trending failure types, modes, manufacturers, locations etc. This allows them to predict asset failure volumes and be more proactive in managing the system. An example is that the smart metering team has their own QA/QC function that follows behind the work of operations to test the quality of workmanship, customer satisfaction etc. This information is fed back to management for review that feeds into investment plans

Integrity Management has been a long-standing program within the company. The continued application of TIMP and DIMP allows the company to make decisions in a more repeatable and consistent manner. These integrity programs are well documented through procedures with a clear vision regarding how they are to be used, the variables that are important, and the way in which the results are used to make decisions within the business unit.

[33] ISO 55000, 4.

Due to the emergent nature of the Asset Management program, there is no formal documentation that describes the scope of the Asset Management System. A scoping document would allow for the articulation of an Asset Management Policy and Strategy with a clear linkage to asset management objectives and individual asset management plans. The company does have a suite of guidance documents (e.g. gas standards, the operator safety manual, etc.) which support asset safety and asset management; however, these documents do not address a holistic plan, encompassing cost, risk, asset performance, for the life-cycle of the assets. Once in place, the asset management policy, strategy and plans would guide how work is planned and risks are mitigated. The integration of asset risk and asset investment processes would provide the means for asset strategies and plans to drive operational work plans. The resulting work plans would support a more optimal asset management system.

#### *6.3.2.2 Role of Senior Leadership*

ISO 55000 maintains that "leadership and commitment from all managerial levels is essential for successfully establishing, operating, and improving asset management within the organization."[34] All managerial levels are responsible for ensuring that appropriate resources are in place to support the asset management system. Senior leaders should also create the vision and values that guide the policy and promote those values,[35] in defining roles and responsibilities.

Leadership has demonstrated a commitment to promoting industry-leading asset management values by investing in initiatives to maintain compliance with commitments, regulations, and corporate safety objectives. This has been exemplified in the appointment of the Asset Management Vice President as well as the Director of Integrity Staff and Programs within Gas Operations and in the investment in pipeline integrity assessment tools as well as the most recent initiative to implement API 1173.

As described in section 6.3.2.1, the asset management program within the company is in its early stages of development. The interview process revealed that the level of understanding around asset management is also at an early stage. However, the API 1173 program has begun implementation and is expected to drive a common understanding of the meaning and purpose of asset management throughout the organization.

There are areas of the organization in which leadership is communicating the need to be more proactive, and conversations regarding work and asset management are more frequently taking place. For example, the RAMP process for risk management elevated the conversation regarding asset management, and the tightening of budgets in some areas has forced a greater consideration of asset performance trending.

In addition, there was evidence through the interview process that inconsistency over the term asset management was present. This is, in part, due to the lack of a common lexicon on asset management. As the recently established program team gains momentum, frequent and consistent support messaging from appropriate levels within the business will help establish that knowledge and drive consistency across the Company. Over time, there should be a gradual cascade of company-wide goals related to the implementation of API 1173 and ISO 55000 into the goals of teams and individuals that play a contributing and supporting role. Doing so should

[34] ISO55000:2014

[35] Ibid., 7.

promote alignment over the strategic intent of the program and increase employee understanding of the associated terminology.

As the quality and quantity of asset management related information increases to employees within the organization there should be a corresponding change in the way resources are allocated and managed. For example, today there is limited comparison and optimization across asset groups and most of the investment and risk management decisions are at best optimized within an asset family such as Transmission pipe. With increasing maturity of the company's asset management practices, there should be greater financial and operational flexibility in sharing and allocating resources across the company.

#### *6.3.2.3 Development of Plans to Manage Assets*

Per ISO 55000, asset management plans "should define the activities to be undertaken on assets, and should have specific and measurable objectives."[36] These objectives should be based on risk and the criticality of the assets.[37] [38]

Certain asset groups such as Transmission pipe are utilizing risk-based asset management plans. Similarly, for the Distribution pipe asset family, information pertaining to asset performance such as 3rd party dig ins, leaks, etc. are utilized to construct investment plans and there is evidence of prioritization within the asset group.

There is opportunity to improve the way in which the various groups prioritize and optimize asset plans. For example, there is opportunity for more consistency in the way in which models are used to gather information to make asset management decisions. The DREAMS tool used in the Distribution asset family provides a level of risk-granularity not seen in other asset groups such as valves.

In addition, there appears to be opportunity to better understand the physical locations and condition of the asset groups. There has been a major program around the implementation of a GIS system; but, interviews revealed a lack of confidence over the quality of data within the GIS system. Additionally, geo-location appears to only cover a subset of the asset groups. This may be an intentional limitation that reflects a balance of cost and risk, but consideration should be given to address any gaps in asset knowledge. At a foundational level having clear line-of-sight to this basic data will make a major difference in the understanding of the assets. Once this information is collected the connection with GIS systems will allow for improved connection with the future asset management strategies and plans.

The absence of a formalized and integrated methodology to capture and assess asset non-conformities, safety issues and opportunities is having a downward impact on the maturity score within the business. This however is being addressed by a recently introduced corrective action system called Safety Observation Reporting System (SORS) which allows employees to raise issues observed through daily operations. As SORS is implemented further and socialized throughout the organization, it will enable methodical non-punitive issue capturing, risk-based assessment, trending and closure of issues, and allow for actions and lessons to be

[36] Ibid, 9.

[37] ISO 55002, 9

[38] Ibid., 12

institutionalized in a more systematic and systemic way. This will ultimately improve the safety culture of the organization.

#### *6.3.2.4 Data, Information and Resource Requirements*

To conform to ISO 55000, the Company needs to determine the necessary support elements required for the development and implementation of the asset management plans and objectives. This includes resources, competence, awareness, communications, documentation, and information systems.

There are a number of initiatives underway to support the organizations data, information and resource needs. One such initiative is the Enterprise Asset Management (EAM) which is intended to integrate the disparate systems that house and manage asset data, such as SAP and GIS. This initiative will continue to drive maturity for the organization as asset management data becomes more centralized and accessible.

However, this area of the assessment showed opportunities for improvement. Data availability and quality vary depending upon the asset family. Through the interview process there were multiple references to the increasing usage and proliferation of KPIs within the organization. Examples of KPIs include: average time to respond to an emergency, number of job observations per employee, and total pipeline replaced. Interview feedback suggested, however, that KPIs do not always drive asset-related decision making and are often based on task completion (e.g. miles of pipeline installed) and cost (i.e. budget). Supplementing such KPIs with those that address asset health and performance would improve the Company's maturity level in this area.

As the organization develops, it should consider both refining the number of KPIs in use and more importantly developing a clearer line of sight to how these KPIs drive decision making.

Once the asset families are structured and established, there should be an opportunity to closely link the asset data needs with the IT program and roadmap. Critical questions would be addressed and the IT roadmap could be recast as necessary to satisfy the data needs of the asset family.

During the interviews, respondents referred to the way in which resources are allocated to various asset groups and how work is executed. Through a more comprehensive assessment of asset management needs over a longer time horizon, the Company could achieve a more effective and efficient balance of labor supply with work demand within practical constraints. Exceptions appear to be in the PSEP and major project organizations where there is a longer-term resource management view set up to drive greater work planning and execution efficiency. This appears to have been accomplished through taking a programmatic view of the needs over multiple years. When taking such a perspective it is easier to balance supply and demand from a resourcing perspective as well as apply lessons learned from one year to the next. The Company should consider how these features can be applied elsewhere to achieve similar benefit.

Contingent workforce and retirees create a concern regarding knowledge management in the organization. As employees retire and demands increase, the employees are spread thinner with a greater reliance on contractors, such as in the engineering organization. The Company may develop a strategy to maintain critical organizational knowledge through adequate hiring

and training practices to counterbalance the turnover of employees equipped with needed knowledge and skills.

#### *6.3.2.5 Implementation of Asset Management Plans*

According to ISO 55000, the organization should establish operational planning and control processes to support effective delivery of the activities contained in the asset management plans.

Some asset groups, particularly pipelines, represent reasonable levels of effectiveness in terms of documenting approaches, desired outcomes and results. Examples are the integrity management programs of TIMP and DIMP. These programs have clearly defined roles and responsibilities, risk-informed analysis techniques that leverage prior year inspection results, process/program metrics and controls, externally-focused communication protocols, and formalized processes and standards (e.g. gas standards).

However, the current level of asset management maturity means that the foundational strategic structure of a comprehensive asset management policy, strategy, objectives and plans are not yet in place. The closure of this gap will allow for the development and implementation of a more strategic view of planning, prioritizing and executing on work.

As the existing plans are converted in accordance with the standards of ISO 55000 and API 1173, they should be made more holistic to align with a complete life-cycle view for all asset types. To increase the effectiveness of current practices, the Company should implement robust governance processes, define objectives, and create asset plans that consider the entire asset management cycle for all asset types, while balancing performance, risk, and investment to best achieve corporate objectives.

#### *6.3.2.6 Maintenance, Monitoring, Review and Continuous Improvement*

ISO 55000 asserts that an "organization should evaluate the performance of its assets, its asset management and its asset management system."[39] The Company should develop a set of performance indicators to measure the asset management activity and outcomes.

The Company has several monitoring and continuous improvement processes, including:

- DIMP Chapter 6 which provides for code-required "Measure Performance, Monitor Results, and Evaluate Effectiveness" tasks;
- The documented process for incident investigations in Gas Standards 191.01 and 223.0030.

The Company also has in place an extensive auditing process with several lines of defense (e.g. functional unit self-audits, company internal audits and regulatory audits) to ensure compliance across all lines of business. Many of the interviewees noted a strong commitment by management to resolve issues discovered during the audits. Continuous improvement is part of the pipeline safety programs, gas standard administration, and the Gas Safety Plan.

The central philosophy to API 1173, ISO 55000 and other asset and safety management systems is the plan-do-check-act cycle. This implies that the system be continually improving. These improvements should be closely monitored by the central program team for delivery as

[39] Ibid, 9.

well as integration across the various areas (e.g. operational improvements with asset management improvements).

If the company is to adopt this plan-do-check-act philosophy and formalize the vehicles in which this will be captured, it can expect positive changes to the safety culture within the business. For example, the thoughtful introduction of new or revised tools and technology because of employee feedback, can have a positive engagement impact across the organization. Ultimately, the improvement of safety and safety culture is the principal objective of applying a safety management system within the organization, which can be accomplished via a continuously improving system.

Because the asset management program within the organization is in the early stages of its development, there are expected gaps in how the overall system is assessed from a performance perspective. Consideration should be given to better understand how the various governance committees in place drive the monitoring and the improvement of the overall asset management system. Consideration should be given to expand existing and/or create new approaches that ensure clear understanding of maintenance and monitoring of the system and its performance. For example, having a forum where asset family owners could communicate the performance and any needs they may have would further increase the level of awareness but also drive cross-asset family integration.

### 6.3.3 Detailed Maturity - Electric Operations

#### *6.3.3.1 Asset Management System/Program*

While SDG&E currently has no overarching or documented asset management system, the Company uses processes to tie business function activities to corporate objectives. Management has also established and relies on high level metrics, such as SAIDI, to ensure that asset management activities are on track. The management of assets is by function such as capacity, reliability and inspection with limited visibility of the management of the assets types across these functions

While SDG&E is performing many asset management functions, the processes and procedures are not organized into a comprehensive and documented structure. More specifically, SDG&E does not yet have a formal asset management system that defines the Company's asset management policies, objectives, and plans. Establishing this framework is currently being planned by the newly formed asset management organization.

#### *6.3.3.2 Role of Senior Leadership*

SDG&E's senior leadership has demonstrated its commitment to asset management by ensuring the Company invests in data information systems, including:

- Investing $20M on the Condition Based Monitoring system used by the Substations organization to determine the condition of assets and support maintenance decisions; and
- Investing in decision support models, such as DobleARMS, that will help the Substation group determine which asset investments were most effective after full implementation.

The company has also invested heavily in asset renewal and hardening programs, such as implementation of the proactive cable replacement and the wildfire mitigation programs.

Most recently, the Company demonstrated its leadership commitment to asset management by establishing a formal organization to build a comprehensive asset management system across the Company. However, it is still at the early stages of building that organization and has yet to develop its asset management policy and clearly defining asset management roles and responsibilities.

#### *6.3.3.3 Development of Plans to Manage Assets*

The Company has successfully established cross-functional teams to develop projects and plans to address specific investment, performance, and risk reduction objectives. Through this approach, the wildfire team has mitigated the risk of wildfires, the Reliability Assessment Team has contributed to the Company's excellent reliability performance, and the Technical Review Committee that reviews projects has ensured that key stakeholders participate in the investment process.

The company is also developing plans to address various risks such as:

1. Electric transmission evaluating N-1-1 risks
2. Distribution planning team using new models and processes to determine the Distributed resources hosting capability of the system
3. Pole loading risk.

The Company leverages the example above to further mature its planning processes for addressing risks consistently. However, most of SDG&E's asset management plans are mandated by regulations that set asset maintenance and replacements to occur on specific time intervals that do not necessarily consider addressing risks over the lifecycle of the assets.

In addition, the asset plans should define the risk to the asset management objectives. Current asset projects and plans submittals for investment considerations do not typically include a clear identification and quantification of the risks of doing or not doing the project.

#### *6.3.3.4 Data, Information and Resource Requirements*

The Company has invested in several data systems, including SAP, GIS, and CASCADE to help manage its asset information and is investing in decision support tools, such as DobleARMS, to optimize asset investments. In addition, the Company has a comprehensive training program and a resource planning and contractor management organization to ensure resource constraints are considered during asset management plans implementation.

However, the systems have not been deployed consistently to all lines of business. For example, while Substations is using CASCADE for asset maintenance information, Distribution uses GIS and SAP. Data quality issues due to migration from legacy systems and lack of timely updating of information are impeding the adoption and full utilization of these systems. A key issue that the Company has started to address is the lack of unique identifications to track assets and integrate information from all the disparate systems.

The Company has integrated its SAP and GIS platforms to enable better use of data to drive asset management. Even though an integrated Asset Data Warehouse is not currently available as a repository for all asset health, performance and financial attributes, the data systems in place are beginning to be leveraged in driving decisions such as proactively addressing gassing transformers and progressing towards a risk-based maintenance program from the current time-based program.

#### *6.3.3.5 Implementation of Asset Management Plans*

According to ISO 55000, the organization should establish operational planning and control processes to support effective delivery of the activities contained in the asset management plans.

Inspection, maintenance, and standard operating procedures have been developed and are audited to ensure that plans are implemented as intended. In addition, tracking of project and program costs and schedules helps ensure proper execution of the asset management plans.

While the Company has several procedures and standards to support the implementation of asset management plans, these do not capture the effectiveness of the Company's asset management practices. For example, while the CMP process ensures that inspections and maintenance are on schedule, there are few metrics to ensure that the inspections and maintenance efforts are providing improvements that justify the expenditure. The company has plans to develop metrics to measure the risk effectiveness of the mitigations/projects however this effort is in its early stages. In addition, the introduction of accountability reports as a result of the RAMP should help evolve the controls in delivering the asset management plans.

#### *6.3.3.6 Maintenance, Monitoring, Review and Continuous Improvement*

Most asset types are inspected and maintained through a time-based program. The Corrective Maintenance Process (CMP) ensures that major asset types, such as poles, are inspected and maintained per General Order requirements and remedial actions are taken on a timely basis commensurate with the severity of the issue. Furthermore, the CMP tracks, monitors, and supports management of timely completion of inspections and resulting backlog of corrective actions identified by the inspections. SDG&E also has in place an extensive auditing process with several lines of defense (e.g. functional units' self-audits, internal audits, company audits, and regulatory audits) to ensure compliance across all lines of business. SDG&E, particularly in Substations, conducted root-cause analyses and post-incident investigations and lessons learned based on industry events. These are used to evaluate and enhance the performance of the Company's asset management process. With this approach, the company has identified issues with, and proactively addressed, specific problematic equipment such as a certain type of insulators or breakers.

It will be necessary to conduct more formal corrective actions and lesson learned efforts and rely more heavily on measurement metrics and KPIs for all lines of business to help improve feedback to top management and contribute to achieving corporate objectives.

## 6.4 INVESTMENT MANAGEMENT MATURITY

### 6.4.1 Overall Maturity

As discussed earlier, SDG&E has established a uniform and repeatable process for making investment decisions with a well-established governance structure that has defined various committees that support the decision-making process.

Additionally, the Company has in place a tool that is used for guidance to evaluate the benefit of proposed programs and projects using a risk reduction metric that considers a set of risk attributes similar to those used to evaluate the Company's enterprise risks.

Over the past few years, the Company has also enhanced its investment planning discussions by further integrating its ERM process with its investment planning process through the development of the Risk Mitigation Planning session and the inclusion of ERM representatives in the Company's financial planning committees.

While the process is well-defined and structured, decisions are still primarily subjective in nature and the prioritization of funding across all programs and projects is not necessarily consistent or repeatable. Furthermore, the tool that the Company currently uses to evaluate benefit of investments is not consistently applied across all proposed programs and projects and thus, funds are typically allocated to functional areas and those functional areas determine how to best prioritize their budgets using separate and varying tools tailored to their specific areas and needs.

Overall maturity of the investment management process at SDG&E can be classified as a level 2 as depicted in Table 11.

*Table 11 SDG&E Evaluation - Investment Management Maturity*

| Current Utility Industry Levels of Maturity Demonstrated | | | | | Maturity Opportunity for Industry Evolution | |
|---|---|---|---|---|---|---|
| | | | SDG&E ◆ | | | |
| Level | 0 | 1 | 2 | 3 | 4 | 5 |
| Characteristics | No Formal Process or Methodology | Characterized as a Bunch of Staff Sitting Around a Table (BOSSAT). Decisions based on judgement. Process is not transparent, repeatable, consistent or auditable. | Objectives and priorities are communicated, but a formal auditable process is still not present. Decisions remain judgment based in terms of the value to the company and allocation remains within business unit silos. | Transparent, repeatable, and consistent method that is in business unit silos. Allocations are made at an Executive Level based on judgment but are tied to corporate objectives. Investments are prioritized against a value definition. | Transparent, repeatable, consistent, and auditable method across the enterprise that is based upon subject matter expertise and is deterministic in nature of evaluation. Allocations are based upon an optimal objective function of that seeks to maximize the return of an objective within the constrained resources. Investment alternatives evaluated objectively. Accountability for the claimed investment benefit is documented and tracked. Investments are aligned with strategy. | Transparent, repeatable, consistent, and auditable method across the enterprise that is data drive and uncertainty in investments are accounted for. Allocations are based upon an optimal objective function that seeks to maximize the return of an objective within the constrained resources. Investment alternatives evaluated objectively. Accountability for the claimed investment benefit is documented and tracked. Investments are aligned with strategy. |

### 6.4.2 Detailed Maturity

#### *6.4.2.1 Process and Evaluation*

The investment planning process at SDG&E follows a consistent framework with well-structured committees that represent the various functional areas of the Company and allow for cross-functional funding discussions to take place.

Furthermore, the existence of common templates that are consistently used by all functional areas provide a common platform for communicating funding needs to senior management.

However, as previously mentioned, risks identified in the ERM process are not the starting point for strategic planning and investment allocation. Instead, templates for seeking funding are populated in isolation of the Company's risk priorities established in the ERM process and risks are informally included in later discussions but are not formally documented as a part of the process.

#### *6.4.2.2 Investment Review Process*

SDG&E has put in place various templates for capturing funding needs based on the different categories it established as a part of its process such as mandatory, base and in-flight work. Over the past few years, SDG&E has enhanced its review process for these categories of funding by challenging funding requests and seeking further documentation to support the needs identified by the various functional areas. As an example, in its mandatory template, SDG&E added a field to tie the proposed project/program to the regulatory mandate it is supposed to meet and in its in-flight template, it is now asking project managers to include the start date of the project as well as the spend to date. These measures enhance accountability in the process and improve the Company's review of funding allocations.

For elective work, the Company utilizes a tool to evaluate the benefit of proposed investments using a set of risk attributes similar to those used in the ERM process to score the risks but the tool has not been consistently used across all projects/programs to determine an optimal investment portfolio.

Furthermore, the set of projects/programs that are produced at the end of the process is not directly correlated to funding risk treatment activities developed/discussed in the ERM's Risk Mitigation Planning session.

#### *6.4.2.3 Investment Documentation and Communication*

While SDG&E has established a template for developing and documenting business cases for proposed projects/programs, the template has not been consistently applied across the Company and different functional areas apply different levels of rigor and sophistication in developing their business cases.

However, the Company's most recent RAMP application can be highlighted as a strength for documenting and communicating well-structured business cases for proposed investments using risk information from the ERM process.

#### *6.4.2.4 Optimal Portfolio Determination*

SDG&E determines its optimal portfolio of investments primarily through the discussions that take place at the various financial committees that share system needs, risks and funding needs across the Company. The discusses include various inputs from stakeholders and experts in the

organization and may use outputs of the investment prioritization tool to guide the discussion but the final determinations are primarily based on subject matter expertise with minimal documentation of quantifiable benefits of investments.

#### *6.4.2.5 Investment Monitoring*

Investment monitoring primarily occurs through the regular EFC meetings where progress on approved investments is tracked and discussed and the need for re-prioritization of funding is determined on a quarterly basis.

Further monitoring capabilities are currently being established as a part of meeting accountability tracking requirements set forth by the CPUC. SDG&E just filed its first accountability report showing approved funding from the CPUC and actual spend by the Company.

However, due to the lack of quantifiable metrics to demonstrate benefit of approved investments, there is minimal monitoring and communication of the benefits of implemented projects and programs in terms of reducing risks to the Company and meeting strategic objectives.

#### *6.4.2.6 Effectiveness Review Process*

SDG&E has made slight modifications to its investment planning process over the years. Some examples of that were previously mentioned where better accountability was built into the Company's templates to align mandated projects with regulatory requirements.

Additionally, the Company has piloted a methodology for quantifying the benefit of investments using a risk reduction metric that is based on ERM's process and methodologies. This methodology was demonstrated in the Company's RAMP application but has not been modified and developed as an enterprise solution. Lessons learned from that pilot have been captured and the Company continues to gain insights from other on-going regulatory proceedings to better determine how best to modify its investment planning tools.

### 6.4.3 Specific Highlights

As previously mentioned, certain areas in the Company have developed unique practices for evaluating and prioritizing project and program implementations at a more granular level. Examples of these unique practices are highlighted below.

#### *6.4.3.1 Gas Operations Highlights*

Gas distribution conducts condition-based risk evaluation through the Distribution Risk Evaluation and Monitoring System (DREAMS) to identify and prioritize high risk pipelines in need of replacement. Using these systems, they consider factors such as pipe location, operating pressure, and material in evaluating pipe risk.

#### *6.4.3.2 Electric Operations Highlights*

In substations, the Company uses a tool called DobleArms to prioritize its transformer investments based on maximizing risk reduction per dollar invested. Another area that was previously mentioned is FiRM, where the Company utilizes its WRRM model to determine an appropriate prioritization of equipment replacements to lower the likelihood of ignitions. Such practices are unique to their areas of implementation and may not be applicable to all areas at the Company but they are good demonstrations for use of data to drive risk-informed investment prioritizations.

## 6.5 INTEGRATION MATURITY

Based on Davies Consulting's review of SDG&E's risk, asset, and investment management processes, methods and experience in the electric and gas utility industry, SDG&E is considered at a level 2 in integrating these processes where the Company's primary integration is evident in its asset management plans being integrated in how investment portfolios are developed.

Over the past few years, the Company has initiated several efforts to more explicitly and formally integrate risk management into its asset and investment planning processes. This was evident the ERM organization that has grown to include operational and financial experts who have proven valuable in integrating risk into the Company's decision-making processes. ERM's integration efforts have materialized in the form of the Company's RAMP report where asset risks were clearly linked to investment priorities and in the development of operating unit risk registers across the Company to further embed risk management into the Company's culture.

To move to a level 3 of integration, SDG&E will need to demonstrate further integration of risk into all its processes.

Table 12 depicts where SDG&E is currently on the integration maturity scale.

*Table 12 SDG&E Evaluation - Integration*

| Current Utility Industry Levels of Maturity Demonstrated | | | | | Maturity Opportunity for Industry Evolution | |
|---|---|---|---|---|---|---|
| | | | SDG&E | | | |
| Level | 0 | 1 | 2 | 3 | 4 | 5 |
| Characteristics | Risk, Asset, and Investment management are not integrated at all, even if they exist. | Some evidence that risk, asset, or investment management may inform one of the other areas, but the information is not used to make decisions | Two areas demonstrate integration to inform and make decisions. Typically, this includes asset management informing the investment selection and risk management isolated at the enterprise level. Additionally, portfolio selection is project and programs based and value is determined outside of any risk management assessment or mitigation evaluation. There is no formal process for integration and there is no demonstration of evaluation of improvement. | Data and information are available to inform processes and procedures. Decision making process demonstrate an awareness and an attempt to incorporate unified information and data. Integration is not a repeatable methodology and any attempts are qualitative in nature. Decisions are informed within business and prioritized to enhance the performance of the business unit. There is evidence of evaluation and improvement of the integration. | Data and information Inform the all processes and procedures and are incorporated into most decision-making processes. Integration is qualitatively driven to communicate the asset, operational and enterprise risk profile of the utility. Decisions are informed across business and prioritized to enhance the performance of the enterprise. All processes are continually monitored and improved. | Data and information inform all areas and are unified into all decision-making processes. Uncertainty and the interrelationships associated within and across programs inform a complete awareness to leadership. Integration is quantitatively driven, communicates the asset, operational and enterprise risk profile of the utility, accounts for uncertainty and the interrelationships of risks, addresses subject matter expert bias and produces and optimized portfolio of investments that estimates the risk reduction from the portfolio of investments using probabilistic and rigorous analytic methods. Decisions are informed across business and optimized for the performance of the enterprise. All processes are continually monitored and improved. |

# 7 EVOLUTION OF INTEGRATED RISK, ASSET AND INVESTMENT MANAGEMENT

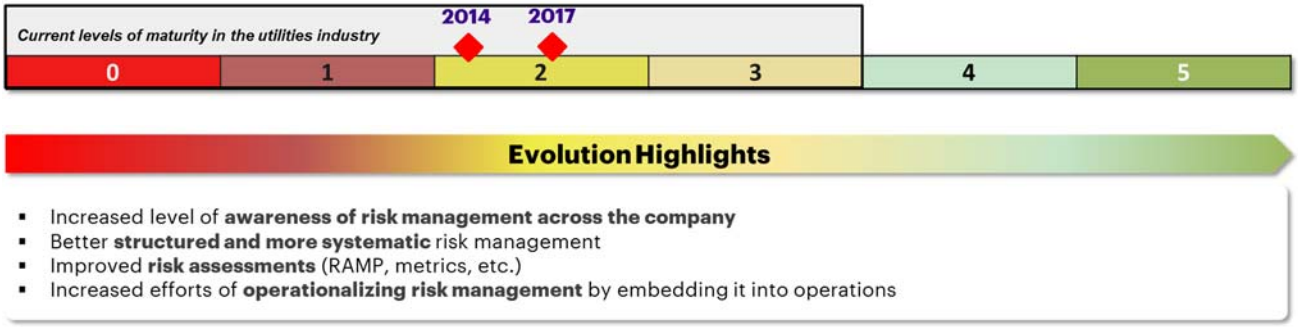
## 7.1 MATURITY EVOLUTION - 2014 TO 2017

As previously mentioned, SDG&E initially engaged Davies Consulting in 2014 to conduct a baseline maturity assessment of the same areas of risk, asset and investment management and how well they're integrated.

Through the current 2017 assessment, Davies Consulting recognized the maturity evolution that took place at SDG&E over the past few years. In 2014, the ERM organization was at the early stages of development where there was an annual process in place to refresh the ERM risk registry but the Company did not have a formalized and documented ERM policy, process and procedures. Now, the Company follows a consistent process with defined officer risk sessions (Risk Assessment, Risk Prioritization and Risk Mitigation Planning sessions) and has documented its framework, governance and processes to embed risk management in the organization. In 2016, the Company documented risk mitigation plans for its top safety risk as presented in its RAMP report. The Company also enhanced and developed new risk management tools over the years. In 2014, its REF used a 5x5 matrix for risk scoring, now the Company has a 7x7 matrix with an enhanced algorithm to allow for better distinction and separation between risks. In 2015, the Company developed its risk taxonomy to more systematically identify risks that the Company is facing. Above all, the Company has embarked on a new initiative to develop risk registries at the operational levels in 2016 and will continue this effort over the next few years.

As such, the Company's risk management maturity in 2014 was at the early stages of level 2 in the ISM$^3$ scale and has shown progress within that level to move the Company towards a level 3 maturity as depicted in Figure 16 below.

*Figure 16 Risk Management Evolution 2014 - 2017*




In 2014, asset management practices were strong as demonstrated in the Company's cable program, FiRM as well as pipeline integrity management programs such as TIMP and DIMP. However, these practices were limited to a few key asset types. There were varying degrees of sophistication in the identification of critical assets, collection of asset health data and documentation of plans for managing those assets. Additionally, there was minimal evidence of a vision to build a comprehensive asset management system that closely integrates the

Company's operations and allows for enhanced utilization of data to drive systematic decision-making.

In the 2017 assessment, Davies Consulting noticed a movement toward higher levels of maturity where integration of asset data and the development of risk-based asset management plans started to take place in more areas at the Company as evidenced in the enhancement of fire risk modeling over the years, the implementation of condition-based monitoring as well as continuing to enhance and utilize risk-based assessments in the pipeline integrity programs. More importantly, the Company has now committed resources to developing a comprehensive and centralized asset management system that aligns with leading industry-standards such as ISO 55000 and API 1173.

As previously mentioned, the asset management maturity levels were based on ISO 55000 and a level 3 corresponds to full conformance to all tenets of the standards. Based on that, Davies Consulting found that SDG&E's asset management maturity fit in the level 2 and movement within that level from 2014 to 2017 shows progress toward conforming with ISO 55000 practices as depicted in Figure 17 for electric operations and Figure 18 for gas operations.

*Figure 17 Electric Operations Asset Management Evolution 2014 - 2017*

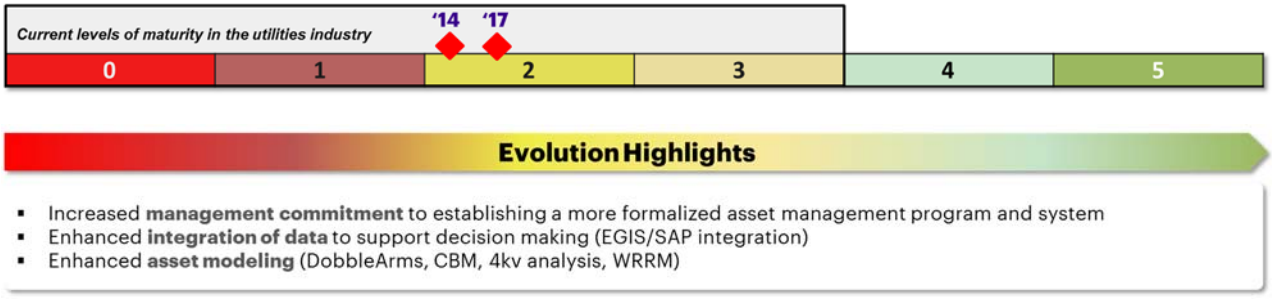
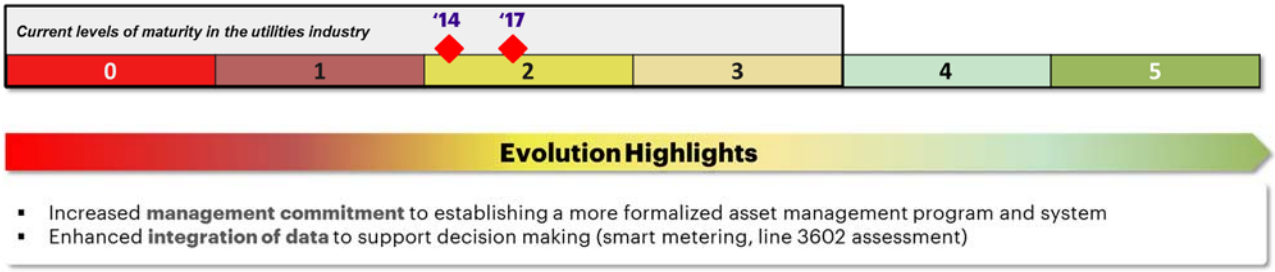



*Figure 18 Gas Operations Asset Management Evolution 2014 - 2017*

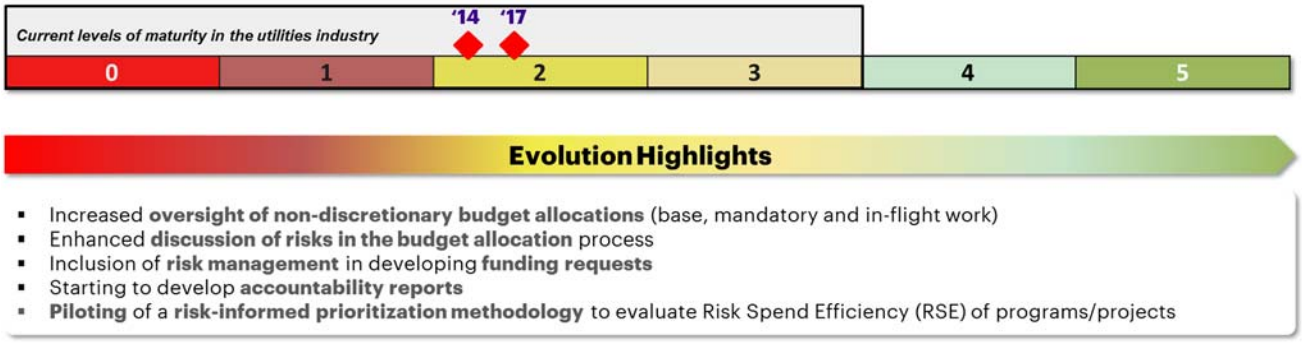



Davies Consulting found that SDG&E's investment management process was well-defined and established in 2014 as demonstrated by the various committees in place that enable cross-functional prioritization of funds. However, in 2014, the process was primarily driven by subject matter expertise input and was not as risk-informed as it is today. In the 2017 assessment, Davies Consulting found that SDG&E had started to more explicitly incorporate risks into the annual investment planning process through the risk mitigation planning session, the increased involvement of ERM in the financial committees and the development of risk-informed plans such as those presented in the RAMP report. Furthermore, to reduce biased subjective decisions, the process was enhanced over the years by building formal challenge sessions into the annual planning process. Inputs to projects and programs are now more scrutinized to

demonstrate the need for funding. As an example, mandatory projects need specific supporting evidence to show the applicable regulatory requirement they address. In 2016, SDG&E also introduced a pilot for prioritizing funds based on risk using the RSE metric as an input to guide decisions and in 2017, the Company filed its first accountability reports to better-track approved funding and has started to identify system modification needs to enhance risk funding accountability for the future.

Investment management maturity level 3 in ISM[3] is defined by an enhanced level of transparency, repeatability and consistency that is highlighted by the utilization of a defined value to guide prioritization of funding. Davies Consulting found that SDG&E's process though repeatable and defined, is still driven by subjective inputs and that it does not use a value function to guide decisions but progress was made over the past few years that demonstrates movement within the level 2 maturity toward a level 3 as depicted in Figure 19 below.

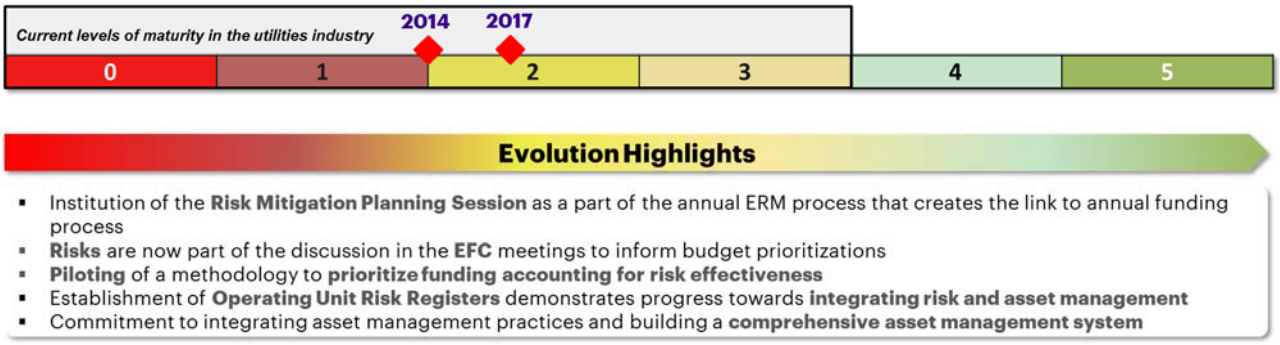
*Figure 19 Investment Management Maturity Evolution 2014 - 2017*




Finally, SDG&E has shown an increased level of integration of risk, asset and investment management since the 2014 assessment. In 2014, Davies Consulting found that the ERM process was more isolated from funding decisions and the explicit discussion of risks to drive decision-making was minimal and not formalized. Since then, SDG&E had implemented several processes and embarked on several initiatives to drive that integration. These new processes and initiatives include the previously mentioned Risk Mitigation Planning Session which provides a platform for risk-informed funding decisions, the development of operating unit risk registers to embed risk management into decision-making at all levels, the piloting of risk-informed decision-support concepts such as the RSE and the newly-developed centralized asset management organization.

Davies Consulting concluded that SDG&E has shown a positive movement in the level 2 maturity in terms of integration with a movement toward a level 3 as depicted in Figure 20 below.

*Figure 20 Integration Maturity Evolution 2014 - 2017*




## 7.2 Areas for Further Improvement

Davies Consulting's assessment process highlighted SDG&E's good practices as well as areas where opportunities for further improvement exist. This section of the report summarizes improvement opportunities in each evaluation area and highlights demonstrated efforts to achieve those improvements.

### 7.2.1 Risk Management Improvement

SDG&E's operations have been implicitly managing safety, security and operational risks for many years and have more recently established an explicit framework for managing risks across the Company. While several improvements have been accomplished over the past three years, SDG&E's risk management practices have yet to meet leading maturity levels in the utility industry and going above and beyond to more advanced industries.

A key initiative that SDG&E should undertake is the establishment of operational risk management across the Company. While the Company has started that process, it is still in its infancy and risk management has not yet been fully embedded in operating units to drive decision-making at all levels. Each operating unit should maintain its own risk registry and develop a governance structure specific to that unit to establish its operational risk management roles and responsibilities and develop regular forums to discuss risks and further integrate them into operations. This will improve the identification of risks from the field and enhance feedback loops in the overall risk management process.

Furthermore, SDG&E should consider clearly establishing its risk tolerance as a part of its risk management policy to guide its risk management process and drive more transparent risk-informed decision-making. To that end, Davies Consulting recognizes the challenges with determining appropriate risk tolerances and the on-going regulatory proceedings that may influence the establishment of risk management methodologies that consider risk tolerance and thus understands that this improvement is an evolutionary process that may take some time to achieve.

Finally, SDG&E can further improve its risk assessments by incorporating data to support its findings and developing metrics to monitor risks and measure mitigation benefits. While company data may not be readily available, especially for high consequence, low likelihood events, industry data can be used as a proxy to determine appropriate risk levels in lieu of subjective input that may be biased.

### 7.2.2 Asset Management Improvement

SDG&E has several foundational blocks of an Asset Management System (AMS) in place, which are meeting the Company's current objectives. Changes to the business environment, including addressing increased regulatory focus on risk reduction while maintaining competitive rates has driven SDG&E to further align its current AMS with ISO 55000.

The Company should build on the foundational elements, found particularly in the substation organization, to establish a holistic, systematic, risk-based, optimal, and sustainable asset management system per PAS 55-2 and ISO 55000. Furthermore, the asset management process needs to be driven by the Company's senior leadership, inculcated into the Company's culture, and supported by employees with asset management skills who are empowered to manage assets that have exceeded their life span.

### 7.2.3 Investment Management Improvement

As noted earlier, SDG&E can further improve its investment planning process by strengthening its investment review process. This can be done through improvement of its current methodology for valuating investment benefits and moving towards more data-driven approaches to quantify the value of proposed projects and programs. Additionally, more directly linking risks identified in the ERM process to the projects and programs in the Company's investment portfolio and using risk reduction as an input in determining appropriate funding allocations will further enhance the Company's efforts to more transparently develop risk-informed portfolios.

## 7.3 Demonstration of Potential to Advance Current Maturity Level

Across SDG&E, there have been a few initiatives that if successfully implemented, could move the Company towards leading maturity levels. Some of these initiatives are either just starting or are on-going in various internal and external forums.

SDG&E has improved its risk management process over the past three years. Since 2014, SDG&E has demonstrated increasing levels of integrating risk into the Company's culture. Its most recent effort being ERM's operational risk management project which started in 2016 and is forecasted to continue to 2019. This effort will not only develop operating unit risk registers across the Company but continue to embed risk management into the Company's operations. As a part of this effort, SDG&E is also moving towards more probabilistic risk assessments by beginning to evaluate multiple scenarios for a given risk event and identifying and capturing relevant risk metrics. This effort once completed, will take the Company to a leading position in the utilities industry.

In 2015, SDG&E identified improvements that the Company can make to meet tenets of internationally recognized asset management standard ISO 55000. In 2017, SDG&E announced a new Senior Vice President of Asset Management with a central organization to manage its assets in a more comprehensive and systematic way. As a part of that effort, the Company has established a preliminary roadmap depicted in Figure 21 to implementing its asset management system and is currently working on developing the details of that initiative.

*Figure 21 SDG&E's Asset Management Roadmap*[40]


This extensive effort is expected to take a few years to implement and will ensure the Company implements leading asset management practices.

These risk and asset management initiatives are foundational to developing a more systematic and transparent risk-informed decision-making process across the Company.

[40] This is a preliminary roadmap and defining its elements is still a work-in-progress.

**APPENDIX E**
**Governance and Compensation Items from D.16-06-054, Pages 155-56**

**APPENDIX E**
**Governance and Compensation Items from D.16-06-054, Pages 155-56**

In D.16-06-054, the Companies' prior GRC Decision for TY 2016, the Commission directed the Companies to provide testimony in their TY 2019 GRC regarding the "actions taken during the 2016-2018 GRC cycle, supported by relevant workpapers, data, company documents, and reports containing the following information,"[61] with itemized requests for information primarily related to compensation and risk management, as follows:

1. Describe what Board committees (for example, compensation committee, safety committee, or other committees) at Sempra, and at SDG&E or SoCalGas, are responsible for determining the guidelines for establishing any compensation, bonuses, severances, and benefits.
2. Describe what direction Sempra provides to SDG&E or SoCalGas in formulating their compensation, bonuses, severances, and benefits.
3. Describe the qualifications of the Board members at Sempra and at SDG&E or SoCalGas who are responsible for determining the guidelines for establishing compensation, bonuses, severances, and benefits, and what committees they sit on.
4. Describe the coordination, if any, between the different committees that are responsible for developing the guidelines for establishing compensation, bonuses, severances, and benefits, and the frequency that these committees meet.
5. Describe the performance metrics and the measures used to set compensation, bonuses, severances, and benefits for non-represented employees and executives, and how these are used to determine them.
6. If applicable, describe how the compensation structure: creates long term and sustainable value for the utility; incentivizes employees; makes executives and managers personally accountable for safety and operational risks; creates a safer working environment and utility system; results in a demonstrated improvement of the utility's processes, policies, and performance; discourages below standard performance, or actions that are contrary to the interests of the utility and the utility's customers; holds employees, managers, and executives accountable for failure to comply with management's guidance, policies and instructions, and for below standard performance.
7. Describe how engaged and effective Sempra's Board is on operations, performance metrics, and safety-related incidents, including: how often Sempra's Board requests reports and/or presentations from SDG&E or

[61] D.16-06-054 at 155.

SoCalGas regarding safety incidents, the effectiveness of risk management plans, and the effectiveness of operational processes; what Sempra's Board did or directed in response to these reports and/or presentations; and whether and how frequently Sempra's Board followed-up or sought updates on the reports, presentations, and the Board's actions and directions.

8. Describe how risk management information is used by Sempra, SDG&E and SoCalGas; how the utilities share this information with their employees; describe the type of training or education that employees receive about management of risks; describe what processes are in place, if any, that allows the employees in the field to provide feedback on the management of risks, and the reporting of unsafe practices or unsafe incidents.[62]

SDG&E and SoCalGas provide their informational showing in responses to requirements 1-4 in the Compliance testimony of Jamie York, Exhibits SDG&E-45/SCG-45; and the information responding to requirements 5 and 6 are provided in the testimony of Compensation and Benefits witness Debbie Robinson, Exhibits SDG&E-28/SCG-30. Information responding to requirements 7 and 8 are provided below.

[62] D.16-06-054 at 155-56.

**Requirement #7:** Describe how engaged and effective Sempra's Board is on operations, performance metrics, and safety-related incidents, including: how often Sempra's Board requests reports and/or presentations from SDG&E or SoCalGas regarding safety incidents, the effectiveness of risk management plans, and the effectiveness of operational processes; what Sempra's Board did or directed in response to these reports and/or presentations; and whether and how frequently Sempra's Board followed-up or sought updates on the reports, presentations, and the Board's actions and directions.

**Companies' Response:**

The Sempra Energy board has formed the Environmental, Health, Safety and Technology Committee (the EHS&T Committee), all members of which are independent directors of Sempra Energy.[63] The EHS&T Committee is responsible for:

- Assisting the board in overseeing the company's programs and performance related to environmental, health, safety and technology matters;
- Reviewing and evaluating technology developments that advance Sempra Energy's overall business strategy;
- Reviewing environmental, health and safety laws, regulations and developments at the global, national, regional and local level and evaluating ways to address these matters as part of the company's business strategy and operations; and
- Reviewing cybersecurity programs and issues.

When a particular matter or project requires additional attention from the board, the board may and has established ad hoc committees. Management reports on significant operations, performance and safety incidents at meetings of the EHS&T Committee and/or board, and management will provide updates to the board as necessary. The EHS&T Committee Chair reports to the board on matters reviewed and discussed at the committee meetings.

On a monthly basis, SoCalGas and SDG&E compile information regarding safe operations, operational performance metrics and safety-related incidents, which is reported monthly to Sempra's Board of Directors. Sempra's Board of Directors thus routinely stays

[63] The EHS&T Committee charter is available at http://www.sempra.com/pdf/about/ehst_ ommittee_charter_11-9-2015.pdf

informed on the business and operations of SoCalGas and SDG&E through monthly reports and management presentations to the board and/or, as applicable, its committees.

Annually, SoCalGas and SDG&E (and all Sempra operating units) report on safety-related performance and other environmental and sustainability data through Sempra's sustainability software system. This information is reviewed at multiple levels (including board level) and compiled into a corporate responsibility report. Sempra's 2016 corporate responsibility report, "Sustainable Growth,"[64] is consistent with the CPUC's corporate sustainability En Banc,[65] follows the Global Reporting Index (GRI) standards, and is used by independent third-party organizations that rate the company on its sustainability initiatives and performance.

[64] *Available at* http://www.sempra.com/pdf/responsibility/final_2016.pdf.

[65] For information on the CPUC's Corporate Sustainability En Banc, *see*, *e.g.*, http://docs.cpuc.ca.gov/WORD_PDF/NEWS_RELEASE/172606.pdf

**Requirement #8:** Describe how risk management information is used by Sempra, SDG&E and SoCalGas; how the utilities share this information with their employees; describe the type of training or education that employees receive about management of risks; describe what processes are in place, if any, that allows the employees in the field to provide feedback on the management of risks, and the reporting of unsafe practices or unsafe incidents.

**Companies' Response:**

The Human Resources, Disability and Workers Compensation and Safety testimony of Mary Gevorkian (Exhibit SCG-32) and Tashonda Taylor (Exhibit SDG&E-30) provide information regarding the employee-based programs, safety training programs, and education of our workforce, in addition to the information provided below.

Section II.B.1 of my testimony describes SoCalGas and SDG&E's risk management framework and describes the six-step process that the Companies use to identity, analyze, evaluate, mitigate and monitor risk. See Figure DD-1.

The annual development of an enterprise level risk registry is a platform which facilitates risk discussion in the organization.

While many of these processes are facilitated and organized by the Enterprise Risk Management organization, it is closely integrated with the operational groups throughout the companies. The risk identification, analysis and evaluation processes are based on inputs and decisions with experts and risk managers throughout the companies.

The development and updating of the enterprise risk registry provides a structured way for the organization to reflect on different types of risk and our strategies to control or mitigate those risks. It is both a "bottom up" and a "top down" process. Subject matter experts and risk managers from throughout the organization provide insight on the risk drivers, impacts and mitigants for risks that are being assessed. The risk owners and senior management team at each utility discuss the enterprise level risks throughout the organization and mitigants for those risks. Risk owners and risk mangers then have the opportunity to ensure that mitigations for top risks are transparent in the business process, and are prioritized in decision making.

The risk registry is a communication tool that is shared amongst the management team and with employees. On an annual basis, the Vice President of Enterprise Risk Management & Compliance provides the Boards of SoCalGas and SDG&E with a risk update which focuses on key enterprise-level risks and associated mitigants. The Sempra Energy Board of Directors also

receives periodic risk updates based on the written reports and management presentations from its operating subsidiaries, including SoCalGas and SDG&E.

Training and education regarding management of risks is an ongoing endeavor. In terms of enterprise risk management, the ERM department conducts formalized in-person workshops to all risk managers as well as facilitates smaller group meetings on topics such as risk overviews, scoring, lexicon, and taxonomy. The ERM group also facilitates risk assessment workshops to assist employees and risk managers.

The Enterprise Risk Management group also hosts an internal website which publishes various risk tools, such as the lexicon, the taxonomy, the 7X7 risk matrix and other materials to employees.

In addition, the development of the RAMP Report and this risk-informed GRC filing offered additional opportunities for ERM to provide additional educational sessions on risk measurement and mitigation.

SoCalGas and SDG&E have processes, programs, and committees in place that welcome feedback on safety from employees on the management of risks and unsafe practices or incidents. The vision and emphasis on risk management begins at the top, with strong support for the risk management process. The companies have an open-door policy that promotes open communication between employees and their direct supervisors. In addition to these culture-based items, there are formal programs designed to encourage employees to speak up if they see unsafe behaviors, such as Stop the Job. Each company also has a Safety Congress as well as safety meetings for field employees that provide safety training, share best practices and promote leadership and employee engagement. If an employee does not feel comfortable reporting unsafe behaviors and incidents through the above-mentioned avenues, there are anonymous means including the Ethics hotline, employee engagement surveys, and National Safety Council Culture Survey.

**SCG and SDG&E 2019 GRC Testimony Revision Log – December 2017**

| Exhibit | Witness | Page | Line or Table | Revision Detail |
|---|---|---|---|---|
| *SCG-2/ SDG&E-2 Chapter 1* | *Diana Day* | *DD-A.2-1* | *Table SoCalGas O&M, Advanced Metering* | *Changed TY 2019 from "183" to "456," and changed Total from "183" to "456."* |
| *SCG-2/ SDG&E-2 Chapter 1* | *Diana Day* | *DD-A.2-1* | *Table SoCalGas O&M, Cyber Security* | *Changed TY 2019 from "0" to "470," and changed Total from "239" to "709."* |
| *SCG-2/ SDG&E-2 Chapter 1* | *Diana Day* | *DD-A.2-1* | *Table SoCalGas O&M, Underground Storage* | *Changed 2016 from "8,035" to "20,086," and changed TY 2019 from "19,597" to "7,546."* |
| *SCG-2/ SDG&E-2 Chapter 1* | *Diana Day* | *DD-A.2-1* | *Table SoCalGas O&M, Total O&M - SCG* | *Changed 2016 from "221,508" to "233,559," changed TY 2019 "181,577" to "170,269," and changed Total from "403,085" to "403,828."* |
| *SCG-2/ SDG&E-2 Chapter 1* | *Diana Day* | *DD-A.2-2* | *Table SoCalGas Capital, Underground Storage* | *Changed 2017 from "128,270" to "144,270," changed 2018 from "130,995" to "131,995," and changed 2019 from "112,601" to "113,601."* |
| *SCG-2/ SDG&E-2 Chapter 1* | *Diana Day* | *DD-A.2-2* | *Table SoCalGas Capital, Total Capital - SCG* | *Changed 2017 from "337,309" to "353,309," changed 2018 from "360,054" to "361,054," and changed 2019 from "527,511" to "528,511."* |
| *SCG-2/ SDG&E-2 Chapter 1* | *Diana Day* | *DD-A.2-3* | *Table SDG&E O&M, CS - Field* | *Changed 2016 from "4,512" to "4,570," changed TY 2019 from "292" to "277," and changed Total from "4,804" to "4,847."* |
| *SCG-2/ SDG&E-2 Chapter 1* | *Diana Day* | *DD-A.2-3* | *Table SDG&E O&M, Electric Distribution* | *Changed TY 2019 from "31,080" to "31,105," and changed Total from "103,010" to "103,035."* |
| *SCG-2/ SDG&E-2 Chapter 1* | *Diana Day* | *DD-A.2-3* | *Table SDG&E O&M, Gas Distribution* | *Changed 2016 from "14,608" to "13,519," and changed Total from "15,704" to "14,615."* |

| | | | | |
|---|---|---|---|---|
| *SCG-2/ SDG&E-2 Chapter 1* | *Diana Day* | *DD-A.2-3* | *Table SDG&E O&M, Total O&M - SDG&E* | *Changed 2016 from "113,327" to "112,296," changed TY 2019 from "43,570" to "43,580," and changed Total from "156,897" to 155,876."* |
| *SCG-2/ SDG&E-2 Chapter 1* | *Diana Day* | *DD-A.2-3* | *Table SDG&E Capital, Information Technology* | *Changed 2018 from "25,413" to "26,129."* |
| *SCG-2/ SDG&E-2 Chapter 1* | *Diana Day* | *DD-A.2-3* | *Table SDG&E Capital, Total Capital - SDG&E* | *Changed 2018 from "395,937" to "396,653."* |

# CHAPTER 2

# DIRECT TESTIMONY OF GREGORY FLORES

# (ENTERPRISE RISK MANAGEMENT ORGANIZATION)

Company: Southern California Gas Company (U 904 G)/San Diego Gas & Electric Company (U 902 M)
Proceeding: 2019 General Rate Case
Application: A.17-10-___
Exhibit: SCG-02/SDG&E-02

**SOCALGAS AND SDG&E**

# DIRECT TESTIMONY OF GREGORY S. FLORES

# (ENTERPRISE RISK MANAGEMENT ORGANIZATION)

**October 6, 2017**

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

SoCalGas
A Sempra Energy utility®

SDGE
A Sempra Energy utility®

317173

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## APPENDICES

## Summary of Requests

- The Enterprise Risk Management (ERM) organization requests the California Public Utilities Commission (Commission) to adopt its Test Year (TY) 2019 proposal for $0.292 million of operations and maintenance (O&M) expenses at Southern California Gas Company (SoCalGas) and $6.743 million of O&M expenses at San Diego Gas & Electric Company (SDG&E), totaling $7.035 million in direct O&M costs, to further develop and evolve an ERM function for both Southern California Gas Company (SoCalGas) and San Diego Gas & Electric Company (SDG&E). This request includes a $2.462 million increase in O&M expenses relative to the 2016 recorded amounts, primarily due to costs associated with furthering:
    - the risk, asset, and investment management programs and the integration of each at SoCalGas and SDG&E; and
    - the development of transparent, repeatable, and consistent processes that are quantitative and data-driven.
- SoCalGas utilized the 2016 recorded costs as the basis for the TY 2019 forecast because 2016 was the first year the ERM organization was fully staffed. Going forward, it is anticipated the costs will remain stable at these levels.
- For SDG&E, a five-year and a three-year historical average was used to develop the 2019 cost forecast because, while risk management roles and priorities are evolving, the advancement of risk management principles remains consistent over time.

# SOCALGAS/SDG&E DIRECT TESTIMONY OF GREGORY S. FLORES (ENTERPRISE RISK MANAGEMENT ORGANIZATION)

## I. INTRODUCTION

### A. Summary of ERM Organization Costs and Activities

My testimony supports the TY 2019 forecasts for O&M shared costs associated with the ERM organization of both SoCalGas and SDG&E. My area does not have any non-shared O&M expenses or capital costs. Table GF-1 summarizes my sponsored costs.

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

| Description | 2016 Adjusted-Recorded (000s) | TY 2019 Estimated (000s) | Change (000s) |
|---|---|---|---|
| SDG&E ERM & Compliance | 4,281 | 6,743 | 2,462 |
| SoCalGas ERM | 292 | 292 | 0 |
| **Total Shared Services** | **4,573** | **7,035** | **2,462** |

My testimony describes SoCalGas and SDG&E's commitment to continued development of our ERM program that facilitates the integration of risk into the review of enterprise risks, with an emphasis on safety, the identification and prioritization of effective mitigation measures and, ultimately, the investment decision-making process. Our integration and practice of risk management continues to evolve to address a variety of changing demands related to operational, compliance, industry and Commission regulations, and increasing expectations related to risk-informed decision-making.

The TY 2019 GRC testimony of SoCalGas and SDG&E Risk Management and Policy witness Diana Day (Exhibit SCG-02/SDG&E-02 Chapter 1) describes the achievement of the TY 2016 goals, how SoCalGas and SDG&E have continued to build on the work accomplished during the prior GRC cycle, and new commitments to further develop our ERM organization and program for the next GRC cycles. My testimony sponsors $0.292 million in O&M expenses at SoCalGas and $6.743 million in O&M at SDG&E, totaling $7.035 million in direct O&M shared costs to support Ms. Day's risk management vision.

### B. Summary of Aliso-Related Costs

In compliance with Decision (D.) 16-06-054,[1] the testimony of witness Andrew Steinberg (Exhibit SCG-12) describes the process undertaken so the TY 2019 forecasts do not include the additional costs from the Aliso Canyon Storage Facility gas leak incident (Aliso Incident), and demonstrates that the itemized recorded costs are removed from the historical information used by the impacted GRC witnesses.

As a result of removing historical costs related to the Aliso Incident from ERM organization adjusted recorded data, and in tandem with the forecasting methods employed and described herein, additional costs of the Aliso Incident response are not included as a component of my TY 2019 funding request. Historical ERM organization costs that are related to the Aliso Incident are removed as adjustments in my workpapers (Exhibit SDG&E-02-WP) and also identified in Table GF-2 below.

**TABLE GF-2**
**Historical Adjustments to Remove Aliso Incident Costs**

| **ERM Organization** | | | |
|---|---|---|---|
| **Workpaper** | **2015 Adjustment (000s)** | **2016 Adjustment (000s)** | **Total (000s)** |
| **Total Non-Shared** | **0** | **0** | **0** |
| 2100-3945.000, OPERATIONS RISK MANAGEMENT SDG&E | 0 | -1 | -1 |
| **Total Shared Services** | **0** | **-1** | **-1** |
| **Total O&M** | **0** | **-1** | **-1** |

### C. Organization of Testimony

My testimony is organized as follows:

I. Introduction;

II. ERM Organization Expenditures – a discussion of the TY 2019 forecasts for O&M costs for shared services and the need to continue to develop and evolve an ERM function for both SoCalGas and SDG&E;

III. Conclusion; and

IV. Witness Qualifications.

[1] D.16-06-054, mimeo., at 332 (Ordering Paragraph 12) and 324 (Conclusion of Law 75).

## II. ERM ORGANIZATION EXPENDITURES

My testimony supports the TY 2019 forecasts to continue to develop and mature an ERM function for both SoCalGas and SDG&E. Table GF-1 above details the ERM organization request of $7.035 million of O&M costs for TY 2019, which is an additional $2.462 million compared to the 2016 adjusted-recorded. Table GF-3 below provides the breakdown of the requested costs by labor and non-labor. As shown in Table GF-3, the additional $2.462 million in TY 2019 over 2016 adjusted-recorded is primarily related to non-labor O&M, an increase of $1.739 million. The cost drivers are further discussed in Section II.C below.

**TABLE GF-3**
**Test Year 2019 Total Costs (Labor and Non-Labor)**

| Description | 2016 Adjusted-Recorded (000s) | TY 2019 Estimated (000s) | Change (000s) |
|---|---|---|---|
| Shared Service Labor | 2,073 | 2,796 | 723 |
| Shared Service Non-Labor | 2,500 | 4,239 | 1,739 |
| **Total Shared Services** | **4,573** | **7,035** | **2,462** |

The costs in Tables GF-1 and GF-3 are incurred on behalf of both SoCalGas and SDG&E, and therefore, these expenses are considered shared services. The utility providing shared services allocates and bills incurred costs to the entity or entities receiving those services. I am sponsoring the forecasts on a total-incurred basis, as well as the shared services allocation percentages related to those costs. Those percentages are presented in my shared services workpaper, along with a description explaining the activities being allocated. *See* Exhibit SCG-02-WP/SDG&E-02-WP. The dollar amounts allocated to affiliates are presented in the Shared Services and Shared Assets Billing Policies and Process testimony of Jim Vanderhye (Exhibit SCG-34/SDG&E-32).

### A. Description of Costs and Underlying Activities

The Enterprise Risk Management department comprises three (3) cost centers at SDG&E and one (1) cost center at SoCalGas. The personnel in the ERM function represent both SDG&E and SoCalGas and, therefore, all four cost centers are considered shared. The three cost centers at SDG&E are for: (1) the Vice President of Enterprise Risk Management, (2) the Director of Operational Risk Management and (3) the Director of Enterprise Risk Management &

Compliance. The one cost center at SoCalGas is for two Project Managers who report to the Directors.

### 1. Vice President of Enterprise Risk Management

As noted in Ms. Day's testimony, SoCalGas and SDG&E leadership have committed to expanding the implementation of risk management practices. The role of the Vice President will be to continue developing, implementing and supporting the application of risk management to SoCalGas and SDG&E's decisions. As part of the role, the Vice President will continue to establish risk management policy, to promote the integration of risk concepts and analysis in asset management and investment processes and to support the strengthening of SoCalGas and SDG&E's safety culture.

### 2. The Director of Operational Risk Management

This cost center has focused on the development of risk frameworks and tools. As SoCalGas and SDG&E expand the implementation of risk management practices, the Director of Operational Risk Management cost center will have primary responsibility to refresh the risk registries, apply new risk models to the risk identification, analysis, and evaluation processes, and support the implementation of operating unit registries. Further risk registry development by operating units (*i.e.*, functional areas) throughout SoCalGas and SDG&E will facilitate the operating units' risk based decision-making and enhance transparency into the overall risk management process.

The Director of Operational Risk Management will also bring the ERM department's risk management expertise to support the implementation of asset management such as conformance with asset management standards such as International Organization for Standardization (ISO) 55000 (Asset Management) and American Petroleum Institute's Recommended Practice 1173 (Pipeline Safety Management System).

This cost center also includes the resources to educate and grow the risk culture at SoCalGas and SDG&E. This will be achieved through the on-going socialization of the risk requirements adopted in D.14-12-025.[2] Specifically, these resources will be used to conduct risk workshops, risk webinars, and other formal and informal risk-related meetings, to foster

[2] Decision Incorporating a Risk-Based Decision-Making Framework into the Rate Case Plan and Modifying Appendix A of Decision 07-07-004.

understanding throughout SoCalGas and SDG&E. These efforts help support risk owners and managers lead and drive the cultural change essential to achieve risk-informed decision-making throughout the organization.

### 3. The Director of Enterprise Risk Management & Compliance

The Director of Enterprise Risk Management & Compliance cost center is responsible for developing and implementing the increased application of probabilistic and quantitative processes based upon data to assess risks and measure results of its risk management efforts, supporting (jointly with the Director of Operational Risk Management) the Safety Model Assessment Proceeding (S-MAP)[3] and other regulatory efforts, partnering with the Accounting & Finance and Regulatory departments to address the Accountability reporting required by D.14-12-025 and D.16-06-054, and enhancing the inclusion of risks in the investment management processes. The identification and inclusion of data will also allow SoCalGas and SDG&E to develop metrics to measure and monitor mitigation activity effectiveness. The cost center will monitor the improvement opportunities identified through the maturity assessment of SoCalGas and SDG&E.

The Director of Enterprise Risk Management & Compliance also includes the Quantitative Risk and Controls (QR&C) group. The QR&C performs business risk analysis, energy risk oversight, and administers the fleet fuel hedging program. Each of these activities dovetail with the spirit of the strategic risk management roadmap (further discussed in the testimony of Ms. Day), namely in that they attempt to identify, assess, and find solutions to risk issues.

Also included in the 2019 cost forecast is a compliance manager who oversees an annual review of key compliance program frameworks for which they are responsible. This review includes: 1) review of how changing laws and regulation are tracked, 2) how employees are trained regarding their compliance responsibilities and obligations, 3) key controls and other program features in place for compliance assurance, 4) how compliance in monitored and verified, and 5) how significant compliance issues are elevated and, if necessary, reported. These compliance frameworks cover state and federal regulation and include key areas of compliance areas such as Federal reliability standards, environmental rules and requirements,

[3] Application 15-05-002 (consolidated).

state and federal pipeline safety operations maintenance and construction requirements regulations , CPUC General Orders related to electric system construction, inspection and maintenance, Affiliate Transaction Rules, state and federal employee and public safety rules, consumer and privacy regulations, and employment rules.

This review demonstrates Sempra Energy, SoCalGas and SDG&E's continued commitment to compliance, ongoing evaluation of these key compliance areas, and engagement of company Officers in the process. Additionally, the compliance manager responsibilities include updating, reviewing, and approving on a periodic basis utility policies as well as verifying those policies are consistent with those of the parent company, Sempra Energy.

**B. Forecast Method**

Different methodologies were used to forecast the TY 2019 costs. For the Vice President cost center, a three-year average was utilized. This dedicated Vice President position did not exist prior to 2014, thus averaging costs over a longer time period (such as a five-year average) was not available. Using a forecasting methodology based on averages is reasonable since the costs are expected to be relatively unchanged over time. Similarly, a five-year average was used for the two remaining cost centers at SDG&E for the two director areas. The director cost centers have historical information for a five-year period that are representative of future expenditure levels. While risk management roles and priorities are evolving, the continual advancement of risk management principles across SoCalGas and SDG&E remains consistent over time. The SoCalGas workpaper group used the 2016 recorded costs (*i.e.*, base year) to inform the TY 2019 request. 2016 was the first year in which the SoCalGas ERM function was fully staffed. However, now that ERM personnel are in place, the costs for the SoCalGas workpaper group are anticipated to generally remain flat. As such, the selected forecast methods are representative of where the four cost centers will likely be during this GRC cycle.

**C. Cost Drivers**

The additional $2.462 million requested herein is needed to accomplish the goals explained by Ms. Day in her TY 2019 GRC Risk Management and Policy testimony. As seen in Table GF-3, this increase in funding will be primarily used to obtain support from experts within the industry (*i.e.*, non-labor O&M), which will allow our organization to continue to mature our risk management practices. In addition, we are requesting incremental funding for the addition of one full time equivalent. With the growing presence of the ERM organization and risk culture

company-wide, the size of our group is also expected grow to support the new activities being performed.

Figure DD-4 of Ms. Day's testimony (Ex. SCG-02/SDG&E-02 Chapter 1) presents SoCalGas and SDG&E's strategic planning trajectory for this and future GRC cycles. It reconfirms SoCalGas and SDG&E's commitments to move forward toward an integrated risk, asset, and investment management perspective as well as demonstrates the new and expanded initiatives that will be supported by the ERM organization. The ERM organization will continue to fulfill its responsibility for providing the leadership, innovation, governance, and management necessary to identify, evaluate, mitigate, and monitor operational and strategic risks.

With the additional funding, we plan to continue to build a comprehensive, asset management-focused risk management process that further embeds risk management into operations, thus allowing the investment planning strategy to be informed by risks identified in our ERM process with a primary focus on safety. It will allow us to:

- build out operational risk management through the implementation of operational risk registries to improve the integration of risk and asset management, and drive risk-informed decision-making within operations;
- enhance risk assessments with data to move toward quantification and probabilistic modeling where it is deemed necessary and effective to strengthen our risk monitoring capabilities and measure the effectiveness of our risk management efforts; and
- continue to develop risk management plans to more closely link risk assessments with risk treatment decisions to make better-informed funding allocations.

In addition to implementing the activities mentioned above, the ERM organization is involved with the Commission's new risk-based regulatory processes (discussed further in Ms. Day's testimony). In order to actively participate in the new risk-focused framework, SoCalGas and SDG&E has devoted a substantial amount of resources. For example, in the S-MAP pending before the Commission, SoCalGas and SDG&E are participating or expect to be involved in working groups on performance metrics and a risk lexicon, test drives evaluating new risk management methodologies, workshops, discussions around the new accountability reporting

requirements and more. These on-going and new Commission-initiated efforts require the continued or expanding support of our ERM organization.

## III. CONCLUSION

In order to continue to evolve and mature our risk management program and processes as well as to further integrate risk, asset and investment management, SoCalGas and SDG&E request that the Commission adopt their proposal for $7.035 million of O&M expenses in TY 2019 for the ERM organization.

This concludes my prepared direct testimony.

## IV. WITNESS QUALIFICATIONS

My name is Gregory S. Flores, and my business address is 8315 Century Park Court, San Diego, California 92123.

In May 2015, I was appointed Director, Enterprise Risk Management and Compliance for SoCalGas and SDG&E. In this role, I am responsible for the integration of risk, asset, and investment management practices at SoCalGas and SDG&E.

I have held various positions with the Sempra companies since 1989, including Director of Audit Services of Sempra Energy (until May 2015), and Director of Financial Planning of SoCalGas. I received a bachelor's degree in business administration with an emphasis in accounting from the University of Southern California. Prior to joining Sempra Energy, I was an auditor with the Los Angeles office of Coopers & Lybrand (now a part of PriceWaterhouse Coopers). I also have prior service as a board member of the Boys and Girls Club of America, Carlsbad, California.

I have not previously testified before the Commission.

## APPENDIX A
## GLOSSARY OF ACRONYMS

| Acronym | Definition |
|---|---|
| Commission | California Public Utilities Commission |
| D. | Decision |
| ERM | Enterprise Risk Management |
| ISO | International Organization |
| O&M | Operations and Maintenance |
| QR&C | Quantitative Risk and Controls |
| SCG | Southern California Gas Company |
| SDG&E | San Diego Gas & Electric Company |
| SoCalGas | Southern California Gas Company |
| S-MAP | Safety Model Assessment Proceeding |
| TY | Test Year |

# CHAPTER 3

# DIRECT TESTIMONY OF JAMIE YORK

# (RAMP TO GRC INTEGRATION)

Company: Southern California Gas Company (U 904 G)/San Diego Gas & Electric Company (U 902 M)
Proceeding: 2019 General Rate Case
Application: A.17-10-___
Exhibit: SCG-02/SDG&E-02

**SOCALGAS AND SDG&E**

**DIRECT TESTIMONY OF JAMIE K. YORK**

**(RAMP TO GRC INTEGRATION)**

**October 6, 2017**

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


317309

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## SUMMARY


- My testimony describes the process used to integrate the Risk Assessment Mitigation Phase (RAMP) process into these General Rate Case (GRC) applications.
- Southern California Gas Company and San Diego Gas & Electric Company mapped RAMP risks and mitigation activities to witness areas in this proceeding, estimated the amount embedded in historical routine operations for 2016, forecasted the mitigation activities for 2017 through 2019, and included, for information purposes, information from the RAMP Report to provide additional context.

# SOCALGAS/SDG&E DIRECT TESTIMONY OF JAMIE K. YORK
# (RAMP TO GRC INTEGRATION)

## I. INTRODUCTION

### A. Summary

My testimony describes the process used by Southern California Gas Company (SoCalGas) and San Diego Gas & Electric Company (SDG&E) (collectively, "the Companies") to integrate the RAMP[1] into these Test Year (TY) 2019 GRC applications. The RAMP is a new procedural requirement established by the California Public Utilities Commission (CPUC or Commission) in Decision (D.) 14-12-025[2] and is considered to be "an initial phase of each utility's GRC process."[3] As discussed in the testimony of Risk Management and Policy witness Diana Day (Exhibit SCG-02/SDG&E-02, Chapter 1), the "purpose of the RAMP is to examine the utility's assessment of its key risks and its proposed programs for mitigating those risks."[4]

The RAMP is a subset of the Companies' GRC showing. It is limited to safety-related activities that correspond to one or more of the Company's key safety risks. Ms. Day's testimony describes the process used to identify the key safety risks subject to the RAMP process.

The Companies were the first utilities to submit a RAMP Report[5] and, thus, integrate the RAMP into the GRC. The integration process was complicated, iterative, and required changes to the Companies' well-established internal GRC process. Pursuant to D.14-12-025, these TY 2019 GRC applications shall include "changes resulting from the RAMP process."[6] My testimony provides a summary of such changes.

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[1] Investigation (I.) 16-10-015/I.16-10-016 (consolidated).
[2] Decision Incorporating a Risk-based Decision-Making Framework into the Rate Case Plan and Modifying Appendix A of Decision 07-07-004, approving Rulemaking 13-11-006. D.14-12-025 will be referred to herein as "Risk Framework Decision."
[3] D.14-12-025, at 31.
[4] *Id.*
[5] I.16-10-015/I.16-10-016 (consolidated), Risk Assessment and Mitigation Phase Report of San Diego Gas & Electric Company and Southern California Gas Company, referred to herein as "RAMP Report," Filed on November, 30, 2016.
[6] D.14-12-025 at 42.

### B. Organization of Testimony

Section I of my testimony provides an introduction. Section II explains the Companies' approach for integrating the RAMP into the GRC. Section III offers concluding remarks, and Section IV presents my witness qualifications.

### C. Support To/From Other Witnesses

Ms. Day's testimony provides necessary background regarding the Risk Framework Decision and its requirements for the Safety Model Assessment Proceeding (S-MAP) and a subsequent RAMP submission. Ms. Day describes the tremendous efforts the Companies have undertaken to integrate the necessary processes, over the past several years, to incorporate the Risk Framework Decision's S-MAP, RAMP, and accountability reporting requirements into their operations and GRC presentations, and describes how risk, and specifically the Risk Framework Decision, shaped SoCalGas and SDG&E's TY 2019 GRC testimony presentation. A summary of RAMP Report, the enterprise risk management process by which the RAMP risks were determined, and a mapping of the GRC witnesses sponsoring RAMP-related requests in this GRC are also included in Ms. Day's testimony (Exhibit SCG-02/SDG&E-02, Chapter 1).

My testimony describes the process by which the various GRC witnesses sponsoring RAMP activities integrated the associated costs into their GRC forecasts. For the derivation of the RAMP forecasts and the specific requests, please refer to the sponsoring testimony exhibits.

## II. THE COMPANIES' PROCESS FOR INCORPORATING THE RAMP INTO THE TY 2019 GRC

The Companies put forth in this TY 2019 GRC specific requests related to the activities presented in the RAMP Report. A major task of the Companies was to translate the safety-risk mitigation activities identified in the RAMP Report into the GRC in a manner that reflects this risk-based view, while at the same time including the requests that meet the traditional non-risk-based operating needs. The Companies took the steps below to incorporate the RAMP mitigation activities into the GRC applications:

1. Identified the population of activities from the RAMP Report that should be further reviewed for inclusion in the GRC.
2. Assigned the RAMP risk mitigation activities to GRC witness areas.
3. Evaluated the risk mitigation activities to determine specific requests in the GRC.
4. Incorporated the specific RAMP requests into the witnesses' GRC forecasts.

Each step is discussed in more detail below.

**A. Identification of Activities from the RAMP Report**

The Companies reviewed each of the projects and programs from the RAMP workpapers, removed mitigations that are addressed in regulatory venues outside of the GRC,[7] and identified overlapping mitigations. In the RAMP Report, activities that mitigated multiple risks (i.e., overlapping mitigations) were included in all applicable risk mitigation plans. For example, security guards help to mitigate the risk of Workplace Violence, but also Physical Security of Gas Infrastructure. While the Companies took this approach in the RAMP Report to demonstrate the impact (both forecasted costs and risk reduction benefits) of each mitigation on a given risk, the same approach cannot be utilized in the GRC, as it would duplicate funding requests. In this step of the process, such overlapping mitigations were identified to bring awareness to the assigned witness area, noted in the next step below, that a particular activity was a mitigant to multiple RAMP risks.

**B. Assignment of the RAMP Risk Mitigation Activities**

Each RAMP mitigation activity identified in step 1 above was assigned to one or more GRC witness areas. Some of the RAMP risk mitigation efforts could be readily paired with just a few or even one GRC witness area or operational group, e.g., Catastrophic Damage Involving Medium-Pressure Pipeline Failure risk. Other activities, however, cut across an entire organization and were much more difficult to pair, e.g., the Records Management risk. These activities are referred to as cross-cutting risks.

For presentation purposes in this GRC, where an activity's costs were confined to a particular witness, the GRC witness sponsors that given RAMP activity. For example, all the mitigations associated with the Cyber Security risk are sponsored by one witness. However, the mitigation activities that cut across a company, mostly related to the cross-cutting risks, were assigned to one or a few select witnesses to discuss the RAMP effort and potential costs. An example of a cross-cutting mitigation activity is Records Management training. The majority of the Companies' employees complete Records Management training; therefore, costs for this training are embedded in multiple cost centers. Rather than each GRC witness discussing Records Management training and providing a line-item forecast, this mitigation activity was

[7] The RAMP Report not only presented mitigations that are typically included in GRCs, but also those requested in separate applications or are under the jurisdiction of other regulatory bodies, such as the Federal Energy Regulatory Commission (FERC).

assigned to a limited number of GRC witnesses. In general, the assigned witness(es) sponsor a description of the activity, the estimated 2016 embedded historical costs for the activity in its entirety, and any related prospective proposals and associated forecasts.

**C. Evaluation of Risk Mitigation Activities for Inclusion in the GRC**

The GRC witness teams reviewed the RAMP Report and applicable workpapers, further discussed with the internal RAMP teams, and analyzed available historical information to estimate the 2016 amount and determine a forecasted request (TY 2019 for Operations and Maintenance (O&M) and 2017 through 2019 for capital) for the assigned RAMP activities. The Companies' RAMP evaluation and showing was also influenced by feedback received from the Safety and Enforcement Division (SED) and intervenors during the RAMP process. The feedback regarding specific mitigation activities is addressed, to the extent possible, by the GRC witness assigned to that particular activity. Overarching feedback, such as including the risk-spend efficiency calculation or suggested modifications to the Companies' risk management processes, is discussed in Ms. Day's testimony.

The requested amounts for RAMP activities in the TY 2019 GRC may differ from what was presented in the November 2016 RAMP Report, for several reasons. First, the RAMP Report utilized a 2015 Base Year (BY), presented proposed activities in ranges of dollars, and did not request funding. By contrast, the TY 2019 GRC is a 2016 BY and is seeking Commission approval for a specific funding request. Second, GRC witnesses revisited the cost estimates developed in the RAMP Report in light of new, more recent or additional information (since the RAMP Report was developed in mid to late 2016). If that caused a re-evaluation of incremental risk mitigation forecasts, either upward or downward, the GRC witnesses utilized the more recent cost estimate in their GRC forecasts. Third, in the course of developing the GRC forecast of activities and costs since the submission of the RAMP Report, in some cases, the Companies became aware of either new risk mitigation opportunities, or changes in scope or schedule of risk mitigation opportunities, identified in the RAMP Report. The GRC witnesses included those modified risk mitigation efforts into their GRC requests. Fourth, as mentioned above, the RAMP Report contained overlapping mitigation activities. The assigned GRC witness areas were made aware of any overlapping activities assigned to them, due to the efforts taken in step 1 above, and determined a single GRC forecast a request for these activities. As such, overlapping activities and associated costs have been removed in the GRC. Lastly, as also

mentioned above, the RAMP Report presented mitigation activities outside the jurisdiction of the Commission, in order to show complete mitigation plans for the identified risks. Such items have not been included in the GRC.

**D. Incorporation of the RAMP Request into Overall GRC Request**

Following evaluation of the RAMP item, the GRC witness areas categorized the RAMP mitigation activities into one or more of the following: RAMP Base, RAMP Incremental, and RAMP Post-Filing. RAMP Base was selected in two scenarios: (i) if the GRC witness area used a zero-base forecasting methodology, in which a witness estimates a forecast on discrete values that may be independent of history; and/or (ii) if no incremental RAMP costs were forecasted in this GRC. If either or both of the two scenarios were met, RAMP Base was intended to show how much of the activity already being performed will continue in the future. In other words, it is the continuation of the 'base' amount or the jumping off point used to forecast future needs. The Companies also attempted to separate the requested amounts for incremental mitigations, that is, the estimated cost for new or enhanced mitigation efforts over that already being performed in the BY (i.e., 2016). Those are labeled as RAMP Incremental.[8] The RAMP Base and RAMP Incremental concepts are consistent with the Companies' presentation in the RAMP Report. Additionally, it was anticipated that the Companies might identify additional RAMP-related activities after the filing of the RAMP Report that contribute to the mitigation of one or more of the 28 RAMP risks. These mitigation activities would normally have been captured in the Companies' RAMP Report, but were not, either because such activities were unknown when the RAMP Report was submitted, or upon further examination, certain activities were considered to be a RAMP mitigation. Such activities in this GRC are referred to as RAMP Post-Filing. It should be noted that the RAMP Post-Filing category can be either RAMP Post-Filing Base or RAMP Post-Filing Incremental.

In addition to the three RAMP categories, the Companies saw value in attempting to quantify the 2016 BY expenditures historically devoted to the identified RAMP mitigation activities. This is because the Companies currently (and will continue to) perform routine work related to safety and risk mitigation. A similar analysis was provided in the Companies' RAMP

[8] Generally, for capital projects, the RAMP categorization was given either the "Base" or "Incremental" designation. As such, if a capital project is shown as "RAMP Incremental," the amount represents the entire forecasted project costs and may not be limited to the estimated incremental amount of that project.

Report for 2015. The Companies are providing a comparable perspective by presenting the 2016 embedded historical values for the RAMP activities in this GRC. Given the Companies' current business operations, the safety and risk mitigation work efforts and associated costs are not separated from other routine utility operations. For example, many of the RAMP mitigation activities are related to training. The Companies' accounting systems are not configured in a way that tracks labor and the associated labor costs for specific training classes. Therefore, assumptions were made to identify RAMP spending in 2016.[9]

To incorporate the RAMP activities into the witnesses' overall GRC forecasts, the Companies modified their existing GRC processes, specifically the adjustments process for O&M and workpaper sub-groups for capital, and categorized mitigations according to RAMP Base, Incremental, and Post-Filing activities. The Companies presented the requests for RAMP activities as adjustments and workpaper sub-groups, in order to: (i) isolate the RAMP activity, to allow the reader to see the dollar request in GRC workpapers and identify the population of RAMP items, and (ii) utilize existing processes. The adjustments and workpaper sub-groups are part of the various GRC witnesses' forecasts and, therefore, contribute to the overall revenue requirements requested by the Companies in these applications.

Adjustments may be made or workpaper sub-groups may be created following the selection of an underlying forecast methodology. Generally, GRC witnesses utilize historic expense information when developing their forecasts and often select from one of several possible forecast methodologies for each workpaper. These include averages (e.g., five-year average), trends, Base Year (i.e., utilizing the 2016 expenses), or a zero-base method. There are specific reasons for the choice of a particular forecast methodology. The GRC witness' selection of one of these methods produces a base forecast. For O&M, the witness can make further adjustments, either upward or downward, to account for discrete variables that are anticipated in the future and are not accommodated by that base forecast. For capital, workpaper sub-groups can be created to provide additional details for a particular project or to establish a relationship

[9] The estimated 2016 RAMP embedded costs are included to provide a comparison of the historic RAMP-related mitigation cost to the TY 2019 request for O&M and for informational purposes for capital. The 2016 embedded costs identified in the context of RAMP, and shown in workpapers, do not carry through or impact the calculation of the TY 2019 revenue requirement.

between projects. The adjustments and workpaper sub-groups themselves are provided in the GRC witnesses' workpapers.[10]

In addition to the O&M adjustments and capital workpaper sub-groups, much information from the RAMP Report was transcribed and is shown in the GRC witness' workpapers to provide context as well as a comparison reference to the RAMP Report itself. Such information includes the RAMP risk the particular activity was associated with, the name of the mitigation as presented in the RAMP Report, the estimated range of costs put forth in the RAMP for the mitigation activity, the funding source (i.e., CPUC-GRC, FERC), the work type (e.g., mandated) and citation (e.g., General Order 165), and the 2016 embedded historical cost estimate.

**E. Example Showing of RAMP into GRC Presentations**

Each GRC witness who sponsors RAMP mitigation activities will present tables illustrating their request as it relates to RAMP. In these tables, you will see the RAMP categories described above. A sample of an O&M RAMP table from the SoCalGas Human Resources Department, Safety, Workers' Compensation and Long-Term Disability testimony of Mary Gevorkian (Exhibit SCG-32) is provided below.

[10] The Companies recognize that some fraction of the forecasted RAMP mitigation costs might be accommodated within the forecast methodology (i.e., the trend or average). If the GRC witness areas found this to be applicable for a particular RAMP activity, they estimated the fraction of the RAMP mitigation cost that might be attributable to that base forecast methodology and excluded it from the requested incremental cost increase.

**Sample O&M RAMP Table**

| **HR, DISABILITY, WORKERS' COMP & SAFETY (In 2016 $)** | | | |
|---|---|---|---|
| **SCG-2 Employee, Contractor, Customer and Public Safety** | **2016 Embedded Base Costs (000s)** | **TY 2019 Estimated Incremental (000s)** | **Total (000s)** |
| 2HR006.000, SCG Director Safety & Wellness | 4,448 | 5,386 | 9,834 |
| **Total** | **4,448** | **5,386** | **9,834** |
| | | | |
| **SCG-7 Workforce Planning** | **2016 Embedded Base Costs (000s)** | **TY 2019 Estimated Incremental (000s)** | **Total (000s)** |
| 2HR004.000, SCG Director HR Services | 1,551 | 840 | 2,391 |
| 2HR007.000, SCG Director Org Effectiveness | 1,175 | 1,066 | 2,241 |
| **Total** | **2,726** | **1,906** | **4,632** |

The above table shows that Ms. Gevorkian is sponsoring costs related to two SoCalGas risks provided in the RAMP Report; Employee, Contractor, Customer, and Public Safety and Workforce Planning. For each mitigation activity, Ms. Gevorkian presents the 2016 embedded historical costs, the TY 2019 incremental, and the total forecasted costs of the mitigation activity requested in 2019 (i.e., a summation of the 2016 embedded historical and the incremental 2019 costs) by workpaper group (e.g., 2HR006.000).

The capital RAMP tables included in the GRC witnesses' testimony provide similar information. Below is a sample of a capital RAMP table from the SDG&E Real Estate, Land Services and Facilities witness R. Dale Tattersall (Exhibit SDG&E-22).

**Sample Capital RAMP Table**

| **FACILITIES/OTHER (In 2016 $)** | | | |
|---|---|---|---|
| **SDG&E-3 Employee, Contractor and Public Safety** | **2017 Estimated RAMP Total (000s)** | **2018 Estimated RAMP Total (000s)** | **2019 Estimated RAMP Total (000s)** |
| 00703A.001, RAMP - Incremental Environmental/Safety Blanket 2017 - 2019 | 456 | 1,504 | 2,146 |
| **Total** | **456** | **1,504** | **2,146** |
| | | | |
| **SDG&E-5 Major Disturbance to Electrical Service (Blackout)** | **2017 Estimated RAMP Total (000s)** | **2018 Estimated RAMP Total (000s)** | **2019 Estimated RAMP Total (000s)** |
| 16766A.001, RAMP - Incremental Mission Control Modernization | 5,199 | 11,062 | 0 |
| **Total** | **5,199** | **11,062** | **0** |
| | | | |
| **SDG&E-6 Fail to Blackstart** | **2017 Estimated RAMP Total (000s)** | **2018 Estimated RAMP Total (000s)** | **2019 Estimated RAMP Total (000s)** |
| 16766A.001, RAMP - Incremental Mission Control Modernization (Costs are already included in SDG&E-5 Major Disturbance to Electrical Service (Blackout)) | 0 | 0 | 0 |
| **Total** | **0** | **0** | **0** |
| | | | |
| **SDG&E-9 Workplace Violence** | **2017 Estimated RAMP Total (000s)** | **2018 Estimated RAMP Total (000s)** | **2019 Estimated RAMP Total (000s)** |
| 00707A.001, RAMP - Incremental Security Blanket 2017 - 2019 | 1,760 | 3,401 | 4,047 |
| 16767A.001, RAMP - Incremental Mission Control Critical Asset Security Hardening | 2,793 | 70 | 0 |
| **Total** | **4,553** | **3,471** | **4,047** |

Like the sample O&M RAMP table, the capital RAMP table provided above presents the witness' applicable RAMP risks. In this case, Mr. Tattersall is sponsoring costs related to the SDG&E RAMP risks of Employee, Contractor, and Public Safety, Major Disturbance to Electric Service (Blackout), Fail to Blackstart, and Workplace Violence. The capital RAMP tables also show the RAMP category (e.g., RAMP Incremental), the mitigation activity (e.g., Mission Control Modernization), and the workpaper where this mitigation activity can be found (e.g.,

16766A.001). Mr. Tattersall's activities and costs related to the Fail to Blackstart RAMP risk were overlapping with those in Major Disturbance to Electric Service (Blackout). As such, Mr. Tattersall is not seeking any funding for the Fail to Blackstart activities. The forecasts for capital are the total estimated costs for the years 2017, 2018, and 2019.

**F. Challenges Experienced in the RAMP to GRC Integration Process**

The necessary integration of the RAMP into the GRC has proven to be a significant effort. The challenges can be primarily attributed to activity-based risk mitigations being translated into how the costs are presented in GRC. This translation required substantial database changes to the systems used to develop GRC forecasts. These changes mainly associated the RAMP activities to various cost centers and budget codes (i.e., modifying the adjustments and workpaper sub-group processes) and develop RAMP-specific workpapers. The necessary system modifications were contemplated before the RAMP Report was submitted, in part influenced by developments in the S-MAP.[11] However, due to the iterative, evolving nature of the RAMP integration process, system modifications related to the RAMP were ongoing during the preparation of this GRC.

Other challenges arose during the RAMP to GRC integration process regarding the disparity between the activity-based presentation of the RAMP and the cost/accounting focus of the GRC. For example, SDG&E's community fire safety outreach program is administered for residential and business customers. Because the activity is for two different customer classes, it is recorded to and presented in two different cost centers for GRC purposes. Yet, in the RAMP Report it was shown as one activity. Another example is regarding shared and non-shared cost centers. The Companies have activities and organizations that solely benefit one company (SoCalGas or SDG&E), which are referred to as non-shared, and others that benefit more than one company (e.g., SoCalGas, SDG&E, Sempra Energy Corporate Center, or possibly a non-utility Sempra affiliate), which are known as shared services. If an activity consists of a shared and non-shared component, it would be forecasted in different cost centers, and the shared cost center would then allocate a certain percentage of the costs to the other company. Additional information about shared services is provided in the testimony of Shared Services & Shared

[11] As D.16-08-018 recognized, the Companies were given a "compressed schedule" to request the Order Instituting Investigation, to file a RAMP and to incorporate the RAMP into the filing of these GRC applications.

Assets Billing, Segmentation, & Capital Reassignments witness James Vanderhye (Exhibit SCG-24/SDG&E-32). In both scenarios, the presentation of activities in the GRC could differ from the RAMP Report in reflecting where and how the costs are tracked. As mentioned above, the Companies included in workpapers the range of costs provided in the RAMP Report for the mitigation activities, for comparison purposes. In the two examples above, the forecasted costs have been bifurcated into multiple workpapers. Likewise, the RAMP range would need to be split, imputed, or shown in all applicable or entirely in one workpaper. For the simplicity of the GRC presentation, the Companies displayed the entire RAMP range in one workpaper; the other workpapers show a zero value for the RAMP range.

## III. CONCLUSION

The RAMP integration process described herein evolved throughout the GRC forecast development process, overlapping with the statewide S-MAP and the Companies' RAMP proceeding currently pending before the Commission. As future S-MAP and RAMP Report filings occur, the process used in this GRC is expected to change.

This concludes my prepared direct testimony.

## IV. WITNESS QUALIFICATIONS

My name is Jamie K. York. My business address is 8330 Century Park Court, San Diego California 92123. I am currently a Regulatory Case Manager in the GRC and Revenue Requirements department within the Regulatory Affairs organization representing both Southern California Gas Company and San Diego Gas & Electric Company. I have held this position since December of 2015. In my current role, I manage regulatory proceedings including the Safety Model Assessment Proceeding, Risk Assessment Mitigation Phase, and aspects of the TY 2019 General Rate Case. In addition, I supervise the Regulatory Case Support group, which serves as central files for SoCalGas and SDG&E and processes regulatory-related information requests. From April 2011 to December 2015, I held several case management-related positions in the Regulatory and Compliance department within the Regulatory Affairs organization managing various regulatory proceedings ranging from procurement-related to rate design cases.

I started my employment with SDG&E in 2006. I have held various positions of increasing responsibility in the departments of Electric & Fuel Procurement, Financial and Strategic Analysis, Pension and Trust Investments and Supply Management before assuming a position in Regulatory Affairs.

I have a Bachelor of Science in Finance and a Master of Business Administration from San Diego State University.

I have not previously testified before the Commission.

## APPENDIX A

## GLOSSARY OF ACRONYMS

| Acronym | Definition |
|---|---|
| BY | Base Year |
| CPUC | California Public Utilities Commission |
| D. | Decision |
| FERC | Federal Energy Regulatory Commission |
| GRC | General Rate Case |
| I. | Investigation |
| O&M | Operations and Maintenance |
| RAMP | Risk Assessment Mitigation Phase |
| SDG&E | San Diego Gas & Electric Company |
| SED | Safety and Enforcement Division |
| S-MAP | Safety Model Assessment Proceeding |
| SoCalGas | Southern California Gas Company |
| TY | Test Year |