Company: San Diego Gas & Electric Company (U 902 M)
Proceeding: 2024 General Rate Case
Application: A.22-05-_____
Exhibit: SDG&E-06

PREPARED DIRECT TESTIMONY OF

RICK CHIAPA AND STEVE HRUBY

(GAS TRANSMISSION OPERATIONS & CONSTRUCTION)

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

May 2022

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APPENDICES

SUMMARY

GAS TRANSMISSION OPERATIONS & CONSTRUCTION In 2021$ (000s)			
O&M	**2021 Adjusted-Recorded**	**Estimated TY 2024**	**Change**
Non-Shared	5,163	5,103	(60)
Shared	0	0	0
Total O&M	**5,163**	**5,103**	**(60)**

GAS TRANSMISSION OPERATIONS & CONSTRUCTION In 2021$ (000s)			
Capital	**Estimated 2022**	**Estimated 2023**	**Estimated TY 2024**
NON-COLLECTIBLE (NC)	**11,532**	**11,619**	**11,706**
COLLECTIBLE (CO)	**17,294**	**0**	**0**
Total CAPITAL	**28,826**	**11,619**	**11,706**

Summary of Requests

In total, San Diego Gas & Electric Company (SDG&E or Company) requests the Commission adopt Test Year (TY) 2024 Gas Transmission capital expenditures of $28,826,000, $11,619,000, and $11,706,000 for 2022, 2023, and 2024, respectively, and expenditures of $5,103,000 in TY 2024 for Operations and Maintenance (O&M). These expenditures will promote the safe and reliable delivery of natural gas through the transmission system, while complying with state and local regulations. SDG&E's O&M and capital requests are reasonable and fully justified in that the activities:

- Are consistent with applicable laws, codes, and standards established by local, state, and federal authorities;
- Maintain the safety and reliability of the gas transmission system;
- Address operations, maintenance, and construction needs;
- Support Southern California Gas Company's (SoCalGas) commitment to mitigate risks associated with hazards to public and employee safety, infrastructure integrity, system reliability and sustainability;
- Maintain and strengthen a qualified workforce; and

- Align with California's climate goals to maintain a resilient gas grid through the energy transition to support a carbon neutral economy and a transition to a net zero energy future.

Gas Transmission is responsible for many key activities and programs that support the SDG&E transmission pipeline operations. These activities are described in this testimony under the following categories:

i. Pipeline Replacements / Installations;
ii. Compressor Stations;
iii. Cathodic Protection;
iv. Measurement and Regulation Stations;
v. Security and Auxiliary Equipment;
vi. Capital Tools; and
vii. Moreno Compressor Modernization Project.

In preparing the TY 2024 forecast for this testimony, SDG&E reviewed historical spending levels, discrete project estimates and developed an assessment of future requirements. Due to the varying life cycle stages of the activities that are being sponsored, the forecast relies upon a mix of five-year average, zero based, and base year (BY) recorded.

PREPARED DIRECT TESTIMONY OF
RICK CHIAPA AND STEVE HRUBY
(GAS TRANSMISSIONS OPERATIONS AND CONSTRUCTION)

I. INTRODUCTION

A. Summary of Gas Transmission Costs and Activities

Our testimony supports the TY 2024 forecasts for O&M costs for non-shared, and capital costs for the forecast years 2022, 2023, and 2024, associated with the Gas Transmission area for SDG&E. The sponsored costs associated with the Gas Transmission Operations and Construction areas of SDG&E are summarized in Table RC-SH-1.

Our testimony also supports the capital investments which are described in greater detail herein. These investments support the safety, reliability, sustainability, and operational effectiveness of the natural gas transmission system while maintaining compliance with applicable regulatory and environmental regulations. We request that the California Public Utilities Commission (CPUC or Commission) adopt the forecasts of Gas Transmission Operations and Construction O&M expenditures for TY 2024 of $5,103,000, and the capital expenditures for years 2022, 2023, and 2024 of $28,826,000, $11,619,000, and $11,706,000, respectively.

TABLE RC-SH-1
San Diego Gas & Electric Company
Test Year 2024 Summary of Total Costs

GAS TRANSMISSION OPERATIONS & CONSTRUCTION In 2021$ (000s)			
O&M	**2021 Adjusted-Recorded**	**Forecast TY 2024**	**Change**
Non-Shared	5,163	5,103	(60)
Shared	0	0	0
Total O&M	5,163	5,103	(60)

GAS TRANSMISSION OPERATIONS & CONSTRUCTION In 2021$ (000s)			
Capital	**Forecast 2022**	**Forecast 2023**	**Forecast TY 2024**
Total CAPITAL	28,826	11,619	11,706

B. Purpose of the Testimony

The purpose of this testimony is to support the request for Gas Transmission O&M and capital projects that are required for the safe and reliable operation of the SDG&E Gas Transmission system and compliance with environmental regulations. The projects described herein include gas transmission pipeline projects as well as gas compressor projects.

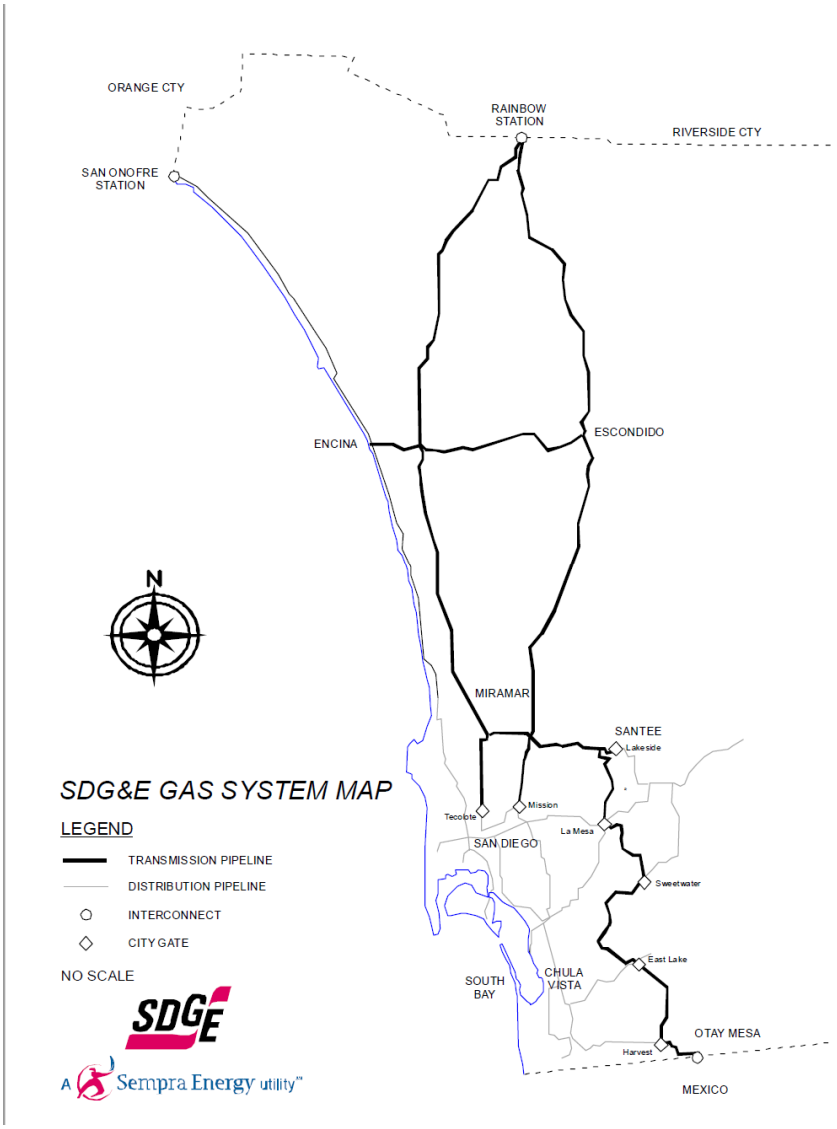
The SDG&E natural gas system is broadly composed of transmission lines, compressor stations, and distribution lines. Our testimony will focus on the natural gas transmission lines and one compressor station facility (Moreno Compressor Station). SDG&E operates approximately 215 miles of natural gas transmission pipelines. SDG&E receives gas from SoCalGas at the San Diego/Riverside County border at Rainbow, California and through various points off a pipeline that runs along the Orange County and San Diego County coastline. SDG&E also receives gas through an interconnection point at Otay Mesa with the Transportadora de Gas Natural pipeline in Mexico.

Gas Transmission and Construction are the two SDG&E organizations responsible for a collection of key base-business projects and activities that support the ongoing safety and reliability of SDG&E's natural gas transmission operations. They share a common goal of achieving operational excellence while providing safe and reliable natural gas service at a reasonable cost.

The SDG&E Gas Transmission organization is responsible for the safe operation of high-pressure gas pipelines and one compressor station with output totaling approximately 16,585 Horsepower (HP). The transmission system is designed to receive natural gas from intrastate and interstate pipelines. The quality of the gas is analyzed and measured, and pipeline-quality gas is delivered to SDG&E's gas distribution system and certain non-core customers.

The SDG&E Construction Organization was initially formed in 2013 as Major Projects and Construction to closely organize and oversee dedicated fiscal and operational management of large capital investments. In 2018, the Major Projects and Construction organization merged with Pipeline Safety Enhancement Plan (PSEP) to form the Construction Organization. The Construction Organization provides consultation and analysis regarding cost estimates, permit requirements, scheduling, and execution of major gas infrastructure facilities projects necessary for the continued safe and reliable transmission of natural gas throughout the service territory.

FIGURE – RC-SH-1
San Diego Gas & Electric Company
SDG&E Gas Transmission Map



C. Cost Forecast Methodology

The TY 2024 O&M forecast of expense was determined first by reviewing five years (2017 through 2021) of historical recorded costs. The recorded costs were adjusted to remove expenses related to the Catastrophic Event Memorandum Account (CEMA). The results of this process were then used to calculate the forecasting options available.

SDG&E reviewed BY 2021 recorded and adjusted cost information for comparison to the multi-year averaging approaches and considered the reasonableness of the various results to identify the best available and most applicable predictor of future period forecasting. Through this process, we determined that for Gas Transmission O&M expenses there was adequate justification for utilizing the five-year annual averaging methodology results for Pipeline & Instrumentation Operations and base year recorded for Compressor Station Operations and Technical Services.

Gas Transmission Capital cost forecasts followed a process similar to the O&M forecast by reviewing historical costs, adjusting any large onetime projects, comparing three- and five-year averages to base year 2021 expenditures and reviewing new and emerging gas transmission facilities to be built in the test year period including Optical Monitoring Stations and Methane Monitoring Stations. SDG&E determined that using both a five-year annual averaging methodology and base year recorded for most cost categories was appropriate; however, the Moreno Compressor Modernization project uses a zero-based methodology because it has discrete project estimates prepared for it.

D. Support To and From Other Witnesses

Our testimony also references the testimony and workpapers of several other witnesses, either in support of their testimony or as referential support for our testimony. Those witnesses are:

A. Sustainability Policy testimony of Estela de Llanos (Exhibit SDG&E-02)

B. Risk Management Policy testimony of Michael Schneider (Exhibit SDG&E-03, Chapter 1)

C. RAMP to GRC Integration testimony of Gregory Flores and R. Scott Pearson (Exhibits SCG-03/SDG&E-03, Chapter 2)

D. SDG&E Gas Distribution testimony of L. Patrick Kinsella (Exhibit SDG&E-04)

E. Clean Energy Innovations testimony of Fernando Valero (Exhibit SDG&E-15)

F. Environmental Services and San Onofre Nuclear Generating Station (SONGS) testimony of Brittany Syz (Exhibit SDG&E-24)

G. Safety, Risk and Asset Management Systems testimony of Kenneth J. Deremer (Exhibit SDG&E-31)

H. Cost Escalation testimony of Scott Wilder (Exhibit SDG&E-41)

I. Post-Test Year Ratemaking testimony of Melanie Hancock (Exhibit SDG&E-45)

E. Organization of Testimony

Our testimony sponsors the TY 2024 General Rate Case SDG&E Gas Transmission Operations & Construction O&M and Capital forecasts for years 2022, 2023, and 2024. Also described in this testimony are the ongoing efforts regarding the Moreno Compressor Modernization project and an estimated forecast of project costs while recognizing that the project will be executed and in-service during the post-test year 2026. Additional details for this project are provided in Appendix B – Moreno Compressor Modernization Supplemental Project Description (Ex. SDG&E-06), to this testimony. In addition to this testimony, please refer to the capital workpapers (CWP) of Rick Chiapa, and Steve Hruby (Ex. SDG&E-06-CWP) for additional information on the projects and activities described herein.

This testimony is organized as follows:

1. Introduction
2. Risk Assessment Mitigation Phase Integration
3. Sustainability, Climate Policy, and Safety Culture
4. Gas Transmission Non-Shared O&M Costs
5. Capital Requests for the Following Activities:
    a. Pipeline Replacements/ Installations
    b. Compressor Stations
    c. Cathodic Protection
    d. Measurement and Regulation Stations
    e. Security and Auxiliary Equipment
    f. Capital Tools
    g. Moreno Compressor Modernization Project
6. Conclusion

II. RISK ASSESSMENT MITIGATION PHASE INTEGRATION

Certain costs supported in this testimony are driven by activities described in SoCalGas and SDG&E's May 17, 2021, Risk Assessment Mitigation Phase (RAMP) Report (2021 RAMP Report).[1] Part of the forecast sponsored in this joint testimony is linked to mitigating a safety risk that has been identified in SDG&E's 2021 RAMP Report. Tables RC-SH-2 and RC-SH-3 provide a summary of the O&M and capital RAMP-related costs supported in the testimony:

TABLE RC-SH-2
Summary of RAMP O&M Costs

RAMP Report Chapter	BY 2021 Embedded Costs	TY 2024 Total	TY 2024 Estimate Incremental
RAMP Risks			
SDG&E-3 Incident Related to the High-Pressure System	4,434	4,373	(61)
Sub-Total RAMP Risk Costs	**4,434**	**4,373**	**(61)**

TABLE RC-SH-3
Summary of RAMP Capital Costs

GAS TRANSMISSION OPERATIONS & CONSTRUCTION In 2021$ (000s)				
	2022 Estimated RAMP Total	2023 Estimated RAMP Total	2024 Estimated RAMP Total	2022-2024 Estimated RAMP Total
RAMP Risk Chapter:				
SDG&E-Risk-3 Incident Related to the High-Pressure System (Excluding Dig-in)	28,678	11,384	11,384	51,446
Sub-total	28,678	11,384	11,384	51,446
Total RAMP Capital Costs	**28,678**	**11,384**	**11,384**	**51,446**

[1] *See* Application (A.) 21-05-011/-014 (cons.) (RAMP Proceeding); *see also* Ex. SCG-03/SDG&E-03, Chapter 2 for more details regarding the utilities' RAMP Report.

A. Risk Overview

As summarized in Tables RC-SH-2 and RC-SH-3 above, this testimony includes costs to mitigate the safety-related risks included in the 2021 RAMP report. These risks and factors are further described in Table RC-SH-4 below:

TABLE RC-SH-4
San Diego Gas & Electric Company
RAMP Risk Chapter Description

SDG&E-Risk-3 Incident Related to the High-Pressure System	This addresses the risk of damage caused by a high-pressure system (maximum allowable operating pressure (MAOP) greater than 60 psi) failure event, which results in consequences such as injuries, fatalities, or outages.

In developing our request, priority was given to these key safety risks to assess which risk mitigation activities Gas Transmission Operations and Construction currently performs and what incremental efforts are needed to further mitigate these risks. While developing the General Rate Case (GRC) forecasts, SDG&E evaluated the scope, schedule, resource requirement, and synergies of RAMP-related projects and programs to determine costs already covered in the base year and those that are incremental increases expected in the test year.

Messrs. Flores and Pearson (Exhibits SCG-03/SDG&E-03, Chapter 2) discuss all of the risks and cross-functional factors (CFFs) included in the 2021 RAMP Reports and the RAMP to GRC integration process.

B. GRC Risk Activities

Table RC-SH-5 below provides a narrative summary of the forecasted RAMP-related activities that are sponsored in this testimony.

TABLE RC-SH-5
Summary of RAMP Risk Activities

RAMP ID	Activity	Description
SDG&E-Risk-3 - C11	Measurement & Regulation Station – Maintenance	Measurement & regulation station activities consist of valve inspections, vault inspections, producer station inspection, pressure limiting station inspections, relief valve and actuator/controller inspections, and regulator inspections on transmission pipelines.
SDG&E-Risk-3 - C12	Odorization	Odorization activities consist of the delivery and safe storage of odorant at SDG&E receipt points and the monthly odor intensity testing on transmission pipelines.
SDG&E-Risk-3 - C14	Engineering, Oversight, and Compliance Review	Engineering, oversight, and compliance review activities consist of utility plan checks and review of all completed compliance orders on transmission pipeline systems.
SDG&E-Risk-3 - C02	Cathodic Protection - Maintenance	Cathodic protection maintenance activities consist of annual electrical test station (ETS)reads, bi-monthly current source inspections, and annual rectifier maintenance on transmission pipelines.
SDG&E-Risk-3 - C06	Pipeline Maintenance	Pipeline maintenance activities consist of class location surveys, valve inspections, vault inspections, and bridge and span inspections on transmission pipelines.
SDG&E-Risk-3 - C09	Compressor Station Maintenance	Compressor station maintenance activities consist of compressor unit inspections, primary and backup power generator inspections, fire water system and emergency system inspections, programable logic controllers (PLC) and instrumentation inspections, valve inspections, vessel inspections, tank inspections, scrubber inspections, relief valve inspections, actuator/controller and regulator inspections, and leak surveys on Compressor Stations equipment and pipeline systems.
SDG&E-Risk-3 - C10	Measurement & Regulation – Capital	Measurement & regulation activities consist of the planning, installation, construction and closeout of redesigns/upgrades for producer vessels, meters, stations, Company-owned facilities at customer meter set assemblies, and control valve stations on transmission pipeline systems.
SDG&E-Risk-3 - C03	Leak Repair	Leak repair activities consist of the planning, installation, construction, and closeout of projects initiated due to leaks on transmission pipelines or appurtenances.

RAMP ID	Activity	Description
SDG&E-Risk-3 - C04	Pipeline Relocation and Replacement	Pipeline relocation and replacement activities consist of planning, installation, construction and closeout of pipeline reroutes triggered by either weather-related external forces, municipality requests, right-of-way agreements, or class location changes.
SDG&E-Risk-3 - C05	Shallow/Exposed Pipe Remediation	Shallow or exposed pipe activities consist of the planning, installation, construction, and closeout of projects to add additional cover or protection to Transmission pipelines.
SDG&E-Risk-3 - C08	Compressor Stations - Capital	Compressor station activities consist of the planning, installation, construction and closeout of compressor upgrades, pipe replacements, valve replacements, equipment upgrades including water, oil, and air systems at the compressor station.
SDG&E-Risk-3 - C01	Cathodic Protection - Capital	Cathodic protection activities consist of the planning, installation, construction and closeout of rectifiers/deep well anode beds, remote power, and pipeline coating replacements on transmission pipelines.
SDG&E-Risk-3 - C13	Security and Auxiliary Equipment	Security and auxiliary equipment activities consist of the planning, installation, construction and closeout of security cameras, lighting, gates, locks and equipment upgrades such as pipe supports, analyzers, and Supervisory Control and Data Acquisitions (SCADAs) on transmission pipeline facilities.

The RAMP risk mitigation efforts are associated with specific actions, such as programs, projects, processes, and utilization of technology. For each of these mitigation efforts, an evaluation was made to determine the portion, if any, that was already performed as part of historical activities (*i.e.*, embedded base costs) and the portion, if any, that was incremental to base year activities. These RAMP activities are discussed further below, as well as in our workpapers. For additional information, please refer to Appendix C, SDG&E RAMP Roadmap Appendix Table - Activity Forecast by Workpaper, which contains a table identifying by workpaper the TY 2024 forecast dollars associated with O&M activities and for 2022, 2023 and 2024 Capital activities from the 2021 RAMP Report that are discussed in this testimony.

C. Changes from RAMP Report

As discussed in more detail in the RAMP to GRC Integration testimony of Messrs. Flores and Pearson (Ex. SCG-03/SDG&E-03, Chapter 2), in the RAMP Proceeding, the Commission's Safety Policy Division (SPD) and intervenors provided feedback on the Companies' 2021

RAMP Reports. Appendix B in Ex. SCG-03/SDG&E-03, Chapter 2 provides a complete list of the feedback and recommendations received and the Companies' responses.

Significant changes presented in this testimony compared to SDG&E's 2021 RAMP Report are listed below:

A. The percentage split of the high consequence area (HCA) and Non-HCA tranches was incorrect in the RAMP filing. The percentage split has been updated in this testimony.

B. The mitigation of Compressor Stations – Capital (SDG&E-Risk-3-C08) was updated in the GRC to reflect a prioritization of forecasts. Accordingly, the GRC forecasted costs have decreased compared to the 2021 RAMP Report. This minor change will not have an impact on the reliability or safety of the transmission system.

III. SUSTAINABILITY AND SAFETY CULTURE

Sustainability, safety and reliability are the cornerstones of SDG&E's core business operations and are central to SDG&E's GRC presentation. SDG&E is committed to not only deliver clean, safe, and reliable electric and natural gas service, but to do so in a manner that supports California's climate policy, adaptation, and mitigation efforts. In support of the legal and regulatory framework set by the state, SDG&E has set a goal to reach Net Zero greenhouse gas (GHG) emissions by 2045, adopted a Sustainability Strategy to facilitate the integration of GHG emission reduction strategies into SDG&E's day-to-day operations and long-term planning, and published an economy-wide GHG Study that recommends a diverse approach for California leveraging clean electricity, clean fuels, and carbon removal to achieve the 2045 goals through the lens of reliability, affordability, and equity. The Sustainability Strategy serves as SDG&E's guide to enable a more just and equitable energy future in SDG&E's service territory and beyond. As a "living" strategy, SDG&E will continue to update the goals and objectives as technologies, policies, and stakeholder preferences change. See the Sustainability Policy testimony of Estela de Llanos (Exhibit SDG&E-02). See the Sustainability Policy Testimony of Estela de Llanos (Exhibit SDG&E-02).

In this GRC, SDG&E focuses on three major categories that underpin the Sustainability Strategy: mitigating climate change, adapting to climate change, and transforming the grid to be the reliable and resilient catalyst for clean energy. SDG&E's goal is to contribute to the decarbonization of the economy by diversifying energy resources, collaborating with regional partners, and providing customer choice that enables affordability, flexibility, and resilience.

Many of the activities described in further detail in this testimony advance the state's climate goals and align with SDG&E's Sustainability Strategy. Specifically, the proposed Moreno Compressor Modernization (MCM) Project will drive progress climate mitigation. The MCM project, described in Section V of this testimony, is a compliance-driven project to meet South Coast Air Quality Management District's (South Coast AQMD) Regional Clean Air Incentives Market (RECLAIM) sunset requirements set forth in Rule 1100 "Implementation Schedule for NOx Facilities,"[2] Rule 1110.2 "Emissions from Gaseous and Liquid-Fueled Engines,"[3] and Rule 1134 "Emissions of Oxides of Nitrogen from Stationary Gas Turbines"[4] to reduce permitted levels of Nitrogen Oxides (NOx) emissions. For details on the MCM project emission reductions, refer to Appendix B – Moreno Compressor Modernization Supplemental Project Description (Ex.SDG&E-06). Further GHG emission reductions may be enabled with installation and operation of the two new electric driven compressors when powered with renewable electricity.

- Using renewable electricity and photovoltaic (PV) cell produced electricity as the power source for MCM project Advanced Renewable Energy (ARE) component to produce green hydrogen.
- Using green hydrogen produced from MCM project ARE component to power Moreno Compressor Station auxiliary power loads, reducing reliance on conventional electric power supply.

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[2] *See* South Coast AQMD Rule 1100 "Implementation Schedule for NOx Facilities" (adopted December 7, 2018, last amended January 10, 2020). The purpose of this rule is to establish the implementation schedule for RECLAIM and former RECLAIM facilities that are transitioning to a command-and-control regulatory structure.

[3] *See* South Coast AQMD Rule 1110.2 "Emissions from Gaseous- and Liquid-Fueled Engines" (adopted August 3, 1990, last amended November 1, 2019).

[4] *See* South Coast AQMD Rule 1134 "Emissions of Oxides of Nitrogen from Stationary Gas Turbines" (adopted August 4, 1989, last amended February 4, 2022).

For details on MCM project ARE component GHG emission reductions, refer to Appendix B – Moreno Compressor Modernization Supplemental Project Description (Ex. SDG&E-06).

Safety is a core value and SDG&E is committed to providing safe and reliable service to all its stakeholders. This safety-first culture is embedded in every aspect of the Company's work. In 2020, SDG&E commenced development and deployment of a Safety Management System (SMS), which better aligns and integrates safety, risk, asset, and emergency management across the entire organization. The SMS takes a holistic and pro-active approach to safety and expands beyond "traditional" occupational safety principles to include asset safety, system safety, cyber safety, and psychological safety for improved safety performance and culture. SDG&E's SMS is a systematic, enterprise-wide framework that utilizes data to collectively manage and reduce risk and promote continuous learning and improvement in safety performance through deliberate, routine, and intentional processes.

SDG&E remains focused on identifying and implementing the most cost-effective solutions with the potential to make the greatest impact on reducing GHG emissions, while maintaining a safe and reliable energy system. SDG&E believes that safety, reliability, and sustainability are inextricably linked and fundamental to the Company's ability to continue to successfully operate.[5]

IV. GAS TRANSMISSION OPERATIONS & CONSTRUCTION NON-SHARED OPERATION AND MAINTANENCE COSTS

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

[5] *See* Ex. SDG&E-02 for additional detail on SDG&E's Sustainability Strategy and Ex. SDG&E-31 for additional detail on SDG&E's Safety Policy.

TABLE RC-SH-6
San Diego Gas & Electric Company
Non-Shared O&M Summary of Costs

GAS TRANSMISSION OPERATIONS & CONSTRUCTION In 2021 $ (000s)			
	BY 2021 Adjusted Recorded	**TY 2024 Estimate**	**Change**
• Pipeline & Instrumentation Operations	1,922	1,862	(60)
• Compressor Station Operations	3,196	3,196	0
• Technical Services	45	45	0
Total Non-Shared Services	**5,163**	**5,103**	**(60)**

A. Pipeline and Instrumentation Operations

TABLE RC-SH-7
San Diego Gas & Electric Company
of O&M Costs

GAS TRANSMISSION OPERATIONS & CONSTRUCTION Pipeline & Instrumentation Operations In 2021 $ (000s)			
PIPELINE & INSTRUMENTATION OPERATIONS	**2021 Adjusted-Recorded**	**TY2024 Estimated**	**Change**
Labor	1,284	1,323	39
Non-Labor	638	539	(99)
NSE Total	0	0	0
Total Non-Shared Services	**1,922**	**1,862**	**(60)**
FTE	**12.2**	**12.6**	**.4**

1. Description of Costs and Underlying Activities

The Gas Transmission Pipeline & Instrumentation Operations includes operation and maintenance of equipment at pipeline receipt points, valve control stations, major customer delivery custody-transfer points, and all associated monitoring, metering, and control facilities, odorization equipment, and real-time operating data telemetry communications between gas facilities and SoCalGas's Gas Control department. Pipeline & Instrumentation Operations also: performs valve inspections, class location surveys, vault inspections, and span inspections of transmission pipeline facilities; maintains SDG&E's rights-of-way; operates and maintains the

cathodic protection systems; conducts surveillance of third-party construction activities around the vicinity of buried pipeline facilities; and performs locate-and-mark services to identify the location of buried facilities. Leak surveys and pipeline patrols are performed by Gas Distribution and are discussed in the SDG&E Gas Distribution testimony of L. Patrick Kinsella (Ex. SDG&E-04).

Monthly odor intensity testing on transmission pipelines is required to maintain odorization of gas to uphold public safety, maintain system reliability, and meet regulatory requirements. Activities related to odorization include testing gas to verify a recognizable amount of gas odor is detectable, identification of any potentially harmful components, and calibrating the appropriate equipment at specified intervals.

The purpose of the Locate and Mark activities is to prevent damage to gas infrastructure caused by third-party excavators. The three primary locate-and-mark activities are locating and marking underground gas facilities before excavation occurs, observing (standby) pipeline excavation activities, and providing staff support for compliance and improvement. Work related to this RAMP mitigation is also addressed in other GRC chapters.

The Pipeline & Instrumentation Operations work category also includes cathodic protection (CP) maintenance. CP maintenance consists of annual electrical test station (ETS) reads, bi-monthly current source inspections, and annual rectifier maintenance on transmission pipelines. The above-mentioned activities involve the following: read/record voltage and verify compliance, inspect ETS for signs of damage, verify ID tags and test leads for correct information and good condition, verify rectifier proper operation, read/record voltage and amperage across rectifier, clean and tighten all current carrying connections on rectifier, clean all ventilating screens on rectifier units, calibrate voltage and amperage meters on rectifier, repair any damaged wires, check all fuses/circuit breakers, clean rectifier unit, replace rectifier ID tags, and diagnose and troubleshoot substandard conditions or out of tolerance reads. These activities are necessary to maintain or improve the pipeline's CP system, extend the life of the pipeline, and maintain CP compliance.

Measurement & Regulation Stations work includes valve inspections, vault inspections, producer station inspection, pressure limiting station inspections, relief valve inspections and actuator/controller and regulator inspections on transmission pipelines. The above mentioned activity involves the following: verifying ID tags for correct information and good condition,

partially operating valves, inspecting and servicing actuators, lubricating valves, check for atmospheric corrosion, test for combustible gas, inspect covers, ventilation systems, structural condition of vaults, vault ladders, steps, handrails, test/record set points and/or verify rupture disc rating, check supply regulators for proper operation, check for leakage, blow/inspect supply filters, check hydraulic fluid levels, inspect mummy cage, check controller for proper operation and test/record set points. These activities are necessary to maintain or improve the pipeline system, extend the life of the pipeline, and maintain pipeline compliance.

Applicable regulatory requirements include those pertaining to air quality, asbestos, lead, polychlorinated biphenyls, natural resources, ground water, storm water, process wastewater, hazardous waste, and storage tanks. Gas Transmission Operations continually tracks and analyzes changes in regulatory requirements and adjusts and adds operations to ensure compliance with regulatory, permitting, and reporting requirements.

Additional responsibilities include:

- Developing and implementing gas handling procedures;
- Providing emergency services in response to earthquakes, wildfires, dig-ins, or other events as needed in order to minimize the potential for danger to the public and minimize impact on system reliability;
- Investigating, enforcing, and addressing gas quality standards and issues; and
- Maintaining compliance with applicable environmental and regulatory agency safety requirements. These regulations cover air quality, asbestos, lead, polychlorinated biphenyls, natural resources, ground water, storm water, hazardous waste and materials handling, and above- and below-ground pipeline appendances. As a result, Gas Transmission Operations continuously monitors changes in regulatory requirements and adjusts and adds operations accordingly to uphold compliance and satisfy all legal requirements.

TABLE RC-SH-8
RAMP Activity O&M Forecasts by Workpaper

GAS TRANSMISSION OPERATIONS & CONSTRCUTION In 2021 $ (000s)						
Workpaper	**RAMP ID**	**Description**	**BY2021 Embedded Base Costs**	**TY2024 Estimated Total**	**TY2024 Estimated Incremental**	**GRC RSE***
1GT000.000	SDG&E-Risk-3 - C11 T1 & T2	Measurement & Regulation Station – Maintenance (HCA & Non-HCA)	425	353	(72)	*
1GT000.000	SDG&E-Risk-3 - C12	Odorization	9	9	0	22.400
1GT000.000	SDG&E-Risk-3 - C14	Engineering, Oversight Compliance Review	83	83	0	0[6]
1GT000.000	SDG&E-Risk-3 - C2 T1&T2	Cathodic Protection (HCA & Non-HCA)	90	77	(13)	*
1GT000.000	SDG&E-Risk-3 - C6 T1&T2	Pipeline Maintenance (HCA & Non-HCA)	587	611	24	*
Total			**1,194**	**1,133**	**(61)**	

*Tranche level RSEs and additional details are available in Ex. SDG&E-06-WP.

2. Forecast Method

The TY 2024 forecast was established using the five-year average forecast methodology. In developing the TY 2024 forecast, SDG&E evaluated the historical expenditures from 2017 through 2021 for the Pipeline and Instrumentation Operations category. Through this analysis it was determined that the most accurate estimate of anticipated future needs is provided by the

[6] An RSE was not calculated for activities with a 0 value.

five-year average. The base year recorded methodology would exceed the anticipated needs of this work category during the forecast period.

3. Cost Drivers

The costs represented under the Pipeline and Instrumentation Operations category are necessary to support the maintenance and enhancement of the transmission pipeline system. These funds provide the needed funding for the activities described above. This work is essential for the safe and efficient operation of the transmission pipeline system. The primary cost driver for this work category is the labor of the employees completing the activities mentioned above.

B. Compression Station Operations

TABLE RC-SH-9
San Diego Gas & Electric Company
Summary of O&M Costs

GAS TRANSMISSION OPERATIONS & CONSTRUCTION Compressor Station Operations - Moreno In 2021 $ (000s)			
COMPRESSOR STATION OPERATIONS - MORENO	**2021 Adjusted-Recorded**	**TY2024 Estimated**	**Change)**
Labor	1,822	1,822	0
Non-Labor	1,374	1,374	0
NSE Total	0	0	0
Total	**3,196**	**3,196**	**0**
FTE	**14.5**	**14.5**	**0**

1. Description of Costs and Underlying Activities

The Gas Compression Station Operations is responsible for the safe day-to-day operation and maintenance of SDG&E's Moreno Compressor Station facility and related infrastructure. This responsibility includes operating and maintaining compressor engines and ancillary equipment; all associated monitoring, metering, and control facilities, odorization equipment, filtration vessels, cooling equipment, and real-time operating data telemetry communications between compression facilities and Gas Control. Additional responsibilities include:

a. Developing and implementing gas compression operating and maintenance procedures;

b. Air emission monitoring and testing;

c. Conducting compressor unit and station inspections under planned maintenance schedules as well as after service interruptions caused by events such as earthquakes, wildfires, pipeline shut-ins, etc., to maximize system and equipment availability and reliability and therefore minimize the impact of such events upon the Gas Transmission, Gas Distribution and Customer Services operations;

d. Adjusting operating parameters to maintain Gas Transmission system integrity and address/mitigate gas quality issues;

e. Providing 24-hour staffing and emergency response to address any compression operation issues;

f. Maintaining compliance with applicable regulatory requirements;

g. Securing 24/7 third-party security services; and

h. Support California Air Resources Board Oil and Gas/Leak Detection and Repair inspections with escorting contractor for safe access throughout the facility and making timely repairs.[7]

Applicable regulatory requirements include those pertaining to air quality, asbestos, lead, polychlorinated biphenyls, natural resources, ground water, storm water, process wastewater, hazardous waste, and storage tanks. Gas Transmission continually tracks and analyzes changes in regulatory requirements and adjusts and adds operations to ensure compliance with regulations, permitting and reporting requirements.

[7] *See* Environmental Services testimony of Albert J. Garcia (Exhibit SCG-20).

TABLE RC-SH-10
RAMP Activity O&M Forecasts by Workpaper

GAS TRANSMISSION OPERATIONS & CONSTRUCTION Compressor Station Operations - Moreno In 2021 $ (000s)						
Workpaper	**RAMP ID**	**Description**	**BY2021 Embedded Base Costs**	**TY2024 Estimated Total**	**TY2024 Estimated Incremental**	**GRC RSE**
1GT001.000	SDG&E-Risk-3 - C14	Engineering, Oversight Compliance Review	83	83	0	0[8]
1GT001.000	SDG&E-Risk-3 - C9	Compressor Station	3,113	3,113	0	8
Total			**3,196**	**3,196**	**0**	

2. Forecast Method

The TY 2024 forecast was established using the base year recorded methodology. This methodology was selected because 2021 spending best represents the future anticipated annual O&M costs associated with the completion of compressor projects during the forecast period. The five-year average would exceed the anticipated needs of this work category during the forecast period.

3. Cost Drivers

The costs represented under the Compressor Station category support Gas Transmission's achievement of operational safety, reliability, and regulatory compliance objectives. Maintaining the effective operation of the Moreno Compressor Station facility is a core function of SDG&E's business that is needed to ensure uninterrupted service to SDG&E customers. The primary cost driver for this work category is the labor of the employees executing the activities mentioned above.

[8] An RSE was not calculated for activities with a 0 value.

D. Technical Services

TABLE RC-SH-11
San Diego Gas & Electric Company
Summary of O&M Costs

GAS TRANSMISSION OPERATIONS & CONSTRUCTION Technical Services In 2021 $ (000s)			
Technical Services	**2021 Adjusted-Recorded**	**TY2024 Estimated**	**Change**
Labor	40	40	0
Non-Labor	5	5	0
NSE Total	0	0	0
Total Non-Shared Services	**45**	**45**	**0**
FTE	**.5**	**.5**	**0**

1. Description of Costs and Underlying Activities

The Technical Services function includes the activities related to instrumentation, control, project support, and environmental services in support of the day-to-day operations and maintenance of the gas transmission system. Responsibilities include providing on-site technical expertise to Pipeline and Compression Operations field personnel and troubleshooting technical issues for both capital and O&M projects.

TABLE RC-SH-12
RAMP Activity O&M Forecasts by Workpaper

GAS TRANSMISSION OPERATIONS & CONSTRUCTION Technical Services In 2021 $ (000s)						
Workpaper	**RAMP ID**	**Description**	**BY2021 Embedded Base Costs**	**TY2024 Estimated Total**	**TY2024 Estimated Incremental**	**GRC RSE**
1GT002.000	SDG&E-Risk-3 - C14	Engineering, Oversight Compliance Review	44	44	0	0[9]
Total			**44**	**44**	**0**	

[9] An RSE was not calculated for activities with a 0 value.

2. Forecast Method

The TY 2024 forecast was developed using the base year recorded methodology. Given the activities described previously and a review of historical costs and underlying cost drivers, SDG&E determined this forecast methodology best reflects the anticipated needs of Technical Services during the forecast period. The five-year average would exceed the anticipated needs of this work category during the forecast period.

3. Cost Drivers

SDG&E forecasts a $0 increase in TY 2024 adjusted recorded expenditure from BY 2021. The costs represented in the Technical Services category support the achievement of Gas Transmission's operational safety, reliability, and regulatory compliance objectives. These funds are needed to support pipeline and instrumentation operations and compressor station operations that support the successful operation and maintenance of the gas transmission system.

V. GAS TRANSMISSION CAPITAL

The primary objective of SDG&E's capital investments is to provide safe and reliable delivery of natural gas to customers at a reasonable cost. This commitment requires that SDG&E invest in its infrastructure and support services to mitigate risks associated with the safety of the public and employees, service reliability, and gas system integrity. The main factors that drive the purpose and need for Gas Transmission capital projects relate to the increasing average age of natural gas transportation infrastructure, and the relocation of existing facilities due to the leading cause of pipeline damage: third-party activities. Other factors driving capital projects include the trend towards automation and remote operating capabilities, obsolescence of installed equipment that is no longer supported by the manufacturer, and the increasing scarcity of replacement parts. By using technology and the professional judgment of experienced, skilled, and well-trained employees, SDG&E utilizes capital in a responsible manner, consistent with local, state, and federal codes and regulations, promoting the safety and reliability of the natural gas transmission system.

Each workpaper in SDG&E-06-CWP includes a Summary of Adjustments to Forecast section. This details the portion that is forecasted to be ratepayer funded (Non-Collectible) and the portion anticipated to be collected from third parties (Collectible), if applicable. The Capital

projects for Gas Transmission Operations and Construction sometimes have a portion of the forecast that is Collectible. The Collectible portion is necessary for calculating the proper allocation of overhead amounts to these projects, but the fully loaded Collectible amounts are not included in the requested revenue requirement.

SDG&E is requesting approval of a Litigated Project Cost Memorandum Account (LPCMA) to record the capital-related costs associated with projects that are intended to qualify as a collectible project to be recovered from third-party customers (*e.g.*, Contributions in Aid of Construction from a local government entity) instead of ratepayers, but later are deemed by a court to be non-collectible from third-party customers. Collectible costs are costs that SDG&E expects to collect from third parties (*i.e.*, not to be collected from ratepayers). For example, in some situations, a local governmental entity (*e.g.*, San Diego) may be responsible for certain costs associated with relocating utility infrastructure as part of a development project. In this example, such costs are considered collectible because they are to be collected from the city. Non-collectible costs are costs that are not expected to be collected from a third party and instead are treated as costs to be collected from ratepayers. A situation may arise in the context of utility disputes with public entities over who should pay for the relocation of utility facilities necessitated by municipal or other public entity projects, such as water, sewer, or transit projects. For instance, while the utility may argue in a litigated proceeding that the public entity should bear the relocation costs, courts may rule otherwise.

If a court rules that a utility must bear the costs of the activity – effectively deeming the costs as non-collectible -- SDG&E will record to the LPCMA any historical capital-related costs (*i.e.*, depreciation, return, and taxes) based on the timing of when the project went into service, no earlier than the effective date of SDG&E's TY 2024 GRC Decision. For example, if a court rules a project is non-collectible in late 2024 and it had gone into service in 2023, capital-related costs would be recorded to the LPCMA as of January 1, 2024, or the effective date of the TY 2024 GRC. Memorandum account treatment for these costs is reasonable and just as it will allow SDG&E the opportunity to litigate, where appropriate, whether the third-party customer should bear the costs at issue, while preserving the ability to later seek recovery of the incremental capital-related costs from ratepayers associated with projects that can no longer be collected from a third-party customer, if the litigation proves unsuccessful.

SDG&E would not record revenue requirement prior to any ruling for tracking purposes and would treat as a collectible project consistent with its understanding. If thereafter a project is deemed non-collectible, SDG&E proposes to record any historical revenue requirement associated with the project based on the timing of when the project went into service, no earlier than January 1, 2024. Any costs recorded to the memo account would be subject to a reasonableness review prior to inclusion in rates and rate base. Additionally, costs recorded in the LPCMA may be addressed in a GRC or other applicable proceeding. SDG&E seeks authorization for the LPCMA in this GRC to avoid the prohibition against retro-active ratemaking, and therefore, requests Commission approval of the LPCMA. Refer to Mr. Kupfersmid's Regulatory Accounts testimony for details on the LPCMA (Ex. SDG&E-43).

In preparing the TY 2024 forecast for this testimony, SDG&E reviewed historical spending levels and assessed future requirements. Through this process it was determined that the two most appropriate forecasting methods to utilize for the Capital forecasted expenditures are the five-year average and base year recorded. Although use of the three-year and four-year historical averages would result in a higher forecast, SDG&E chose the more conservative five-year historical average and base year recorded for the Capital work categories since it was determined that they most accurately represented anticipated spending during the forecast period.

With the goal of providing safe and reliable service while mitigating associated risks, SDG&E requests the Commission to adopt its forecast for capital expenditures of $28,826,000, $11,619,000, and $11,706,000 in each of the years 2022, 2023, and 2024, respectively.

Table RC-SH-13 summarizes the total capital forecasts for 2022, 2023, and 2024.

TABLE RC-SH-13
San Diego Gas & Electric Company
Capital Expenditures Summary of Costs

GAS TRANSMISSION OPERATIONS & CONSTRUCTION In 2021 $ (000s)				
Categories of Management	**2021 Adjusted-Recorded**	**Estimated 2022**	**Estimated 2023**	**Estimated 2024**
A. Pipeline Replacements	4,036	19,288	1,994	1,994
B. Compressor Stations	10,308	6,564	6,564	6,564
C. Cathodic Protection	959	959	959	959
D. Measurement & Regulator Stations	1,636	1,637	1,637	1,637
E. Security & Auxiliary Equipment	230	230	317	404
F. Capital Tools	369	148	148	148
G. Moreno Compressor Modernization[10]	N/A	N/A	N/A	N/A
Total	**17,538**	**28,826**	**11,619**	**11,706**

[10] Due to the expected completion date extending beyond 2024, there is no Capital shown for Moreno Compressor Modernization in this table as there is no revenue requirement request for 2022- 2024. Capital-related revenue requirement for the Moreno Compressor Upgrade capital additions are being requested in the Post Test Year testimony of Melanie Hancock (Ex. SDG&E- 45).

A. Pipeline Replacements (Budget Code 4X2)

TABLE RC-SH-14
San Diego Gas & Electric Company
Capital Expenditures Summary of Costs

GAS TRANSMISSION OPERATIONS & CONSTRUCTION Pipeline Replacements In 2021 $ (000s)				
	2021 Adjusted-Recorded	**Estimated 2022**	**Estimated 2023**	**Estimated 2024**
Pipeline Replacements – *Non-Collectible (NC)*	4,036	1,994	1,994	1,994
Pipeline Replacements - *Collectible (CO)*	0	17,294	0	0
Total	**4,036**	**19,288**	**1,994**	**1,994**

1. Description of Costs and Underlying Activities

SDG&E operates transmission pipelines that are up to 36 inches in diameter in a geographical area that extends from the Pacific Coast in the West, to the Orange County line in the North, and the U.S. Mexico border to the South. The condition of the pipelines is routinely assessed through operation and maintenance activities, including valve inspections, span inspections, in-line inspections, and external assessments. When deteriorated conditions are found on a pipeline, an engineering evaluation of the pipeline is performed to determine if repair or replacement is needed to reduce risk. Pipeline conditions that may necessitate repair or replacement include corrosion, damage, and leakage. In addition, external and environmental factors such as changes in class location due to expanding development, insufficient soil cover due to erosion, and other hazards like subsidence and landslides can lead to pipeline replacements.

Occasionally, natural gas transmission pipelines need to be replaced due to the condition of the population density in the vicinity of that pipeline segment. Pipeline Replacements due to changes in class location are included in SDG&E's 2021 RAMP Report, Chapter SDG&E Risk – 3.

Leak repair activities consist of the planning, installation, construction, and closeout of projects initiated due to leaks on transmission pipelines or appurtenances. Classification of leaks is based on relative degree of hazard and must be remediated in accordance with the timelines set

out by General Order 112-F.[11] Leak repair activities are necessary to uphold public safety, maintain system reliability, and meet regulatory requirements

Pipeline relocation and replacement activities consist of planning, installation, construction, and closeout of pipeline reroutes triggered by weather-related external forces, municipality requests, right-of-way agreements, or class location changes. Pipeline replacements due to a change in operating class are time-sensitive and must be remediated within 24 months of the class location change. These relocation and replacement activities are necessary to reduce the potential for pipeline damage, uphold public safety, and maintain pipeline access.

Shallow or exposed pipe activities consist of the planning, installation, construction, and closeout of projects to add additional cover or protection to transmission pipelines. Exposed pipelines are inspected for signs of corrosion, metallurgical flaws, construction flaws, and mechanical damage. Concrete revetment mats (technology designed to help prevent shoreline erosion) and/or additional earth coverage are installed to prevent damage to exposed/shallow pipe caused by corrosion, third party damage, erosion, or other external forces. These activities are necessary to uphold public safety, reduce the potential for pipeline damage, and extend the life of the pipeline.

The forecast provided herein includes $17,294,000 in 2022 for a known collectible pipeline replacement project. The forecast in 2023 and 2024 was developed to be used for several small projects and includes the costs to plan, design, permit, procure material, construct, commission, and mitigate most environmental impacts that may arise.

[11] CPUC, General Order 112-F, State of California Rules Governing Design, Construction, Testing, Operation, and Maintenance of Gas Gathering, Transmission, and Distribution Piping Systems, June 25, 2015, *available at*: https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M163/K327/163327660.PDF.

TABLE RC-SH-15
RAMP Activity Capital Forecasts by Workpaper

GAS TRANSMISSION OPERATIONS & CONSTRUCTION Pipeline Replacements In 2021 $ (000s)						
Workpaper	**RAMP ID**	**Description**	**2022 Estimated RAMP Total**	**2023 Estimated RAMP Total**	**2024 Estimated RAMP Total**	**GRC RSE**
004120.001	SDG&E-Risk-3 - C03 T1&T2	Leak Repair (HCA & Non- HCA)	998	998	998	*
004120.002	SDG&E-Risk-3 - C4 T1&T2	Pipeline Relocation/ Replacement (HCA and Non-HCA)	17,294	0	0	*
004120.003	SDG&E-Risk-3 - C4 T1&T2	Pipeline relocation and replacement (HCA & Non-HCA)	498	498	498	*
004120.004	SDG&E-Risk-3 - C5 T1 & T2	C5 Shallow Exposure (HCA & Non-HCA)	498	498	498	*
Total			**19,288**	**1,994**	**1,994**	

*Tranche level RSEs and additional details are available in Ex. SDG&E-06-WP.

2. Forecast Method

The TY 2024 forecast was established using the five-year average methodology. Year 2022 was adjusted upward to account for a single collectible project. SDG&E expects to see replacement work consistent with the five-year average; thus, this methodology best reflects anticipated needs. The base year recorded methodology would exceed the anticipated needs of this work category during the forecast period.

3. Cost Drivers

The underlying cost drivers for these capital projects relate to pipe size and pressure, the class location of the project, lead time, availability of qualified contractors, and workload. Pipe size and pressure is a function of required volume. Pipe grade and wall thickness is a function of design related to the operating pressure, and class location is a function of the population density where the pipeline is placed in service. Lead time is often a significant cost driver since projects are dependent on notice from customers such as local governments and other agencies. Lastly, supply and demand forces will affect pricing. The pool of qualified contractors in Southern California is limited and these contractors are in high demand since they perform work for customers other than SDG&E. Thus, construction and installation bids vary with contractor workloads and associated projected lead times.

B. Compressor Stations (Budget Code 4X5)

TABLE RC-SH-16
San Diego Gas & Electric Company
Capital Expenditures Summary of Costs

GAS TRANSMISSION OPERATIONS & CONSTRUCTION Compressor Stations In 2021 $ (000s)				
	2021 Adjusted-Recorded	**Estimated 2022(000s)**	**Estimated 2023(000s)**	**Estimated 2024(000s)**
Compressor Stations	10,307	6,564	6,564	6,564
Total	**10,307**	**6,564**	**6,564**	**6,564**

1. Description of Costs and Underlying Activities

The nature of compressor station operation requires consistent maintenance and replacement of key engine components and controls equipment to maintain the reliability and safety of the facility, especially as this equipment continues to age. To manage operating costs, SDG&E relies on automated data gathering systems to monitor performance data such as flows, pressures, and temperatures. The upgrade and replacement of outdated control technology is critical to enable the station to operate at its highest efficiency and facilitate the execution of proper testing and diagnostics when the engine units are down. Existing compressor station equipment has a finite life requiring regular replacement and/or upgrade, as recommended by manufacturers or as required by operating experience, to maintain reliability and transportation

ability for the Southern California market. The capital forecasts identified in Table RC-SH-17 follow the five-year average capital costs for existing compressor assets.

TABLE RC-SH-17
RAMP Activity Capital Forecasts by Workpaper

GAS TRANSMISSION OPERATIONS & CONSTRUCTION Compressor Stations In 2021 $ (000s)						
Workpaper	**RAMP ID**	**Description**	**2022 Estimated RAMP Total**	**2023 Estimated RAMP Total**	**2024 Estimated RAMP Total**	**GRC RSE**
004150.001	SDG&E-Risk-3 - C8	Compressor Stations - Capital	6,564	6,564	6,564	4
Total			**6,564**	**6,564**	**6,564**	

2. Forecast Method

The TY 2024 forecast was determined using the five-year average methodology. It is anticipated that recent modernization work will result in fewer capital improvements needed in the forecast period. SDG&E determined that the base year recorded methodology and the other historical averages would exceed the anticipated funding needs of this cost category during the forecast period.

3. Cost Drivers

The cost drivers for compressor station capital projects relate to the highly specialized nature of high-pressure, high-volume engine-driven compressors, the increasing average age of compressor equipment, and the limited number of qualified contractors that specialize in industrial engines and compressor equipment.

C. Cathodic Protection (Budget Code 4X6)

TABLE RC-SH-18
San Diego Gas & Electric Company
Cathodic Protection Capital Expenditures Summary of Costs

GAS TRANSMISSION OPERATIONS & CONSTRUCTION Cathodic Protection In 2021 $ (000s)				
	2021 Adjusted-Recorded	**Estimated 2022**	**Estimated 2023**	**Estimated 2024**
Cathodic Protection	959	959	959	959
Total	**959**	**959**	**959**	**959**

1. Description of Costs and Underlying Activities

Cathodic protection equipment is used to preserve the integrity of natural gas transmission pipelines, steel mains and services lines, and buried appurtenances by protecting them from external corrosion. Cathodic protection of these facilities is mandated by federal and state pipeline safety regulations and is included in SDG&E's Risk Assessment Mitigation Phase addressing Transmission Cathodic Protection. Typical expenditures consist of the planning, installation, construction, and closeout of rectifiers/deep well anode beds, remote power, and pipeline coating replacements on transmission pipelines. Rectifiers/deep well anode beds are utilized to drive the electrochemical reaction required for cathodic protection via an impressed current system along SDG&E pipelines. The utilization of remote power allows SDG&E the flexibility to install impressed current systems without having to find a power supply and instead focus on the most effective placement for an impressed current system. Pipeline coating replacements allow SDG&E to replace the pipeline's first line of defense against corrosion related defects and lower the amount of CP current needed to protect the newly recoated portion of pipeline. Cathodic protection projects may also include the installation of new remote satellite communication technology. This technology allows for increased efficiency in the operation and monitoring of remote cathodic protection systems. Cathodic protection activities are necessary to maintain or improve the pipelines CP system, extend pipeline useful life, and maintain CP compliance.

TABLE RC-SH-19
RAMP Activity Capital Forecasts by Workpaper

GAS TRANSMISSION OPERATIONS & CONSTRUCTION Cathodic Protection In 2021 $ (000s)						
Workpaper	**RAMP ID**	**Description**	**2022 Estimated RAMP Total**	**2023 Estimated RAMP Total**	**2024 Estimated RAMP Total**	**GRC RSE**
004160.001	SDG&E-Risk-3 - C01 - T1&T2	Cathodic Protection - Capital (HCA & Non-HCA)	959	959	959	*
Total			**959**	**959**	**959**	

*Tranche level RSEs and additional details are available in Ex. SDG&E-06-WP.

2. Forecast Methodology

The TY 2024 forecast was determined using the base year recorded methodology. SDG&E anticipates completing more CP projects during the forecast period than have been historically completed. The historical average forecast methodologies would provide insufficient funding during the forecast period and therefore were not chosen for this cost category.

3. Cost Drivers

The underlying cost drivers for CP activities are driven by pipeline coating conditions, lack of adequate CP current along pipelines, adverse effects from nearby foreign pipelines, replacement of rectifier/deep well systems, High Voltage Alternating Current areas around the pipeline, permitting (*i.e.*, land and right-of way, and environmental), and proactive and preventative measures.

The primary cost driver for this category is related to the remediation activities for any out of tolerance reads. These remediation activities include inspecting, replacing, upgrading, or altering components of the CP system such as deep well anodes, rectifiers, bonds, test points, electric drops, and insulators. Significant work is required to maintain CP system components as they reach the end of their useful life. CP projects require excavation to expose the pipeline, stripping the existing coating, rewrapping, backfill and compaction, as well as repaving of the

impacted area if needed. The location of a project as well as drilling contractor availability are cost drivers. There are limited qualified drilling contractors in Southern California and they also perform work for customers other than SDG&E.

D. Measurement and Regulation Stations (Budget Code 4X8)

TABLE RC-SH-20
San Diego Gas & Electric Company
Capital Expenditures Summary of Costs

GAS TRANSMISSION OPERATIONS & CONSTRUCTION - Measurement & Regulation Stations In 2021 $ (000s)				
	2021 Adjusted-Recorded	**Estimated 2022**	**Estimated 2023**	**Estimated 2024**
Measurement & Regulation Stations	1,636	1,637	1,637	1,637
Total	**1,636**	**1,637**	**1,637**	**1,637**

1. Description of Costs and Underlying Activities

The installation and rebuilding of large meter set assemblies for transmission-served customers and pressure limiting stations that reside on the gas transmission system are included in this category. Meter and regulator stations require replacement for three principal reasons: aging, change in use patterns and/or population encroachment, and enhancement of the transmission system to address gas quality and capacity issues. This includes periodic replacement of local field measurement and control equipment that is linked with Gas Operations SCADA via remote communications. This equipment includes gas meters installed to help manage gas flows and quality on the transmission system that provides operating information to SCADA personnel. Also included in this category are regulating stations used to control and limit gas pressure and the flow of gas within the gas transmission system.

As with all capital projects, while identifying and prioritizing meter and regulator station equipment for replacement, SDG&E considers the associated safety and reliability risks as well as the benefits of replacement. The installation of this equipment is associated with the safe and reliable local operation of SDG&E pipelines in conformance with regulatory requirements for the limiting of pipeline and vessel operating pressures. All pipelines must be operated within their maximum allowable operating pressure, and this equipment, whether for newly installed

pipelines or existing pipelines, maintains the operating integrity of the transmission system. The projects in this activity category include several small, similar projects that are needed to operate SDG&E's natural gas transmission system safely and reliably, but which do not individually meet the capital costs threshold to require individual workpapers.

The Measurement & Regulation RAMP activities consist of the planning, installation, construction, and closeout of redesigns/upgrades for producer vessels, meters, stations, company owned facilities at customer meter set assembly, and control valve stations on transmission pipeline systems. These activities are necessary to maintain or improve system reliability, extend equipment and system life, and uphold public safety. The expected RAMP costs have been split evenly between budget codes 418 and 438.

TABLE RC-SH-21
RAMP Activity Capital Forecasts by Workpaper

GAS TRANSMISSION OPERATIONS & CONSTRUCTION Measurement & Regulation Stations In 2021 $ (000s)						
Workpaper	**RAMP ID**	**Description**	**2022 Estimated RAMP Total**	**2023 Estimated RAMP Total**	**2024 Estimated RAMP Total**	**GRC RSE**
004080.001	SDG&E-Risk-3 - C10 T1&T2 (BC 418)	Measurement & Regulation - Capital (HCA & Non-HCA)	818	818	818	*
004080.002	SDG&E-Risk-3 - C10 T1&T2 (BC 438)	Measurement & Regulation – Capital HCA & Non-HCA)	819	819	819	*
Total			**1,637**	**1,637**	**1,637**	

*Tranche level RSEs and additional details are available in Ex. SDG&E-06-WP.

2. Forecast Method

The TY 2024 forecast was determined using the base year recorded methodology. The anticipated projects in the forecast period are expected to be similar in scale to those completed

in 2021. The historical average forecast methodologies would provide excess funding for the anticipated work during the forecast period.

3. Cost Drivers

Activities within the Measurement & Regulation Stations category are driven by regulatory requirements as well as the need to safeguard the safety and integrity of the pipeline system and mitigate risks associated with customer/public and employee/contractor safety, system reliability, and infrastructure integrity. The equipment replacements are driven by several factors including the condition of the equipment, the need to support system reinforcement, and the need to address infrastructure maintenance.

The underlying cost drivers for this capital work category relate to internal labor, third party services, and materials such as piping, tubing, fittings, solar panels, actuators, and valves.

E. Security & Auxiliary Equipment (Budget Code 4X9)

TABLE RC-SH-22
San Diego Gas & Electric Company
Capital Expenditures Summary of Costs

GAS TRANSMISSION OPERATIONS & CONSTRCUTION Security & Axillary Equipment In 2021 $ (000s)				
	2021 Adjusted-Recorded	**Estimated 2022**	**Estimated 2023**	**Estimated 2024**
Security & Auxiliary Equipment	230	230	317	404
Total	**230**	**230**	**317**	**404**

1. Description of Costs and Underlying Activities

The Auxiliary Equipment & Infrastructure capital request captures the cost of equipment used to support the natural gas transmission system operations that cannot appropriately be assigned to a specific project. This category includes, among other items, RAMP-related costs associated with physical security upgrades to energy infrastructure and equipment to assist SDG&E with real-time monitoring of land movement. Security and auxiliary equipment expenses consist of the planning, installation, construction, and closeout of security cameras, lighting, gates, locks, and equipment upgrades such as pipe supports and analyzers at gas transmission facilities. These activities are necessary to harden the security at pressure limiting

stations, valve stations, and compressor stations to increase personnel safety and reduce the potential of system damage.

Costs associated with Control Center Modernization (CCM) project's deployment of HCA methane sensors have been added to the base year recorded forecast in 2023 and 2024. Ten sensors are forecast to be added in 2023 and 20 more will be added in 2024. These HCA methane sensors will enable 24/7 control room monitoring personnel to accelerate the identification of, response to, and remediation of potential leaks on the transmission system within high-consequence and evacuation-challenged areas. These HCA methane sensors will help increase system reliability, support sustainability efforts, and enhance the overall safety of our system. These costs include the continual evaluation and testing of the latest point sensor technologies to support wide scale deployment throughout the system. The CCM project's deployment of HCA methane sensors will not replace any existing activities intended for pipeline safety. Those activities include but are not limited to leak surveys, aerial monitoring, and vehicle monitoring.

TABLE RC-SH-23
RAMP Activity Capital Forecasts by Workpaper

GAS TRANSMISSION OPERATIONS & COSNTRUCTION RAMP Activity Capital Forecasts by Workpaper In 2021 (000s)						
Workpaper	**RAMP ID**	**Description**	**2022 Estimated RAMP Total**	**2023 Estimated RAMP Total**	**2024 Estimated RAMP Total**	**GRC RSE**
004190.001	SDG&E-Risk-3 - C13	Security and Auxiliary Equipment	230	230	230	0.800
Total			**230**	**230**	**230**	

2. Forecast Method

The TY 2024 forecast was determined using the base year recorded methodology. Added to this base year forecast were the costs for ten methane sensors in 2023 and 20 additional sensors in 2024. The historical average forecast methodologies would exceed the anticipated funding needs of this work category during the forecast period.

3. Cost Drivers

The cost drivers for this capital project relate to equipment type and complexity, operating location, availability of qualified contractors, and workload. Thus, bids vary, depending on contractor workloads and associated lead times. Costs associated with the CCM project's HCA methane sensor deployment detailed above are also significant cost drivers for the Security and Auxiliary Equipment category.

F. Capital Tools (Budget Code 436)

TABLE RC-SH-24
San Diego Gas & Electric Company
Capital Tools Capital Expenditures Summary of Costs

GAS TRANSMISSION OPERATIONS & CONSTRUCTION In 2021 $ (000s)				
CAPITAL TOOLS	**2021 Adjusted-Recorded**	**Estimated 2022**	**Estimated 2023**	**Estimated 2024**
Capital Tools	369	148	148	148
Total	**369**	**148**	**148**	**148**

1. Description of Costs and Underlying Activities

The Capital Tools work category includes capital expenditures associated with the purchase of tools and equipment used by Gas Transmission field personnel for the inspection, maintenance, and repair of gas pipeline systems and appurtenances. Costs in this category are related to the need to replace existing tools that are damaged, broken, outdated technologically, or have outlived their useful lives. In addition, SDG&E invests in new tools that reduce customer disruptions, improve pipeline facility documentation, increase gas system safety, and ensure employee safety.

2. Forecast Method

The TY 2024 forecast was established using the five-year average methodology. Routine tool purchase requirements are identified throughout each year as part of the regular course of maintenance and construction activities and are expected to continue during the forecast period. The base year recorded methodology would exceed the anticipated funding needs of this work category during the forecast period.

3. Cost Drivers

The cost drivers for Capital Tools are related to the specialized nature of the tools utilized in the operation and maintenance of gas facilities. There are very few options for suppliers of high-quality tools and measuring systems, which has a bearing on costs.

G. Moreno Compressor Modernization (MCM) Project

1. Description of Costs and Underlying Activities

The forecasts for the MCM Project Principal component for 2022, 2023, and 2024 are $10.1MM, $73.7MM, and $163.4MM, respectively. The MCM Project is divided into two components: the Principal component and the Advanced Renewable Energy (ARE) component. The Principal component is designated as RAMP. SDG&E plans to install and commission the Principal component of the MCM Project in 2026 and the ARE component in 2028. Due to the expected completion date of the Principal component being forecasted beyond 2024, the associated revenue requirement is captured in the post-test year proposal sponsored in the Post-Test Year Ratemaking testimony of Melanie Hancock (Ex. SDG&E-45). There are no revenue requirements for the ARE component in this General Rate Case.

The Moreno Compressor Station boosts pressure into the SDG&E and SoCalGas natural gas transmission lines serving Riverside and San Diego Counties and is a critical facility to provide safe and reliable natural gas to the customers and residents in this region. The Moreno Compressor Station delivers over 96% of the natural gas that is consumed in the San Diego County, including residences, hospitals, schools, and power plants. In the test year 2019 General Rate Case, the Commission recognized the importance of the MCM Project and the role of compressor stations in maintaining operational reliability and safety of the gas transmission system.[12.]

The MCM Project compressor configuration as presented in SDG&E's 2019 GRC rebuttal testimony[13] has been modified to better align with emissions compliance requirements and the ARE component was added. Notable MCM Project Principal component design

[12] Decision (D.) 19-09-051 at 116-117.

[13] A.17-10-007/008 (cons.), Joint Rebuttal Gas Transmission testimony of Michael A. Bermel and Beth Musich (Exhibit SDG&E-207, Appendix A at MAB/EAM-A-1).

improvements are associated with the number and type of compressors, including electric motor driven compressors. The MCM Project scope with the Principal component and the ARE component is summarized below and additional project detail is provided in Appendix B – Moreno Compressor Modernization Supplemental Project Description (Ex. SDG&E-06).

SDG&E completed the Front-End Engineering Design (FEED) of the MCM Project Principal and ARE components in June 2021. SDG&E plans to execute the MCM Project in a phased manner with focus on the Principal component followed by the ARE component. The Engineering Procurement and Construction (EPC) phase for the Principal component will commence in 2022 and is estimated to be placed into service in 2026. The EPC phase for the ARE component is anticipated to begin in 2024 and estimated to be placed into service in 2028.

The Principal component of the MCM Project includes the installation of new compression equipment at the Moreno Compressor Station to comply with South Coast AQMD's RECLAIM sunset requirements, including South Coast AQMD Rule 1134 "Emissions of Oxides of Nitrogen from Stationary Gas Turbines" (amended in April 5, 2019), Rule 1110.2 "Emissions from Gaseous and Liquid-Fueled Engines" (amended in November 1, 2019) and Rule 1100 "Implementation Schedule for NOx Facilities" (amended in January 10, 2020).

The Principal component of the MCM Project includes the installation of two new gas turbine driven compressors and two new electric driven compressors, the installation of two new natural gas fueled emergency backup electric generators, the construction of two new compressor buildings to house the new compressor assets, and associated compressor appurtenances, instrumentation, and controls. Once completed, the Principal component of the MCM Project will allow SDG&E to maintain compliance with the new emissions rules while improving the operational reliability of the Moreno Compressor Station. Once the new compressor assets and emergency backup generators are commissioned, decommissioning of nine existing compressors and four existing natural gas fueled electric generators will occur.

SDG&E is collaborating with the communities and local municipalities in which the Company's facilities are located, and with regulatory agencies who have oversight of the facility. Regular and routine engagement of community stakeholders through various methods is conducted to share information, as well as to obtain and address feedback about the Company's operations and pending project.

The ARE component of the MCM Project includes the installation of electrolyzers powered by Southern California Edison's (SCE)Green Tariff program to produce green hydrogen. Green hydrogen will be stored onsite and consumed as compressor fuel blended with natural gas with the installation of fuel-blending equipment. A green hydrogen fueling station for Company vehicles will be installed along with a renewable energy microgrid. The renewable energy microgrid is comprised of roof-mounted solar PV cells, a battery energy storage system, and proton exchange membrane (PEM) fuel cells. The PEM fuel cells convert green hydrogen produced at the facility to generate renewable electricity. The renewable energy microgrid will power the Moreno Compressor Station's auxiliary and administrative electrical loads, increasing the station's electric supply resiliency while reducing emissions and peak grid electricity usage.

The ARE component supports Energy Upgrade California®, demonstrates modern technology to help achieve California's climate goals, and is in alignment with SDG&E's Sustainability Strategy.

Additional details regarding the MCM Project are provided in Appendix B – Moreno Compressor Modernization Supplemental Project Description (Ex. SDG&E-06).

TABLE RC-SH-25
RAMP Activity Capital Forecasts by Workpaper
In 2021 Dollars ($000s)

Workpaper	RAMP ID	Description	2022 Estimated RAMP Total (000s)	2023 Estimated RAMP Total (000s)	2024 Estimated RAMP Total (000s)	GRC RSE
Appendix B	**SDG&E-Risk-1** – M5	Moreno Compressor Modernization (Principal Component)	$10,086	$73,667	$163,446	0*

* An RSE will be calculated and submitted at a later date.

The Principal component of the MCM project involves the installation of new compressor assets that are used to boost the pressure of natural gas to maintain flow through gas transmission lines. The installation of these new transmission compressors will benefit the Moreno Compressor Station by incorporating modern safety features and achieving environmental compliance, while maintaining transmission capacities. The new compressors will reduce the likelihood of mechanical failures in parts such as camshafts, heads, pistons,

valves, bearings, and gaskets that could result in the release of natural gas or impede the reliability of natural gas supply to this region.

2. Forecast Method

The forecast method used for this cost category is a zero-based methodology using estimates based on knowledge of experienced personnel, major equipment and material vendor quotes. and previously completed, similarly sized project work.

3. Cost Drivers

The underlying major cost drivers for this capital project relate to schedule, equipment and material pricing, craft availability, wage rates, and productivity.

VI. CONCLUSION

SDG&E's ability to meet its obligation to provide natural gas service in accordance with tariff provisions and customer expectations is highly dependent on the reliable operation of the natural gas transmission pipelines, compressor stations, valves, and related natural gas transmission appurtenances. To continue to provide safe and reliable service, SDG&E must continue to invest in its infrastructure pursuant to applicable regulatory requirements.

SDG&E requests the Commission to adopt its O&M forecast of $5,103,000 for TY 2024 and forecasted capital expenditures for years 2022, 2023, and 2024 of $28,826,000, $11,619,000, and $11,706,000, respectively. This forecast reflects SDG&E's commitment toward sustaining safe and reliable service to its customers while also striving to control project costs without compromising safety or regulatory compliance.

This concludes our prepared direct testimony.

VII. WITNESS QUALIFICATIONS

My name is Rick Chiapa and since 2018 I have been the Field Operations Manager for Gas Transmission. My responsibilities include providing leadership to a team responsible for the safe and reliable delivery of natural gas through the SoCalGas pipeline network in the western transmission territory. I manage the operation, maintenance, installation, and replacement of the facilities, equipment, and pipeline system associated with this segment of the service territory. Since joining SoCalGas in 1998 I have held positions of increasing responsibility within Operations (Gas Transmission & Gas Distribution) and Project Management Departments.

I have a Bachelor of Science degree in Mechanical Engineering from California State University, Northridge, and a Master of Business Administration from Pepperdine University.

This is my first time appearing before the California Public Utilities Commission.

My name is Steve Hruby and I have been a Business Manager in Complex Facilities Project Development, Construction since May 2019. I hold a Bachelor of Science degree in Geology from the University of California, Riverside, and a Master of Business Administration with a concentration in Finance from the University of La Verne.

Before joining SoCalGas I was employed by Arcadis in 2000 and Tetra Tech until 2005. In my time at SoCalGas I have held positions with increasing responsibilities in the Commercial & Industrial Services, Regulatory Affairs, Major Projects, and Construction organizations.

This is my first time appearing before the California Public Utilities Commission.

APPENDICES

Appendix A – Glossary of Terms

Appendix B – Moreno Supplemental Project Description – SDG&E-06

Appendix C – RAMP Activity Forecasts by Workpaper

APPENDIX A
Glossary of Terms

APPENDIX A
Glossary of Terms

ACRONYM	DEFINITION
ARE	Advanced Renewable Energy
AQMD	Air Quality Management District
BY	Base Year
CCM	Control Center Modernization
CEMA	Catastrophic Event Memorandum Account
CO	Collectible
CP	Cathodic Protection
CWP	Capital Workpaper
DIG-IN	Damage Involving Gas Infrastructure
EPC	Engineering, Procurement and Construction
ETS	Electrical Test Station
FEED	Front End Engineering Design
GHG	Gas House Gases
GRC	General Rate Case
HCA	High Consequence Area
HP	Horsepower
MAOP	Maximum Allowable Operating Pressure
MCM	Moreno Compressor Modernization
NC	Non-Collectible
NOx	Nitrogen Oxides
O&M	Operations and Maintenance
PEM	Proton Exchange Membrane
PLC	Programmable Logic Controllers
PSEP	Pipeline Safety Enhancement Plan
psi	Pounds Per Square Inch
PV	Photovoltaic
RAMP	Risk Assessment Mitigation Phase
RECLAIM	Regional Clean Air Incentives Market
RSE	Risk Spend Efficiency
SCADA	Supervisory Control and Data Acquisition
SCG	Southern California Gas Company
SDG&E	San Diego Gas & Electric Company
SMS	Safety Management System
SoCalGas	Southern California Gas Company
South Coast AQMD	South Coast Air Quality Management District
SPD	Safety Policy Division
TY	Test Year

APPENDIX B

Moreno Compressor Modernization Supplement Project Description

APPENDIX B

TABLE OF CONTENTS

I. PURPOSE AND OVERVIEW

The purpose of this Supplemental Project Description is to provide additional details of the scope, cost, schedule, and sustainability of the Moreno Compressor Modernization (MCM) Project.

In the following sections, we provide the background and the summary of the project in section II, project scope in section III, project cost details in section IV and project schedule in section V. In section VI, we describe how the MCM Project aids in achieving SDG&E's sustainability goals. Finally, in section VII, we provide an overview of SDG&E's project management activities to achieve the objective of successful execution of the project on schedule and at reasonable cost, while meeting quality and safety targets and complying with governing environmental and regulatory requirements.

II. BACKGROUND AND SUMMARY

A. Background and Regulatory History

The Moreno Compressor Station is an SDG&E-owned and -operated natural gas transmission compression facility located in Moreno Valley, approximately 35 miles north of the San Diego County line. Natural gas moves south through SoCalGas's service territory into SDG&E territory through three pipelines leaving the station and combines into two pipelines at the Rainbow Station near the San Diego County line.

The station currently comprises three compressor plants that house ten compressor units (further described below) with supporting auxiliary equipment and buildings, with a total of 16,585 Horsepower (HP) (rated) installed, which are used to flow and compress natural gas into San Diego County and portions of Riverside County. The current configuration of the Moreno Compressor Station is as follows:

- Clark Plant: three Clark HSRA-8LEC reciprocating compressors gas lean-burn engines rated at 995 HP each (installed in 1955);
- Solar Plant: four Solar Saturn turbine-driven centrifugal compressors rated at 1100 HP each (installed in the 1970s); and

- Cooper Plant: two Cooper "Quad" reciprocating compressors gas lean-burn engines rated at 3,000 HP each and one Cooper 8V-275 reciprocating compressor gas lean-burn engine rated at 3,200 HP (installed in the 1990s).

The Moreno Compressor Station holds a combined Title V and Regional Clean Air Initiative Market (RECLAIM) air permit issued by the South Coast Air Quality Management District (South Coast AQMD). As South Coast AQMD transitions facilities from the RECLAIM program to command-and-control rules, the existing compressor natural gas lean-burn engines and compressor natural gas turbines are subject to Rule 1110.2 "Emissions from Gaseous and Liquid-Fueled Engines[1]" and Rule 1134 "Emissions of Oxides of Nitrogen from Stationary Gas Turbines,"[2] respectively, as well as companion Rule 1100 "Implementation Schedule for NOx Facilities.[3]" SDG&E submitted the Permit to Construct (PTC) application to South Coast AQMD for the proposed MCM Project for the Moreno Compressor Station (FID #004242) in June 2021, as well as the Retirement Plan for five of the six existing compressor natural gas lean-burn engines that are proposed for retirement. By replacing the five existing compressor natural gas lean-burn engines and four existing compressor natural gas turbines with a hybrid of two new natural gas-driven turbine compressors and two new electric driven compressors, there will be a reduction in permitted air emissions providing an air quality benefit to the community.

The main purposes of the MCM Project are to:

- Modernize the Moreno Compressor Station through the installation of new equipment and innovative technology that will achieve measurable reductions in NOx emissions;
- Comply with South Coast AQMD regulations Rules 1134 (turbines) and 1110.2/1100 (stationary engines);
- Support California in meeting its climate commitment goals; and

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1 *See* South Coast AQMD Rule 1110.2, *supra* note 5, at section (d)(1)(B)(vii), Table II for NOx emission limit for compressor gas lean-burn engines.

2 *See* South Coast AQMD Rule 1134, *supra* note 6, at Section (d)(4), Table II for NOx emission limit for compressor gas turbines. The MCM project will follow the implementation schedule specified in Section (d)(4).

3 *See* South Coast AQMD Rule 1100, *supra* note 4, at Section (d)(4).The MCM project will follow the timeline requirements specified in Section (d)(4) and has submitted a Retirement Plan to South Coast AQMD.

- Enhance reliability by modernizing aging equipment and ancillary systems.

The MCM Project was presented in the test year 2019 General Rate Case and provided a high-level scope, schedule, and anticipated annual spend. Since then, the project scope has matured to comply with South Coast AQMD Rules amended in 2019 and 2020 and through development of the project definition during the engineering design phase. The MCM Project has evolved into two subcomponents: the Principal component and the Advanced Renewable Energy (ARE) component. The Principal component includes the installation of new compressors to comply with South Coast AQMD Rules, and the ARE component, while not required to maintain compliance with South Coast AQMD, will provide additional environmental benefit and align with SDG&E's long term sustainability vision.

Front End Engineering and Design (FEED) has been completed for the Principal and ARE components. SDG&E will prioritize the execution of the Principal component to meet the emissions compliance deadlines required by South Coast AQMD and will resume engineering design of the ARE component in 2024. The Principal component is estimated to be placed into service in 2026, followed by the ARE component in 2028. The maturation in MCM Project scope has resulted in updated schedule and cost forecasts associated with the project, described below.

B. Cost Summary

While there were no explicit cost representations or revenue requirements for the MCM Project in SDG&E's 2019 GRC, it was noted that the MCM Project was ongoing and capital expenditure recovery for this project would be presented in a future General Rate Case. The forecasted capital investment for MCM is summarized below:

Figure MCM-1
Summary of Total Costs by Year

MCM	2022	2023	2024	2025	2026	2027	2028	2029	Total
Principal Component	$10,086	$73,667	$163,446	$140,378	$18,921	$3,237	$353	$0	$428,686
ARE Component	$155	$0	$931	$8,210	$27,110	$14,277	$6,916	$762	$59,721
Total	$10,241	$73,667	$164,377	$148,588	$46,031	$17,514	$7,269	$762	$488,407

The total cost provided includes $19,960,330 in project actuals since 2015. The cost representations provided are based on third-party estimates. Costs are presented in thousands of 2021 dollars. These costs do not include SDG&E Overheads, Property Taxes, Allowance for Funds Used During Construction (AFUDC), and/or future escalation.

III. PROJECT SCOPE

A. Detailed Project Scope

The MCM Project is divided into two subcomponents:

- MCM – Principal Component; and
- MCM – Advanced Renewable Energy (ARE) Component

1. Principal Component

The Principal Component consists of:

- Compressor system upgrade with the installation of two new electric driven compressors (EDCs), two new compressor gas turbines (CGTs), two new natural-gas-fueled emergency generators, one new building for CGTs, one new building for EDCs, and associated compression support and emission control equipment;
- A new Southern California Edison (SCE) electrical interconnection to support the increased electric load;
- Site development;
- Commissioning new equipment and decommissioning of the existing compressor assets and auxiliary supporting equipment; and
- Environmental and Permitting support.

a. Compliance Driven Compressor System

The Principal Component of the MCM Project includes the installation of new compression equipment at the Moreno Compressor Station to comply with South Coast AQMD's RECLAIM sunset requirements, including South Coast AQMD Rule 1134 "Emissions of Oxides of Nitrogen from Stationary Gas Turbines" (amended in April 2019), Rule 1110.2 "Emissions from Gaseous and Liquid-Fueled Engines" (amended in November 2019) and Rule 1100 "Implementation Schedule for NOx Facilities" (amended in January 2020).

b. Compressor System Upgrade

The MCM Project includes replacing the compressors in the Clark Plant (three reciprocating compressors rated at 995 HP each) and two of the three compressors (rated at 3,000 HP each) in the Cooper Plant, and replacing the Solar Plant compressors (four turbine-driven centrifugal compressors rated at 1,100 HP each) with two new natural gas 5,825 HP Solar Centaur Model 50 compressor gas turbines (CGTs) and two new electric driven compressors (rated at 4,000 HP each) for compliance with Rules 1134 and 1110.2/1100. Each of the new CGTs would be equipped with emissions control systems consisting of a selective catalytic reduction (SCR) and oxidation catalyst, as well as with a Continuous Emissions Monitoring System (CEMS). The existing units (other than the Cooper No. 10 unit in the Cooper Plant) would be decommissioned and removed from service, reducing the natural-gas-fueled horsepower of the affected compressors from 13,385 HP to 11,650 HP, and the overall facility-wide natural-gas-fueled horsepower from 16,585 HP to 14,850 HP.

A new hybrid compression plant would be installed and referred to as Plant 4. When complete, the combined capacity of the new Plant 4 and the remaining Cooper No. 10 unit (3,200 HP) would provide the compression necessary for maintaining reliability while complying with air emission rules. Plant 4 would consist of two buildings. The new CGT building would be approximately 11,200 square feet and 56 feet in height and house the two new CGTs. The new EDC building would be approximately 10,000 square feet and approximately 56 feet in height and house the two new EDCs rated at approximately 4,000 HP each.

Two new natural-gas-fueled, 824 HP Waukesha engine-driven emergency generators, each with an emissions control system that includes three-way nonselective catalytic reduction, and an air fuel ratio controller will also be installed as part of the MCM Project.

c. Southern California Edison (SCE) Electrical Interconnection

The MCM Project would require SCE to upgrade its existing 12 kV distribution line to a 33 kV distribution line (SCE distribution line). The upgraded SCE distribution line would provide the required power supply of approximately ten megawatts for Moreno Compressor Station facility enhancements, powering the two new 4,000 HP electric-motor-driven reciprocating compressors, two electrolyzers, and ancillary cooling and compression.

d. Site Development

As part of site development scope, the MCM Project would include the relocation or replacement of one existing warehouse, new storm water retention basin, new fencing along portions of the west and south of the facility, and landscaping in the vicinity of the new compressor buildings.

e. Commissioning New Equipment and Decommissioning Old Equipment

The newly installed compressor equipment will undergo commissioning and site performance testing. This will verify the station meets the expected design criteria, operates as expected, and complies with the emission requirements. The commissioning process will be a rigorous systematic process that tests and documents the condition of each system to verify that it is fit for service. The verification will include approvals of the installation and design, performance testing, and all required functional testing and tuning for safe operation of the system.

After the systems have been commissioned and are acceptable for service, a site performance test will be performed. The test will verify that the system meets the specified operational requirements and performance guarantees. The test will mimic multiple operating points to simulate station operation. The operational requirements and performance guarantees include automation, emissions, injection rate, power output, cooling, and inlet and outlet pressure. The site performance test will be performed in conjunction with the equipment manufacturers, construction contractors, and design-engineering firm that integrated the systems. After the test is successful, the station will be turned over to Operations.

Once the new equipment has been performance-tested and becomes fully operational, the existing compressor assets will be decommissioned and isolated from the plant. The

decommissioned equipment will be removed and some of the existing buildings will be partially demolished or demolished to grade.

2. Advanced Renewable Energy (ARE) Component

The MCM Project includes the integration of green hydrogen into the fuel stream for combustion in the new CGTs, the use of green hydrogen to fuel company fleet vehicles, and the use of green hydrogen to power fuel cells to power the station's administrative and auxiliary loads during peak power demand hours or as a backup during failure of the electric grid. The ARE component consists of:

- Green hydrogen electrolyzers, fuel blending equipment to integrate hydrogen into compressor combustion fuel, green hydrogen storage cylinders, and water treatment skid;
- A green hydrogen fueling station for Company vehicles; and,
- Renewable Energy Microgrid consisting of Polymer Electrolyte Membrane (PEM) fuel cells, an Energy Storage System (ESS), and a roof-mounted solar photovoltaic (PV) array.

a. Green hydrogen electrolyzers, fuel blending equipment, green hydrogen storage cylinders, and water treatment skid

i. Electrolyzer

Electrolysis is the chosen form of technology for this project to produce renewable, zero-emission hydrogen. Electrolyzers take electricity (renewable electric grid energy in this case) and use it to separate water molecules into oxygen and hydrogen (fuel). The MCM Project will use a PEM electrolyzer. In a PEM electrolyzer, the electrolyte is a solid specialty plastic material and uses the following process to produce hydrogen:

- Water reacts at the anode to form oxygen and positively charged hydrogen ions (protons).
- The electrons flow through an external circuit and the hydrogen ions selectively move across the PEM to the cathode.
- At the cathode, hydrogen ions combine with electrons from the external circuit to form hydrogen gas.

As part of MCM Project, up to two electrolyzers will be used to create the hydrogen for facility. These electrolyzers would be located on the southern portion of the Moreno Compressor Station (MCS) site. The electrolyzers are assumed to operate up to 19 hours per day and would produce about 235 kilograms (kg) per day on average (750 kg per day max), using 100% renewable energy from the electric grid. Water will be provided by the Eastern Municipal Water District (EMWD) and is anticipated to require an average of 640 gallons per day, equating to 233,600 gallons per year. The oxygen produced via electrolysis will be released into the atmosphere.

ii. Blending Skid

Hydrogen would pass through piping into the blending skid, which will combine hydrogen produced in the electrolyzers with natural gas to fuel the CGTs. Given expected equipment and pipeline operating conditions, a maximum blend ratio of 90% natural gas and 10% hydrogen could occur. The blending skid will be located at the southern portion of the MCS site near the electrolyzers.

iii. Storage Cylinders

Hydrogen that is not immediately needed to support operations will be stored onsite in pressurized cylinders, to be located at the southern portion of the MCS site.

iv. Water Treatment Skid and Cooling System

Water to be used in the hydrogen process will pass through a water treatment skid that would purify water to a level acceptable for the electrolyzers. The electrolysis process can generate heat, and thus a cooling system is also proposed. Wastewater from the electrolysis process would be discharged into the existing evaporation ponds.

b. Green hydrogen fueling station for company vehicles

A new hydrogen fleet vehicle fueling station will be constructed at the southeastern corner of the MCS site. The hydrogen storage capacity is being designed for 200 kg per day for three days, which equates to fueling approximately 40 light-duty passenger vehicles per day. The proposed hydrogen station will include compressed gaseous hydrogen cylinders for direct dispensing to vehicles. The hydrogen storage cylinders will be constructed from hydrogen-compatible materials. Storage systems will contain redundant safeguards such as pressure and

temperature relief and safe venting. Hydrogen will flow from the lower-pressure storage to the high-pressure compressor(s), which reduces the volume and increases the pressure, preparing the hydrogen for fueling at either 350 bar (5,000 pounds per square inch) or 700 bar (10,000 pounds per square inch). After leaving the compressor and prior to dispensing, hydrogen typically enters a closed-loop cooling system to chill the molecules to a predetermined temperature appropriate to the fueling protocol used. The chiller compensates for the heat of expansion and enables high-pressure, fast fills. Hydrogen dispensers are designed to appear like typical gasoline dispensers.

c. Renewable Energy Microgrid

The MCM Project will include new renewable electrical generation components to provide on-site generation. These features include PEM fuel cells, an Energy Storage System (ESS), and a roof-mounted solar PV array that together will form a microgrid. This would typically operate during the SCE peak demand hours (5:00 p.m. to 9:00 p.m.) each day to reduce grid load and GHG emissions. The solar PV array and grid-supplied renewable electricity will charge the battery storage system that, along with the PEM fuel cell, will supply power to the administrative and auxiliary loads for the station (not the electric motor driven compressors). The microgrid could power the station without any grid-supplied electricity for a brief period until battery power and hydrogen supplies have been exhausted, providing greater station reliability.

i. Fuel Cells

Fuel cells use the chemical energy of hydrogen or another fuel to cleanly and efficiently produce electricity. If hydrogen is the fuel, electricity, water, and heat are the only products of electricity generation.[4] The MCM Project will use stored green hydrogen to pass through fuel cells to generate electricity to power the administration building and MCS auxiliary electric load. The fuel cells will be located at the southern portion of the MCS site.

[4] U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy, *Hydrogen and Fuel Cells Technologies Office: Fuel Cells*, 2020b, *available at*: https://www.energy.gov/eere/fuelcells/fuel-cells.

ii. Energy Storage System (ESS)

The MCM Project's specific ESS is located near the southern portion of the MCS site. An ESS typically includes batteries housed in a container (often repurposed shipping containers) maintained at a constant temperature with a Supervisory Control and Data Acquisition (SCADA) system. Adequate thermal barrier protection between battery cells is also an important design feature to minimize fire risk. The ESS will include a fire suppression system and an emergency response plan to inform first responders of appropriate safety procedures. This component of the microgrid will be charged by the solar PV array or renewable grid power and used to supplement the PEM fuel cell to supply power to the station.

iii. Solar Photovoltaic System

Solar PV systems convert sunlight into electrical energy. When the sun shines onto a solar panel, photons from the sunlight are absorbed by the cells in the panel, which creates an electric field across the layers and causes electricity to flow (USDOE 2020c[5]). The MCM Project would include the placement of solar PV modules on available roof areas on site. Up to 600 kilowatts of total solar PV output would provide power to the MCS.

IV. PROJECT COSTS

Figure MCM-2
Cost Breakdown

Components	Costs ($ in 000s)
Principal	**$428,686**
Design & Engineering	$48,694
Material & Equipment	$107,747
Construction	$210,163
Third-Party Utility Substation	$924
Site Work & Civil	$14,117
Environmental	$888
Company Labor & Project Services	$44,939
Other	$1,212
ARE	**$59,721**

[5] U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy, *Solar Energy Technologies Office: Photovoltaics*, 2020c, *available at*: https://www.energy.gov/eere/solar/photovoltaics.

Components	Costs ($ in 000s)
Design & Engineering	$5,627
Material & Equipment	$7,113
Construction	$34,149
Site Work & Civil	$732
Environmental	$54
Company Labor & Project Services	$11,732
Other	$313
Project Total	**$488,407**

Figure MCM-3
Cost Breakdown Activities

Sub-Component	Activities
Design & Engineering	Pre-FEED, FEED, and detailed design, and engineering
Material & Equipment	Procurement and handling of bulk material and equipment
Construction	Construction labor, activities, and subcontractors
Third-Party Utility Substation	Third-party substation and grid interconnection
Site Work & Civil	Site preparation and civil work such as grading, leveling, earthwork, and subsurface installation
Environmental	Environmental services and activities
Company Labor & Project Services	SDG&E employee labor and third-party services
Other	Other activities not applicable to other components

A. Basis of Cost Breakdown

Project costs are presented in direct 2021 dollars and exclude SDG&E Overheads, Property Taxes, AFUDC, and escalation. The estimates represent a Class 3 with a range of +30/-20. The project estimate includes assumptions made in the estimating process including, but not limited to:

- Costs are based on current construction costs in Riverside, California with full and open competition from local regional contractors.

- The construction schedules assume weekday work, with no night or weekend work planned.
- The contingency was determined utilizing a Monte Carlo Risk Analysis Assessment.

V. SCHEDULE

The MCM Project is currently in the Engineering Procurement Construction (EPC) Contractor Selection phase, which is expected to be completed by Q3 2022. After a contractor has been selected, the project will move into the EPC phase. The MCM Project Permit to Construct (PTC) application package was submitted to the South Coast AQMD in June 2021. The South Coast AQMD is processing the PTC application package and receipt of the PTC is anticipated in June 2023. Construction of the Principal component will follow PTC issuance and is anticipated to begin in March 2024. The Principal component is estimated to be placed in service by June 2026, after commissioning and startup of the plant. SDG&E plans to execute the MCM Project in a phased manner with focus on compliance-driven Principal component followed by the ARE component. The NOP date for the ARE component is anticipated to be in June 2028.

Figure MCM-4
Principal Component Major Milestones

Major Milestones	Date
FEED Phase Completion	Jun-2021
Permit to Construct Submission	Jun-2021
EPC Contract Executed	Sep-2022
Permit to Construct Expected Approval	Jun-2023
Construction Begins	Mar-2024
Principal Component NOP Date	Jun-2026
Decommissioning of Existing Facilities	Apr-2027
Project Close-Out	Jun-2028

Figure MCM-5
Principal Component Schedule by Stages

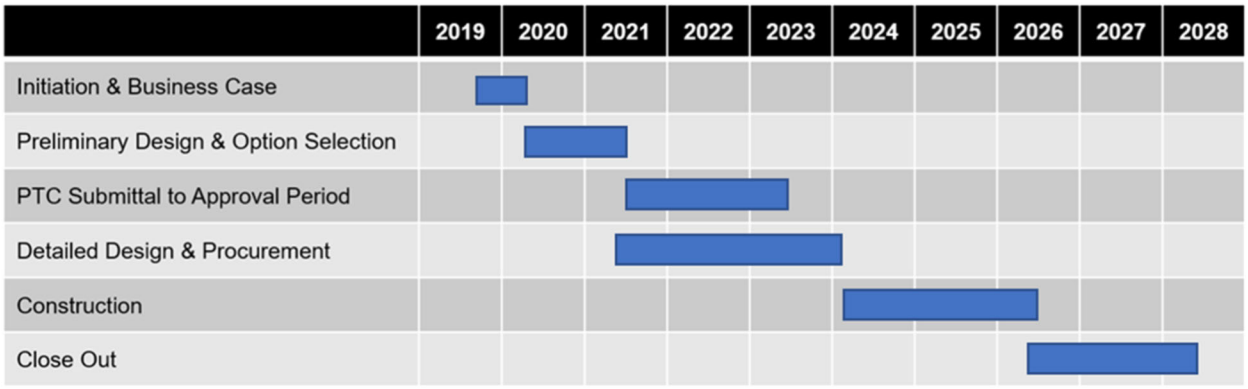
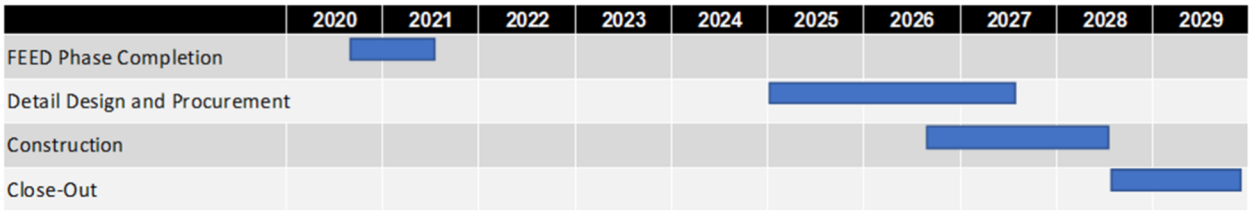


Figure MCM-6
MCM ARE Project Major Milestones

Major Milestones	Date
FEED Phase Completion	Jun-2021
Permit to Construct Submission	Jun-2021
EPC Contract Executed	Jan-2025
Permit to Construct Expected Approval	Jun-2023
Construction Begins	Aug-2026
NOP Date	Jun-2028
Project Close-Out	Dec-2029

Figure MCM-7
MCM ARE Schedule by Stages



VI. SUSTAINABILITY

SDG&E has made a commitment to reach net zero GHG emissions in operations and delivery of energy by 2045 across Scope 1, 2, and 3 emissions.[6] Scope 1 emissions are direct

[6] *See* SDG&E, *Building a Better Future: Sustainability Strategy Update*, October 2021, *available at*: https://www.sdge.com/sites/default/files/documents/Sustainability_2021.pdf. SDG&E announced a climate pledge of reaching Net Zero GHG emissions by 2045. The proposed project does not impact Scope 3 emissions and therefore Scope 3 emissions are not evaluated in this document.

GHG emissions that occur from sources owned or controlled by the company, which include facility natural gas usage, the transmission and distribution system, and the Company vehicle fleet. Scope 2 emissions are indirect GHG emissions associated with the generation of purchased electricity consumed by the Company. Additionally, SDG&E is working to reduce criteria pollutant emissions associated with combustion equipment, with a focus on reducing NOx emissions for compliance with South Coast AQMD requirements specified in Rule 1134 "Emissions of Oxides of Nitrogen from Stationary Gas Turbines,"[7] Rule 1110.2 "Emissions from Gaseous and Liquid-Fueled Engines"[8] and companion Rule 1100 "Implementation Schedule for NOx Facilities."[9] This testimony focuses on Scope 1 and 2 GHG emissions, as well as criteria pollutants, and summarizes how the MCM project is designed to provide SDG&E with a direct pathway to make progress towards achieving its net zero GHG emissions commitment by 2045.

A. Principal Component

The Principal component of the MCM Project consists of a compressor system upgrade to replace the four existing CGT of 4,400 HP total and five existing compressor natural gas lean-burn engines of 8,985 HP total with two new natural gas CGTs of 11,650 HP total equipped with emissions control systems comprised of selective catalytic reduction (SCR) and oxidation catalyst and two new EDC equipment of 8,000 HP total. Additionally, the four existing natural-gas-fueled emergency generators of 1,129 HP total will be replaced with two new natural-gas-fueled emergency generators of 1,648 HP total, each equipped with an emissions control system which includes three-way nonselective catalytic reduction (NSCR) and an air fuel ratio controller.

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7 *See* South Coast AQMD Rule 1134, *supra* note 6, at Section (d)(4), Table II for NOx emission limit for compressor gas turbines. The MCM project will follow the implementation schedule specified in section (d)(4).

8 *See* South Coast AQMD Rule 1110.2, *supra* note 5, at Section (d)(1)(B)(vii), Table II for NOx emission limit for compressor gas lean-burn engines.

9 *See* South Coast AQMD Rule 1100, *supra* note 4, at Section (d)(4). The MCM project will follow the timeline requirements specified in Section (d)(4) and has submitted a Retirement Plan to South Coast AQMD.

The Scope 1 combustion emission sources[10] include the two new replacement CGTs, approximately 5,825 HP each, as well as the two new emergency generators of approximately 824 HP each. Scope 2 emissions are the indirect GHG emissions associated with generation of the purchased non-renewable grid electricity to operate two new EDCs, approximately 4,000 HP each, and provide supplemental electricity to support auxiliary and administrative electrical loads.

1. Greenhouse Gas Emissions[11]

The estimated change in GHG potential emissions associated with the Principal component of the MCM Project is shown in Figure 8 below. The potential emissions of the Principal component of the MCM Project emission sources were estimated and are discussed in this section. This estimate was prepared by comparing the pre-project potential emissions to the post-project potential emissions, rather than comparing total pre-project actual emissions to post-project actual emissions. Changes in actual emissions will depend on actual fuel consumed by the compressors as well as the actual quantity of electricity purchased in the future.[12]

a. Pre-Project Emissions

For Scope 1 emission sources of the Principal component, pre-project current potential emissions are based on the following: 1) the four existing CGTs and five existing compressor natural gas lean-burn engines operating 24 hours per day, seven days per week, at full load, and 2) the four existing emergency generators operating at the permitted limit of 200 hours per year. For Scope 2 emission sources of the Principal component, pre-project potential emissions are estimated based on the total existing facility-wide electrical load.[13]

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[10] Combustion emissions reported as 40 C.F.R. Part 98 Subpart C and include the main compressor units. Emergency generators are exempt from Subpart C reporting per Section 98.30(b)(2); however, they have been included in the PTE emissions calculations in this document.

[11] GHG emissions are not criteria pollutants and are not a compliance requirement for MCM.

[12] Potential GHG emission reductions may be enabled with installation and operation of the two new electric-driven compressors when powered with renewable electricity.

[13] Indirect CO2e emissions for purchased electricity were estimated using The Climate Registry (TCR) emission factor of 498.45 lbs CO2e/MWh.

b. Post-project Emissions

For Scope 1 emission sources of the Principal component, the post-project potential emissions are estimated based on the following: 1) the two new CGTs operating 24 hours per day, seven days per week, at full load; and 2) the two new emergency generators operating at the proposed limit of 200 hours per year. For Scope 2 emission sources of the Principal component, the post-project potential emissions were estimated based on the maximum annual electricity needed for the two new EDCs and the electricity required to support auxiliary and administrative electrical loads via electricity purchased.[14,15] Actual post-project emissions are expected to be significantly lower than the potential emissions estimate due to operating conditions, utilization of the natural gas fueled equipment, and base-loading compression with the new EDCs.

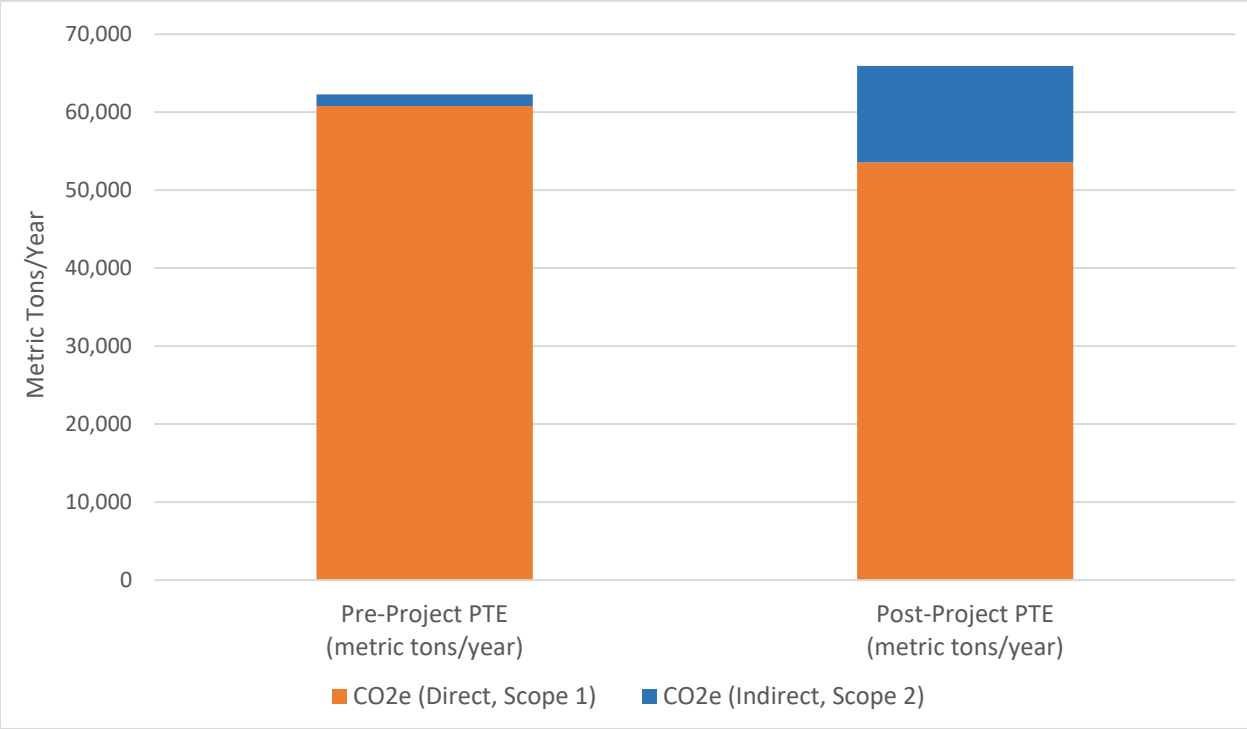
Although there is a decrease in GHG direct emissions, the projected overall emissions increase for GHG is approximately 5,400 metric tons per year based on the pre-project potential emissions and post-project potential emissions.[16] The change in current and proposed GHG potential emissions associated with the Principal component is shown in Figure 8 below.

[14] This analysis is conservative and assumed electricity required for the station's auxiliary and admin loads are fully supplied through purchased electricity. The proposed renewable microgrid, which is discussed in the Advanced Renewable Energy Component section, would provide supplemental electricity to the auxiliary and admin loads for the station to reduce grid load and GHG emissions.

[15] Existing station electrical load was estimated based on the station's total connected load of approximately 826 kW. The estimated load breakdown for MCM are as follows: 0.2 MW for administrative load, 0.8 MW for station auxiliary loads, and 5.8 MW for the EDCs.

[16] Indirect emissions associated with electricity purchases (for EDCs) can be mitigated through the purchase of renewable electricity from SoCal Edison.

Figure MCM-8:
Pre-and Post-Project Greenhouse Gas (CO2e) Potential Emissions for Principal Component

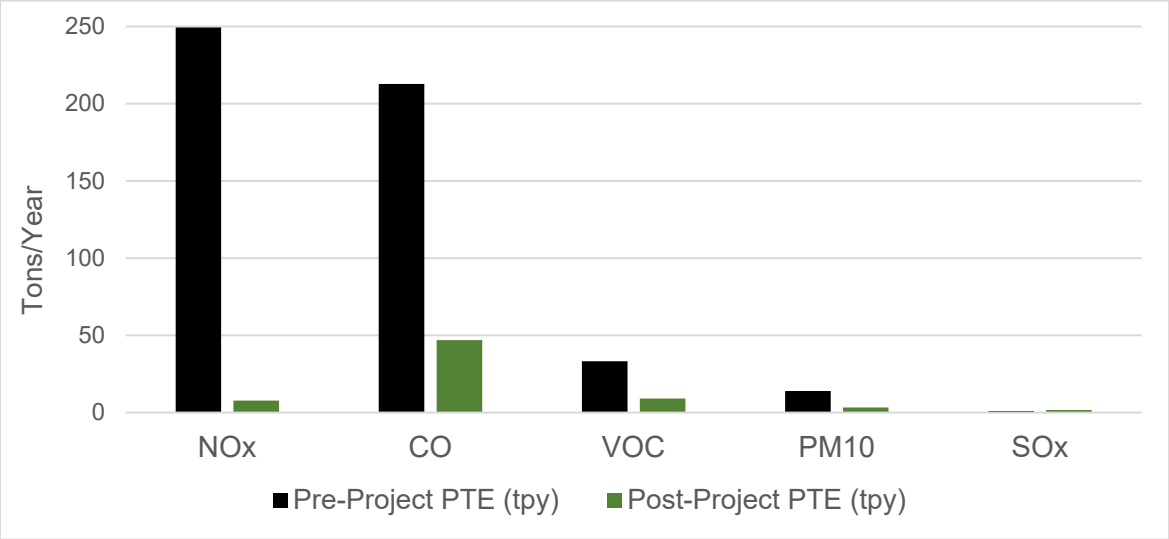


2. Criteria Air Pollutant Emissions

The estimated changes in criteria air pollutants Potential to Emit (PTE) associated with the Principal component are shown in Figure 9 below. This estimate was prepared by comparing the pre-project PTE to the post-project PTE for the compressor natural gas lean-burn engines, CGTs, and emergency generators being replaced. The pre-project PTE includes the four existing CGTs and five existing compressor natural gas lean-burn engines operating 8,760 hours per year at full load and the four existing emergency generators operating 200 hours per year as permitted by the South Coast AQMD. The post-project PTE includes the proposed two CGTs operating at 8,760 hours per year and the proposed two emergency generators operating at the proposed limit of 200 hours per year. The PTE for the CGTs is based on current Best Available Control Technology (BACT) emission levels. As shown in Figure 9, the projected change in NOx PTE is a reduction of approximately 97%. Carbon monoxide (CO), volatile organic compounds

(VOC), and respirable particulate matter (PM10[17]) emissions are each projected to decrease by approximately 75%.

Figure MCM-9:
Pre-and Post-Project Criteria Pollutant PTE for Principal Component



B. Advanced Renewable Energy Component

The ARE component of the MCM Project consists of the following: 1) green hydrogen electrolyzers and ancillary equipment, enabling up to 10% of the fuel feeding the compressor equipment to be hydrogen; 2) a new green hydrogen vehicle fleet fueling station for company vehicles; and 3) a renewable energy microgrid composed of hydrogen-fueled PEM fuel cells, an energy storage system (ESS), and roof-mounted solar PV panels to provide supplemental electricity.

1. Greenhouse Gas Emissions

The MCM ARE component which includes the hydrogen electrolyzers, hydrogen storage, fuel blending equipment, hydrogen vehicle fueling stations, and other hydrogen ancillary supporting equipment will be powered by renewable electricity[18] and therefore indirect GHG emissions are expected to be zero. Likewise, indirect GHG emissions from operating the PEM

[17] Fine particulate matter (PM2.5) is a subset of respirable particulate matter (PM10). PM2.5 is assumed to be equal to PM10 emissions for combustion of natural gas.

[18] The estimated load for the hydrogen electrolyzer and hydrogen auxiliary equipment is approximately 2.5 MW.

fuel cell, PV panels, and energy storage system are zero. The PEM fuel cell will be powered by green hydrogen and the ESS will be charged during daytime hours via renewable electricity generated by the PV panels.

2. GHG Emissions Reductions/Avoidances from the ARE Component

As stated above, SDG&E proposes to integrate hydrogen and other renewable energy technologies to reduce GHG emissions. As shown in Figure 10 below, the ARE component could potentially reduce GHG emissions by about 2,200 MT per year, which is equivalent to removing approximately 480 passenger vehicles from the roads each year.[19]

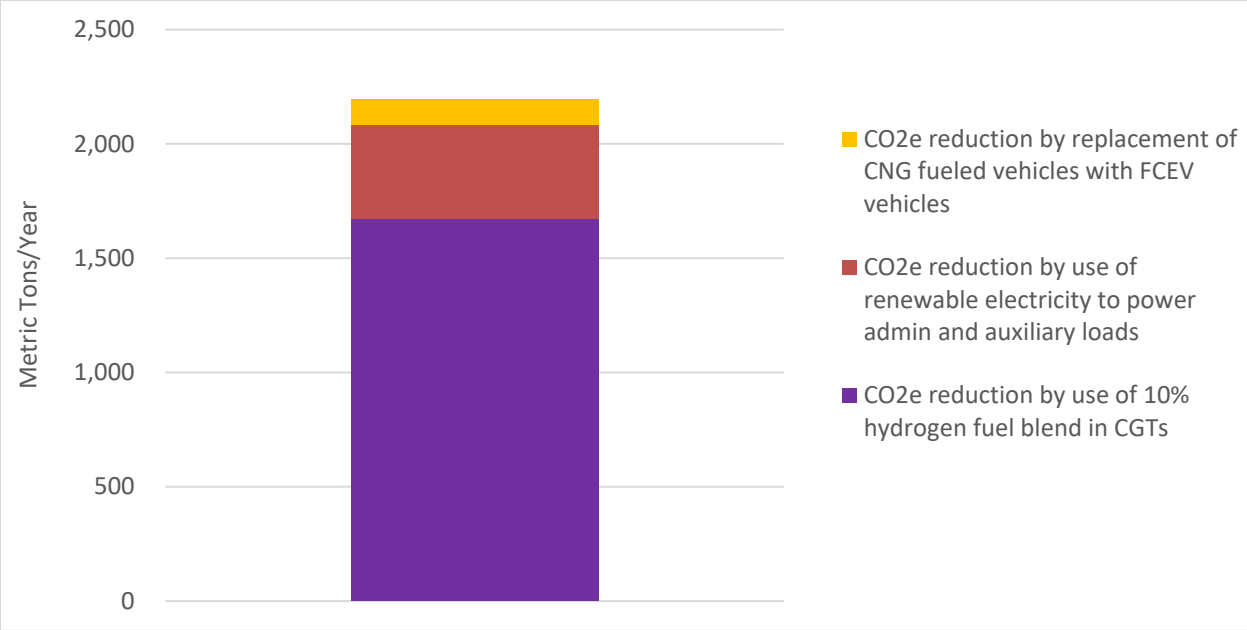
The emissions have been estimated on an annual PTE basis and are associated with the following:

- Replacing existing CNG-fueled company vehicles with fuel cell electric vehicles (FCEVs) that are powered by green hydrogen produced via electrolysis,[20]
- Using blended green hydrogen fuel from onsite electrolysis instead of 100% natural gas for the new CGTs; and
- Using renewable electricity produced onsite for up to five hours per day to provide supplemental power for the station's administrative and auxiliary loads.

[19] Vehicle quantity equivalency estimated using the U.S. Environmental Protection Agency Greenhouse Gas Equivalences Calculator, *available at*:, https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.

[20] The estimated emissions from the CNG vehicles assumes that up to forty vehicles would travel to the Moreno Compressor Station to refuel with hydrogen and each vehicle travels approximately 8,000 miles per year. The number of vehicles was estimated based on the highest quantity of vehicles the facility would be able to receive per day for the proposed quantity of hydrogen production onsite. The emission reductions were based on the GHG associated with forty vehicles going to zero since FCEVs do not have tailpipe emissions. CO2e emission factor of 0.35 kg/miles for CNG vehicles was estimated based on the U.S. Department of Energy presentation, *Well-to-Wheels GHG Emissions of Natural Gas Use in Transportation: CNGVs, LNGVs, EVs, and FCVs*, October 10, 2014, *available at*: https://greet.es.anl.gov/files/EERE-LCA-NG.

Figure MCM-10:
Greenhouse Gas (CO2e) Potential Reductions associated with ARE Component



VII. COMMISSIONING NEW EQUIPMENT AND DECOMMISSIONING OLD EQUIPMENT

The newly installed compressor equipment at Moreno will undergo commissioning and site performance testing. This will verify that the station meets the expected design criteria, the station operates as expected, the safety systems are operational, and the natural-gas-fueled equipment complies with emission requirements. The commissioning process will be a rigorous systematic process that tests and documents the condition of each system to verify that it is fit for service. The verification will include approvals of the installation and design, performance testing, and all required functional testing and tuning for safe operation of the system.

After the safety and operating systems have been commissioned and are acceptable for service, a site performance test will be performed. The test will verify that the system meets the specified operational requirements and performance guarantees. The test will mimic multiple operating points to simulate station operation. The operational requirements and performance guarantees include automation, emissions, injection rate, power output, cooling, and inlet and outlet pressure. The site performance test will be performed in conjunction with the equipment manufacturers, construction contractors, and a design-engineering firm(s) that integrated the

systems. Upon the successful completion of these tests, the station will be turned over to operations.

Once the new equipment becomes fully operational, the existing compressor assets will be decommissioned.

VIII. PROJECT EXECUTION

A. Project Management

SDG&E's primary project objective is to successfully execute the MCM Project safely, reliably, on schedule, and at reasonable cost, while meeting applicable SDG&E Gas Standards and complying with environmental and regulatory requirements. To achieve this objective, SDG&E has formed a well-trained and qualified team comprised of Project Management, Engineering, Construction Management, Project Controls, Environmental Services, Legal, Quality Risk and Compliance, Safety, Procurement, Communications, and Stakeholder Outreach personnel to oversee compliance with applicable regulatory and quality assurance requirements and continuously improve project controls to validate that project tasks are performed safely and cost effectively. The Project team has developed and implemented Project Execution Plans to outline the project execution and governance principles utilized by the Project team to conduct and manage the Project. Compliance with the Plans supports the achievement of project safety, schedule, cost, quality, stakeholder engagement, compliance, and risk mitigation goals.

1. Safety

SDG&E has deployed the Safety Management System (SMS) for the MCM Project. SMS better aligns and integrates safety, risk, asset, and emergency management across the entire organization. The SMS takes a holistic and pro-active approach to safety and expands beyond "traditional" occupational safety principles to include asset safety, system safety, cyber safety, and psychological safety for improved safety performance and culture. SDG&E's SMS is a systematic, enterprise-wide framework that utilizes data to collectively manage and reduce risk and promote continuous learning and improvement in safety performance through deliberate, routine, and intentional processes.

- The safety process for the project is supplemented through use of the HAZOP or Process Hazard Analysis (PHA) process. PHA/HAZOP reviews are scheduled by

the project engineering manager and managed by the process engineer assigned to the project. Each review session has appropriate participants in attendance from Storage Operations, Project Management, Engineering, and the engineering contractor. Facilitation of the PHA/HAZOP reviews is performed by a third-party contractor. For the MCM Project, PHA was completed in the FEED phase. The comments from the PHA associated with FEED design were resolved and the remaining open items to be addressed during the Detailed Engineering phase are documented for resolution. In the EPC phase of the project, HAZOP reviews will be done to incorporate safety in design for the MCM Project.

- Additional reviews for maintenance/accessibility/human factors, commonly called constructability reviews, will be scheduled by Operations and Construction Organization. Construction, maintenance, and safety personnel will be invited to the reviews to make certain that plant operability and safety issues are addressed throughout the project's design engineering lifecycle. For the MCM Project, constructability reviews were conducted during the FEED phase of the project and will be scheduled at regular intervals in the Detailed Engineering phase to inherently build safety into the design.
- On-sight safety training is required for all company employees and contractors supporting field activity and inspection work.
- During the construction phase, the importance of working safely and following zero incident culture will be emphasized every day at all levels of project organization.
- Job specific safety plans will be developed for the company employees and contractors/subcontractors working on the MCM Project.
- An emergency notification, response, and evacuation plan will be developed for the project.
- SoCalGas leadership is fully committed to safety as a core value. SoCalGas's executive leadership is responsible for overseeing reported safety concerns and promoting a strong, positive safety culture and an environment of trust that includes empowering employees to identify risks and "Stop the Job."

SoCalGas's approach to safety is one of continuous learning and improvement where all employees and contractors are encouraged and expected to engage in areas of opportunity for learning and promote open dialogue where learning can take place.

2. Phased Project Execution:

SDG&E has adopted the Capital Delivery Model (CDM) that sets forth the various stages of the project lifecycle for managing major projects. The CDM principles maintain that SDG&E and its contractors through various management and document requirements prior to proceeding to the next stage of each project. The stages are:

Stage 1 – Initiation & Feasibility
Stage 2 – Preliminary Engineering
Stage 3 – Detail Engineering and Procurement
Stage 4 – Construction
Stage 5 – Closeout

The MCM Project is currently in Stage 3.

3. Project Controls:

The MCM Project Management team has established project controls and management practices that enable the Project team to execute the project and achieve its objectives. The Project team tracks and reports performance indicators and metrics to facilitate communication and evaluation of project health among the Project team and key stakeholders, with the goal of risk mitigation and continuous improvement. The MCM Project Management team has established project cost and schedule controls to assist the Project team in identifying changes compared to project baseline plans and project adjustment options as early as possible.

4. Estimating

The MCM Project Management team treats estimating as a critical part of project planning and development. Project estimating is an iterative process which begins with the initiation of the project to set expectations and prepare the project Team for the completion of estimate development and to assist in presentation to management for approvals as the project matures through various stages of SDG&E's CDM. Multiple alignments with different project

stakeholders and estimating teams occur throughout the life cycle of a project to seek information available for developing and updating the estimate of project capital costs and schedule. Project estimate and schedule basis documents are developed and updated throughout the lifecycle of the project to meet the corresponding accuracy requirement for the phase of the project.

The estimates are developed by the estimating group in conjunction with input from the third-party contractors and the MCM Project Management team. The output of the cost estimate is used to determine project economic feasibility, assist with decision making, establish a baseline budget, and track accuracy of material quantities throughout the lifecycle of the project. The estimate deliverables are comprised of estimate basis, estimate details, and a contingency recommendation. The contingency recommendation is derived from the project risk register portion of the Project Execution Plan (PEP).

SDG&E's CDM staged execution model estimate alignment with the Association for the Advancement of Cost Engineering (AACE) standards[21] can be represented as shown below:

Estimate Class	Usage	Accuracy Range	Stage
Class 5	Concept Screening	+100%/-50%	1
Class 4	Feasibility Study	+50%/-30%	1 & 2
Class 3	Budget Authorization	+30%/-20%	2 & 3

5. Engineering

SDG&E employs a multi-pronged approach to the engineering associated with capital projects of the size and complexity of the MCM Project. SDG&E uses: 1) SoCalGas/SDG&E Gas Engineering Department supplemented with third-party engineers (Owner's Engineer); 2) third-party engineering firm for FEED; and 3) third-party firm responsible for EPC. In addition, specialty engineering expertise is employed throughout the project, as needed.

a. SDG&E Gas Engineering & Owners Engineer

SoCalGas/SDG&E's Gas Engineering department supplemented with expertise from Owner's Engineer are responsible for the following project activities:

[21] AACE International, Recommended Practice No. 18R-97: *Cost Estimate Classification System - As Applied in Engineering, Procurement, and Construction for the Process Industries*, August 7, 2020.

- Support for the initial scoping, analysis of requirements, and development of alternatives.
- Preparation of requirements for FEED development, analysis of bid responses, and support for the selection of FEED engineering consultant.
- Review and approval of FEED work products.
- Development of Engineering, Procurement and Construction (EPC) bid requirements, analysis of bid responses, and support for the selection of EPC firm.
- Review and approval of EPC work products.
- Support for the commissioning of a new compressor station and closeout of the project.

b. Front End Engineering & Design Contractor

For the MCM Project, a FEED contractor was selected during a competitive bid process. In this phase of the project, the FEED contractor was responsible for completing engineering and design of the new compressor station to a 30% design level. The engineering and design (30%) deliverables included mechanical equipment, utility system, instrument and control systems, electrical components, and civil, architectural, structural, and piping designs. Also, as part of the deliverables of this phase, the FEED contractor provided engineering and design information necessary to include in the EPC bid package along with an updated project cost estimate and schedule.

c. Engineering – EPC Phase

SDG&E plans to contract the EPC phase of the project to a third-party engineering contractor. Under this approach, the EPC contractor will be responsible for all activities relating to the engineering, design, material and equipment procurement, construction, and commissioning of the project, including mechanical equipment, utility system, instrument and control systems, electrical components, and civil, architectural, structural, and piping design for the new compressor station. This contracting approach is used for several reasons including

availability of good scope definition, prudent risk allocation to the EPC contractor, single point responsibility, and schedule control.

d. Specialty Engineering

Additional third-party engineering firms are retained, as needed, to support routine engineering and specialty engineering activities, such as preparing permit packages, geotechnical and environmental evaluations, etc.

6. Environmental and Permitting Support

The Environmental team is responsible for informing the project team of environmental compliance requirements applicable to the project, which are identified by conducting project reviews. The Environmental team is also responsible for obtaining environmental permits, participating in agency consultations for environmental permits, preparing and conducting environmental training, obtaining plan approvals, and performing environmental regulatory updates and/or interpretations. The Permitting team is responsible for supporting submittal and receipt of all permits and follow-through for their approvals. They are also responsible for ministerial actions/permits such as street use permits, traffic control permits, or related items, or for obtaining permits associated with non-Owner owned equipment.

7. Procurement of Services and Materials

Procurement of services and materials is the largest component of Project expenditures. As such, an important aspect of prudent Project execution is the evaluation, selection, and retention of qualified suppliers and contractors at reasonable rates. An overall objective of the MCM Project Management team is to utilize competition to obtain materials and services at market-based rates. Supply management techniques and practices utilized by the Project team to acquire materials and services at market rates include implementation of available procurement processes and cost control measures for the preparation, solicitation, competitive bidding, evaluation, award, and administration of qualified and best value contractors, subcontractors, and suppliers.

The procurement process for competitively bidding contracts involves soliciting bids from potential contractors and suppliers based on the scope, specifications, and terms and conditions of the proposed contract. While pricing is a major factor used in the selection process, other factors such as safety, supplier performance, experience, key personnel, life-cycle

cost analyses, Disadvantage Business Enterprise (DBE) participation, and history, among others, are also considered for award recommendation and contractor selection.

8. Construction Management

The SDG&E Construction Management team performs and oversees the construction of the project and manages vendors and contractors effectively, in alignment with scope-of-work and gas company standards. The Construction Management team makes certain that the project is constructed per design to operate reliably and safely. Construction management at SDG&E is integrated into the project early to provide input to constructability and identify potential risk to construction schedule and cost of the project. The Construction Management team comprises Construction Manager, Construction Team Lead, Field Engineers, Construction Inspectors, and Contractors.

9. Quality, Risk and Compliance Management

Quality Management for the Project focuses on implementation oversight and review of project components with the goals of: 1) conducting quality reviews and/or audits; 2) reporting on corrective actions and closure; and 3) continuous improvement through quality review metrics, feedback, and/or lessons learned. This function is managed by the MCM Project Management team, with assistance from the Quality Risk and Compliance group, other Company personnel, qualified independent consultants, outside inspection agencies, and testing laboratories, as required.

Risk Management identifies and manages potential risks to allow for the early preparation of mitigation or avoidance responses to minimize impacts on the project cost and schedule. Although the Project Manager has overall responsibility for managing project risks, it is a collective effort of the team and project stakeholders to continuously identify and track mitigation and management of risks. The MCM Project risk register log is used to track identification, mitigation, and closure of project risks throughout the lifecycle of the project.

Document Control facilitates the process of gathering, organizing, reviewing, storing, and sharing documents, making it easier to collaborate, retrieve, and share information across the Project team. Project Document Control also addresses version control, document review and approvals, document quality reviews, and generation of a compliance record for the life of each

asset. The Project Engineer and a Document Control Specialist are assigned these responsibilities on the MCM Project.

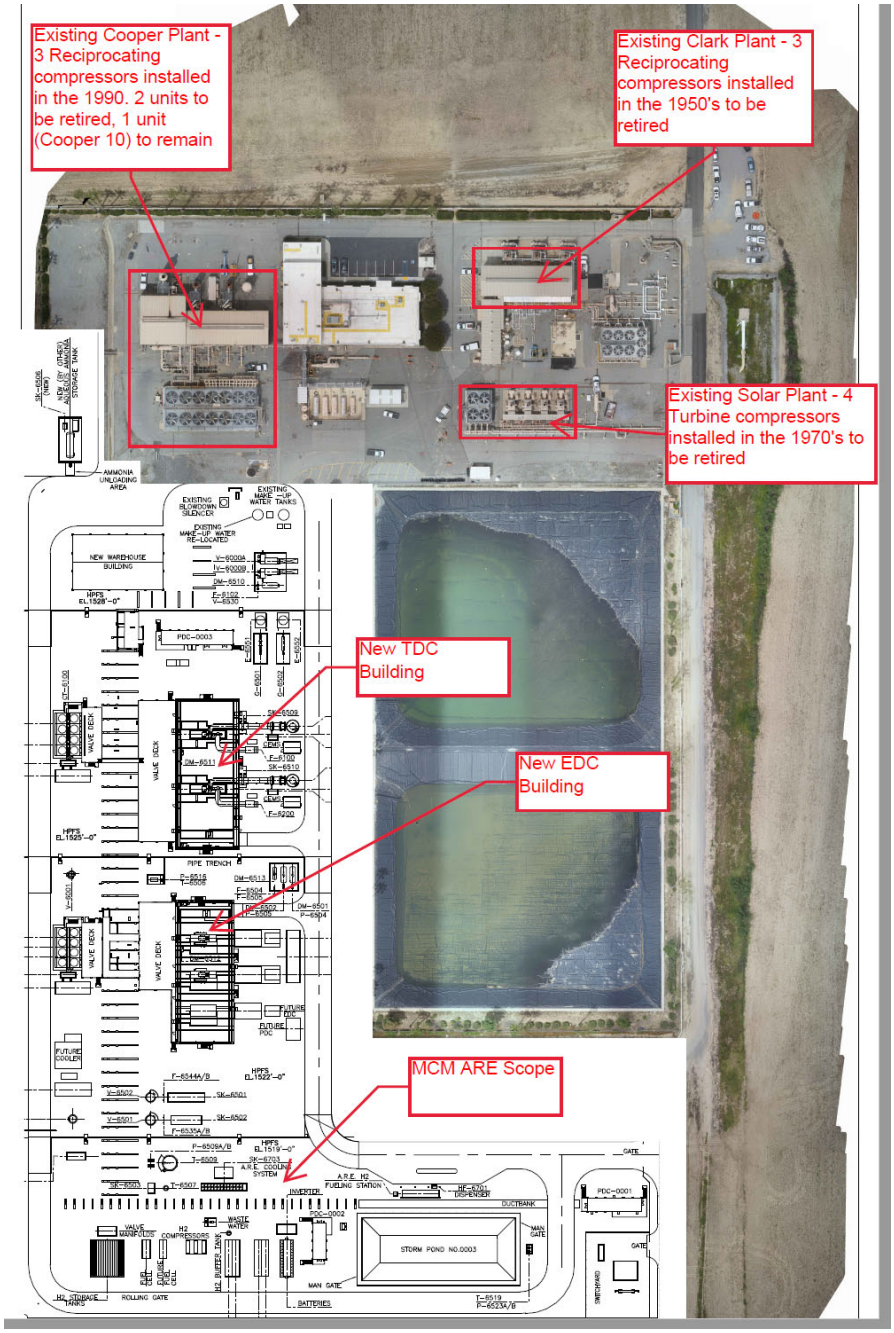
10. Communication and Stakeholder Engagement

Finally, stakeholder outreach is essential to keep communities and customers educated about the Company's mission and how our facilities and projects fit into the delivery of safe, affordable, and increasingly cleaner energy. SoCalGas collaborates with the communities and local municipalities in which our facilities are located, and with regulatory agencies who have oversight of the facility. Regular and routine engagement of community stakeholders through various methods is conducted to share information about Company operations and pending projects. SoCalGas has dedicated Public Affairs Managers to act as a primary point of contact for the public to share information. Communication methods may include actions like public meetings, community canvasing, stakeholder briefings, station tours for local officials, informational newsletters, social media posts, radio ads and dedicated project website updates.

For the Moreno Compressor Station Modernization Project, SDG&E and SoCalGas regional public affairs representatives held several project briefings to share information about the purpose and need for the project. These briefings included government agency staff, elected representatives and their staff, local school districts, chambers of commerce, major commercial businesses, and other local non-profit organizations. SDG&E has also participated in community events, such as Beautify MoVal held by the City of Moreno Valley, to share information about the Company, its operations, and the project.

The Company's communication efforts are a critical part of its mission to engage with and learn from community partners and customers.

Figure MCM-11
MCM Project Scope Layout



APPENDIX C

O&M RAMP Activity Forecast by Workpaper and

Capital RAMP Activity Forecast by Workpaper

APPENDIX C
O&M RAMP Activity Forecast by Workpaper and
Capital RAMP Activity Forecast by Workpaper

O&M Summary

GAS TRANSMISSION OPERATIONS & CONSTRUCTION RAMP Activity O&M Forecasts by Workpaper (In 2021 $)						
Workpaper	**RAMP ID**	**Description**	**BY2021 Embedded Base Costs (000s)**	**TY2024 Estimated Total (000s)**	**TY2024 Estimated Incremental (000s)**	**GRC RSE**
1GT000.000	SDG&E-Risk-3 - C02 T1&T2	Cathodic Protection (HCA & Non-HCA)	90	77	-13	*
1GT000.000	SDG&E-Risk-3 - C06 T1&T2	Pipeline Maintenance (HCA & Non-HCA)	587	611	24	*
1GT000.000	SDG&E-Risk-3 - C11 T1 & T2	Measurement & Regulation Station – Maintenance (HCA & Non-HCA)	425	353	-72	*
1GT000.000	SDG&E-Risk-3 - C12	Odorization	9	9	0	2.000
1GT000.000	SDG&E-Risk-3 - C14	Engineering, Oversight Compliance Review	83	83	0	0[14]
1GT001.000	SDG&E-Risk-3 - C09	Compressor Station	3,113	3,113	0	8.000

[14] An RSE was not calculated for activities with a 0 value.

GAS TRANSMISSION OPERATIONS & CONSTRUCTION RAMP Activity O&M Forecasts by Workpaper (In 2021 $)						
Workpaper	**RAMP ID**	**Description**	**BY2021 Embedded Base Costs (000s)**	**TY2024 Estimated Total (000s)**	**TY2024 Estimated Incremental (000s)**	**GRC RSE**
1GT001.000	SDG&E-Risk-3 - C14	Engineering, Oversight Compliance Review	83	83	0	0[15]
1GT002.000	SDG&E-Risk-3 - C14	Engineering, Oversight Compliance Review	44	44	0	0[16]
Total			**4,434**	**4,373**	**-61**	

*Tranche level RSEs and additional details are available in Ex. SDG&E-06-WP.

Capital Summary

Workpaper	**RAMP ID**	**Description**	**2022 Estimated RAMP Total (000s)**	**2023 Estimated RAMP Total (000s)**	**2024 Estimated RAMP Total (000s)**	**GRC RSE**
004080.001	SDG&E-Risk-3 - C10 T1&T2	Measurement & Regulation - Capital (HCA & Non-HCA)	818	818	818	*
004080.002	SDG&E-Risk-3 - C10 T1&T2	Measurement & Regulation – Capital HCA & Non-HCA)	819	819	819	*

[15] An RSE was not calculated for activities with a 0 value.
[16] An RSE was not calculated for activities with a 0 value.

Workpaper	RAMP ID	Description	2022 Estimated RAMP Total (000s)	2023 Estimated RAMP Total (000s)	2024 Estimated RAMP Total (000s)	GRC RSE
004120.001	SDG&E-Risk-3 - C03 T1&T2	Leak Repair (HCA & Non-HCA)	998	998	998	*
004120.002	SDG&E-Risk-3 - C04 T1&T2	Pipeline Relocation/ Replacement (HCA and Non-HCA)	17,294	0	0	*
004120.003	SDG&E-Risk-3 - C04 T1&T2	Pipeline relocation and replacement (HCA & Non-HCA)	498	498	498	*
004120.004	SDG&E-Risk-3 - C05 T1 & T2	Shallow Exposure (HCA & Non-HCA)	498	498	498	*
004150.001	SDG&E-Risk-3 - C08	Compressor Stations - Capital	6,564	6,564	6,564	4.000
004160.001	SDG&E-Risk-3 - C01 - T1&T2	Cathodic Protection - Capital (HCA & Non-HCA)	959	959	959	*
004190.001	SDG&E-Risk-3 - C13	Security and Auxiliary	230	230	230	4.000

Workpaper	RAMP ID	Description	2022 Estimated RAMP Total (000s)	2023 Estimated RAMP Total (000s)	2024 Estimated RAMP Total (000s)	GRC RSE
		Equipment				
Total			**28,678**	**11,384**	**11,384**	

*Tranche level RSEs and additional details are available in Ex. SDG&E-06-WP.