Risk Assessment and Mitigation Phase

Cross-Functional Factor

(SDG&E-CFF-1)

Asset Management

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CROSS-FUNCTIONAL FACTOR: ASSET MANAGEMENT

I. INTRODUCTION

This Asset Management Cross-Functional Factor (CFF) Chapter describes how Asset Management activities impact the risks described in SDG&E's Risk Assessment Mitigation Phase (RAMP) risk chapters.

SDG&E is presenting CFF information in this RAMP Report to provide the Commission and parties additional information regarding the risks and mitigations described in its RAMP risk chapters. CFFs are not in and of themselves RAMP risks. Rather, CFFs are drivers, triggers, activities or programs that may impact multiple RAMP risks. CFFs are also generally foundational in nature. Therefore, SDG&E's CFF presentation differs from that of its RAMP risk chapters (*e.g.*, no risk spend efficiency calculations or alternatives are provided). SDG&E's CFF chapters provide narrative descriptions of the CFF projects and programs that impact multiple SDG&E's RAMP risk chapters through the 2022-24 time frame. Related cost forecasts are provided as available, consistent with an expected test year (TY) 2024 general rate case (GRC) request.

As described below, Asset Management is an enterprise-wide framework that provides a standardized approach for managing risk and safety across assets and activities. The Asset Management CFF therefore spans multiple lines of business and helps to mitigate several RAMP risks in this Report.

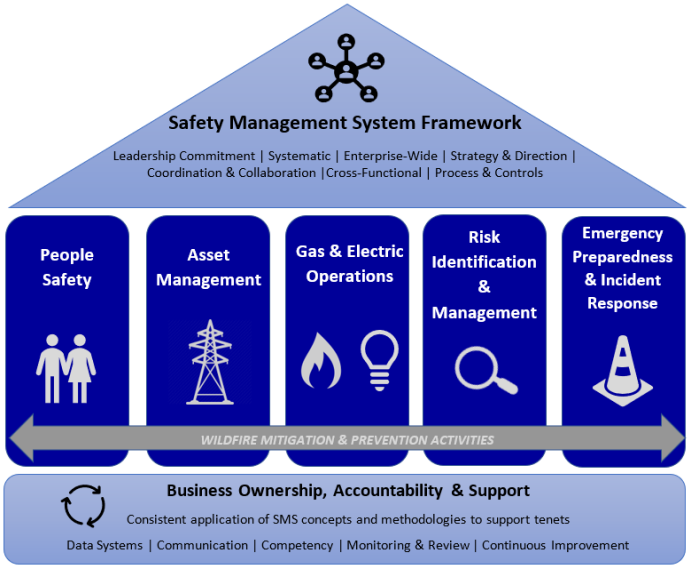
II. OVERVIEW

The SDG&E Asset Integrity Management (AIM) program, driven by the Asset Management organization, advances the development and implementation of a comprehensive, sustainable and risk-informed Asset Management System (AMS), encompassing people, process, data, analytics and technology. The AIM program builds the AMS to conform with ISO 55000, an international standard that specifies the requirements (ISO 55001) and application (ISO 55002) for establishing, implementing, maintaining, and improving a holistic AMS. The AMS is aligning with this standard to support regulatory direction on safety, wildfire mitigation, and electric system resilience and to reinforce an integrative approach to electric assets for governance, strategy, analytics, and continuous improvement. SDG&E's strategic aspirations for the AMS include enhanced asset safety, improved performance and measurement, risk-informed decision making, demonstrated compliance, and improved efficiencies and effectiveness of asset

utilization and operations. A comprehensive AMS, which includes process improvements, data analytics and system solutions, enables the following capabilities for SDG&E:

- Establishing an AMS provides an internal framework that supports SDG&E's optimal balancing of asset cost, asset risk, and asset performance, by making safe and effective management of its physical assets a core business function;
- Following ISO 55000 (a proven benchmark) leads to greater internal consistency across asset groups and repeatable and transparent business and asset management processes;
- The ISO 55000 framework promotes significant alignment across the organization and build "line of sight" to ensure employees at all levels fully understand their role in supporting the goals of the organization, at the top of which is safety;
- The access to and integration of data throughout the asset life cycle to develop asset health and risk index for critical assets supports risk-informed decision-making and advances SDG&E maturity from performing descriptive analytics to more predictive;
- Supports capital investment prioritizations and risk reduction strategies; and
- Prioritizes investment decisions across the portfolio of company assets, providing information to determine the cost and risk reduction programs.

SDG&E's AMS serves as a direct link to risk mitigation by using identified and prioritized enterprise risks to inform asset management strategic and long-term risk planning. Additionally, the implementation of ISO 55000 standards not only supports but enhances SDG&E's enterprise Safety Management System (SMS) framework, whereby operating assets are managed as an element of enterprise safety. The figure below illustrates the SMS framework with Asset Management as one of the core pillars.



Additional information on SMS and associated programs are outlined in SDG&E's SMS CFF Chapter. Alignment with international and industry standards furthers the Company's continued adherence to best practices and continuous improvements across risk and safety initiatives. SDG&E's implementation of an AMS that aligns with the ISO 55000 standard is characterized as a systematic and coordinated set of governing practices and activities to manage information about assets and asset systems, enabling better investment decisions in alignment with the Company's strategic values.

The integrated governance of SDG&E's AMS reinforces safety as our highest priority and promotes prudent and effective planning and managing our long-lived network of assets, in accordance with the service levels our customers value. It also effectively positions SDG&E to navigate current changes in the energy environment and to influence future change. This asset management initiative is directly aligned with and is a critical extension of SDG&E's enterprise risk management program and is a key component of managing asset safety across the Company. Developing a holistic enterprise for AMS is a multi-year effort and will continue to evolve and mature over time. SDG&E's current approach is focused on electric distribution and transmission operations but will be expanded into other operational areas, including gas, in future years. To date, the AIM program has achieved several milestones, all of which are ISO 55000 requirements:

Governance and Organizational Structure

- Development of organizational structure including executive oversight, asset management governance, program leadership, asset class owners and managers, implementation and support leaders, and subject matter experts;
- Determination of asset classes and identification of critical asset types within each class based on risk assessments;
- Development of asset management policy and integrated electric strategy;
- Completion of the Asset Management Plans (AMPs), operational plans for risk and life-cycle management of the electric distribution, transmission and substation assets;
- Establishing an AIM Operating Model, which is a process flow that leads and facilitates development of the strategic documents that define program governance, overarching standards and strategy for a sustainable AMS and integrated asset management plan implementation, in alignment with ISO 55000 standards. The AIM Operating Model includes the asset management framework, capabilities, and accountability needed to effectively adopt the asset management culture in the organization;
- Enhancement of organizational asset management capabilities leveraging existing engineering and risk methodologies and other maturing business proficiencies, and assessment and assignment of roles and responsibilities required for organizational development and implementation of the AIM program; and
- Development of high-level asset management processes and identification of sub-processes for integrated governance, strategy, analytics and performance evaluation.

Asset Data Integration and Analytics

- Initial development of alternative replacement strategy analyses and asset health indices for certain critical assets;
- Assessment and design of information systems needed to support electric asset management; and
- Development and implementation of information system solutions development for data integration, asset performance analytics and portfolio optimization.

Performance Measurement and Decision Making

- Development of an initial value framework utilizing strategic value drivers and determining value-based metrics for quantitative capital investment valuation and assessment of risk mitigation benefits of electric system projects; and
- Compilation of asset-related operational and performance metrics for consistent and comprehensive reporting and performance evaluation of the AMS for continuous improvement.

III. ASSOCIATED RISK EVENTS

Asset Management projects and programs are indirectly assessing and mitigating SDG&E's RAMP risks identified in chapters such as SDG&E-Risk-1, Wildfires Involving SDG&E Equipment (Including Third Party Pole Attachments) and SDG&E-Risk-2, Electric Infrastructure Integrity. The Asset Data Governance and Records Management program described below directly supports the risks identified in SDG&E-CFF-6, Records Management.

IV. 2020 PROJECTS AND PROGRAMS

A. Asset Integrity Management Program

In 2017, SDG&E began the implementation of its AIM program, aligning asset management functions and strategies across electric system operations and implementing an integrated and comprehensive asset management program in accordance with ISO 55000. As part of this alignment, SDG&E has been focused on setting the groundwork for organizational change and establishing the foundation to integrate ISO 55000 principles across electric operating units. The program has been focused on developing an Operating Model and AMP that align the various functional areas of risk, electric planning and operations, financial planning, asset management and portfolio management.

The AIM Operating Model is a process flow designed for electric system projects that outlines the different capabilities to lead and facilitate development of the strategic documents that define the program governance, overarching standards, and strategy for a sustainable asset management system and integrated asset management plan implementation in alignment with ISO 55000 standard. The operating model harmonizes with current company programs through alignment of objectives and leadership support, promoting assurance through risk-informed performance evaluation for continual improvement and focusing on greater asset utilization value. The AIM Operating Model also assists in the strategic development of asset strategies to

promote cross-functional alignment, consistency and/or an integrative approach with engineering and operations business units, the Wildfire Mitigation Program, and the Asset Management, Enterprise Risk Management (ERM), and Capital Portfolio Management organizations as they relate to regulatory filings.

The AMP is a governance document that provides a present-day overview of an asset class and its life cycle. The AMP provides transparency in identifying critical assets and replacement strategies and addresses performance and risk. Additionally, it captures the capital and operating expenses required in sustaining asset performance for electric assets. In future iterations as part of continuous improvement, the AMPs will serve as operational plans for risk and life-cycle management of the electric system assets.

These initiatives directly support alignment with ISO 55000 by establishing systematic and coordinated activities and practices through which an organization optimally and sustainably manages its assets and asset systems and their associated performance, risks and expenditures over their life cycles. Over the next several years, SDG&E anticipates implementing the AIM program enterprise-wide, operating under a comprehensive, sustainable, and risk-informed asset management system, and continually evolving the asset management system. The AIM program will continue the asset management system implementation for electric transmission, substation and distribution business segments through 2021 to 2022. Planning and implementation design for other assets supporting the electric system infrastructure will be in focus thereafter.

1. Asset Investment Prioritization

Because safety is the company's highest priority, the Asset Management organization is incorporating a multi-dimensional value framework for evaluating investments through a data-driven, quantitative, risk- and safety-based lens. This value framework utilizes the Company's strategic values and determines standardized value-based metrics to quantitatively compare projects, thereby enhancing the company's ability to cross-prioritize across the Company's portfolio and optimize investment decisions, including wildfire mitigation investments, while effectively spending ratepayer funds.

Since 2019, the Asset Management organization has embarked on a cross-functional project of streamlining an end-to-end process on investment prioritization and allocation. SDG&E is implementing a software solution in phases to improve investment prioritization capabilities. The purpose of this software solution implementation project is to develop business

processes and a system for capital investment optimization using an objective, risk-informed value framework. The first phase focuses on the initial value framework development for the electric system capital investments. The completion of this preliminary value framework in 2020 for electric system projects evaluates the benefits and costs of capital projects in terms of Safety, Reliability, Financial and Stakeholder Satisfaction attributes. This value framework will also serve as a foundation to build upon for other asset-intensive capital investments and eventually evolve to enterprise-wide value framework. The 2021 focus is the next phase of the software solution implementation project, which includes extending adoption across the different electric system projects in SDG&E's portfolio. Subsequently, other assets supporting the electric system infrastructure will be included in the multi-year phased implementation to achieve enterprise-wide investment prioritization and optimization.

B. Asset Data Systems & Records Management

Two centralized teams were formed within SDG&E's Asset Management organization to develop and implement a holistic and sustainable AMS for electric infrastructure assets with an integrative approach for governance, strategy, analytics and continuous improvement. Over the past year, the Asset Management organization addressed the dynamic electric system and collaborated with additional departments and subject matter experts to evaluate all electric assets and initiate the development of an Enterprise Asset Management data foundation and an Asset Investment Prioritization tool. This collaboration and development of enhancements to tools as well as databases will allow SDG&E to further expand its capabilities and improve the development of programs.

1. Enterprise Asset Management Data Integration

Beginning in September 2019, SDG&E developed tools and solutions allowing for more robust and comprehensive ways to manage electric asset data records. With the focus on electric distribution data systems, the team has been developing an asset data lake that aggregates critical asset data from multiple disparate sources systems from across the company that reside within each business unit and consolidate into per asset class views in a centralized repository for poles, overhead conductors, underground cables, and underground tee connectors. The development of these tools includes data engineering, integration, statistical and advanced analytics models and identification of data gaps. Consolidating asset data into a centralized repository enables

business units to utilize the data in a uniform and consistent manner and provides the ability to run advanced analytics on top of the data.

2. Data Analytics

Predictive machine learning models have been built on top of the centralized repository using geographic, nameplate, inspection, maintenance, and failure data to understand asset health and risk at an individual asset level. Ultimately, the asset health and risk scores are used to prioritize maintenance and replacement activities and stay informed on situations that might lead to potential outages or failures. Collection of this asset data also allows for long term planning on asset health to support capital investment prioritizations and risk reduction strategies. SDG&E has started to use the asset health scores to scope hardening work in the High Fire Threat District and to drive proactive maintenance and replacement of the distribution system. Understanding risks at a system level through asset health and risk indices will be adopted by a wide range of engineering and operations business units to generate projects and programs and to serve operational needs. Work in 2021 and beyond will be focused on integrating the available data into the business units' processes, policies, and procedures.

V. 2022-2024 PROJECTS AND PROGRAMS

A. Asset Integrity Management Program

The Asset Integrity Management Program will expand Operation Model activities to encompass the Distribution, Gas, IT and Fleet assets, creating cross-functional alignments between the respective accountable business units such as ERM, Asset Management, Engineering and Operations and Capital Portfolio Management as they relate to the Wildfire Mitigation Plan and/or other regulatory filings. The Asset Management Plans will expand to include Gas, IT, and Fleet asset management capturing the capital and operating expenses required in sustaining asset performance.

To further operationalize the AMS, the AIM program will also focus on developing the other key operating model capabilities, including performance evaluation, internal audit, and continuous improvement of the AMS. The performance evaluation capability will create business processes around identifying objectives and key performance indicators, determining action plans to monitor the effectiveness of the AMS, and documenting performance for management reporting. The management audit capability will establish business processes of verifying the effectiveness of the AMS and reporting on recommended corrective or

improvement actions. The continuous improvement capability will produce business processes on developing the approach and collaboration to address the recommended corrective or improvement actions. The efforts in developing these capabilities further reinforces the alignment with the enterprise SMS framework.

1. Asset Investment Prioritization

Throughout the next couple of years, SDG&E's goal is to extend Asset Investment Prioritization development and the software solution implementation across the enterprise, including Gas, IT, and Fleet assets, starting with a gap assessment of existing plans and processes.

2. Asset Data Systems & Records Management

Asset Data Systems & Records Management ongoing activities will continue for 2022-2024 with currently engaged business units and expansion into other areas of the business. The key objectives are to continue alignment and integration of asset information across various functional areas to enable data-driven, risk-informed initiatives, supporting capital investment priorities and advance asset data intelligence, integration and analytics.

3. Enterprise Asset Management Data Integration

SDG&E will spend the next few years continuing to build upon the data lake that was initiated in 2019, by integrating more asset types from various business units. The initiative includes identifying critical asset data from multiple disparate source systems and integrating the information into a single platform. The objective is to continue expanding the initiative across the company to provide a tool for decision support of capital and Operations & Maintenance (O&M) and replacement strategies, including health scores, criticality, probability of failure, risk, and visualization.

4. Data Governance and Records Management

SDG&E will build upon current asset data activities by forming a governing structure to oversee, monitor, and control the management of asset information. This includes the efforts to create asset information traceability and establish records management processes to identify data gaps, validate data quality, and perform data remediation.

Asset data governance will also include the development of asset data maturity metrics. Asset data maturity metrics will support the monitoring, controlling, and reporting of data sets and will measure how data quality progresses to an advanced state, for reporting purposes. Data

maturity metrics will be developed for each asset type and will be based on unique sets of data quality priorities established by subject matter experts.

By implementing an asset data governance structure, SDG&E will mitigate the safety and reliability risks associated with incorrect or incomplete asset records by dedicating proper resources to oversee information management of asset data.

5. Data Analytics

Predictive machine learning models and asset health and risk scores will continue to be developed for additional electric system assets and will be used to prioritize maintenance and replacement activities and to stay informed on situations that might lead to potential outages or failures. Near-term efforts will continue focus on Electric System Hardening in the High Fire Threat District and Electric Distribution Engineering. Additional business units will be added incrementally.

VI. COSTS

The table below contains the 2020 recorded and forecast dollars for the programs and projects discussed in this CFF. The dollars included in the table below duplicate dollars that are also reflected in the Wildfires Involving SDG&E Equipment (SDG&E-Risk-1) and Foundational Technology Systems (SDG&E-CFF-4) Chapters.

Costs (Direct After Allocations, in 2020 $000)[1]

Line No.	Description	Recorded		Forecast			
		2020 Capital	2020 O&M	2022-2024 Capital (Low)	2022-2024 Capital (High)	TY 2024 O&M (Low)	TY 2024 O&M (High)
1	Asset Integrity Management (AIM)	4,000	473	25,000	35,000	1,200	1,500
2a	Asset Data System & Records Management (Gov, Quality, Rec Mgt)	72	79	2,700	3,300	400	700
2b	Asset Data Syst & Rec Mgmt (Data Integration)	11,923	150	19,800	24,200	350	500
3	AIMDAT (Data Analytics)	373	200	1,900	2,400	450	600

[1] Costs presented in the workpapers may differ from this table due to rounding. The figures provided are direct charges and do not include company loaders, with the exception of vacation and sick. The costs are in 2020 dollars and have not been escalated in forecasts beyond 2020.