Company: Southern California Gas Company (U 904 G)
Proceeding: 2024 General Rate Case
Application: A.22-05-015
Exhibit: SCG-10-R

REVISED

PREPARED DIRECT TESTIMONY OF

LARRY T. BITTLESTON AND STEVE HRUBY

(GAS STORAGE OPERATIONS AND CONSTRUCTION)

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

SoCalGas™

August 2022

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APPENDICES

SUMMARY

TESTIMONY AREA (in 2021 $, in 000s)			
O&M	**2021 Adjusted-Recorded**	**Estimated TY 2024**	**Change**
Non-Shared	43,106	47,443	4,337
Shared	367	339	(28)
Total O&M	**43,473**	**47,782**	**4,309**

TESTIMONY AREA (in 2021$, in 000s)			
Capital	**Estimated 2022**	**Estimated 2023**	**Estimated TY 2024**
Total CAPITAL	**206,195**	**163,279**	**146,550**

Summary of Requests

The funding summarized above and described in this testimony is reasonable and represents the necessary O&M expenses and capital investments for SoCalGas's Gas Storage facilities to:

- Maintain the safety, integrity, and effective operations of the natural gas storage system;
- Provide a reliable and economical supply of gas for customers throughout the service territory, especially during periods of high demand;
- Achieve compliance with regulatory requirements; and
- Allow gas deliveries to be efficiently balanced throughout the overall transmission and distribution system.

The Gas Storage forecasts in this testimony have been structured to address those costs related to the individual organizations under the Gas Storage operational umbrella. These functional organizations include: (1) Aboveground Gas Storage (AGS) and (2) Underground Gas Storage (UGS). The descriptions of the organizations are as follows:

1) AGS includes the operation and maintenance of the storage field aboveground assets. These assets include compressors, pipelines, purification, and auxiliary equipment.

2) UGS includes the operation and maintenance of the storage reservoir and the operation, maintenance, and installation of storage wells.

The driving force behind the expenditure plan for Gas Storage is the objective of SoCalGas to continue to provide safe and reliable deliveries of natural gas to customers at reasonable rates. O&M and capital investments also facilitate compliance with existing and proposed regulatory requirements.

Currently, the primary and emerging regulations that impact forecasts are:

- The California Geologic Energy Management Division (CalGEM) Requirements for California Underground Storage Projects, outlined in Title 14, California Code of Regulations (C.C.R.) § 1726 et seq., and proposed new Article 5 requirements for California Underground Storage that would require underground gas storage operators to submit a chemical inventory and consider additional risk mitigation strategies.
- CalGEM Underground Injection Control (UIC) guidelines as outlined in Title 14, C.C.R. §§ 1724.5-1724.13.
- United States Department of Transportation, Pipeline and Hazardous Material Safety Administration (PHMSA), Underground Natural Gas Storage (UGS) regulations in Title 49, Code of Federal Regulations (C.F.R.) § 192.12.
- California Air Resources Board (CARB) Oil and Gas Rule, outlined in Title 17, C.C.R, Division 3, Chapter 1, Subchapter 10 Climate Change, Article 4, Subarticle 13: Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities, § 95665 et seq.

The above regulations are discussed further throughout our testimony.

The Gas Storage forecasts were developed as follows:

- Non-shared O&M labor and non-labor forecasts were established using a zero-based approach. Shared labor and non-labor forecasts were established using a three-year average.
- All capital forecasts were established using a zero-based approach.

Additional detail on the selected forecast method is discussed in greater detail below.

To better understand the forecasted costs, the following factors should be considered:

- Gas Storage facilities consist of large, complex, and interconnected industrial equipment. The increasing volume, frequency, and complexity of above-ground and below-ground maintenance work and the difficulty in procurement or reproduction of replacement components for older assets exposed to demanding field conditions, continue to place upward pressure on operating costs.
- Costs for Gas Storage activities continue to increase to support safety, reliability, system integrity, and compliance.
- SoCalGas's Gas Storage compressors, one of the key assets for injecting gas into the reservoir, continue to age with increasing maintenance challenges. This, in combination with new emissions compliance requirements, has resulted in compressor upgrades and replacements. Since these projects are non-routine, a zero-based methodology is used to forecast costs for compressor related capital projects.

- Underground storage reservoirs are geological assets where gas injection and withdrawal capabilities can change over time. These changes, which include facility infrastructure updates and storage volume variability due to fluid extraction or intrusion, require ongoing studies and capital investments in new or replacement wells to support storage deliverability rates. The number of new or replacement wells planned, the cost of constructing these assets, and the variability for this sub-activity supports a zero-based approach to forecasting the capital costs for new wells.
- CalGEM assessment fees have increased from $137 per well in 2015/2016 to $5,559 per well in 2020/2021 and $6,717 per well in 2021/2022. In 2015/2016 this equated to $31,041 for 226 wells, and in 2020/2021 this equated to $1,189,648 for 214 wells, and in 2021/2022 this equated to $1,329,947 for 198 wells. In addition, PHMSA has begun imposing assessment fees. The fees for the 2021 calendar year were $100,000.

REVISED PREPARED DIRECT TESTIMONY OF
LARRY T. BITTLESTON AND STEVE A. HRUBY
(GAS STORAGE OPERATIONS AND CONSTRUCTION)

I. INTRODUCTION

A. SUMMARY OF STORAGE COSTS AND ACTIVITIES

This testimony supports the Test Year (TY) 2024 forecasts for operations and maintenance (O&M) costs for both non-shared and shared services and capital costs for the forecast years 2022, 2023, and 2024 associated with the Aboveground and Underground Gas Storage (Gas Storage) area and the compressor modernization projects for Southern California Gas Company (SoCalGas or Company). The forecasted O&M of $47.782 million for TY 2024 and forecasted capital of $206.195 million in 2022, $163.279 million in 2023, and $146.550 million in 2024, support the Company's goals of maintaining and enhancing safety, system integrity, and reliability. Gas Storage's support for these goals is discussed in greater detail within this testimony. Table BH-1 summarizes my sponsored costs.

TABLE BH-1
Southern California Gas Company
Test Year 2024 Summary of Total Costs

STORAGE (In 2021 $)			
	2021 Adjusted-Recorded (000s)	**TY2024 Estimated (000s)**	**Change (000s)**
Total Non-Shared Services	43,106	47,443	4,337
Total Shared Services (Incurred)	367	339	(28)
Total O&M	**43,473**	**47,782**	**4,309**

STORAGE (In 2021 $)			
	Estimated 2022 (000s)	**Estimated 2023 (000s)**	**Estimated 2024 (000s)**
Total CAPITAL	**206,195**	**163,279**	**146,550**

SoCalGas operates four storage fields: Aliso Canyon, La Goleta, Honor Rancho, and Playa del Rey. Gas Storage promotes the safety, integrity, design, operations, and maintenance of gas injection/withdrawal activities along with environmental and compliance functions for the four storage fields. Gas Storage also plans and constructs the capital investments necessary for the Company to meet customer demand.

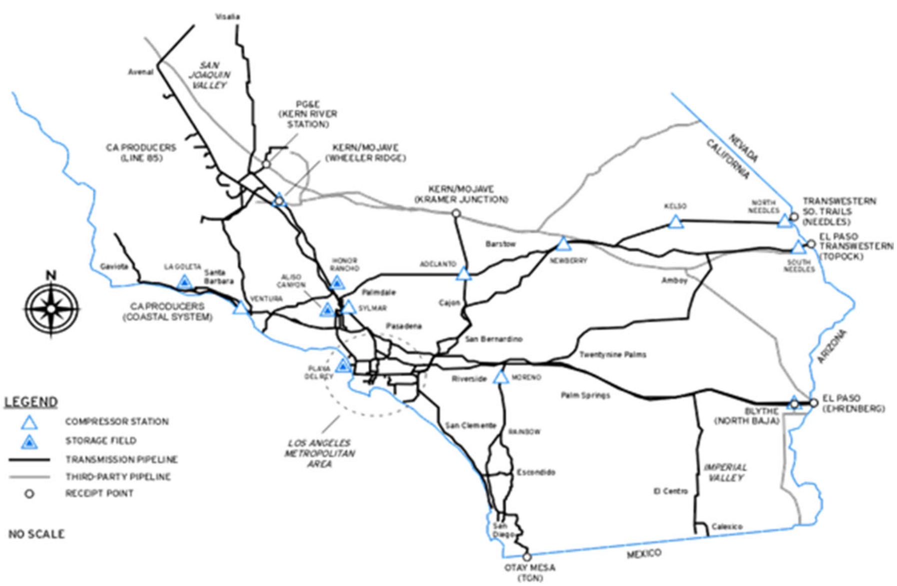
The geologic conditions of SoCalGas's storage fields, all former hydrocarbon-producing fields, and their location with respect to gas demand centers make them ideally suited for storage operations within the SoCalGas system. More information about storage fields is provided in Appendix D: Underground Storage of Natural Gas and is incorporated herein for reference.

Storage fields require the continual installation, maintenance, refurbishment, and replacement of heavy industrial equipment such as engines, compressors, electrical systems, wells, piping, gas processing components, and instrumentation. Natural gas is compressed onsite and is injected underground into the field reservoirs through piping networks and storage wells, typically during seasonal periods when gas consumption is low and supplies are ample. Storage gas is typically withdrawn and delivered to customers through SoCalGas's transmission and distribution system when customer demand exceeds flowing gas supplies.

For context, a diagram/map of the SoCalGas/San Diego Gas & Electric Company (SDG&E) gas system, including the locations of the four storage fields is shown in Figure BH-1 below.

FIGURE BH-1

SoCalGas/San Diego Gas and Electric Gas System



SoCalGas's four storage facilities are an integrated part of the energy infrastructure required to provide southern California businesses and residents with safe and reliable energy at a reasonable cost.

1. Aliso Canyon

Aliso Canyon is in Northern Los Angeles County and is the largest of SoCalGas's four storage fields. Aliso Canyon historically has a design working capacity of 86 Bcf.[1] Aliso Canyon began storage operations in 1973. Aliso Canyon currently has 69 injection/withdrawal/observation wells and is designed for a maximum withdrawal capability of approximately 1.8 Bcf per day.[2] Within the field, there are approximately 38 miles of gas injection, withdrawal, and liquid-handling pipelines that connect the storage wells to processing and compression facilities.

2. Honor Rancho

Honor Rancho is also located in Northern Los Angeles County with a design working capacity of approximately 27 Bcf. Honor Rancho began storage operations in 1975. Honor Rancho currently has 22 injection/withdrawal wells and is designed for a maximum withdrawal capability of 1.0 Bcf per day. Approximately 12 miles of pipelines connect the storage wells to processing and compression facilities.

3. Playa Del Rey

Playa Del Rey, located in central Los Angeles County, was placed into operation in 1942. It has a design working capacity of approximately 2.4 Bcf. Playa Del Rey currently has 30 active injection/withdrawal/observation wells. Approximately 11 miles of pipeline connect the storage wells to processing and compression facilities. Playa Del Rey is designed for a maximum withdrawal capability of 0.4 Bcf per day to meet residential, commercial, and industrial loads throughout the western part of Los Angeles, including oil refineries and power generators.

4. La Goleta

La Goleta is located in Santa Barbara County and provides service to the northern coastal area of the SoCalGas service territory. La Goleta began operation in 1941 and has a design working capacity of approximately 21 Bcf. La Goleta currently has 11 injection/withdrawal wells and two observation wells and is designed for a maximum withdrawal capability of 0.184

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[1] D.21-11-008, "Decision Setting the Interim Range of Aliso Canyon Storage Capacity at Zero To 41.16 Billion Cubic Feet" (restricting Aliso Canyon to a working gas range of 41.16 Bcf).

[2] Storage field withdrawal capacity is dependent on well availability and inventory.

Bcf per day. Approximately eight miles of pipelines connect the storage wells to processing and compression facilities.

B. PURPOSE OF JOINT TESTIMONY

The purpose of this joint direct testimony is to support the request for Gas Storage O&M and capital projects that support the Company's goals of maintaining and enhancing safety, system integrity, and reliability. The projects included in this testimony are related to storage wells, storage pipelines, storage purification systems, and storage auxiliary systems, along with projects associated with gas compressor stations.

Gas Storage, which consists of Aboveground Storage (AGS) and Underground Storage (UGS), and Construction are responsible for planning and executing projects and activities that support the ongoing reliability of SoCalGas's storage operations. Gas Storage is responsible for the routine operation, maintenance, integrity, and engineering functions associated with the use of facilities within the perimeter of the fields. This responsibility also extends beyond the plant perimeter in some areas, where gas injection and withdrawal pipelines and storage wells exist outside of the main storage field property. Gas Storage is also responsible for routine capital improvements within the storage fields related to storage wells, storage pipelines, storage gas compressor stations, storage purification systems, and storage auxiliary systems.

Construction provides centralized fiscal and operational management of large capital investments. Functions managed within this department include analysis and consultation 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.

C. 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

- Direct Testimony of Naim Jonathan Peress and Michelle Sim – Sustainability and Climate Policy, Ex. SCG-02, Chapters 1 and 2.
- Direct Testimony of Deana M. Ng – Risk Management Policy, Ex.SCG-03, Chapter 1.
- Direct Testimony of Gregory S. Flores and R. Scott Pearson – RAMP-to-GRC Integration, Ex.SCG-03/SDG&E-03, Chapter 2.

- Direct Testimony of Michael Franco – Fleet Services, Ex. SCG-18.
- Direct Testimony of Albert J. Garcia – Environment Services, Ex.SCG-20.
- Direct Testimony of Angel N. Le – Shared Services Billing, Shared Assets Billing, Segmentation, & Capital Reassignments, Ex. SCG -30.
- Direct Testimony of Patrick D. Moersen – Rate Base, Ex. SCG-31.
- Direct Testimony of Scott Wilder – Cost Escalation, Ex. SCG-36.
- Direct Testimony of Rae Marie Yu – Regulatory Accounts, Ex. SCG-38.
- Direct Testimony of Khai Nguyen – Post-Test Year Ratemaking, Ex. SCG-40.

D. ORGANIZATION OF TESTIMONY

Our testimony is organized as follows:

- Introduction;
- Risk Assessment Mitigation Phase (RAMP) Integration;
- Sustainability and Safety Culture;
- Non-Shared Costs –Underground Storage and Aboveground Storage;
- Shared Costs – Vice President;
- Capital Costs;
- Aliso Canyon Turbine Replacement (ACTR) Project Regulatory Account Cost Recovery; and
- Conclusion.

Workpapers to this testimony are:

- SCG 10-WP, O&M Workpapers.
- SCG 10-CWP, Capital Workpapers.

II. RISK ASSESSMENT MITIGATION PHASE (RAMP) INTEGRATION

Certain costs supported in our testimony are driven by activities described in SoCalGas's 2021 Risk Assessment Mitigation Phase (RAMP) Report (the 2021 RAMP Report). The 2021 RAMP Report presented an assessment of the key safety risks for SoCalGas and proposed plans for mitigating those risks. As discussed in the RAMP to GRC Integration testimony of Gregory S. Flores and R. Scott Pearson (Ex. SCG-03, Chapter 2), the costs of risk mitigation projects and programs were translated from the 2021 RAMP Report into the individual witness areas. In the course of preparing the Storage GRC forecasts, SoCalGas continued to evaluate the scope, schedule, resource requirements, and synergies of RAMP-related projects and programs. Therefore, the final presentation of RAMP costs may differ from the ranges shown in the 2021

RAMP Reports. Table BH-2 and Table BH-3 provide summaries of the RAMP-related costs supported in our testimony.

TABLE BH-2
Southern California Gas Company
Summary of RAMP O&M Costs

GAS STORAGE Summary of RAMP O&M Costs (in 2021 $, in 000s)			
	BY2021 Embedded Base Costs	**TY2024 Estimated Total**	**TY2024 Estimated Incremental**
RAMP Risk Chapter			
SCG-Risk-4 Incident Related to the Storage System (Excluding Dig-in)	11,542	47,363	35,821
SCG-Risk-5 Incident Involving an Employee	80	80	0
Total RAMP O&M Costs	**11,622**	**47,443**	**35,821**

TABLE BH-3
Southern California Gas Company
Summary of RAMP Capital Costs

GAS STORAGE Summary of RAMP Capital Costs (In 2021 $, in 000s)				
	2022 Estimated RAMP Total	**2023 Estimated RAMP Total**	**2024 Estimated RAMP Total**	**2022-2024 Estimated RAMP Total**
RAMP Risk Chapter				
SCG-Risk-4 Incident Related to the Storage System (Excluding Dig-in)	111,298	82,114	83,647	277,059
Total RAMP Capital Costs	**111,298**	**82,114**	**83,647**	**277,059**

A. RAMP Risk Overview

As summarized in Table BH-3 above, our testimony includes costs to mitigate the safety-related risks and cross-functional factors included in the RAMP Report. These risks and factors are further described in Table BH-4 below:

TABLE BH-4
Southern California Gas Company
RAMP Risk Chapter Description

Incident Related to Storage System	This risk relates to damage of storage systems including, wells, reservoirs and surface assets (compressors, laterals, oil/brine systems, etc.), which can result in consequences such as injuries, fatalities, or outages.

In development of this request, priority was given to these key safety risks (described in Table BH-4 above) to determine which currently established risk control measures were important to continue and what incremental efforts were needed to further mitigate these risks. Gas Storage's forecasts were influenced by the ongoing risk mitigation and preventive measures related to the continuous maintenance of storage field wells, pipelines, and equipment.

Identifying projects and programs that help to mitigate these risks manifest themselves in our testimony as adjustments to our forecasted costs. This adjustment process was used to identify both RAMP mitigation costs embedded as part of traditional and historic activities, as well as forecasted RAMP-incremental costs, which are also associated with mitigation strategies and correspond to historic or new activities. These can be found in our workpapers as described below. The general treatment of RAMP forecasting is described in the RAMP to GRC Integration testimony of Gregory S. Flores and R. Scott Pearson (Ex. SCG-03/SDG&E-03, Chapter 2).

B. GRC Risk Activities

Table BH-5 below provides a narrative summary of the forecasted RAMP-related activities that we sponsor in our testimony.

TABLE BH-5
Summary of RAMP Risk Activities

RAMP ID	Activity	Description
SCG-Risk-4-C01	Integrity Demonstration, Verification, and Monitoring Practices	SoCalGas performs integrity inspections on gas storage wells to verify the pressure containing capability of the wells, detect possible leaks, and identify metal loss anomalies in the tubing and casing.
SCG-Risk-4-C02	Well Abandonment and Replacement	Under certain circumstances, SoCalGas may abandon a well rather than continue to utilize it for gas storage operations. The decision to plug and abandon a well is driven by various factors including, but not limited to, well-specific information; location-specific information; deliverability; operation and maintenance history; and operational needs.
SCG-Risk-4-C05	Storage Field Maintenance	Aboveground operation and maintenance activities include pipeline patrols, inspections, corrosion control, and other maintenance on a regular basis throughout the year.
SCG-Risk-4-C06	Compressor Overhauls	Storage compressor units increase the pressure of natural gas so it can be injected into the underground reservoirs. Examples of equipment within this area include engines and high-pressure gas compressors. Periodic overhauls of this equipment are necessary to uphold safety, maintain or improve system reliability, extend equipment life, achieve environmental compliance, and meet required injection capacities.
SCG-Risk-4-C07	Upgrade to Purification Equipment	Upgrades to this equipment will allow SoCalGas to address potential safety issues related to uncontrolled releases due to equipment failures, maintain or improve reliability, meet regulatory and environmental requirements, and meet the required capacities and specifications of various purification systems.
SCG-Risk-5-C10	Workplace Violence Prevention Programs	Consists of either physical security, security planning, awareness, risk management, and incident management.

These activities are discussed further below in Sections IV, V, and VI, as well as in our workpapers. There are other RAMP activities related to Gas Storage facilities described in the Environment Services testimony of Albert J. Garcia (Ex. SCG-20). For additional information and a roadmap of the RAMP activities in this testimony, please refer to Appendices B and C, which contains a table identifying by workpaper the TY 2024 forecast dollars associated with activities in the 2021 RAMP Report that are discussed in this testimony.

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. Furthermore, for the incremental activities, a review was completed to determine if any portion of incremental activity was part of the workgroup's base forecast methodology. The result is what SoCalGas considers to be a true representation of incremental increases over the base year.

Our incremental request supports the ongoing management of these risks that could pose significant safety, reliability, and financial consequences.

C. Changes from RAMP Report

As discussed in more detail in the RAMP to GRC Integration testimony of Messrs. Pearson and Flores (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. The RAMP to GRC Integration testimony (Ex. SCG-03/SDG&E-03, Chapter 2) provides a complete list of the feedback and recommendations received and the Companies' responses.

Other than as discussed below, the RAMP-related activities described in my GRC testimony are consistent with the activities presented in the 2021 RAMP Report. General changes to risks scores or Risk Spend Efficiency (RSE) values are primarily due to changes in the Multi-Attribute Value Framework (MAVF) and RSE methodology, as discussed in the RAMP to GRC Integration testimony (Ex. SCG-03/SDG&E-03, Chapter 2).

Changes from the 2021 RAMP Report presented in my testimony, including updates to forecasts and the amount and timing of planned work, are summarized as follows:

- The Honor Rancho Compressor Modernization Project was identified as a mitigation (C23-T3: Honor Rancho Storage Field) to SCG-Risk-1 Incident Related to the High-Pressure System along with other transmission compressor modernization projects. After further evaluation, it has been determined this project should be considered a mitigation to the SCG-Risk-4 Incident Related to the Storage System.

III. SUSTAINABILITY AND SAFETY CULTURE

Sustainability at SoCalGas focuses on continuous improvement, innovation, and partnerships to advance California's climate objectives incorporating holistic and sustainable business practices and approaches. SoCalGas's sustainability strategy, ASPIRE 2045, integrates five key focus areas across the Company's operations to promote the public interest, and the wellbeing of utility customers, employees, and other stakeholders. Please refer to the Sustainability and Climate Change Policy testimony of Michelle Sim and Naim Jonathan Peress (Ex. SCG-02, Chapters 1 and 2) for a more detailed discussion of SoCalGas's sustainability and climate goals.

The activities described below and in Section VI in this testimony advance the state's climate goals and align with SoCalGas's sustainability priorities. Specifically, the proposal of the Regional Clean Air Incentives Market (RECLAIM) projects and the Honor Rancho Compressor Modernization project will drive progress in the areas of protecting the climate and improving air quality in the communities. The Honor Rancho Compressor Modernization ARE component also addresses the accelerating transition to clean energy.

A. Regional Clean Air Incentives Market (RECLAIM) Projects

The compressor RECLAIM projects, described in Section VI of this testimony, are compliance driven projects to meet South Coast Air Quality Management District's (South Coast AQMD) effort to sunset the RECLAIM program and transition RECLAIM equipment to command-and-control regulations based on Best Available Retrofit Control Technology (BARCT) assessments. To comply with South Coast AQMD Rule 1110.2 ("Emissions from Gaseous and Liquid Fueled Engines") and Rule 1100 ("Implementation Schedule for NOx Facilities"), these projects will reduce NOx emissions and contribute to the air quality ozone attainment goals set forth by California Air Resources Board (CARB) and Environmental Protection Agency (EPA).

B. Honor Rancho Compressor Modernization (HRCM) Project – Principal Component

The Honor Rancho Compressor Modernization (HRCM) Project, described in Section VI of this testimony, is a compliance driven project to comply with South Coast AQMD RECLAIM

Sunset requirements, Rule 1110.2[3] and Rule 1100[4]. Specifically, the South Coast AQMD approved Facility-Wide Engine Modernization Compliance Plan (FWEMCP) sets forth the approach to reduce permitted levels of criteria pollutant emissions. For details on HRCM Project emission reductions, refer to Appendix E – Honor Rancho Compressor Modernization Supplemental Project Description. Potential Greenhouse Gas (GHG) emission reductions may be enabled with installation and operation of the two new electric driven compressors when powered with renewable electricity.

C. Honor Rancho Compressor Modernization (HRCM) Project – Advanced Renewable Energy (ARE) Component

The Honor Rancho Compressor Modernization (HRCM) Project includes an ARE Component that supports California's climate and sustainability goals set forth by SoCalGas. The HRCM Project ARE Component, as currently designed, reduces GHG emissions and supports climate conservation goals as listed below:

- Blending green hydrogen with natural gas as the combustion fuel for the four new compressor gas lean-burn engines.
- Using green hydrogen as a fuel in SoCalGas company fleet vehicles replacing automotive conventional internal combustion engine (ICE), compressed natural gas (CNG) engines by fuel cell electric vehicles (FCEV).[5]
- Using green renewable electricity as the power source for HRCM Project ARE Component to produce green hydrogen.

For details on HRCM project ARE component emission reductions refer to Appendix E – Honor Rancho Compressor Modernization Supplemental Project Description.

Safety is foundational to SoCalGas and SoCalGas's sustainability strategy. As the nation's largest gas distribution utility, the safety of SoCalGas's customers, employees, contractors, system, and the communities served has been – and will remain – a fundamental value for the Company and is interwoven in everything SoCalGas does. This safety-first culture is embedded in every aspect of SoCalGas's business. The tradition of providing safe and reliable

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[3] SCAQMD Rule 1110.2, "Emissions from Gaseous- and Liquid-Fueled Engines" (Amended November 1, 2019).

[4] SCAQMD Rule 1100, "Implementation Schedule for NOx Facilities" (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.

[5] Direct Testimony of Michael Franco – Fleet Services (Ex. SCG-18).

service spans 150 years of the Company's history and is summarized in the SoCalGas Leadership Commitment statement, which is endorsed by the entire senior management team:

> *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 to "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. To learn about SoCalGas's overall safety approach please see the Safety & Risk Management Systems testimony of Neena M. Master (Ex. SCG-27).

Gas Storage and Construction follow SoCalGas's integrated approach to safety called the Safety Management System (SMS). 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. SoCalGas'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 SMS applies to all SoCalGas Gas Storage assets, as well as to all employees, from senior management to those on the frontline.

IV. NON-SHARED COSTS

A. Introduction

"Non-Shared Services" are activities that are performed by a utility solely for its own benefit. For purposes of this GRC, SoCalGas treats costs for services received from Corporate Center as non-shared Services costs, consistent with any other outside vendor costs incurred by the utility. Table BH-6 summarizes the total non-shared O&M forecasts for the listed cost categories.

TABLE BH-6
Southern California Gas Company
Non-Shared O&M Summary of Costs

Storage (2021 $)	2021 Recorded (in 000s)	2024 Estimated (in 000s)	Change (in 000s)
Underground Storage	$6,685	$4,888	($1,797)
Aboveground Storage	$36,421	$42,555	$6,134
Total Non-Shared Services	**$43,106**	**$47,443**	**$4,337**

B. Aboveground and Underground Storage

1. Description of Costs and Underlying Activities

SoCalGas operates four underground storage fields – Aliso Canyon, Honor Rancho, La Goleta, and Playa del Rey – as an essential part of its integrated transmission pipeline and distribution system. This interconnected system consists of high-pressure pipelines, compressor stations, and underground storage fields, designed to receive natural gas from interstate pipelines and local production sources. The integrated system enables deliveries of natural gas to customers or into storage field reservoirs, depending on system demands. SoCalGas uses its storage assets to efficiently meet gas balancing requirements. To satisfy these needs, the individual storage facilities act as "gas suppliers" or "consumers," depending upon the withdrawal or injection requirements as managed by Gas Control. Fluctuating demands may require storage operations to perform gas injection or withdrawal functions at any hour of the day, 365 days per year. Storage fields are continually staffed with operating crews and on-call personnel to support these critical 24/7 operations.

Figure BH-2 below illustrates the crucial role of storage in the delivery of safe, reliable gas service for energy consumers within Southern California during the fall and winter heating season.

Figure BH-2
Southern California Gas Company
System Send-out February 2022

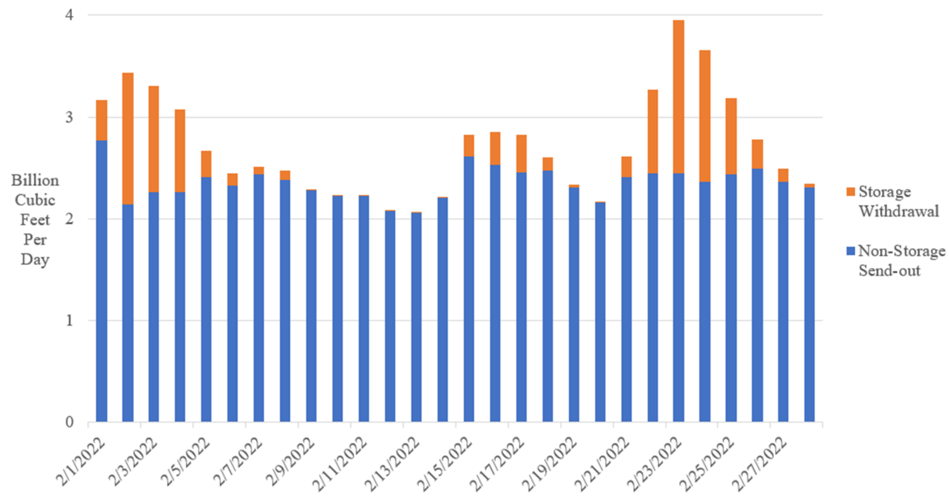

Figure BH-2 shows that SoCalGas Storage provided approximately 19% of the system send-out, or 5 Bcf, for a five-day period beginning on February 22, 2022. On February 23, 2022, storage delivered 1.51 Bcf or 38.2% of the gas consumed by residential, commercial, and industrial customers on this cold day. Had Gas Storage not been available, customer demand may not have been met, which highlights how critical Gas Storage is to energy reliability.

The reliance and dependency on underground storage to instantly supply the SoCalGas system with such volumes of gas over brief period of times due to extreme weather conditions occurring locally or out of state, unforeseen pipeline maintenance, or from the temporary reduction of interstate supplies for other reasons, places demand on the wells, pipelines, and other storage facilities that must support the withdrawal demands. The reliance on the availability of Storage gas requires continuous maintenance activities and ongoing investments on the wells, pipelines, and other storage facilities that must support the withdrawal demands, to meet customer demands.

Gas Storage includes both operational and technical support groups that provide services essential to operating and maintaining the safety, integrity, and reliability of this critical gas delivery assets. While each storage field has its own unique operating conditions and characteristics, there are common support activities performed on a regular basis which make up the bulk of routine expenses presented in this testimony.

In general, the activities are performed in compliance with regulatory requirements including, but not limited to:

- CalGEM Title 14, C.C.R. §1726 et seq. – Requirements for California Underground Gas Storage Projects: These regulations include requirements and standards such as well construction, mechanical integrity testing, risk management, emergency response plans, data management, monitoring and inspecting, wellhead and valve maintenance, and well decommissioning. Appendix D shows a "downhole" schematic and a "wellhead" diagram for illustrative purposes. In addition, proposed new Article 5 (§1726 et seq.) requirements for California Underground Storage would require underground gas storage operators to submit a chemical inventory and consider additional risk mitigation strategies.
- CalGEM Title 14, C.C.R. §1724.5 et seq. – UIC Regulations: These regulations include requirements and standards addressing well construction, mechanical integrity testing, monitoring and inspecting, wellhead, additional geologic and reservoir data, and safety precautions.
- U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) revised the Federal pipeline safety regulations, Title 49, C.F.R. § 192.12: These regulations address downhole facilities, including wells, wellbore tubing, and casing.
- CARB Oil and Gas Rule—Title 17, C.C.R. §95665 et seq.: These regulations address Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities.

The activities, which would be impacted by the requirements listed above, can be summarized as follows:

Management, Supervision, Training, and Engineering

These activities cover the administrative salaries and engineering costs associated with the operation of the underground storage fields. This includes funding for studies in connection with reservoir operations and wells necessary to maintain the integrity of the storage system. Leadership, safety, technical training, operator qualification, and quality assurance functions are other critical components of this grouping.

Wells and Pipelines

These costs include salaries and expenses associated with routinely operating storage reservoirs such as operating wells, well testing and pressure surveys, and wellhead and down hole activities for contractors that perform subsurface leakage surveys on injection/withdrawal facilities. Other expenses include the costs associated with patrolling field lines, lubricating valves, cleaning lines, disposing of pipeline drips, injecting corrosion inhibitors, pressure monitors, and maintaining alarms and gauges.

Equipment Operation and Maintenance

These costs include salaries and expenses for maintenance work performed on gas compressors and other mechanical equipment. This ranges from basic repair to a major overhaul of a compressor engine. Other maintenance functions include work on measurement and regulating equipment, starting and monitoring engines, lubricating machinery, environmental compliance, checking pressures, working on equipment used for conditioning extracted gas, and wastewater disposal systems. Lastly, this area includes costs for chemicals, consumables (such as filters), fuel, and electrical power used to operate storage reservoirs and compressors.

Structural Improvements, Rents, and Royalties

These costs include salaries and expenses for maintenance work performed on compressor station structures at storage facilities along with property rental costs. Royalty payments associated with gas wells and land acreage located at storage facilities are also included.

Data and Records Management

These activities are associated with maintaining data and records related to storage assets and operations. Typical types of work performed include work order authorizations, surveys and documentation of wells, pipelines, topography, roads, rights-of-way, various infrastructure and easements boundary verification, and creation and maintenance of maps related to underground zones/rights. In addition, the work activities related to internal and external audits and data requests are performed.

1. Forecast Method

Due to the variability in work associated with Gas Storage operations, both labor and non-labor forecasts used a zero-based methodology to determine TY 2024 O&M. The non-labor forecast is based on knowledge of experienced personnel at the storage fields and quotes for necessary materials and equipment. The labor forecast is based on both the on-site field personnel and business support related to Gas Storage operations and projects.

2. Cost Drivers

The cost drivers behind these forecasts are based on safety, risk management, and compliance with state and federal regulations. The primary drivers for the TY 2024 GRC are the

CalGEM Requirements for California Underground Gas Storage Projects (Title 14, C.C.R. §1726 et seq.) and PHMSA Underground Natural Gas Storage regulations (Title 49, C.F.R. § 192.12). CalGEM UIC requirements and other federal, state, and local agency requirements are also drivers. Increasingly stringent regulations, operator qualification requirements, enhanced employee training, chemicals, consumables, records management functions, increased assessment fees and increased audit activities all contribute to the upward incremental costs. Storage facilities consist of complex equipment located above and below ground. The volume of maintenance work, along with its complexity and the limited availability of replacement components on equipment such as the compressors, continues to push costs consistently higher on an annual basis.

V. SHARED COSTS

A. INTRODUCTION

As described in the Shared Services Billing, Shared Assets Billing, Segmentation, & Capital Reassignments testimony of Angel N. Le and Paul D. Malin (Ex. SCG-30/SDG&E-34), Shared Services are activities performed by a utility shared services department (i.e., functional area) for the benefit of: (i) SDG&E or SoCalGas, (ii) Sempra Energy Corporate Center, and/or (iii) any affiliate subsidiaries. The utility providing Shared Services allocates and bills incurred costs to the entity or entities receiving those services.

Table BH-7 summarizes the total shared O&M forecasts for the listed cost categories.

TABLE BH-7
Southern California Gas Company
Shared O&M Summary of Costs

Storage (in 2021 $, in 000s)	**2021 recorded**	**2024 Estimated**	**Change**
Total Shared Services (Incurred)	$367	$339	($28)
Total O&M	**$367**	**$339**	**($28)**

We are sponsoring the forecasts on a total incurred basis, as well as the shared services allocation percentages related to those costs. Those percentages are presented in my shared services workpapers, along with a description explaining the activities being allocated (Ex. SCG 10-WP/Bittleston). The dollar amounts allocated to affiliates are presented in our Shared

Services Billing, Shared Assets Billing, Segmentation, & Capital Reassignments testimony of Angel N. Le and Paul D. Malin (Ex. SCG-30/SDG&E-34).

B. VICE PRESIDENT OF TRANSMISSION AND STORAGE

1. Description of Costs and Underlying Activities

Within the Transmission and Storage group there is the leadership cost center 2200-2629, which represents the Vice President's activities. The Vice President activities extend beyond Storage since the Vice President is also responsible for the Transmission, and Gas Control & System Planning. The Vice President's expenses include technical and financial support, as well as policy issuance to successfully staff the operation and further the goals of the company.

2. Forecast Method

The forecast method developed for this cost category is a three-year average. This method is most appropriate because the expected costs are expected to remain consistent to what has been experienced in the last three years.

3. Cost Drivers

The cost drivers behind these forecasts are the provided leadership and guidance of the Vice President for the organizations of Storage, Transmission, and Gas Control & System Planning and are therefore applicable here as well.

VI. CAPITAL

A. INTRODUCTION

The costs described in this section cover the capital expenditures estimated for Gas Storage operations. The intent behind the capital expenditure plan is to provide safe, reliable delivery of natural gas to customers at reasonable costs. These investments also enhance the integrity and efficiency of operations while maintaining compliance with applicable regulatory and environmental regulations. Table BH-8 below summarizes the total capital Storage forecasts for 2022, 2023, and 2024. The 2024 capital request of $146.550 million was derived using a zero-based forecast methodology. Additional details on the categories and costs that comprise the total capital forecasts are presented in the sections below.

Table BH-8 summarizes the total capital forecasts for 2022, 2023, and 2024.

TABLE BH-8
Southern California Gas Company
Capital Expenditures Summary of Costs

Storage (in 2021 $, in 000s)			
Budget Codes	**2022 Estimated**	**2023 Estimated**	**2024 Estimated**
Compressors 411	16,439	16,122	15,342
Wells 412	83,188	58,000	57,000
Pipelines 413	30,126	25,532	28,946
Purification 414	11,670	7,991	11,304
Auxiliary Equipment 419	64,772	55,634	33,958
Total	**206,195**	**163,279**	**146,550**

B. STORAGE COMPRESSORS

This category includes costs associated with routine capital improvements for compressors located at storage fields. Storage compressor units increase the pressure of natural gas so it can be injected into the underground reservoirs. Examples of equipment within this area include engines, high pressure gas compressors, electric drive compressors, compressed air system equipment, fire suppression systems, gas scrubbers, auxiliary systems, and related control instruments. This category includes the necessary capital for maintenance, replacements, and upgrades of the various storage field compressors to maintain and enhance reliability, extend equipment life, achieve environmental compliance, and to meet the required injection capacities. Table BH-9 below summarizes the cost forecasts for storage compressors.

TABLE BH-9
Southern California Gas Company
Capital Expenditures Summary of Costs

Storage (in 2021 $, in 000s)			
Storage Compressors	**Estimated 2022**	**Estimated 2023**	**Estimated 2024**
Aliso Canyon Gas Compressor	6,491	5,822	3,589
Honor Rancho Gas Compressor	2,560	1,886	1,886
La Goleta Gas Compressor	1,274	3,181	1,127
PDR Gas Compressor	2,065	1,694	477
Blanket Projects All Field	4,051	3,541	8,265
Total	**16,441**	**16,124**	**15,344**

1. Description

Forecasts of capital costs for 2022, 2023, and 2024 are $16.441M, $16.124M, and $15.344M, respectively. Storage compressor equipment needs continued capital maintenance as items continue to age and wear out. SoCalGas plans to replace and upgrade compressor equipment through smaller projects with individual cost estimates that do not justify the preparation of individual workpapers. These smaller projects typically include capital maintenance of equipment where parts are no longer manufactured. These projects and cost estimates vary from tens of thousands to several hundred thousands of dollars. Projected work includes, but is not limited to, overhauls, rebuilds, major equipment replacements, and upgrades to critical assets such as gear boxes, compressors, and engines. These smaller compressor maintenance projects promote safety and help avoid equipment shutdowns, which can threaten continuity of supply. Specific details regarding Compressor Station projects over $2.5M are found in my capital workpapers (Ex. SCG 10-CWP).

2. Forecast Method

Due to the annual variability of capital maintenance required, a zero-based methodology was used to develop the estimate. The forecast method is based on knowledge of experienced personnel at the storage fields, major equipment and material vendor quotes, and previously completed similar-sized project work.

3. Cost Drivers

The underlying major cost drivers for these capital projects relate to compliance requirements and project schedules. The costs are based on equipment and material pricing, qualified contractor availability and associated contractor rates.

C. COMPRESSOR STATION MODERNIZATION

1. Honor Rancho Compressor Modernization (HRCM) Project

Future Major Projects	Forecast 2022 (in 000s)	Forecast 2023 (in 000s)	Forecast 2024 (in 000s)	Forecast 2025 (in 000s)	Forecast 2026 (in 000s)	Forecast 2027 (in 000s)
Honor Rancho Compressor Modernization	3,663	23,251	112,732	241,869	127,558	18,202

2. Description

The HRCM Project consists of two components; the Principal component and the Advanced Renewable Energy (ARE) component. The forecast for the Principal component for 2022, 2023, and 2024 are \$3.7MM, \$23.3MM, and \$112.7MM, respectively. SoCalGas is prioritizing the execution of the Principal component to comply with South Coast AQMD Rules 1110.2 and 1100. SoCalGas estimates the Principal component will be placed into service in 2027 followed by 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 Ratemaking proposal sponsored by Khai Nguyen (Ex. SCG-40). There are no revenue requirements for the ARE Component in this General Rate Case. The HRCM Project scope is summarized below and a Supplemental Project Description containing greater project detail is provided as Appendix E to this testimony.

The Honor Rancho Storage Field facility plays a vital role in the delivery of natural gas to millions of residential, commercial, and industrial customers throughout Southern California. Currently, the Honor Rancho storage field compression capacity is provided by five obsolete Enterprise (Delaval) HVA16C reciprocating units that are reaching the end of their useful life. The compressor trains were purchased in 1975, and the Delaval Company went out of business in 1989, which resulted in parts becoming difficult to find or virtually non-existent.

The HRCM Project was introduced in the test year 2019 GRC[6] and while there was no revenue requirement represented (because the Project would not be in service in the test year), it was noted the HRCM Project is ongoing and capital expenditure recovery would be presented in a future GRC. In the test year 2019 GRC Decision, the Commission recognized the importance of the Project and the role of compressor stations in maintaining operational reliability and safety of the gas system.[7] The HRCM Project configuration presented in the test year 2019 GRC has evolved to align with emissions compliance requirements finalized since that time. Notable HRCM Project design improvements are associated with the number and type of compressors, including electric motor driven compressors, as well as the addition of the ARE component.

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6 Application (A.) 17-10-008, SCG-207 - Joint Rebuttal Testimony of Michael A. Bermel and Beth Musich (Gas Transmission), June 18, 2018, at MAB/EAM-C-1 - MAB/EAM-D-3.

7 Decision (D.)19-90-051 at 116-117.

SoCalGas is collaborating 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, as well as to obtain and address feedback regarding our operations and pending project.

SoCalGas completed the Front-End Engineering Design (FEED) of the HRCM Project, including the Principal and ARE components, in March 2022. SoCalGas plans to execute the HRCM Project in a phased manner with a focus on the Principal component followed by the ARE component. The Engineering Procurement and Construction (EPC) phase for the Principal component is estimated to be initiated in 2023 and is anticipated to be placed into service in 2027. The EPC phase for the ARE component is anticipated to begin in 2024 and be placed into service in 2028.

The Principal component of the HRCM Project includes the installation of new compression equipment to comply with South Coast AQMD's sunset of its cap-and-trade program to a command-and-control system under SCAQMD Rule 1110.2[8] and Rule 1100.[9] SoCalGas received South Coast AQMD approval in November 2021 for the Facility-Wide Engine Modernization Compliance Plan (FWEMCP) submitted to South Coast AQMD as required under Rule 1100(d)(7).[10] The project scope satisfies the Rule 1100(d)(7) provision for the FWEMCP by committing to replace or remove all existing compressor gas lean-burn engines and install replacement units with at least 20% of the replaced horsepower with zero emission technology (i.e., two new electric driven compressors). To implement the FWEMCP, SoCalGas will submit a Permit to Construct (PTC) application package to South Coast AQMD with specific information about the equipment.

The Principal component of the HRCM Project includes the installation of four new gas engine driven compressors, the installation of two new electric motor driven compressors, and associated compressor appurtenances, instrumentation, and controls. Two existing natural gas

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8 SCAQMD Rule 1110.2, "Emissions from Gaseous- and Liquid-Fueled Engines" (Amended November 1, 2019).

9 SCAQMD Rule 1100 "Implementation Schedule for NOx Facilities" (Adopted December 7, 2018 and Amended January 10, 2020).

10 SCAQMD Rule 1110(d)(7), "Facility-Wide Engine Modernization Compliance Plan."

injection and withdrawal wells will need to be plugged and abandoned at the facility to accommodate the placement of a new compressor building to house the new compressor assets. Upon commissioning of the new compressor assets, SoCalGas will decommission the five existing compressors.

The Principal component of the HRCM Project also includes the installation of a microgrid comprised of super capacitor and/or battery energy storage system and a system of solid oxide fuel cells (SOFC) to generate electricity to support auxiliary and administrative electrical loads while reducing the need for grid purchase of electricity.

The HRCM Project ARE Component includes several features. Green hydrogen equipment such as electrolyzers, storage vessels, blending equipment, and a green hydrogen fueling station for fleet vehicles will be installed. The electrolyzers will be powered through 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.

Modernization of Honor Rancho storage field's compression assets will reduce emissions, allow SoCalGas to maintain compliance with South Coast AQMD's emissions rules, reduce peak grid electricity demand, and maintain the operational reliability of natural gas injection in the field. The HRCM Project demonstrates SoCalGas's mission to become the cleanest, safest, and most innovative energy company in America, it supports Energy Upgrade California®, and deploys modern technology to help achieve California's climate goals.

The specific details regarding HRCM Project are included in this testimony as Appendix E - Honor Rancho Compressor Modernization Supplemental Project Description.

3. Description of RAMP Mitigations

TABLE CHB-10
RAMP Activity Capital Forecasts by Workpaper[11]
In 2021 Dollars ($000s)

Workpaper	RAMP Chapter	RAMP ID	Description	2022 Estimated RAMP Total	2023 Estimated RAMP Total	2024 Estimated RAMP Total	GRC RSE

[11] As mentioned in the Description of the HRCM, this project is in the Post-Test Year proposal sponsored by Khai Nguyen (Ex. SCG-40). Costs shown are just through TY 2024.

See Appendix E	SCG-Risk-4	New 01*	Honor Rancho Compressor Station Modernization	$3,663	$23,251	$112,732	0* *

* The Risk has been reclassified under SCG-Risk-4: Storage System/Honor Rancho Compressor Modernization
* * An RSE (Risk Spend Efficiency) will be calculated and submitted according to the Commissioner's March 30, 2022, Ruling.

The Principal component of the HRCM Project involves the installation of new storage compressor units. The installation of these new storage compressors will benefit the Honor Rancho Storage Field by incorporating modern safety features, achieving environmental compliance, and promoting operational reliability. This is aligned with mitigating SCG Risk-4 Incident Related to the Storage System. The new compressors will reduce the likelihood of mechanical failures of components, such as camshafts, heads, pistons, valves, bearings, and gaskets, that could result in the release of natural gas inside the compressor building or impede the reliability of natural gas injection and withdrawal capability at the field. The existing five compressors, which are obsolete and hard to find replacement parts will be decommissioned.

a. Forecast Method

The forecast method developed 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, similar-sized project work.

b. Cost Drivers

The underlying major cost drivers for these capital projects relate to compliance requirements and project schedules. The costs are based on equipment and material pricing, qualified contractor availability, and associated contractor rates.

D. STORAGE WELLS

1. Description

The forecast for storage wells for 2022, 2023, and 2024 are $83.2 million, $58.0 million, and $57.0 million, respectively. This category includes costs associated with replacing components on existing wells and the design, drilling, and completion of replacement wells for the injection and withdrawal of natural gas and reservoir observation purposes. This includes well workover contractors (major well work), drilling contractors, and component materials such as tubing, casing, valves, pumps, and other down-hole equipment. Table BH-11 below summarizes the capital cost forecasts for this category.

TABLE BH-11
Southern California Gas Company
Storage Wells Summary of Costs

Storage (in 2021 $, in 000s)			
Storage Wells	**Estimated 2022**	**Estimated 2023**	**Estimated 2024**
Well Replacements	45,853	20,631	13,948
Well Plug & Abandon	29,475	35,965	36,006
Well Workover	7,860	1,405	7,046
Total	**83,188**	**58,001**	**57,000**

This category is further described using the following subcategories:

- Well Replacements
- Well Plug & Abandon
- Well Workovers

2. Well Replacements

a. Description

The forecasts for well replacements are $45.853 million, $20.631 million, and $13.948 million for 2022, 2023, and 2024, respectively. Approximately seventy wells were abandoned from 2016 to 2020. SoCalGas plans to drill new wells to replace wells abandoned for various reasons including, but not limited to, wells that are low producing and have high operating costs and those that do not meet integrity testing requirements or conform to recent construction standards. With modern well design and completion techniques, opportunities exist to reduce the number of storage wells by drilling new replacement wells in a manner that may allow for better than a one-for-one replacement. Depending on the storage field and its geology, a newly drilled and completed replacement well is likely to provide the replacement deliverability of two or more existing older wells, which has the potential to reduce the overall storage well count and operating expenses. These projects include locating and preparing drill sites, procuring services and materials, and drilling and completing new replacement storage wells. The anticipated numbers of replacement wells are as follows:

- 2022 - 2024 – Six Storage Wells

This work is required to replace deliverability from existing wells and wells that have been abandoned. Replacing wells with new higher deliverability wells, and eliminating higher cost wells over time, has the potential to reduce the Company's long-term operating costs (e.g., reducing the need for mitigation such as gravel pack capital projects). Specific details regarding storage well replacements are found in my capital workpapers (Ex. SCG-10-CWP).

b. Forecast Method

Due to the annual variability of capital maintenance required, a zero-based methodology was used to develop the estimate. The forecast method is based on knowledge of experienced personnel at the storage fields, major equipment and material vendor quotes, and previously completed similar-sized project work.

c. Cost Drivers

The underlying cost drivers for these capital projects relate to the highly specialized nature of work performed on high pressure wells and the necessarily skilled workforce and equipment employed. The costs are based on equipment and material pricing, qualified contractor availability and associated contractor rates.

3. Well Plug & Abandon

a. Description

The cost in for well plug and abandonments are forecasted to be $29.475 million, $35.965 million, and $36.006 million, for 2022, 2023, and 2024, respectively. SoCalGas plans to abandon wells that have high operating costs and have a decreased or lack of productivity. In addition, some of the abandonments are for the removal of wells and their operations from environmentally sensitive areas or locations outside the storage field. Projected costs include the material and services required to plug and abandon the wells in a manner that meets or exceeds CalGEM requirements. Specific details regarding well abandonment projects are found in the capital workpapers (Ex. SCG-10- CWP).

b. Forecast Method

Due to the annual variability of capital maintenance required, a zero-based methodology was used to develop the estimate. The forecast method is based on knowledge of experienced personnel at the storage fields, major equipment and material vendor quotes, and previously completed similar-sized project work.

c. Cost Drivers

The underlying cost drivers for these capital projects relate to the highly specialized nature of work performed on high pressure gas wells and the necessarily skilled workforce and equipment employed. The costs are based on equipment and material pricing, qualified contractor availability and associated contractor rates.

4. Well Workovers

a. Description

The forecasts for well workovers are $7.86 million, $1.41 million, and $7.05 million for 2022, 2023, and 2024, respectively. Well workovers are critical maintenance activities performed on storage wells to promote safety and integrity, and to maintain withdrawal and injection capacity. If well workovers are not completed, wells may need to be taken out of service for various conditions including wellhead upgrades, damaged liners, production equipment replacement, production of reservoir sand, or fluid encroachment into the storage reservoir, leading to a diminished number of wells available for withdrawal/injection. SoCalGas plans to complete eleven well workovers at the storage fields. The specific details regarding well workovers are found in my capital workpapers (Ex. SCG-10 -CWP).

b. Forecast Method

Due to the annual variability of capital maintenance required, a zero-based methodology was used to develop the estimate. The forecast method is based on knowledge of experienced personnel at the storage fields, major equipment and material vendor quotes, and previously completed similar-sized project work.

c. Cost Drivers

The underlying cost driver for this capital project is related to the eleven well workovers planned between 2022 and 2024 and the availability of workover rigs and the skilled field and technical workforce required to produce and analyze data and for the specialized equipment to be employed. The costs are based on equipment and material pricing, qualified contractor availability and associated contractor rates.

E. STORAGE PIPELINES

This category includes costs associated with upgrading or replacing failed field piping and related components.

The forecasts for this work are summarized in Table BH-12 below.

TABLE BH-12
Southern California Gas Company
BC 413 Storage Pipelines

Storage (in 2021 $, in 000s)			
BC 413 Storage Pipelines	Estimated 2022	Estimated 2023	Estimated 2024
AC Pipeline work	1,382	1,629	4,799
HR Pipeline Work	6,540	1,447	1,112
LG Pipeline Work	1,237	161	853
PDR Pipeline Work	1,878	1,226	1,025
Pipeline Laterals	17,215	17,215	17,217
Blanket Pipeline Work	1,875	3,854	3,940
Total	30,127	25,532	28,946

5. Pipelines - Projects

a. Description

The costs in are estimated to be $30.127 million, $25.532 million, and $28.946 million for 2022, 2023, and 2024, respectively. This category includes pipe replacements, expansions, upsizing, supports, corrosion protection, and other work related to piping systems. These upgrades to station piping will help maintain injection and deliverability capacity. Specific details regarding pipeline projects over $2.5M are found in my capital workpapers (Ex. SCG-10-CWP).

b. Forecast Method

Due to the annual variability of capital maintenance required, a zero-based methodology was used to develop the estimate. The forecast method is based on knowledge of experienced personnel at the storage fields, major equipment and material vendor quotes, and previously completed similar-sized project work.

c. Cost Drivers

The underlying cost drivers for this capital category relate to the purchase price of valves and their installation costs, specialized work performed on high pressure gas lines, and the skilled workforce and equipment employed for replacements.

F. STORAGE PURIFICATION SYSTEMS

This budget category forecasts costs associated with equipment used primarily for the removal of impurities from, or the conditioning of, natural gas withdrawn from storage. Examples of equipment included in this area are dehydrators, coolers, scrubbers, boilers, pumps, valves, piping, power supply, controls, and instrumentation. Table BH-13 below summarizes the forecasts of capital expenditures for Storage Purification Systems.

TABLE BH-13
Southern California Gas Company
BC 414 Purification Equipment

Storage (in 2021 $, in 000s)			
BC 414 Purification Equipment	Estimated 2022	Estimated 2023	Estimated 2024
AC Purification Equip	4,217	670	89
HR Purification Equip	373	106	106
LG Purification Equip	1,813	652	27
PDR Purification Equip	5,179	3,259	2,321
Blanket Purification Equip	89	3,305	8,762
Total	11,671	7,992	11,305

6. Purification – Projects

d. Description

The costs for purification in are estimated to be $11.671 million, $7.991 million, and $11.305 million for 2022, 2023, and 2024, respectively. This includes work on various equipment including dehydrators, coolers, scrubbers, boilers, pumps, valves, piping, power supply, controls, and instrumentation. Upgrade of purification equipment will help maintain deliverability capacity and allow the station to better achieve water content standards in pipeline-quality natural gas. Specific details regarding purification projects over $2.5 million are found in my capital workpapers (Ex. SCG -10-CWP).

e. Forecast Method

Due to the annual variability of capital maintenance required, a zero-based methodology was used to develop the estimate. The forecast method is based on knowledge of experienced personnel at the storage fields, major equipment and material vendor quotes, and previously completed similar-sized project work.

f. Cost Drivers

The underlying cost drivers for this capital category relate to the purchase price of valves and their installation costs and specialized work performed on high pressure gas piping. The costs are based on equipment and material pricing, qualified contractor availability and associated contractor rates.

G. STORAGE AUXILIARY SYSTEMS

This budget code includes work on distinct types of field equipment not included in other budget codes such as instrumentation, measurement, controls, electrical, drainage, infrastructure, safety, security, and communications systems. The costs associated with this work are summarized in Table LB-14 below.

TABLE BH-14
Southern California Gas Company
BC 419 Auxiliary Equipment

Storage (in 2021 $, in 000s)			
BC 419 Auxiliary Equip	Estimated 2022	Estimated 2023	Estimated 2024
AC Aux Equip Projects	15,930	12,432	8,431
HR Aux Equip Projects	8,096	4,896	3,447
PDR Aux Equip Projects	5,907	3,867	1,965
LG Aux Equip Projects	6,094	7,799	993
Aux Equip Blanket	2,461	2,594	13,614
AC Reclaim Lean Burn	4,746	9,691	3,093
AC Reclaim Rich Burn	2,869	2,189	0
HR Reclaim	4,603	854	0
PDR Reclaim	12,001	11,312	2,414
AC Isolation Valves	2,065	0	0
Total	64,772	55,634	33,957

1. Auxiliary Systems Projects

a. Description

The costs of this project are estimated to be $64.772 million, $55.634 million, and $33.958 million for 2022, 2023, and 2024, respectively. SoCalGas plans to perform necessary work to alleviate instrumentation, Supervisory, Control and Data Acquisition (SCADA), measurement, controls, electrical, cyber security, and other auxiliary systems support issues. This can include work on various equipment including coolers, scrubbers, boilers, pumps, valves, piping, and power supplies. The upgrade of auxiliary systems will help maintain safety, security, deliverability, and reliability in the delivery of pipeline-quality natural gas. Specific details regarding purification projects over $3.5 million are found in my capital workpapers (Ex. SCG-10-CWP).

2. Forecast Method

Due to the annual variability of capital maintenance required, a zero-based methodology was used to develop the estimate. The forecast method is based on knowledge of experienced personnel at the storage fields, major equipment and material vendor quotes, and previously completed similar-sized project work.

b. Cost Drivers

The underlying major cost drivers for these capital projects relate to compliance requirements and project schedules. The costs are based on equipment and material pricing, qualified contractor availability and associated contractor rates.

3. Aliso Canyon (AC) Regional Clean Air Incentive Market (RECLAIM) Lean-Burn

a. Description

The forecast for AC RECLAIM – Lean Burn Project for 2022, 2023, and 2024 are $4.746 million, $ 9.691 million, and $3.093 million, respectively. SoCalGas anticipates the project will be placed into service in Q2 2024.

The purpose of the AC RECLAIM Project is to comply with the new South Coast AQMD requirements of Rule 1110.2[12] and Rule 1100[13] associated with the sunset of the cap-and-trade program to a command-and-control system. Compliance will be achieved by retrofitting the five existing compressor gas lean-burn engines with modern emission control systems, specifically by replacement of the existing oxidation catalysts that control CO and VOC with dual function catalysts to control NOx in addition to CO and VOC emissions. These modifications will allow the existing engines to achieve the new NOx, CO, and VOC emissions limits of 11, 250, and 30 parts per million (ppmvd) at 15% oxygen, respectively.

The specific details of AC RECLAIM – Lean Burn Project can be found in Appendix F – RECLAIM Supplemental Project Description.

b. Forecast Method

The forecast method developed 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, similar sized project work.

c. Cost Drivers

The underlying major cost drivers for this capital project relates to compliance requirements and project schedule. The costs are based on equipment and material pricing, qualified contractor availability, and associated contractor rates.

4. Aliso Canyon (AC) Regional Clean Air Incentive Market (RECLAIM) Rich-Burn

a. Description

The forecast for AC RECLAIM – Rich Burn Project for 2022, 2023, and 2024 are $2.869 million, $2.189 million, and $0.0 million, respectively. SoCalGas anticipates the project will be placed into service in Q3 2023.

The purpose of the AC RECLAIM Project is to comply with the new South Coast AQMD requirements of Rule 1110.2 associated with the sunset of the cap-and-trade program to a command-and-control system. Compliance for four existing rich-burn generator engines will

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12 SCAQMD Rule 1110.2 Emissions from Gaseous- and Liquid-Fueled Engines, (Amended November 1, 2019).

13 SCAQMD Rule 1100 Implementation Schedule for NOx Facilities, (Adopted December 7, 2018 and Amended January 10, 2020).

be achieved by replacing existing Non-Selective Catalytic Reduction (NSCR) catalyst and associated catalyst housing with new in-kind NSCR catalysts and housings. Additionally, Continuous Emissions Monitoring System (CEMS) analyzers to monitor NOx, CO, and CO_2 will be installed. These modifications will enable compliance with NOx, CO, and VOC emissions limits of 11, 250, and 30 parts per million (ppmvd) at 15% oxygen, respectively.

The specific details of AC RECLAIM – Rich Burn Project can be found in Appendix F – RECLAIM Supplemental Project Description.

b. Forecast Method

The forecast method developed 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, similar sized project work.

c. Cost Drivers

The underlying major cost drivers for this capital project relates to compliance requirements and project schedule. The costs are based on equipment and material pricing, qualified contractor availability, and associated contractor rates.

5. Honor Rancho (HR) Regional Clean Air Incentive Market (RECLAIM)

a. Description

The forecast for HR RECLAIM Project for 2022, 2023, and 2024 are $4.6 million, $0.9 million, and $0.0 million, respectively. SoCalGas anticipates the project will be placed into service in Q1 2023.

The purpose of the HR RECLAIM Project is to comply with the South Coast Air Quality Management District (South Coast AQMD) requirements of Rule 1110.2 associated with the sunset of the cap-and-trade program to a command-and-control system. This compliance for three existing generator rich-burn engines and two existing wet gas compressor engines will be achieved by replacement of existing NSCR catalyst and associated catalyst housings with new in-kind NSCR catalysts and housings. Additionally, CEMS analyzers to monitor NOx, CO, and CO_2 will be installed on the three existing rich-burn engine generators. These modifications will enable compliance with NOx, CO, and VOC emissions limits of 11, 250 and 30 parts per million (ppmvd) at 15% oxygen, respectively.

The specific details of HR RECLAIM Project can be found in Appendix F – RECLAIM Supplemental Project Description.

b. Forecast Method

The forecast method developed 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, similar sized project work.

c. Cost Drivers

The underlying major cost drivers for this capital project relates to compliance requirements and project schedule. The costs are based on equipment and material pricing, qualified contractor availability, and associated contractor rates.

6. Playa Del Rey (PDR) Regional Clean Air Incentive Market (RECLAIM)

a. Description

The forecast for PDR RECLAIM Project for 2022, 2023, and 2024 are $12.0 million, $11.3 million, and $2.4 million, respectively. SoCalGas anticipates the project will be placed into service in Q2 2024.

The purpose of the PDR RECLAIM Project is to comply with the new South Coast AQMD requirements of Rule 1110.2 and Rule 1100 associated with the sunset of the cap-and-trade program to a command-and-control system. Compliance will be accomplished by improving and stabilizing combustion in the three Cooper compressor engines and installing new SCR units on the engine exhausts to reduce NOx emissions along with new CEMS.

The specific details of PDR RECLAIM Project can be found in Appendix F – RECLAIM Supplemental Project Description.

b. Forecast Method

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

c. Cost Drivers

The underlying major cost drivers for this capital project relates to compliance requirements and project schedule. The costs are based on equipment and material pricing, qualified contractor availability, and associated contractor rates.

7. Aliso Canyon (AC) Isolation Valves

a. Description

The forecast for Aliso Canyon (AC) Isolation Valves Project for 2022, 2023, and 2024 are $2.1 million, $0.0 million, and $0.0 million, respectively. SoCalGas anticipates the project will be placed into service in Q3 2022.

This project was presented to the Commission in the 2019 GRC[14] as the Aliso Canyon Pipe Bridge Replacement Project. The scope of the project has since been modified to include the installation of isolation valves at Porter (P) 30 where the pipes enter the canyon, and at Fernando Fee (FF) 38 where the pipes exit the canyon, rather than a bridge to span the canyon. These valves will be designed to automatically isolate the critical gas pipelines and waste liquid pipelines mitigating the risk of a gas and/or liquid release in the event of a landslide -or ephemeral soil erosion.

As mentioned in Section II of this testimony, this project is designated as a post-RAMP filing activity. The specific details of Aliso Canyon Isolation Valves Project may be found in our capital workpapers (Ex. SCG-10-CWP-419).

b. Forecast Method

The forecast method developed for this cost category is a zero-based methodology using historical procurement and installation estimate for similar isolation valves.

c. Cost Drivers

The underlying cost drivers for this capital project relates to historical installation of cost in the local area as well fluctuations in supply chain for procurement of isolation valves. The costs are based on equipment and material pricing, qualified contractor availability and associated contractor rates.

[14] For further discussion, please refer to the SoCalGas 2019 GRC Application, A-17-10-008, Underground Storage testimony of Neil Navin (Ex. SCG-10 at NPN-43 "Aliso Pipe Bridge Replacement" testimony).

VII. ALISO CANYON TURBINE REPLACEMENT PROJECT REGULATORY ACCOUNT COST RECOVERY

A. Purpose and Overview

The purpose of this section of testimony is to request recovery of $21.6 million in capital expenditures incurred by SoCalGas to complete the Aliso Canyon Turbine Replacement Project (ACTR). Pursuant to D.19-09-051, the on-going capital revenue requirement associated with these expenses are currently recorded in the Aliso Canyon Memorandum Account (ACMA). Cost recovery of the balance in the ACMA is discussed in the Regulatory Accounts testimony of Rae Marie Yu (Ex. SCG-38).

B. Background

In the 2019 GRC, SoCalGas sought[15] and was approved[16] cost recovery of $74.6 million in costs that exceeded the previously authorized cost of $200.9 million for the Project.[17] The Commission authorized recovery in rates of the $74.6 million and found it reasonable to continue the ACMA and that any recovery sought for these amounts would be subject to a reasonableness review in a future GRC:

> "Based on our review and analysis of the above, we find that the testimony presented supports the reasonableness of the $275.5 million in capital expenditures to complete the Aliso Canyon Turbine Replacement Project and that SoCalGas should be authorized to recover in rates the $74.6 million in costs which exceed the previously authorized amount in D.13-11-023. We also find that the request to continue the Aliso Canyon Memorandum Account (ACMA) to record additional capital-related costs in excess of $275.5 million is reasonable. Any recovery sought for such amounts should be subject to a reasonableness review in SoCalGas's next GRC.[18]

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[15] SoCalGas 2019 GRC Application, A-17-10-008, Aliso Canyon Turbine Replacement Direct Testimony of David Buczkowski (Ex. SCG-11).

[16] D.19-09-051 at 173.

[17] D.13-11-023, "Decision Addressing Application of Southern California Gas Company to Amend Its Certificate of Public Convenience and Necessity for the Aliso Canyon Gas Storage Facility."

[18] D.19-09-051 at 173-174.

C. Project Cost Elements and Variance from the Assumptions and Projections in the 2019 GRC ACTR Reasonableness Review

The final cost for ACTR was $21.6 million over the total cost approved for recovery in 2019 GRC decision. This increase in costs was driven by two major elements of the project. First, pre-commissioning, commissioning, acceptance testing, and turnover was more complex and took five months longer than anticipated with ACTR going into service in May 2018. In addition, the project closeout efforts were significantly greater for a facility of ACTR's complexity than was anticipated at the time of the GRC filing.

Pre-commissioning activities were conducted to verify the equipment was installed according to specification and each individual system was ready to safely operate as intended. Next, commissioning began with energizing the systems to verify proper operation. In addition to the physical components of the new compressor station such as motors, compressors, valves, etc., there are extensive electronic systems including pressure sensors, temperature sensors, and complex computer software that must communicate as intended. The systematic process of commissioning a facility such as ACTR begins during the engineering and design stage of a project with a Commissioning Manager who uses design documentation to determine a commissioning plan and schedule and follows it through to the end. All commissioning is documented and verified to be complete prior to Acceptance and Performance Testing. There were no significant issues during commissioning, or since, due to the detailed and extensive pre-commissioning efforts.

Acceptance and Performance Testing is complex as ACTR needed to be tested over the wide range of injection conditions that were specified in the design. These conditions include storage field inventory and pressure from early in the injection season when the inventory and field pressure is low, requiring the new compressors to be able to inject significant volumes to end of the season when the storage field inventory and field pressure is high requiring the compressors to meet end of season firm injection requirements. The wide range between low and high inventory conditions required the compressors to run in two modes. In parallel mode with two or more units compressing or in series mode where one or two compressors compress into the third compressor to reach the higher pressures. Since the storage field inventory and pressure are within a narrow range at any given time, the various operating conditions require complex plans and techniques to simulate field conditions, volumes, and pressures, to confirm the new compressors meet the design requirements and function in both parallel and series modes. In effect, the Acceptance and Performance Testing is completed twice to verify both modes are correct.

Finally, SoCalGas personnel worked with engineers to develop a plan that would comply with the standards required for a complex compressor station consistent with the standards for pipelines. Once the standards were developed and approved, a significant effort was required to complete all documentation such as material data records, strength testing records, welding reports, as-built drawings, specification sheets, etc. For a typical mile-long pipeline, the line might have 25 features (such as valve, fitting, pipe, or ell) that need documenting, whereas a complex compressor station has an estimated 25 features every 20 feet. The result is that thousands of features require documentation taking significantly more time and resources than initially anticipated in 2017.

The table BH-15 below identifies the costs by category that are above the commission approved $275.5M in the 2019 GRC.

TABLE BH-15
ACTR Cost by Category

Category	(in $M)
Central Compressor Station	5.0
SCE Substation & Electrical Infrastructure	1.3
Environmental	(0.4)
Buildings	0.1
Other	2.0
Company Labor	1.8
Indirects	11.8
Total	**21.6**

1. Central Compressor Station

The Central Compressor Station direct costs were approximately $5.0 million over the planned amount. This included $1.7 million of additional EPC costs and $2.6 million owner's engineering costs for commissioning, performance testing, and closeout. There was also an additional $0.7 million in other costs related to the commissioning and turnover to the Central Compressor Station.

2. Southern California Edison (SCE) Substation and Electrical Infrastructure

The replacement of the obsolete gas turbines with electrical-driven compressors required SoCalGas to contract with SCE for the construction and operation of a new electric substation to provide service to the Aliso Canyon Storage Field. Under this contract, SCE was responsible for the substation, and SoCalGas was responsible for the site preparation and the plant power line. SoCalGas was to reimburse SCE for all costs associated with design, engineering, and construction of the substation. The substation is designed, constructed, owned, and operated by SCE and located on SoCalGas property.

The SCE substation costs were approximately $1 million over the final anticipated amount, and the third-party electrical contractor costs were approximately $0.3 million over the estimated amount.

3. Environmental

The Environmental costs included costs incurred by the Commission and SoCalGas to retain the services of consultants to comply with California Environmental Quality Act (CEQA) requirements and came in under the expected final total by $0.4 million.

4. Buildings

The buildings cost component includes relocation of the Aliso Canyon Storage Field guard house and replacement of office buildings. The final costs were just $0.1 million over the estimate at completion.

5. Other

The Other cost category is comprised of activities associated with soil fill-sites, minor construction activities, temporary office trailers, project controls support, and increased site security. The drivers of these cost increases are, in part, due to the need to miscellaneous construction activities and augmentation of SoCalGas Project Management staff to enhance project management and controls and provide support in commissioning and closeout. The other construction activities totaled $1.4 million, and additional project management and controls costs totaled $0.6 million.

6. Company Labor

SoCalGas engaged a team of qualified and experienced personnel to witness the commissioning, oversee performance testing and turnover, and complete all closeout activities. The Project team included technical and management personnel at the construction site including a project manager, storage personnel, engineering manager, construction manager, environmental compliance manager, and safety advisor as well as support from engineering and project controls groups.

The incremental $1.8 million was primarily due to the extensive closeout requirements with engineering labor expense making up the largest component of the cost increase.

7. Indirect Costs

The Indirect cost category includes SoCalGas overheads, Allowance for Funds Used During Construction (AFUDC), and Property Taxes.

a. SoCalGas Overheads

Project costs include overhead allocations based on direct capital costs, consistent with their classification as Company Labor, Contract Labor, or Purchased Services and Materials. Overhead allocations are those activities and services that are associated with direct costs and benefits, such as payroll taxes, pension, and benefits, or costs that cannot be economically direct charged, such as Administrative and General overheads. The overhead allocations adhere to the methodology established by the Federal Energy Regulatory Commission (FERC) and were derived using the same methodology approved in SoCalGas's most recent GRC Application. Increases in overhead costs are due to the increases in direct capital costs described above. Direct capital costs were $8.4 million higher than anticipated resulting in overhead costs increasing by $2.2 million.

b. Allowance for Funds Used During Construction (AFUDC)

AFUDC costs are based on the direct capital cost, overhead costs, and duration to close out the project. The higher direct capital and overhead costs resulted in an increase to AFUDC. Additional AFUDC costs of $8.4 million were incurred through May 2018.

c. Property Tax

The Code of Federal Regulations specifies that ad valorem taxes on physical property during a period of construction shall be included in the capital construction costs. Increase cost for project closeout caused an increase in property taxes of approximately $1.2 million.

VIII. CONCLUSION

In this testimony, we describe activities and projects necessary for SoCalGas to achieve its goals of maintaining and enhancing the safety and reliability of essential Gas Storage infrastructure. The expenditures discussed in this testimony are required to maintain safety while cost-effectively meeting customer needs in compliance with mandated regulatory requirements. Our O&M and capital forecasts represent a reasonable level of funding for the activities and capital projects planned during this forecast period. The forecasts of the planned O&M and capital expenditures represented in this testimony are appropriate and prudently derived and should be adopted by the Commission.

This concludes our prepared direct testimony.

IX. WITNESS QUALIFICATIONS

LARRY T. BITTLESTON

My name is Lawrence Thomas Bittleston, Jr. (Larry Bittleston), PE. I have been the Storage Operations Manager of SoCalGas's Honor Rancho Storage Field since June 2019. My business address is 25205 W. Rye Canyon Rd, Santa Clarita, California 91355. I have been employed by SoCalGas since March 17, 2003. At SoCalGas, I have also held the positions of Engineer, Engineer I, Engineer II, Sr. Engineer, Storage Plant Engineer, Project Manager III, and Storage Technical Services Manager.

My current responsibilities include providing direction and leadership to a team of represented and management employees at the Honor Rancho Storage Field. My team is responsible for the safe and reliable delivery of natural gas through the storage facility, including the operation, maintenance, installation, and replacement of the facilities, equipment, and pipeline systems associated with the facility.

Prior to joining SoCalGas, I held various roles at other companies. Through my career my roles have included project engineering, project management, construction management, and start-up for projects in refineries, oil and gas production and processing facilities, chemical plants, food processing plants, mining operations, manufacturing, and residential, commercial, industrial, and institutional buildings. Project scopes included conceptual engineering, detail engineering, and design, procurement, and construction efforts.

I graduated from California Polytechnic State University in 1988 with a Bachelor of Science degree in Mechanical Engineering. I also obtained my Professional Engineer's License (27752) in California in the discipline of Mechanical Engineering in February 1991.

I have not previously testified before the California Public Utilities Commission.

STEVE HRUBY

My name is Steve Hruby, and I have been a Business Manager for SoCalGas in Complex Facilities Project Development, Construction since May 2019. In my time at SoCalGas I have held positions with increasing responsibilities in the Commercial & Industrial Services, Regulatory Affairs, Major Projects, and Construction organizations. Before joining SoCalGas, I was employed by Arcadis from 2000 to 2001 and Tetra Tech from 2001 to 2005. 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.

I have not previously testified before the California Public Utilities Commission.

APPENDIX A

GLOSSARY OF TERMS

APPENDIX A

Glossary of Terms

ACRONYM	DEFINITION
AC	Aliso Canyon
ACMA	Aliso Canyon Memorandum Account
ACTR	Aliso Canyon Turbine Replacement
AFUDC	Allowance for Funds Used During Construction
AGS	Aboveground Gas Storage
ARE	Advanced Renewable Energy
BARCT	Best Available Retrofit Control Technology
Bcf	Billion Cubic Feet
BY	Base Year
CO	Carbon Monoxide
CalGEM	California Geologic Energy Management
CARB	California Air Resources Board
CCR	California Code of Regulations
CEMS	Continuous Emissions Monitoring System
CEQA	California Environmental Quality Act
CFF	Cross Functional Factor
CNG	Compressed Natural Gas
CWP	Capital Workpapers
EPA	Environmental Protection Agency
EPC	Engineering, Procurement and Construction
FCEV	Fuel Cell Electric Vehicle
FEED	Front End Engineering Design
FWEMCP	Facility-Wide Engine Modernization Compliance Plan
GHG	Gas House Gases
GRC	General Rate Case
HR	Honor Rancho
HRCM	Honor Rancho Compressor Modernization
ICE	Internal Combustion Engine
NOx	Nitrogen Oxide
NSCR	Non-Selective Catalytic Reduction
O&M	Operations and Maintenance
PDR	Playa Del Rey
PHMSA	Pipeline and Hazardous Materials Safety Administration
ppmvd	Part Per Million by Volume, Dry
RAMP	Risk Assessment Mitigation Phase
RECLAIM	Regional Clean Air Incentives Market
RSE	Risk Spend Efficiency
SB	Senate Bill
SCAQMD	South Coast Air Quality Management District
SCG	Southern California Gas
SDG&E	San Diego Gas & Electric Company

ACRONYM	DEFINITION
SMS	Safety Management System
SoCalGas	Southern California Gas Company
SOFC	Solid Oxide Fuel Cells
SPD	Safety Policy Division
TY	Test Year
UGS	Underground Gas Storage
UIC	Underground Injection Control
VOC	Volatile Organic Compound
WP	Workpapers

APPENDIX B

Summary of O&M Safety Related Risk Mitigation Costs by Workpaper

APPENDIX B

Summary of O&M Safety Related Risk Mitigation Costs by Workpaper

GAS STORAGE 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
2US000.000	SCG-Risk-4 - C5-T3	Storage Field Maintenance	5,143	4,888	-255	116
2US001.000	SCG-Risk-4 - C5-T1&T2	Storage Field Maintenance	6,399	42,475	36,076	-*
2US001.000	SCG-Risk-5 - C10	Workplace Violence Prevention Programs	80	80	0	591
Total			11,622	47,443	35,821	

*Tranche level RSEs and additional details are available in SCG-10-WG

APPENDIX C

Summary of Capital Safety Related Risk Mitigation Costs by Workpaper

APPENDIX C

Summary of Capital Safety Related Risk Mitigation Costs by Workpaper

GAS STORAGE **RAMP Activity Capital Forecasts by Workpaper (In 2021 $)**						
Workpaper	**RAMP ID**	**Description**	**2022 Estimated RAMP Total (000s)**	**2023 Estimated RAMP Total (000s)**	**2024 Estimated RAMP Total (000s)**	**GRC RSE**
004110.001	SCG-Risk-4 – C06	Compressor Overhauls	16,439	16,122	15,342	1.00
004120.001	SCG-Risk-4 - C02	Well Abandonment and Replacement	45,853	20,631	13,948	2.800
004120.002	SCG-Risk-4 - C02	Well Abandonment and Replacement	29,475	35,965	36,006	2.800
004120.003	SCG-Risk-4 - C01	Integrity Demonstration, Verification and Monitoring Practices	7,860	1,405	7,046	0.300
004140.001	SCG-Risk-4 - C07	Upgrade to Purification Equipment	11,671	7,991	11,305	0.1
Total			**111,298**	**82,114**	**83,647**	

APPENDIX D

Underground Storage of Natural Gas

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Underground Storage of Natural Gas

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Underground Storage of Natural Gas

STORING NATURAL GAS THE SAME WAY NATURE ALWAYS HAS...

DEEP UNDERGROUND

Most of the natural gas used in Southern California travels from supply sources as far away as Texas and Canada. So, in order to maintain a balance between supply and demand, storage is a necessity. Without it, we might not always be able to meet our customers' needs.

Customer needs change by the season, by the day, and even by the hour. On a cold winter day, for example, residential customers can use seven times the amount of natural gas used on an average summer day.

Five decades ago, balancing customer demand meant relying on natural gas holding structures, which stood several stories high and resembled oil storage tanks.

In 1941 we introduced a new system to the Southwest: underground storage of natural gas. This system is based on the simple premise that if an underground rock formation held oil and natural gas securely for millions of years, it could continue to do so under controlled circumstances.

Underground storage is based on the simple premise that if an underground rock formation held oil and natural gas securely for millions of years, it could continue to do under controlled conditions.

Extensive research and our experience have proven that this concept is sound. Depleted oil and natural gas fields offer ideal storage conditions because they are comprised of natural underground traps. Care is taken that the original formation pressure of the field is not exceeded. These subterranean rock formations can be repeatedly ref lled and drawn from to meet the fluctuating needs of our customers.

When out of state pipelines can't deliver enough natural gas to meet heavy demand, which might occur on a cold winter day, we withdraw natural gas stored underground to supplement pipeline supplies. When customer needs for natural gas drop below the available pipeline supply, which can happen during the summer, we inject the surplus natural gas into the underground reservoirs. We also sell storage capacity to other large companies so they will have natural gas (which they purchase on the open market) available to them when they need it.

2 UNDERGROUND STORAGE OF NATURAL GAS

APPENDIX D

Underground Storage of Natural Gas

Geologic traps are rock formations which trap and hold natural gas, oil and water.

WHERE IS THE GAS STORED?

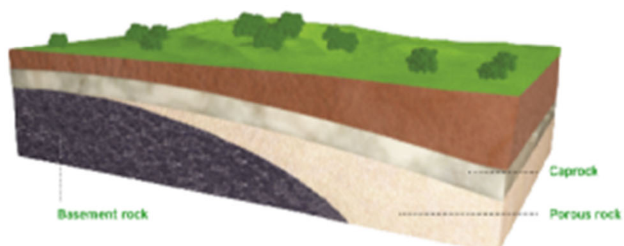
Surplus natural gas is forced down through wells drilled into porous rock formations thousands of feet below the earth's surface, where oil and natural gas originated. The formations appear solid but are actually sandstone made up of sand, with spaces between the grains.

The rock formations are called "geologic traps" because they are shaped by nature, and trap and hold natural gas, oil and water within a specific area. Like a sandwich, the basic trap contains porous reservoir rock between layers of nonporous rock. The top layer is commonly called "caprock," while the bottom most layer is often called "basement rock."

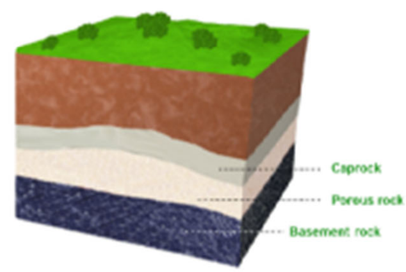
There are several different kinds of geologic traps. One is a pinch-out trap (left, below), in which the caprock meets the basement rock at one end, effectively sealing the porous storage area. The most common geologic trap is the anticlinal trap (right, below) which resembles a buried hill. This is because the caprock arches over the top of the porous rock "reservoir" to stop natural gas from traveling upward. Another type of trap is formed by shifts in the ancient earth strata that moved one section of rock against another, so that it abuts the caprock, creating a fault-bounded trap.

We can depend upon the force of gravity to separate the natural gas, oil and water that may already be in any trap. As the lightest component, natural gas will always rise to the top.

PINCH-OUT TRAP



ANTICLINAL TRAP



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APPENDIX D

Underground Storage of Natural Gas

WHAT DETERMINES A GOOD STORAGE FIELD

CORE SAMPLES

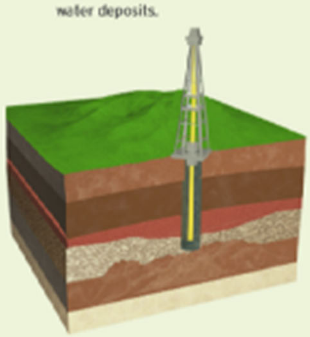
Before using any former oil or natural gas field for our storage, extensive geologic data of each of the field's rock layers are carefully examined. This usually is accomplished by studying "core samples," which are taken by drilling with a hollow core diamond cutting edge deep down through the earth's sedimentary layers.

Numerous core samples and other geologic surveys help us profile a specific field. Measuring anywhere from 10 to 60 feet (3 to 20 meters) long, the core samples tell us the location, depth and condition of the caprock, the storage reservoir and the basement rock. They also determine the present concentration of any natural gas, oil or water deposits.

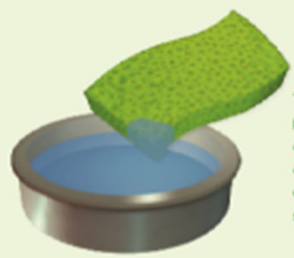
POROSITY

The first characteristic we look for when examining the core sample is porosity. Porosity refers to the volume percentage of rock pore space available for natural gas or liquid retention between the rock or sand grains. It is essential that the reservoir of rock have high porosity, because that indicates a high storage capacity.

The ability of porous rock to absorb natural gas and liquids can be demonstrated with a sponge. Take the sponge and barely touch one corner to the surface of a liquid. Watch it soak up the liquid until saturated, without altering the shape or size of the sponge. The fluid simply fills the small pores of the sponge. Underground storage is based on the same principle.



Core samples are taken by drilling with a hollow core deep into the earth.



The ability of a porous rock trap to absorb natural gas and liquids can be demonstrated with a sponge.

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Underground Storage of Natural Gas

Core samples tell us the location, depth and condition of the caprock, the storage reservoir and the basement rock.

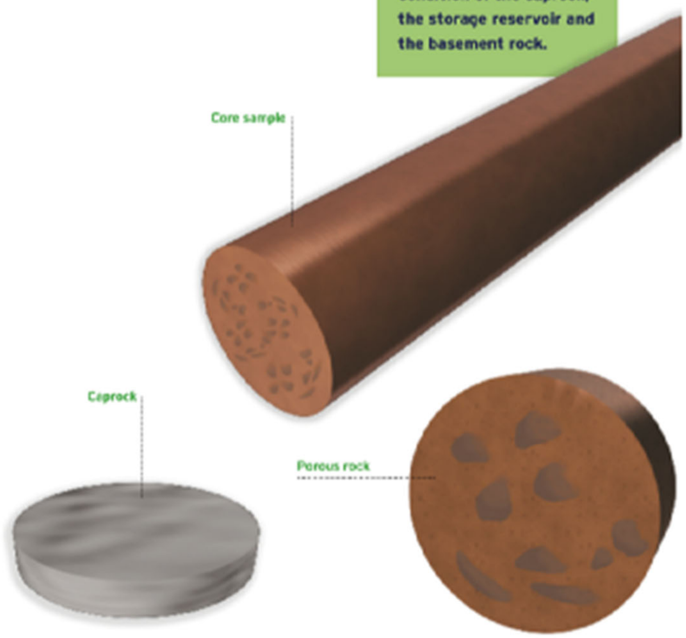
PERMEABILITY

Permeability, closely related to porosity, is another characteristic we look for when evaluating core samples. Permeability is important for efficient natural gas storage because it measures how well the pore spaces are interconnected.

It is essential that the reservoir rock be highly permeable because the natural gas must be able to move freely through the storage zone during injection and withdrawal. If the rock isn't very permeable, meaning most of the pore spaces are isolated, then the natural gas injection and withdrawal rates will be low.

In caprock, we look for just the opposite. A rock such as shale is an ideal caprock since its impermeability prevents natural gas from traveling upwards and being lost.

Below the caprock, we need a porous, permeable layer of rock that will permit natural gas to flow in and out of the reservoir. The underlying water-saturated rock and dense basement rock trap the lighter natural gas in place above.



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Underground Storage of Natural Gas

A TYPICAL UNDERGROUND GAS STORAGE FIELD

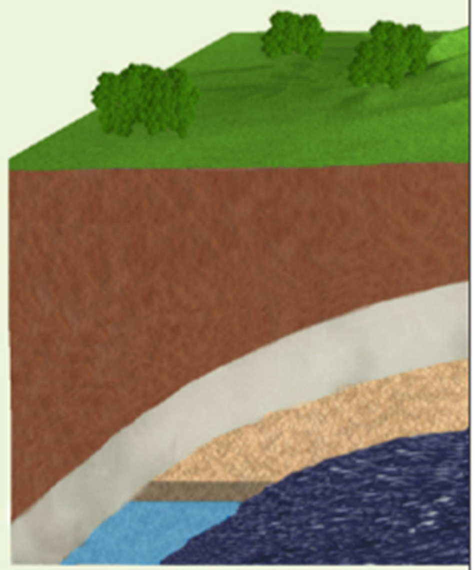
As shown at right, we operate two basic types of wells in our natural gas storage fields.

❶ INJECTION/WITHDRAWAL WELLS

Functioning in the upper level of the reservoir and at shorter depths, these wells are used for withdrawing natural gas from storage. Many of these wells are also used to inject natural gas into the storage zone.

❷ OBSERVATION WELLS

Observation wells are used for monitoring reservoir pressures and the integrity of the caprock.



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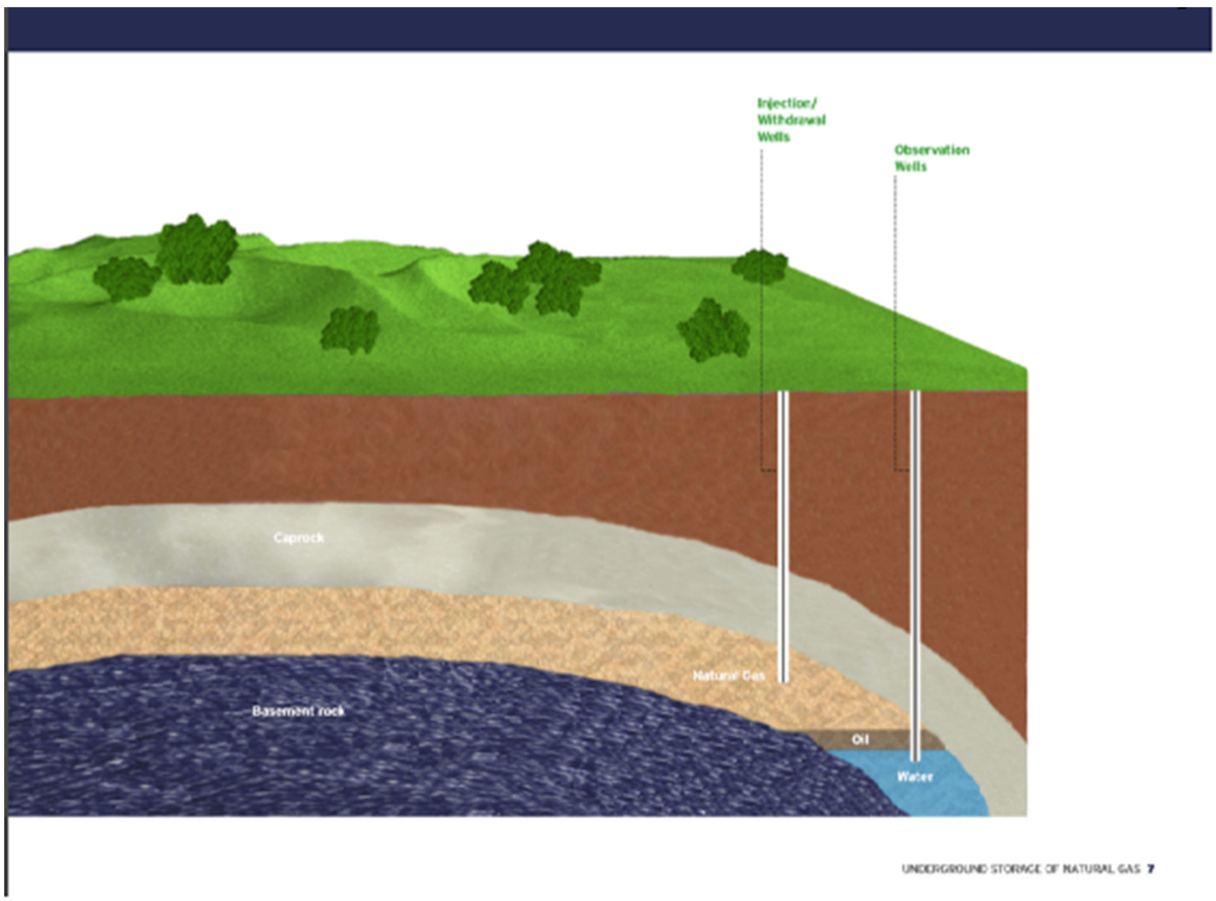
Underground Storage of Natural Gas



APPENDIX D

Underground Storage of Natural Gas

OPERATING THE UNDERGROUND STORAGE FACILITY

Storage operations are activated on orders from our gas control center to specific storage fields. Customarily, storage is required for seasonal load balancing: injecting summer supplies of gas underground to be held in reserve for winter withdrawal.

INJECTION

Storage operations are activated on orders from our natural gas control center to specific storage fields. Customarily, storage is required for "seasonal load balancing": injecting summer supplies of natural gas underground to be held in reserve for winter withdrawal.

SCRUBBING

As natural gas comes from the pipeline, it is run through intake scrubbers to remove any liquids that may have accumulated in the pipeline and might damage the compressors. Only natural gas that meets set specifications is brought into our pipeline system and injected into our fields.

COMPRESSION

Gas supplied in transmission pipelines flows under pressures often ranging from 250 pounds to 1,030 pounds per square inch (psi). The pressure in the underground storage reservoir, however, can be up to three or four times higher. To force the natural gas a mile or more down into the porous rock, it must be compressed to 1,500 psi (103 bars) or higher. This function is handled in two stages. Initially, high horsepower engines boost the pressure up to 800 to 1,500 psi (55 to 103 bars), significantly raising the temperature of the natural gas, since compression generates heat. To increase compression efficiency, the natural gas is next sent through cooling equipment before the second compression stage boosts it to 1,500 to 3,900 psi (103 to 270 bars), completing the process.

Before injection, the compressed natural gas will again be cooled to protect pipelines and other equipment in the storage field.

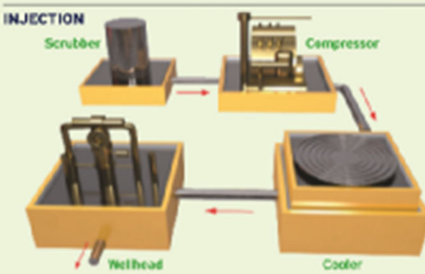
COOLING

Most of our storage facilities use the unique cooling system known as a "fin-fan." Appropriately named, each cooler contains a set of giant fan blades, whose rapid rotation pulls cool air across a system of tubes containing the natural gas. The tubes are wrapped with thin aluminum "fins" that assist in the cooling.

THE WELLHEAD

Generally referred to as a "Christmas tree," this collection of piping and valves controls all natural gas movement in and out of the storage wells. The Christmas tree controls are easily accessible to the crews which operate them during injection and withdrawal of natural gas.

INJECTION



APPENDIX D

Underground Storage of Natural Gas

> **Just as in storage injection the signal to commence withdrawal of natural gas from storage is relayed to the field from our main natural gas control center. Withdrawal is usually ordered to meet heavy customer demand**
> **(1) throughout the cold, rainy winter season;**
> **(2) on air pollution ep[illegible] days; or**
> **(3) during peak-load conditions when natural gas from the storage augments the volumes constantly flowing in from out-of-state suppliers.**

WITHDRAWAL

Just as in storage injection, the signal to commence withdrawal of natural gas from storage is relayed to the field from our main natural gas control center. Withdrawal is usually ordered to meet heavy customer demand (1) throughout the cold, rainy winter season; (2) on air pollution episode days; or (3) during peak-load conditions when natural gas from storage augments the volumes constantly flowing in from out-of-state suppliers.

THE WELLHEAD

To start withdrawal, valves at the well site must be opened. Both injection/withdrawal wells and oil wells can be used to withdraw natural gas supplies, although the percentage of natural gas produced by the oil wells is limited.

SEPARATORS

When natural gas is withdrawn from the field, it generally flows under its own pressure directly into special vessels which separate most of the oil and water from the natural gas coming out of storage. Since natural gas is lighter than the accompanying fluids, it rises in the vessels, where it is collected for cooling. The oil and water left behind are separated, with the oil stored in tanks to be sold and the water stored for disposal or reinjected in the ground.

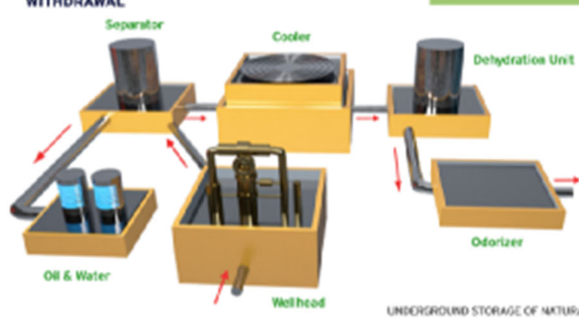
COOLING AND DEHYDRATION

When natural gas is removed from underground storage, it brings along petroleum liquids, water vapor and the hot temperatures from the earth a mile or two below. The natural gas is cooled by running it through a cooling system, and any free liquids are removed by another scrubber. Next, triethylene glycol, a substance similar to the ethylene glycol used as antifreeze in automobile cooling systems, is used to remove water vapor from the natural gas via a process known as dehydration.

ODORIZING

Natural gas is normally odorless. Its characteristic aroma is man-made for safety reasons and after its stay underground, the natural gas loses some of its manufactured scent. To give it that characteristic odor so important in detecting leaks, we add a drop of chemicals (as much as (1) 8-ounce cup per million cubic feet) just before delivering the natural gas into our distribution lines.

WITHDRAWAL



APPENDIX D

Underground Storage of Natural Gas

SOCALGAS UNDERGROUND STORAGE SITES

SoCalGas, operates four underground storage fields. Each facility has been developed due to unique geological characteristics, which makes it ideal for natural gas storage. The work done at these sites performs an essential function for all of our natural gas customers in the Southern California area. We work to meet our customers' needs in a safe and environmentally sound manner, thereby assuring the continuance of good neighbor relations with surrounding residents.

FACTS ABOUT NATURAL GAS

NATURAL GAS HAS SOME IMPORTANT PROPERTIES:

- It is colorless and odorless. We add the distinctive smell to natural gas as a safety precaution.
- It is lighter than air, which is an important built-in safety feature. If natural gas should escape outside, it will rise and dissipate harmlessly into the atmosphere.
- It is the cleanest burning of all hydrocarbon fuels.
- It will burn only when specific concentrations come in contact with an ignition source.

APPENDIX D

Underground Storage of Natural Gas

A TRADITION OF SERVICE

SoCalGas has a long tradition of providing dependable service to homes, business and industries in over 530 communities in a twelve-county area.

As the largest natural natural gas distribution company in the nation, we serve most of Central and Southern California. Providing safe, reliable and efficient natural gas service to meet this vast and fluctuating energy demand requires a highly responsive distribution system of more than 45,000 miles (83,000 kilometers) of natural gas main. The underground storage of natural gas plays a vital role in balancing the region's energy supply and demand.

SAFETY FIRST

Safety has always been a top priority with us. The technology to monitor and operate an underground natural gas storage field has developed steadily through the years. In addition, all of our operations are closely monitored for compliance with the safety standards of the California Public Utilities Commission, the Division of Oil, Gas, & Geothermal Resources, the Occupational Safety and Health Administration, and local fire departments.

APPENDIX E

HONOR RANCHO COMPRESSOR MODERNIZATION
SUPPLEMENTAL PROJECT DESCRIPTION

APPENDIX E – Honor Rancho Compressor Modernization Supplemental Project Description

TABLE OF CONTENTS

I. PURPOSE AND OVERVIEW

The main purpose of this Supplemental Project Description is to provide additional details of the scope, cost, schedule, and sustainability goals of the Honor Rancho Compressor Modernization (HRCM) Project.

In the following sections, I have provided 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, I describe how HRCM project aides in achieving SoCalGas company's sustainability goals. Finally, in Section VII, I provide an overview of SoCalGas'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 Honor Rancho Storage Field ("Honor Rancho") is in the City of Santa Clarita, County of Los Angeles and is SoCalGas's second largest natural gas storage field, spanning more than 700 acres. Approximately 25% of SoCalGas' total firm injection capacity is currently provided by Honor Rancho, making this facility a critical part of Southern California's energy delivery system. The facility has been safely operating since 1975, with a design working capacity of approximately 27 billion standard cubic feet (BCF) and is designed for a maximum withdrawal capacity of 1.0 BCF per day. The injection capacity at this field is provided by five Enterprise (Delaval) HVA16C reciprocating units, purchased in 1975, that are reaching the end of their useful life. The compressor trains have a capacity of 27,500 HP (5,500 HP each). The Delaval Company went out of business in 1989, which resulted in parts becoming difficult or not possible to find.

Honor Rancho operates in accordance with 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 RECLAIM to command-and-control rules, the five Enterprise (Delaval) HVA16C compressor gas lean-burn engines are subject to Rule 1110.2 "Emissions from Gaseous and Liquid-Fueled Engines" and companion Rule 1100 "Implementation Schedule for NOx Facilities." SoCalGas filed a Facility-

Wide Engine Modernization Compliance Plan (FWEMCP) for Honor Rancho (FID #005973) on December 18, 2020, per the requirements specified in South Coast AQMD Rule 1100(d)(7)(A). South Coast AQMD approved the FWEMCP on November 9, 2021, which acknowledged SoCalGas's plans to replace the five existing compressor gas lean-burn engines of 5,500 HP each (total of 27,500 HP) with approximately 20,000 HP of compressor gas lean-burn engines and approximately 11,000 HP of electric motor driven compression units. This replacement approach meets the Rule 1100(d)(7)(B) requirement that at least 20% of total HP of all Rule 1110.2 engines are replaced using zero-emission technology such as an electric motor. Replacing the five existing compressor gas lean-burn engines with a hybrid of natural gas driven compressors and electric driven compressors will result in a reduction in permitted air emissions, providing an overall air quality benefit.

The Permit to Construct (PTC) application for the HRCM Project, which is consistent with the approved FWEMCP, will be submitted to the South Coast AQMD by July 1, 2022.

The main purposes of the HRCM Project are to:

- Modernize the Honor Rancho Storage Field through the installation of new equipment and innovative technology that will achieve measurable reductions in NOx emissions;
- Comply with South Coast AQMD Rules 1110.2/1100 (stationary engines);
- Support California in meeting its climate commitment goals; and
- Enhance reliability by modernizing aging equipment and ancillary systems.

The HRCM Project was presented in the TY 2019 General Rate Case detailing scope, schedule, and anticipated annual spend. The project scope has matured and expanded due to development of project definition as well as changes in compliance requirements, which were adopted after the 2019 GRC (General Rate Case) cycle, and SoCalGas's long term sustainability vision. The prominent changes in scope since the TY 2019 GRC include changes to the compressor configuration for regulatory compliance, evolution of sitework requirements based on better engineering definition, and the addition of the Advanced Renewable Energy (ARE) component to further support SoCalGas's sustainability vision. The maturation in HRCM Project scope has resulted in updated cost and schedule forecasts associated with the project.

B. COST SUMMARY

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

Figure HRCM-3
Summary of Total Costs by Year

HRCM	2022	2023	2024	2025	2026	2027	2028	2029	Total
Principal Component	$3,663	$23,251	$112,732	$241,869	$127,558	$16,079	$2,094	$29	$537,927
ARE Component	$524	$0	$781	$15,292	$22,451	$18,505	$4,093	$172	$62,732
Total	$4,187	$23,251	$113,513	$257,161	$150,009	$34,584	$6,187	$201	$600,659

The total cost provided includes $11,564,122 in project actuals since 2017. The cost representations provided are based on third party estimates. Costs are presented in thousands in 2021$. These costs do not include SoCalGas Overheads, Property Taxes, Allowance for Funds Used During Construction (AFUDC), and/or future escalation.

III. PROJECT SCOPE

A. DETAILED PROJECT SCOPE

The HRCM Project is divided into two subcomponents:

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

1. HRCM Principal Component

The Principal component consists of:

a. Compressor system upgrade with the installation of a new compressor building with compression equipment comprised of four natural gas lean-burn engines and two electric motors, and associated compression support equipment;

b. Electric microgrid comprised of a super capacitor and/or battery Energy Storage System (ESS) and natural gas-fueled Solid Oxide Fuel Cell (SOFC) to provide administrative and auxiliary base load and standby electricity;

c. Compressor station grading, site preparation, well abandonment, and fill site development; and

d. A new Southern California Edison (SCE) electrical interconnection to support the increased electric load.

The above-stated components are described in further detail below.

a. Compliance Driven Compressor System

The Principal component of the HRCM Project includes the installation of new compression equipment at Honor Rancho to comply with South Coast AQMD's RECLAIM sunset requirements, including South Coast AQMD 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 compressor system upgrade includes the installation of a new approximately 27,808 square foot (sf) compressor building (referred to as "Plant 2") that will house four new compressor gas lean-burn engines, each rated at 5,000 HP with post combustion emissions reduction systems and two new electric motor-driven reciprocating compressors rated at 5,500 HP each. The building will be approximately 58.5 feet in height with four emissions stacks reaching approximately 64.5 feet in height.

Ancillary equipment will also be installed including piping and equipment to support the operation of the compressor system comprised of cooling towers, lube oil system, tanks, filters/separators, control, electrical, and instrumentation equipment.

An 8,000-gallon vessel for 32.5 weight percent (wt.%) aqueous urea will be used to support the emission-reduction equipment. New equipment will require the same lubricants and water softening chemicals as existing equipment.

c. Electric Microgrid: Fuel Cell and Energy Storage System

A microgrid is a self-sufficient energy system that serves a discrete geographic footprint, such as a college campus, hospital complex, business center, or neighborhood and can serve the load when the electric power grid is absent, disrupted, or unavailable. Within microgrids, there are one or more kinds of distributed energy (fuel cells, super capacitors, solar panels, batteries, wind turbines, combined heat and power, generators) that produce its power.

i. Solid Oxide Fuel Cell

The HRCM Project will install a base loaded SOFC as a power source for station administrative and auxiliary loads. These fuel cells primarily operate with natural gas as a fuel source. The fuel cell can operate in parallel with utility grid power as well as islanded from the utility grid and can supply station loads in the event of a power failure. Moreover, there will be a back-up electrical storage system in the form of either batteries and/or a super capacitor that can support an islanded microgrid, at times when the utility power supply is curtailed.

ii. Super Capacitor Energy Storage System

The HRCM Project also includes a super capacitor to provide high power, low-energy storage for short duration, and will be designed to allow the fuel cells to be operated off-grid.

d. Compressor Station Grading, Site Preparation, Well Abandonment and Fill Site Development

The HRCM Project will need an excavation of an estimated 200,000 cubic yards of soil moved from the soil cut site to the planned soil fill location on the west side of the facility to allow space for the construction of the new compressor station Building 2. The HRCM Project will require the abandonment of two existing wells to make space for the new compressor building. This scope will be executed along with the site grading activities for the project (see Figure HRCM-4).

Figure HRCM-4
Proposed Cut and Fill Locations

e. Southern California Edison (SCE) Electrical Interconnection

The HRCM Project's increased power demand will require a new power supply line from SCE. The proposed Electric Driven Compressors (EDCs), electrolyzers, and new auxiliary station load together will increase the power demand by an estimated 10 to 15 megawatts (MW). It is anticipated that SCE will serve the project with a new 66 kV sub-transmission circuit, supplying a SCE-operated substation installed on the Honor Rancho site to step down the voltage to 12 kV, the rated voltage of the SoCalGas electrical distribution equipment.

2. HRCM ARE Component

The ARE component consists of:

a. Green hydrogen electrolyzers, hydrogen storage, and fuel blending equipment to integrate hydrogen into compressor combustion fuel; and
b. Green hydrogen fueling station for company vehicles.

a. The above-stated components are described in further detail below. Electrolyzers, Storage and Fuel Blending Equipment

i. Electrolyzer

Electrolysis is the chosen form of technology for the ARE component to produce green hydrogen. In a Polymer Electrolyte Membrane (PEM) electrolyzer, such as that proposed for the ARE component, electricity (renewable electric grid energy in this case) is applied to separate water molecules into oxygen and hydrogen. In a PEM electrolyzer, the electrolyte is a solid specialty plastic material used in the following process to produce hydrogen.

- Water is split 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 electrolyte membrane to the cathode.
- At the cathode, hydrogen ions re-combine with electrons from the external circuit to form hydrogen gas.

Water demand will remain consistent with current usage since older equipment will be decommissioned and replaced with new equipment. Water use from the electrolyzers should be small; around the order of 2 gpm while operating and the actual average water consumption is expected to be in the magnitude of less than 1,000 gallons per day. Oxygen gas is produced as a byproduct and vented to atmosphere from the electrolysis process.

ii. Storage

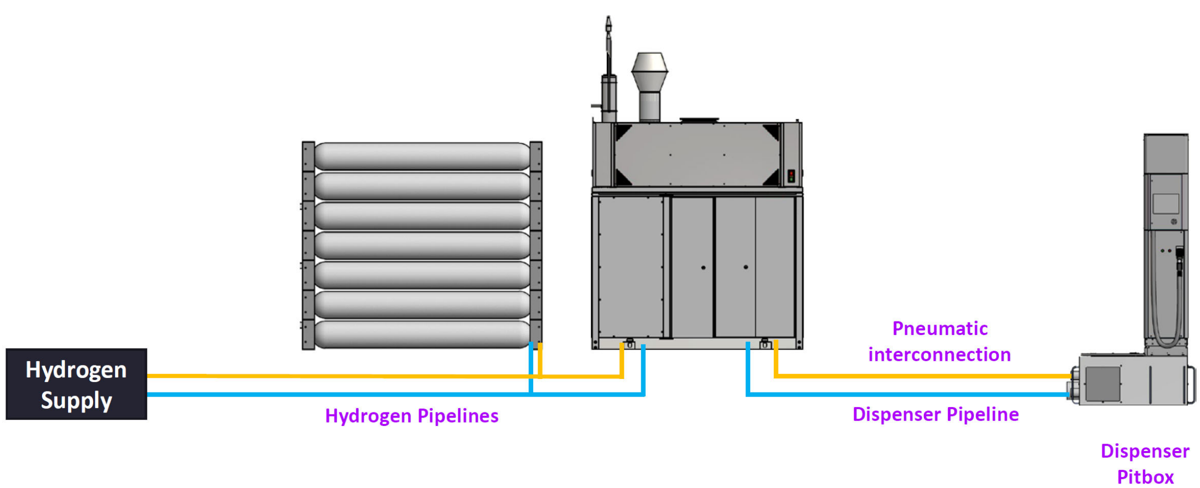
The hydrogen stream from the electrolyzers will be compressed and sent to multiple racks of pressurized storage cylinders at up to 6,525 psig. The storage capacity will be designed to hold at least 3 days-worth of hydrogen under high demand to allow enough time for servicing the production equipment should there be a malfunction. There will be allocated storage cylinders for both the blending fuel for the gas driven compressor engines and the vehicle fueling stations. All applicable safety protocols and standards will be implemented for leak detection and shut down processes for the storage and other systems.

iii. Blending Skid

Hydrogen will flow through high pressure piping and/or tubing either directly from the electrolyzer or (more likely) from the storage tubes into the blending skid where it will be combined with pipeline natural gas at a maximum ratio of 10% hydrogen by volume and sent to the compressor skids as engine fuel. These units will also have the ability to run without hydrogen in the event of operational issues or lack of hydrogen supply. Hydrogen that is not immediately needed to support operations will be stored onsite in the compressed gas cylinders.

b. Hydrogen Fueling Station for SoCalGas Fleet Vehicles

SoCalGas will build a new green hydrogen fleet vehicle fueling station as part of the ARE component scope. The HRCM Project's hydrogen fueling station would include compressed gaseous hydrogen cylinders for dispensing to the vehicles. Storage systems will contain safeguards such as pressure and temperature relief (PRV/TRVs) and pressure safety valves (PSVs). Hydrogen flows from the lower pressure primary storage to the fueling station package, where it is pressurized and stored in a series of "cascade tanks" used for various stages of the filling process depending on the fuel quantity and pressure of the vehicle's tank, at a maximum of either 350 bar (5,075 psi) or 700 bar (10,150, psi). After leaving the compressor and prior to dispensing, hydrogen typically will enter a closed loop cooling system to chill the gas to a predetermined temperature appropriate to the fueling protocol used at the station. The chiller will compensate for the heat of expansion and enables high-pressure, fast fills. Hydrogen dispensers will be designed to appear like typical gasoline dispensers and function in a similar manner. The system at Honor Rancho will consist of three major components as seen in the diagram below. The left component is the local high pressure hydrogen storage cylinders rack, the center is the control module or room containing cooling and compression equipment, and the right is the single dispenser and fill nozzle.



IV. PROJECT COSTS

Figure HRCM-5
Cost Breakdown

Components	Costs ($ in 000s)
Principal	**$537,927**
Design & Engineering	$47,871
Material & Equipment	$131,057
Construction	$218,645
3rd Party Utility Substation	$28,203
Site Work & Civil	$59,376
Environmental	$1,065
Company Labor & Project Services	$50,895
Other	$815
ARE	**$62,732**
Design & Engineering	$4,967
Material & Equipment	$20,337
Construction	$22,073
Site Work & Civil	$831
Environmental	$207
Company Labor & Project Services	$14,090
Other	$227
Project Total	**$600, 659**

Figure HRCM-6
Cost Breakdown Definitions

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
3rd Party Utility Substation	Third party substation and grid interconnection.
Site Work	Site preparation such as grading, leveling, and well work
Environmental	Environmental services and activities
Company Labor & Project Services	SoCalGas 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 SoCalGas Overheads, Property Taxes, AFUDC, and future escalation. The estimates represent a Class 3 estimate consistent with AACE International Recommended Practice No. 18R-97, which denotes an estimated final project cost between -20% or +30% from the current project cost. The project estimate includes assumptions made in the estimating process including, but not limited to:

- Costs are based on current construction costs in Santa Clarita, California with full and open competition from local regional contractors.
- The construction schedule will not include planned night or weekend work.
- The contingency was determined utilizing a Monte Carlo Risk Analysis Assessment.

V. SCHEDULE

The HRCM Project completed FEED in March 2022. The Project is currently transitioning into the Engineering Procurement Construction (EPC) phase. The HRCM Project PTC is anticipated to be submitted to the South Coast AQMD before July 1, 2022. Based on prior PTC applications filed by SoCalGas, the review period is anticipated to be 2 years with approval in July 2024. Construction will follow PTC approval and is anticipated to begin in October 2024. The Principal component is anticipated to be placed into service or NOP (Notice of Operation) by January 2027, followed by the ARE component in January 2028.

Figure HRCM-7
Principal Component Major Milestones

Major Milestones	Date
FEED Phase Completion	Mar-2022
Permit to Construct Submission	Jul-2022
EPC Contract Executed	Apr-2023
Permit to Construct Expected Approval	Jul-2024
Construction Begins	Oct-2024
NOP Date	Jan-2027
Decommissioning of Existing Facilities	Nov-2027
Project Close-Out	Jan-2029

Figure HRCM-8
Principal Component Schedule by Stages

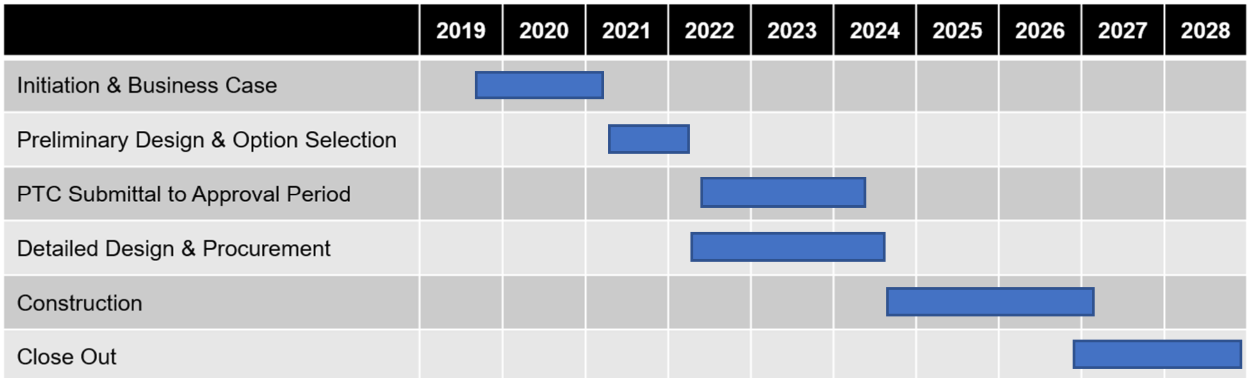
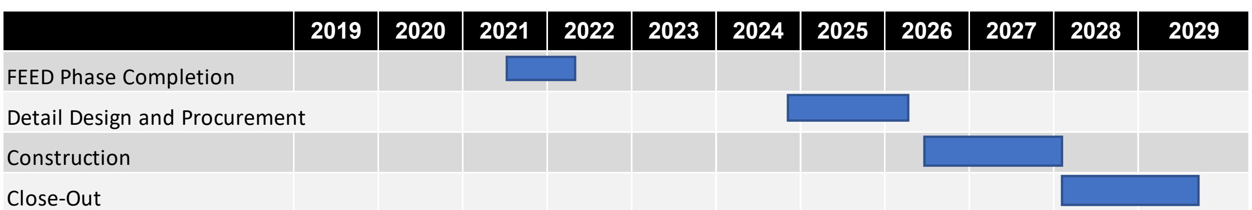


Figure HRCM-9
ARE Component Major Milestones

Major Milestones	Date
FEED Phase Completion	Mar-2022
EPC Contract Executed	Dec-2024
Construction Begins	May-2026
NOP Date	Jan-2028
Project Close-Out	July-2029

Figure HRCM-10
ARE Component Schedule by Stages



VI. SUSTAINABILITY

SoCalGas recently announced ASPIRE 2045[1], which is a sustainability and climate commitment to achieve net zero greenhouse gas (GHG) emissions in our operations and delivery

[1] SoCalGas has committed to achieve net-zero GHG emissions in its operation and delivery of energy by 2045. See https://www.socalgas.com/sites/default/files/2021-03/SoCalGas_Climate_Commitment.pdf.

of energy by 2045. SoCalGas is the largest gas distribution utility in the nation to include Scope 1, 2, and 3 emissions[2]. Additionally, SoCalGas is working to reduce criteria pollutant emissions associated with combustion equipment, with a focus on reducing nitrogen oxides (NOx) emissions for compliance with South Coast AQMD requirements specified in Rule 1110.2 "Emissions from Gaseous and Liquid-Fueled Engines"[3] and companion Rule 1100 "Implementation Schedule for NOx Facilities."[4] This section focuses on Scope 1 and 2 GHG emissions, as well as criteria pollutants, and summarizes how the Honor Rancho Compressor Modernization (HRCM) Project is being designed to provide SoCalGas with a direct pathway to make progress towards achieving the ASPIRE 2045 commitments.

Scope 1 emissions are direct GHG emissions that occur from sources owned or controlled by the company which include facility gas usage, the transmission and distribution system, and our vehicle fleet. Scope 1 emissions are comprised of emissions from combustion and non-combustion emission sources. Scope 2 emissions are indirect GHG emissions associated with the generation of purchased electricity consumed by the company.

The HRCM Project is divided into two subcomponents: The Principal component and the Advanced Renewable Energy (ARE) component. The sections below describe the scope and estimated emissions reductions associated with each project component.

A. Principal Component

The Principal component of the HRCM Project consists of the following: 1) compressor system upgrade to replace the five existing compressor gas lean-burn engines of 27,500 horsepower (HP) total with four new compressor gas lean-burn engines of approximately 20,000

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2 See page 8 of: https://www.socalgas.com/sites/default/files/2021-03/SoCalGas_Climate_Commitment.pdf. The proposed project does not impact Scope 3 emissions and therefore Scope 3 emissions are not evaluated in this document.

3 SCAQMD, Rule 1110.2, "Emissions from Gaseous and Liquid-Fueled Engines," (Amended November 1, 2019) (NOx emission limit for compressor gas lean-burn engines is specified in Table II), *available at:* http://www.aqmd.gov/docs/default-source/rule-book/reg-xi/rule-1110-2.pdf?sfvrsn=4..

4 South Coast Air Quality Management District, Rule 1100 "Implementation Schedule for NOx Facilities," http://www.aqmd.gov/docs/default-source/rule-book/reg-xi/rule-1100.pdf?sfvrsn=22. The HRCM project will follow the timeline requirements specified in Section (d)(7) and the Facility-Wide Engine Modernization Compliance Plan that was approved by South Coast AQMD in November 2021.

HP total and two new electric motor-driven compressors (EDCs) of approximately 11,000 HP total along with auxiliary electrical and controls systems; and 2) microgrid comprised of a super capacitor and/or battery energy storage system ESS and a system of natural gas-fueled solid oxide fuel cells (SOFC) to support facility's administrative and auxiliary electrical needs.

The Scope 1 combustion emission sources[5] include the four new replacement compressor gas lean-burn engines, approximately 5,000 HP each, equipped with state-of-the art criteria and toxic air contaminant emission control technology. The non-combustion emission sources include the new system of natural gas fueled SOFC which provides electricity to power the administrative and station auxiliary electrical loads. Scope 2 emissions include the indirect GHG emissions associated with generation of the purchased non-renewable grid electricity to operate two new electric driven compressors, approximately 5,500 HP each.

<u>Greenhouse Gas Emissions</u>

The estimated change in GHG potential to emit (PTE) associated with the Principal component is shown in Figure HRCM-11 below. The PTE of the Principal component emission sources were estimated and are discussed in this section. This estimate was prepared by comparing the pre-project PTE to the post-project PTE. Changes in actual emissions will depend on actual fuel consumed by the compressors and SOFCs (Solid Oxide Fuel Cells), as well as the electricity purchased in the future.

Pre-project Emissions

For Scope 1 emission sources of the Principal component, pre-project current PTE emissions are based on the five existing compressor gas lean-burn engines operating 24 hours per day, seven days per week, at full load. For Scope 2 emission sources of the HRCM Principal Component, pre-project PTE emissions are estimated based on the total existing facility-wide electrical load[6].

Post-project Emissions

For Scope 1 emission sources of the HRCM Principal Component, the post-project PTE emissions are estimated based on the four new compressor gas lean-burn engines operating 24 hours per day, seven days per week, at full load. Non-combustion emissions from the system of

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[5] Combustion emissions reported as 40 CFR Part 98 Subpart C and include the main compressor units.

[6] Indirect CO2e emissions for purchased electricity were estimated using The Climate Registry (TCR) emission factor of 455.22 lbs CO2e/MWh.

SOFCs[7] were calculated based on the maximum annual electricity needed to support the administrative and station auxiliary loads of the facility. The administrative and auxiliary loads[8] were assumed to be serviced by the system of SOFCs for 8,760 hours (about 12 months) per year. The super capacitor and/or battery ESS will be powered by the system of SOFCs and therefore, GHG emissions associated with operating the ESS are covered under the direct emissions from the system of SOFCs. For Scope 2 emission sources of the HRCM Principal Component, the post-project PTE was estimated based on the maximum annual electricity needed for the two new EDCs via electricity purchased[10, 12].

Based on the pre-project PTE and post-project PTE, the projected overall emissions reduction for GHGs is approximately 6,700 metric tons (MT) per year, as shown in Figure HRCM-11 below. This is equivalent to removing about 1,500 passenger vehicles from the roads each year[9].

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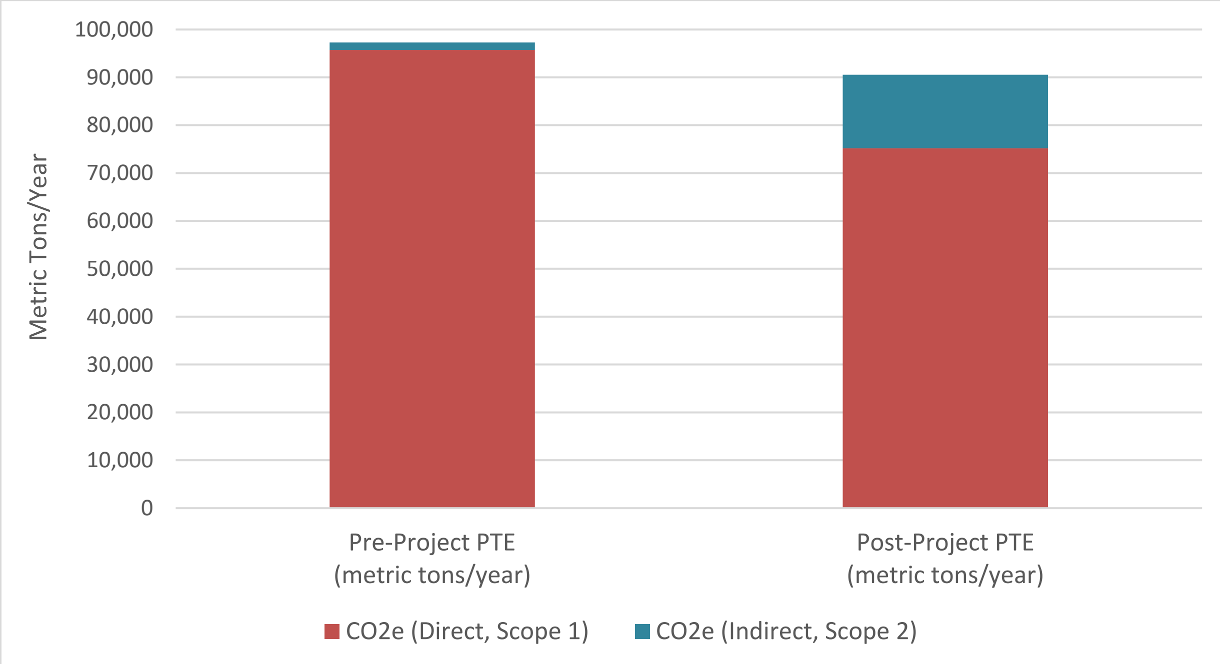
7 CO2e emission factor of 833 lbs/MWh for the solid oxide fuel cell provided by Bloom Energy.

8 The existing station electrical load was estimated based on the station's historical peak demand of 857 kW. The estimated load breakdown for HRCM are as follows: 0.1 MW for administrative load, 1.1 MW for station auxiliary loads, and 8.5 MW for the EDCs.

9 Vehicle quantity equivalency estimated using U.S. EPA's Greenhouse Gas Equivalencies Calculator, https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.

Figure HRCM-11: Pre-and Post-Project Greenhouse Gas (CO2e) PTE for Principal Component

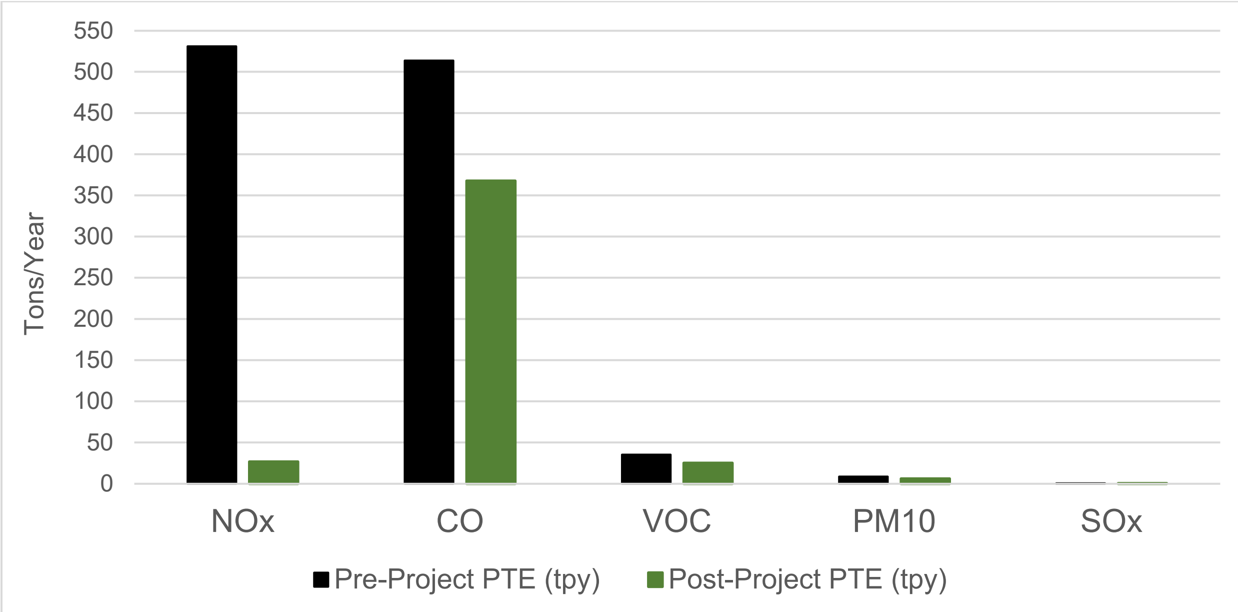


Criteria Air Pollutants Emissions

The estimated changes in criteria air pollutants PTE associated with the HRCM Principal Component are shown in Figure HRCM-12 below. This estimate was prepared by comparing the pre-project PTE to the post-project PTE for the compressor engines being replaced. The pre-project PTE includes the five existing compressor gas lean-burn engines operating 8,760 hours (about 12 months) per year at full load as permitted by the South Coast AQMD. The post-project PTE includes the proposed four compressor gas lean-burn engines operating at 8,760 hours (about 12 months) per year. The PTE for the compressor gas lean-burn engines is based on current Best Available Control Technology (BACT) emission levels. As shown in Figure HRCM-12, the projected change in NOx PTE is a reduction of approximately 95%. Carbon monoxide (CO), volatile organic compounds (VOC), respirable particulate matter (PM10[10]), and sulfur oxides (SOx) emissions are each projected to decrease by approximately 30%. The NOx PTE is decreasing substantially because the permitted emissions are decreasing by over 90% and the total horsepower for compressor gas lean-burn engines is also decreasing by over 25%, which results in an overall decrease in NOx PTE of 95%.

[10] Fine particulate matter ($PM_{2.5}$) is a subset of respirable particulate matter (PM_{10}). $PM_{2.5}$ is assumed to be equal to PM_{10} emissions for combustion of natural gas.

Figure HRCM-12: Pre-and Post-Project PTE for Principal Component



B. Advanced Renewable Energy Component

The ARE Component of the HRCM Project consists of the following: 1) new electrolyzers, hydrogen storage, and fuel blending equipment to integrate green hydrogen into compressor combustion fuel; and 2) new green hydrogen vehicle fueling station for company vehicles.

Greenhouse Gas Emissions

The ARE component, which includes the electrolyzers, hydrogen storage, fuel blending equipment, hydrogen vehicle fueling stations, and other hydrogen ancillary supporting equipment, will be powered by renewable electricity[11] and therefore, GHG emissions will be zero.

GHG Emission Reductions from HRCM Project ARE Component

As stated above, the ARE component proposes to integrate hydrogen and other renewable energy technologies to reduce GHG emissions. As shown in Figure HRCM-13 below, the ARE component could potentially reduce GHG emissions by about 2,300 MT per year, which is equivalent to removing approximately 500 passenger vehicles from the roads each year.

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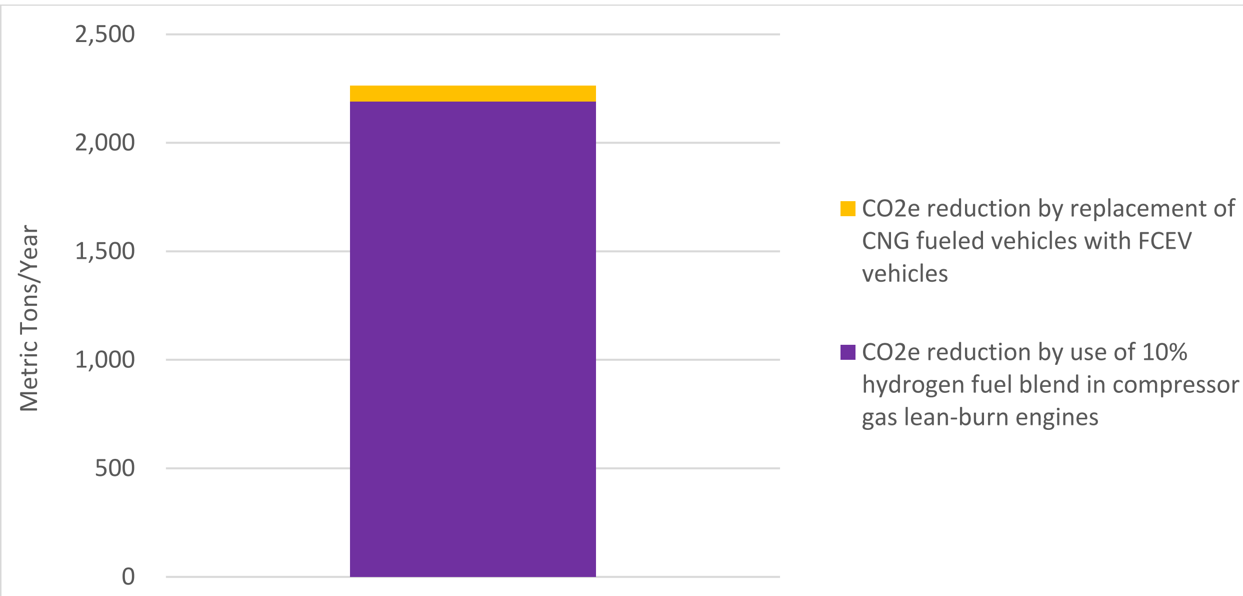
[11] The estimated load for the hydrogen electrolyzer and hydrogen auxiliary equipment is approximately 2.7 MW.

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

- Replacing existing CNG (Compressed Natural Gas) fueled company vehicles with fuel cell electric vehicles (FCEVs) that are powered by green hydrogen produced via onsite electrolysis[12]; and
- Using blended green hydrogen fuel from onsite electrolysis instead of 100% natural gas for the new compressor gas lean-burn engines.

Figure HRCM-13: Greenhouse Gas (CO2e) Potential Emissions Reductions associated with ARE Component



[12] The estimated emissions from the CNG vehicles assume that up to twenty-six vehicles would travel to the Honor Rancho Storage Field 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 twenty-six 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)".

VII. COMMISSIONING NEW EQUIPMENT AND DECOMMISSIONING EXISTING EQUIPMENT

The newly installed compressor equipment at Honor Rancho will undergo commissioning and site performance testing to verify the station meets the expected design criteria, operates as expected, the safety systems are operational, and the natural gas fueled equipment complies with air emission requirements. The commissioning process will be a rigorous systematic process that tests and documents the condition of each system to verify it is fit for service. The verification will include approvals of the installation and design, testing document reviews, all required functional testing and tuning to allow 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 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, inlet, and outlet pressure. The site performance test will be performed in conjunction with the equipment manufacturers, construction contractors, and 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. The decommissioned equipment will be removed and some of the existing buildings will be partially demolished or demolished to grade.

VIII. PROJECT EXECUTION

A. Project Management

SoCalGas's primary project objective is to successfully execute the HRCM Project safely, reliably, on schedule and at reasonable cost, while meeting applicable SoCalGas Company Standards, and complying with applicable environmental and regulatory requirements. To achieve this objective, SoCalGas has formed a well-trained and qualified team comprised of Project Management, Engineering, Construction Management, Project Control, Quality Risk and Compliance, Safety, Procurement, Environmental, Communication 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 Plan(s) to outline the project execution and governance principles utilized by the Project team to conduct and manage the Project. Compliance with this Plan supports the achievement of project safety, schedule, cost, quality, stakeholder engagement, compliance, and risk mitigation goals.

1. Safety

HRCM is utilizing SoCalGas's integrated approach to safety called the Safety Management System (SMS). 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. SoCalGas'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 SoCalGas process engineer assigned to the project. Each review session has appropriate participants in attendance from storage operations, project management, SoCalGas engineering and the engineering contractor. Facilitation of the PHA/HAZOP reviews is performed by a third-party contractor. For HRCM 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 HRCM 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 design engineering lifecycle. For the HRCM 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 SoCalGas 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 SoCalGas employees and contractors/subcontractors working on the HRCM Project.
- An emergency notification, response & 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 to "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. Project Execution

SoCalGas has adopted the Capital Delivery Model (CDM) that sets forth the various stages of the project lifecycle for managing major projects. The CDM principles guide SoCalGas 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 HRCM Project will transition from Stage 2 to Stage 3 in June 2022.

3. Project Controls

The HRCM Project Management team has established project controls and management practices 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 HRCM 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 HRCM 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 assist in presentation to management for approvals as the project matures through various stages of SoCalGas'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 SoCalGas estimating group in conjunction with input from the 3rd party contractors and the HRCM 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 comprise 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).

SoCalGas's CDM staged execution model estimate alignment with the Association for the Advancement of Cost Engineering (AACE) standards[13] 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

SoCalGas employs a multi-pronged approach to the engineering associated with capital projects of the size and complexity of the HRCM Project. SoCalGas uses: 1) SoCalGas Gas

Engineering Department supplemented with third party engineers (Owner's Engineer); 2) Third-party engineering firm for Front End Engineering & Design (FEED); and 3) third-party firm responsible for Engineering, Procurement and Construction (EPC). In addition, specialty engineering expertise is employed throughout the project, as needed.

a. SoCalGas Gas Engineering & Owner's Engineer

SoCalGas's Gas Engineering Department, supplemented with expertise from third-party engineers, Owner's Engineer, are responsible for the following project activities:

- Support for the initial scoping, analysis of requirements and development of alternatives.
- Preparation of requirements for front end engineering bid development, provide analysis of bid responses and support the selection of front-end (FEED) engineering consultant.
- Review and approval of FEED work products.
- Develop Engineering, Procurement and Construction (EPC) bid requirements, provide analysis of bid responses and support selection of EPC firm.
- Review and approve EPC work products.
- Support commissioning of new compressor station and close out of project.

b. Front End Engineering & Design Contractor

For the HRCM 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

[13] AACE International Recommended Practice No. 18R-97.

design of the new compressor station to a 30% design level. The engineering and design (30%) deliverables included mechanical equipment, utility systems, instrument and control systems, electrical components, civil, architectural, structural, process 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

SoCalGas 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 systems, instrument and control systems, electrical components, civil, architectural, structural, and the piping for the new compressor station. This contracting approach is used for several reasons including availability of a well-defined scope, 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 Services team is responsible for informing the project team of the environmental compliance requirements applicable to the project, which are identified by conducting project reviews. The Environmental Services 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 HRCM 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, diverse business enterprise (DBE) participation, and history, among others, are also considered for award recommendation and contractor selection.

8. Construction Management

SoCalGas's Construction Management team oversees the construction of the project and manages vendors and contractors effectively, in alignment with scope of work and Company standards. The Construction Management team makes certain that the project is constructed per design to operate reliably and safely. Construction management at SoCalGas is integrated into the project early to provide input to constructability and identify potential risk to the construction schedule and cost of the project. The Construction Management team is comprised of one or more Construction Manager(s), Construction Team Lead(s), 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 HRCM 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 stake holders to continuously identify and track mitigation and management of risks. The HRCM 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 HRCM Project.

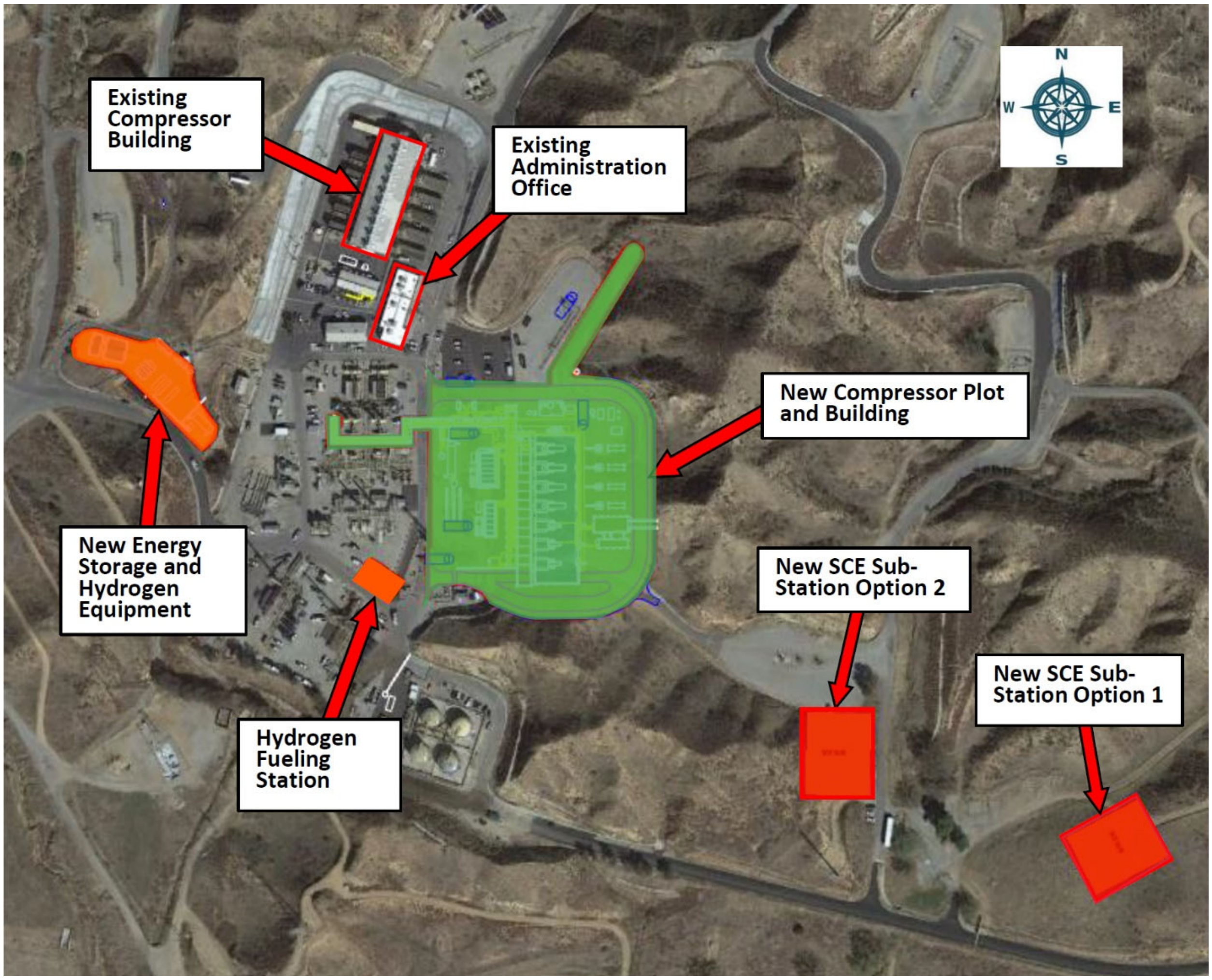
10. Communication and Stakeholder Outreach

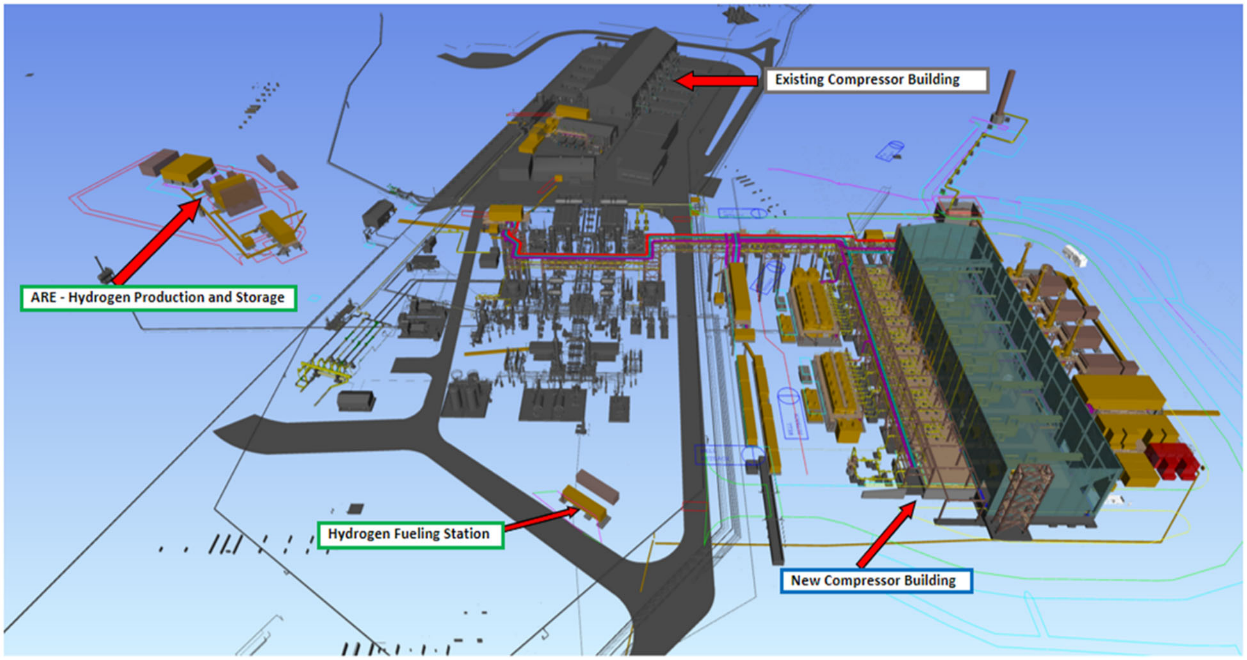
Stakeholder outreach is essential to keeping our communities and our customers informed about our mission and how our facilities and projects fit into the delivery of safe, affordable, and increasingly cleaner energy. SoCalGas collaborates with the communities and local municipalities in which our facilities 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 our 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 public meetings, community canvasing, stakeholder briefings, station tours for local officials, informational newsletters, social media posts, radio ads and dedicated project website updates.

SoCalGas also participates in Community Advisory Councils (CAC). These councils provide invaluable information and help guide SoCalGas' operations at certain facilities. At the Honor Rancho Storage Field, SoCalGas participated in the April 2022 CAC meeting to share information about the proposed Honor Rancho Compressor Modernization Project. Our communications efforts are a critical part of our mission to engage with and learn from our community partners and customers.

APPENDIX A

HRCM PROJECT SCOPE LAYOUT




Existing Compressor Building
ARE - Hydrogen Production and Storage
Hydrogen Fueling Station
New Compressor Building

APPENDIX F

RECLAIM SUPPLEMENTAL PROJECT DESCRIPTION

APPENDIX F – RECLAIM Supplemental Project Description

TABLE OF CONTENTS

I. PURPOSE AND OVERVIEW

The main purpose of this workpaper is to provide supplementary details of the scope, cost, schedule and sustainability of SoCalGas's Regional Clean Air Incentives Market (RECLAIM) Projects. These projects are aligned with the sunset of South Coast Air Quality Management District's (South Coast AQMD) RECLAIM program and shift to a command-and-control regulatory structure.

In the following sections, I have provided the background and the summary of the projects in section II, project scopes in section III, project cost details in section IV and project schedules in section V. In section VI, I describe how the RECLAIM projects aide in achieving SoCalGas's sustainability goals. Finally, in section VII, I provide an overview of SoCalGas's project management activities to achieve the objective of successful execution of the Projects on schedule and at reasonable costs, while meeting quality and safety targets, and complying with governing environmental and regulatory requirements.

II. BACKGROUND AND SUMMARY

SoCalGas's RECLAIM projects consist of four separate projects: Aliso Canyon (AC) RECLAIM Lean Burn Project (Compressor Engines), Aliso Canyon (AC) RECLAIM Rich Burn Project (Generator Engines), Honor Rancho (HR) RECLAIM Project, (Generator and Wet-Gas Compressor Engines), and Playa Del Rey (PDR) RECLAIM Project (Compressor Engines).

A. South Coast Air Quality Management District Reclaim

South Coast AQMD is the regulatory agency responsible for air quality for Orange County and large portions of Los Angeles, Riverside and San Bernardino counties. South Coast AQMD adopts an overarching air quality management plan along with targeted rules to address specific emission sources. South Coast AQMD has amended Rule 1110.2 and Rule 1100, which include sections addressing gas engines transitioning from the RECLAIM Program to the command-and-control regulations requiring implementation of Best Available Retrofit Control Technology (BARCT). These amendments provide the requirements and the timeline for bringing gas engines into compliance with the updated rules or for removing them from operation. South Coast AQMD Rules 1110.2/1100 require that:

- Lean Burn engines, such as those used on the Aliso Canyon and Playa del Rey compressors, be brought into compliance within 24 months of receiving the Permit to Construct (PTC) from South Coast AQMD. The PTC application packages were submitted to South Coast AQMD in June 2021.
- Rich Burn engines, such as those used on the electrical generators at Aliso Canyon and Honor Rancho, be brought into compliance no later than December 31, 2023. The PTC application for these services was submitted in September 2020 and the PTCs were issued in October 2021 for Aliso Canyon and in November 2021 for Honor Rancho.

1. Aliso Canyon Lean Burn RECLAIM Project

The purpose of the Aliso Canyon RECLAIM Lean Burn Project is to maintain compliance with recently adopted South Coast AQMD requirements to allow continued operation of the five 2,000 HP Ingersoll Rand KVS compressors which are used for smaller injection capacity adjustments at the storage field. Aliso Canyon KVS compressor engines have been operating under RECLAIM and are required to comply with Rule 1110.2 emission limits, monitoring, and reporting requirements.

The AC Lean Burn Project's baseline scope entails the retrofit of the five existing lean burn engines with the following modifications and equipment:

- Install new Continuous Emission Monitoring System (CEMS) for monitoring gas engine exhaust and demolish existing CEMS and CEMS enclosure after new system commissioning; and
- Modify existing engines as required to replace the existing oxidation catalyst with new Dual Function Catalyst (SCR + Oxidation) and associated catalyst housing

2. Aliso Canyon Rich Burn RECLAIM Project

Aliso Canyon compressor station's Waukesha generator engines have been operating under RECLAIM and are required to comply with Rule 1110.2 emission limits, monitoring, and reporting requirements. The purpose of the Aliso Canyon RECLAIM Rich Burn Project is to maintain compliance with recently adopted South Coast AQMD requirements for the purpose of allowing continued operation of the four 818 HP Waukesha generators, which are used for providing emergency backup electrical power to the Aliso Canyon facility.

The baseline scope also entails the retrofit of four rich burn engines with the following modifications and equipment:

- Modify and reprogram the existing gas engine Air Fuel Ratio Control (AFRC) units;
- Install new CEMS for monitoring gas engine exhaust; and
- Replace existing Non-Selective Catalytic Reduction (NSCR) catalyst and associated catalyst housing with new NSCR catalysts and housings.

The Aliso Canyon RECLAIM Project(s) are driven by recent South Coast AQMD rule amendments and as such have not been presented in previous SoCalGas General Rate Cases.

3. Honor Rancho RECLAIM Project

The Honor Rancho RECLAIM project is independent of the larger Honor Rancho Compressor Modernization Project (HRCM), which is modernizing the main injection compressor engines. The purpose of the Honor Rancho RECLAIM Project is to maintain compliance with South Coast AQMD requirements to allow continued operation of three 818 HP Waukesha generator engines that supply facility power, and two 738 HP Waukesha wet gas compressor engines that are used for gas compression in the gas extraction process.

The baseline scope entails the retrofit of three generator engines with the following modifications and equipment:

- Replacement AFRC unit for each generator gas engine;
- Install new CEMS for monitoring gas engine exhaust; and
- Replace existing NSCR catalyst and associated catalyst housing with new NSCR catalysts and housings.

The project baseline scope entails the retrofit of the two existing wet gas compressor engines with the following modifications and equipment:

- Replace existing Non-Selective Catalytic Reduction (NSCR) and associated catalyst housing with new NSCR catalysts and housings

The Honor Rancho RECLAIM Project is driven by recent South Coast AQMD rule amendments and as such has not been presented in previous SoCalGas General Rate Cases.

4. Playa Del Rey RECLAIM Project

The purpose of the Playa del Rey RECLAIM Lean Burn Project is to maintain compliance with new South Coast AQMD requirements to allow continued operation of the three Cooper GMVH compressors. In addition, the project will modify the compressors to improve their operation and reliability.

The baseline scope entails the retrofit of three GMVH compressors engines with the following modifications and equipment:

- Installation of high-pressure fuel supply system and associated fuel management upgrades to improve combustion stabilization, normalizing exhaust composition;
- Regrouting of two compressor foundations;
- Retrofit installation of Selective Catalytic Reduction system; and
- Installation of CEMS for engine exhaust monitoring.

The Playa Del Rey RECLAIM Project is driven by recent South Coast AQMD rule amendments and as such has not been presented in previous SoCalGas General Rate Cases.

B. Cost Summary

Figure RECLAIM-14
Summary of Total Costs by Year

RECLAIM Project	2020 Actuals	2021 Actuals	2022 Forecast	2023 Forecast	2024 Forecast	Total
Aliso Canyon Lean Burn	$0	$1,780	$4,746	$9,691	$3,093	$19,310
Aliso Canyon Rich Burn	$775	($156)	$2,869	$2,189	$0	$5,677
Honor Rancho	$287	$654	$4,603	$854	$0	$6,398
Playa Del Rey	$513	$3,211	$12,001	$11,312	$2,415	$29,452
Total	$1,575	$5,488	$24,219	$24,046	$5,508	$60,837

Costs are presented as direct cost in thousands in 2021$. These costs do not include SoCalGas Overheads, Property Taxes, Allowance for Funds Used During Construction (AFUDC), and/or future escalation.

III. PROJECT SCOPE

A. Aliso Canyon RECLAIM Lean Burn (Compressor Engines) Detailed Project Scope

The Project scope can be summarized as:

- Installation of a dual function catalyst system on each of the five compressor gas lean-burn engines, including:
  - Removal of the existing oxidation catalyst;
  - Installation of new dual function catalyst to control NOx, CO and VOC emissions; and
  - New aqueous urea injection system
- Install one new aqueous urea storage tank with secondary containment;
- Replace the existing CEMS with new CEMS and CEMS enclosure to monitor lower NOx concentrations as required by South Coast AQMD Rules;
- Demolish and remove the existing CEMS enclosure after commissioning of new system and equipment;
- Route heated exhaust gas sampling lines from engine stacks to the analyzers in the CEMS enclosure;
- Install air compressor skid and utility air receiver; and
- Install temporary starting air receivers for construction project duration and install two new permanent starting air receivers after demolition of existing CEMS in newly available space.

B. Aliso Canyon RECLAIM Rich Burn (Generator Engines) Detailed Project Scope

The Project scope can be summarized as:

- Replacement four generator engines NSCR catalyst and associated catalyst housing;
- Replacement of exhaust ducting to support new catalyst housing;
- Install four new rich burn engine CEMS analyzers and supporting systems in new CEMS enclosure;

- Route heated exhaust gas sampling lines from engine stacks to the analyzers in the CEMS enclosure; and
- Install support structures and platforms for access to new equipment and connections.

C. Honor Rancho RECLAIM (Generator Engines and Wet Gas Compressors) Detailed Project Scope

The Project scope can be summarized as:

- For three generator engines:
  - Replace existing NSCR catalyst and associated catalyst housing;
  - Replacement of exhaust ducting to support new catalyst housing;
  - Replacement of existing air fuel ratio controller (AFRC) with new AFRC;
  - Install new continuous emission monitoring system (CEMS); and
  - Modify exhaust stacks to add sampling connections and route heated exhaust gas sampling lines from engine stacks to the analyzers in the CEMS enclosure.
- For two wet gas compressor engines:
  - Replace existing NSCR catalyst and associated catalyst housing;
  - Replacement of exhaust ducting to support new catalyst housing; and
  - Re-tune the existing air fuel ratio controller (AFRC).

D. Playa Del Rey RECLAIM (Compressor Engines) Detailed Project Scope

The Project scope can be summarized as:

- Install combustion stabilization systems comprised of engine model predictive control, trapped equivalence ratio (TER) control, electronic pre-combustion check (EPCC) valves, high-pressure fuel injection (Hyperfuel™), and re-work engine turbos;
- Install post combustion treatment system three engine exhausts comprising of new SCR system with new housing and replacement of existing oxidation catalyst in-kind with new housing;
- Replace foundations for two compressors as part of combustion stabilization to allow for safe continuous future operation;

- Install new aqueous urea storage system and urea injection systems for SCR system including two new urea storage tanks;
- Install new CEMS system with enclosure to monitor lower NOx concentrations as required by South Coast AQMD rules;
- Route heated exhaust gas sampling lines from engine exhaust to the analyzers in the CEMS enclosure; and
- Replace utility air compressor and the starting air compressor with new electric motor driven units to meet updated air demands.

IV. PROJECT COSTS

Figure RECLAIM-15
Cost Breakdown

Components	Aliso Canyon Lean Burn ($ in 000s)	Aliso Canyon Rich Burn ($ in 000s)	Honor Rancho ($ in 000s)	Playa Del Rey ($ in 000s)	RECLAIM Total ($ in 000s)
Design & Engineering	$1,446	$431	$695	$2,540	$5,113
Material & Equipment	$5,618	$1,675	$2,482	$7,047	$16,823
Construction	$9,261	$2,761	$1,480	$15,595	$29,097
Environmental	$395	$118	$314	$600	$1,426
Company Labor & Project Services	$2,540	$677	$1,377	$3,602	$8,196
Other	$50	$15	$49	$68	$182
Project Total	**$19,310**	**$5,677**	**$6,398**	**$29,452**	**$60,837**

Figure RECLAIM-16
Cost Breakdown Activities

Sub-Component	Activities
Design & Engineering	Pre-FEED, FEED, and detailed design and engineering
Material & Equipment	Procurement and handling bulk material and equipment
Construction	Construction labor, activities, and subcontractor
Environmental	Environmental services and activities
Company Labor & Project Services	SoCalGas 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$ and exclude SoCalGas Overheads, Property Taxes, AFUDC, and/or future escalation. The estimate represents a Class 3 estimate consistent with AACE International Recommended Practice No. 18R-97, which denotes an estimated final project cost between +30% or -20% from the current project cost. The estimates for all four RECLAIM projects were performed in 2021. The project estimates include assumptions made in the estimating process including, but not limited to:

- Costs are based on current construction costs in Los Angeles County, California with full and open competition from local regional contractors;
- All items in the estimate are unit cost line items based on actual design quantities; and
- The contingencies were determined utilizing a Monte Carlo Risk Analysis Assessment.

V. SCHEDULE

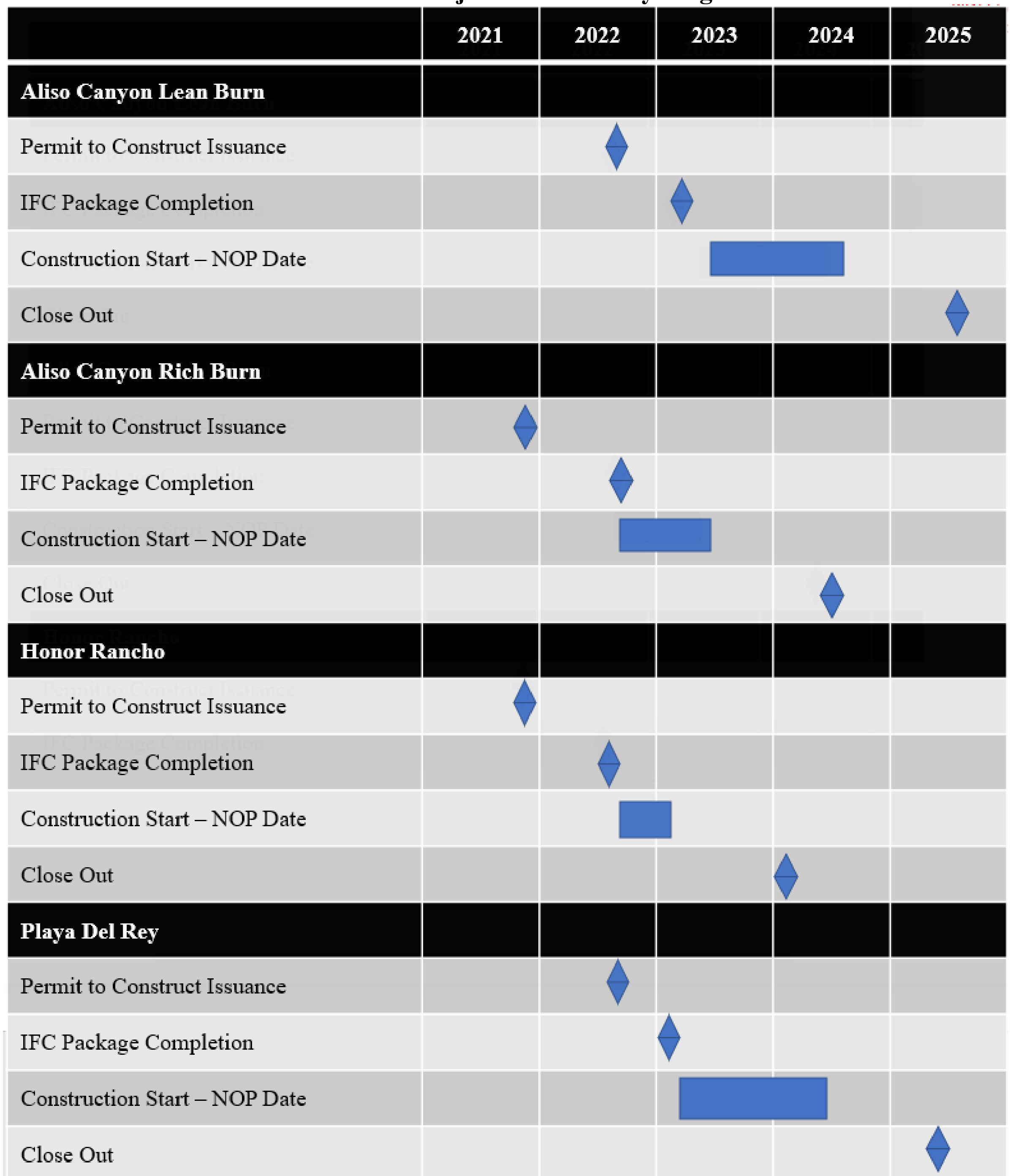
The schedules for the RECLAIM Projects are driven by South Coast AQMD regulations and key milestones include:

- SoCalGas submittal of permit applications to South Coast AQMD;
- South Coast AQMD issuing permit to construct;
- South Coast AQMD Rich Burn engine compliance deadline December 2023; and
- South Coast AQMD Lean Burn engine compliance deadline of 24 months after PTC issuance.

Figure RECLAIM-17
RECLAIM Projects Major Milestones

Major Milestones	Aliso Canyon Lean Burn	Aliso Canyon Rich Burn	Honor Rancho	Playa Del Rey
Project Start Date	Mar 2020	Mar 2020	Mar 2020	Mar 2020
Complete Pre-FEED/FEED	Jan 2021	Jan 2021	Jan 2021	Jan 2021
PTC Issue Date	Aug 2022	Nov 2021	Nov 2021	Aug 2022
IFC Package Completion	Apr 2023	Aug 2022	Jun 2022	Feb 2023
Construction Start	May 2023	Sep 2022	Aug 2022	Mar 2023
NOP	Jul 2024	Jul 2023	Feb 2023	May 2024
Financial Closeout	Jul 2025	Jun 2024	Jan 2024	Apr 2025

Figure RECLAIM-18
RECLAIM Project Schedules by Stages

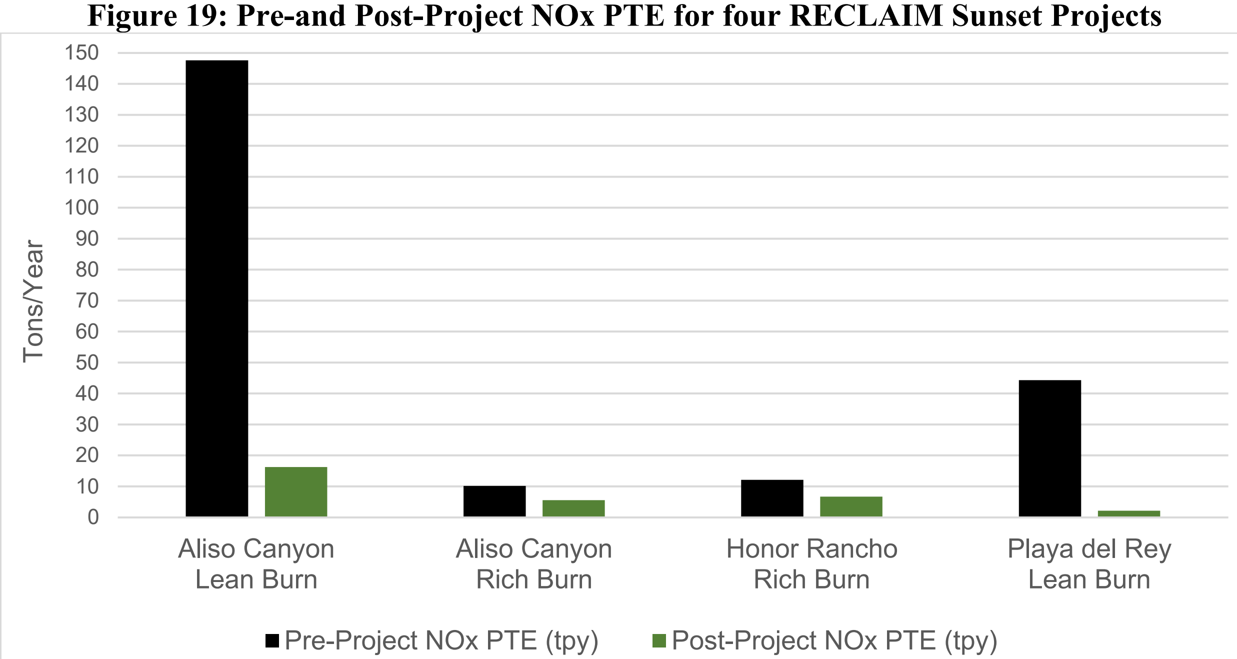


VI. SUSTAINABILITY

SoCalGas will install and/or upgrade emission control systems to the existing engines to comply with South Coast AQMD RECLAIM Program Sunset requirements for oxides of nitrogen (NOx) as specified in South Coast AQMD Rule 1110.2 "Emissions from Gaseous-and Liquid-Fueled Engines" and Rule 1100 "Implementation Schedule for NOx Facilities." The pre and post project potential NOx emissions associated with four of SoCalGas's RECLAIM Sunset projects are shown in Figure 19 below.

The pre-project potential to emit (PTE) values are calculated based on the current permitted NOx emissions factors and with the engines operating 8,760 hours per year at full load for the Aliso Canyon and Honor Rancho projects and at 2,190 hours per year at full load for the Playa del Rey project. The post-project PTE values are based on the same annual hours of operation and with Rule 1110.2 NOx Best Available Retrofit Control Technology emission limit of 11 ppm after the installation and/or upgrade of the emission control systems. As shown in Figure 19, the estimated decrease in NOx PTE for the Aliso Canyon Lean Burn project is approximately 90%; for the Aliso Canyon and Honor Rancho Rich Burn projects are approximately 45%; and for the Playa del Rey Lean Burn project is approximately 95%.

Figure 19: Pre-and Post-Project NOx PTE for four RECLAIM Sunset Projects



VII. PROJECT EXECUTION

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SoCalGas's primary project objective is to successfully execute the RECLAIM Projects safely, reliably, on schedule and at reasonable cost, while meeting applicable SoCalGas Company Standards, and complying with environmental and regulatory requirements. To achieve this objective, SoCalGas has formed a well-trained and qualified team comprised of Project Management, Engineering, Construction Management, Project Control, Quality Risk and Compliance, Safety, Procurement, Environmental, 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 teams have developed and implemented Project Execution Plan(s) to outline the project execution and governance principles utilized by the Project teams to conduct and manage the Projects. Compliance with these Plans support achievement of project safety, schedule, cost, quality, stakeholder engagement, compliance and risk mitigation goals.

1. Safety

The RECLAIM Projects are utilizing the SoCalGas's integrated approach to safety called the Safety Management System (SMS). 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. SoCalGas'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 SoCalGas process engineer assigned to the project. Each review session has appropriate participants in attendance from storage operations, project management, SoCalGas engineering and the engineering contractor. Facilitation of the PHA/HAZOP reviews is performed by a third-party contractor. For RECLAIM Projects, PHAs were completed in the FEED phase. In the EPC phase of the projects, HAZOP reviews will be done to incorporate safety in design for the RECLAIM Projects.

- 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 projects design engineering lifecycle. For the RECLAIM Projects, constructability reviews were conducted during the FEED phase of the projects 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 SoCalGas 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 organizations.
- Job specific safety plans will be developed for the SoCalGas employees and contractors/subcontractors working on the RECLAIM Projects.
- An emergency notification, response & evacuation plans will be developed for the projects.
- 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 to "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

SoCalGas has adopted the Capital Delivery Model (CDM) that sets forth the various stages of the project lifecycle for managing major projects. The CDM principles guide SoCalGas 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

3. Project Controls

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

4. Estimating

The RECLAIM Project Management teams treat estimating as a critical part of project planning and development. Project estimating is an iterative process which begins with the initiation of the projects to set expectations and prepare the project Teams for the completion of estimate development and assist in presentation to management for approvals as the projects mature through various stages of SoCalGas's CDM. Multiple alignments with different project stakeholders and estimating teams happens throughout the life cycle of a projects to seek information available for developing and updating the estimate of projects capital costs and schedules. 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 SoCalGas estimating group in conjunction with input from the 3rd party contractors and the RECLAIM Project Management teams. The output of the cost estimate is used to determine projects economic feasibility, assist with decision making, establish a baseline budget, and track accuracy of material quantities throughout the lifecycle of the projects. The estimate deliverables comprise 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).

SoCalGas's CDM staged execution model estimate alignment with the Association for the Advancement of Cost Engineering (AACE) standards[1] 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

SoCalGas employs a multi-pronged approach to the engineering associated with capital projects of the size and complexity of the RECLAIM Projects. SoCalGas uses: (1) SoCalGas Gas Engineering Department supplemented with third party engineers (Owner's Engineer); (2) Third-party engineering firm for Front End Engineering & Design (FEED); and (3) SoCalGas responsible for management of engineering, procurement of equipment, and selection and outsight of construction contractor. In addition, specialty engineering expertise is employed throughout the projects, as needed.

a. SoCalGas Gas Engineering & Owners Engineer

SoCalGas's Gas Engineering Department, supplemented with expertise from third-party engineers, Owner's Engineer, are responsible for the following project activities:

- Support for the initial scoping, analysis of requirements and development of alternatives.
- Selection of pre-qualified engineering firm.
- Review and approval of FEED work products.
- Develop construction bid requirements and provide analysis of bid responses and support selection of construction firm.
- Provide overall Project Management and oversight of construction activities.
- Support commissioning of new compressor station and close out of project.

1 AACE International Recommended Practice No. 18R-97

b. Front End Engineering & Design Contractor

For the RECLAIM Projects, FEED contractor was selected from a pre-qualified list of engineering firms. In this phase of the project, FEED contractor is responsible for completing engineering and design of the emissions control systems for gas engines. The engineering and design deliverables included mechanical equipment, utility system, instrument and control systems, electrical components, civil, architectural, structural, and piping designs.

SoCalGas plans to contract the engineering phase of the projects to the third-party engineering contractor. Under this approach, the engineering contractor will be responsible for all engineering activities related to the project.

c. 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

Environmental stewardship and compliance with federal, state, and local regulatory requirements and ordinances are of key importance to SoCalGas and the RECLAIM Project teams. SoCalGas's sustainability strategy is embodied in ASPIRE 2045. Driven by our values and mission, ASPIRE 2045 presents an actionable framework to support the goals of a net zero greenhouse gas emissions future. Environmental Compliance consists of best practices, mitigation measures, and permit conditions.

The Environmental Compliance Manager provides environmental oversight and guidance for the projects. Environmental reviews, permitting, agency consultations, training of onsite personnel, and any regulatory updates or interpretations are coordinated through the Environmental Compliance Manager.

7. Procurement of Services and Materials

Procurement of services and materials is the largest component of the RECLAIM Projects 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 RECLAIM Project Management teams are to utilize competition to obtain materials and services at market-based rates. Supply management techniques and practices utilized by the Project teams 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, Disadvantaged Business Enterprises (DBE) participation, and history, among others, are also considered for award recommendation and contractor selection.

8. Construction Management

SoCalGas's 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. Construction management team makes certain that the project is constructed per design to operate reliably and safely. Construction management at SoCalGas 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 of Construction Manager, Construction Team Lead, Field Engineers, Construction Inspectors, and Contractors.

9. Quality, Risk and Compliance Management

Quality Management for the RECLAIM Projects focuses on implementation oversight and review of projects 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 RECLAIM Project Management teams, 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's costs and schedules. Although the Project Managers have overall responsibility for managing project risks, it is a collective effort of the teams and project stakeholders to continuously identify and track mitigation and management of risks. RECLAIM project risk register logs are used to track identification, mitigation and closure of project risks throughout the lifecycle of the projects.

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 teams. 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 Engineers and a Document Control Specialist are assigned these responsibilities on the RECLAIM Projects.

10. Communication and Stakeholder Engagement

Stakeholder outreach is essential to keeping our communities and our customers informed about our 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 our 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.

Our communications efforts are a critical part of our mission to engage with and learn from our community partners and customers.

SoCalGas 2024 GRC Testimony Revision Log –August 2022

Exhibit	Witness	Page	Line or Table	Revision Detail
SCG-10	*Larry T. Bittleston, Steve Hruby*	*LTB-SH-B-1*	*Table: Appendix B*	*Changed RSE value for SCG-Risk-4-C5-T3 to 116 from 35.1*
SCG-10	*Larry T. Bittleston, Steve Hruby*	*LTB-SH-B-1*	*Table: Appendix B*	*Changed RSE value for SCG-Risk-4-C5-T1&T2 from "blank" to -**
SCG-10	*Larry T. Bittleston, Steve Hruby*	*LTB-SH-B-1*	*Table: Appendix B*	*Changed RSE value for SCG-Risk-5-C10 to 591 from 498*
SCG-10	*Larry T. Bittleston, Steve Hruby*	*LTB-SH-B-1*	*Table: Appendix B*	*Added * note informing tranche level RSE values for certain RAMP mitigations are available in the workpapers*
SCG-10	*Larry T. Bittleston, Steve Hruby*	*LTB-SH-C-1*	*Table: Appendix C*	*Changed RSE value for SCG-Risk-4-C06 to 1.0 from 82.7*
SCG-10	*Larry T. Bittleston, Steve Hruby*	*LTB-SH-C-1*	*Table: Appendix C*	*Changed RSE value for SCG-Risk-C07 to 0.1 from 5.7*