CALIFORNIA ENERGY COMMISSION

California Energy Commission

Clean Transportation Program

FINAL PROJECT REPORT

LANCASTER CNG STATION

Prepared for: California Energy Commission

Prepared by: Southern California Gas Company

Gavin Newsom, Governor

August 2020 | CEC-600-2020-045

California Energy Commission

Primary Authors

Stan Sinclair
Southern California Gas Company
555 West Fifth Street
Los Angeles, CA 90013

Ann Hempelmann
Ann Hempelmann Consulting
553 N. Pacific Coast Highway, #126
Redondo Beach, CA 90277

Agreement Number: ARV-12-004

Jacob Orenberg
Commission Agreement Manager

Elizabeth John
Office Manager
ADAVANCED FUELS & VEHICLE TECHNOLOGIES OFFICE

Hannon Rasool
Deputy Director
FUELS AND TRANSPORTATION

Drew Bohan
Executive Director

ACKNOWLEDGEMENTS

The Southern California Gas Company (SoCalGas) acknowledges the support of its project sponsors and project team, including the California Energy Commission, the Antelope Valley Air Pollution Control District and SoCalGas' local project implementation team. The successful implementation of this project is a result of this team's hard work and unwavering support.

PREFACE

Assembly Bill 118 (Núñez, Chapter 750, Statutes of 2007) created the Clean Transportation Program, formerly known as the Alternative and Renewable Fuel and Vehicle Technology Program. The statute authorizes the California Energy Commission (CEC) to develop and deploy alternative and renewable fuels and advanced transportation technologies to help attain the state's climate change policies. Assembly Bill 8 (Perea, Chapter 401, Statutes of 2013) reauthorizes the Clean Transportation Program through January 1, 2024, and specifies that the CEC allocate up to $20 million per year (or up to 20 percent of each fiscal year's funds) in funding for hydrogen station development until at least 100 stations are operational.

The Clean Transportation Program has an annual budget of about $100 million and provides financial support for projects that:

- Reduce California's use and dependence on petroleum transportation fuels and increase the use of alternative and renewable fuels and advanced vehicle technologies.
- Produce sustainable alternative and renewable low-carbon fuels in California.
- Expand alternative fueling infrastructure and fueling stations.
- Improve the efficiency, performance and market viability of alternative light-, medium-, and heavy-duty vehicle technologies.
- Retrofit medium- and heavy-duty on-road and nonroad vehicle fleets to alternative technologies or fuel use.
- Expand the alternative fueling infrastructure available to existing fleets, public transit, and transportation corridors.
- Establish workforce-training programs and conduct public outreach on the benefits of alternative transportation fuels and vehicle technologies.

To be eligible for funding under the Clean Transportation Program, a project must be consistent with the CEC's annual Clean Transportation Program Investment Plan Update. The CEC issued PON-11-602 to provide funding opportunities under the ARFVT Program for projects which develop infrastructure necessary to store, distribute, and dispense electricity, E-85, propane, diesel substitutes, and natural gas. In response to PON-11-602, the recipient submitted an application which was proposed for funding in the CEC's notice of proposed awards April 24, 2012 and the agreement was executed as ARV-12-004 on October 17, 2012.

ABSTRACT

SoCalGas designed, constructed, and now operates a public/private compressed natural gas fueling station with fueling capacity of five (5) gasoline gallon equivalent per minute. The new station is located at SoCalGas Lancaster facility. This station includes a 554 standard cubic feet per minute compressor, two dispensers and one shared 377 gasoline gas equivalent compressed gas storage system. The public access portion of the station is located outside the SoCalGas facility gate and consists of a newly constructed fueling island, a dispenser with one 3,600 pounds per square inch gauge nozzle and one 3,000 per square inch gauge nozzle, a universal card reader, and capacity to add a second dispenser in the future. The publicly accessible dispensers are open 24 hours/day, 7 days/week.

This project station location offers an important addition to the state's compressed natural gas fueling infrastructure network. Station throughput was estimated to displace 28,200 gasoline gallon equivalent per minute per year within the first year of operation, with an associated reduction in greenhouse gases of approximately 76 tons per year. Operational results from the first six months show that actual throughput is nearly twice the expected level. The station has delivered 24,427 gasoline gallon equivalent per minute, which is equivalent to annual throughput of 48,850 gasoline gallon equivalent per minute. Greenhouse gas emission reductions associated with the station's measured throughput were 134 tons of carbon dioxide equivalent a year. The project was also intended to reduce criteria pollutant emissions. A final goal for the project was to increase awareness of and access to compressed natural gas as a vehicle fuel. Through a station grand opening, media outreach, and a strong local effort to build load at this station by the SoCalGas marketing team, awareness of the station is building.

The maximum station throughput design limit is over two (2) million gasoline gallon equivalent per minute per year; marketing and outreach efforts will continue in order to reach this maximum.

Keywords: California Energy Commission, Southern California Gas Company, compressed natural gas, CNG station, petroleum displacement, greenhouse gas, emission reduction

Please use the following citation for this report:

Sinclair, Stan, Ann Hempelmann. 2020. *Lancaster CNG Station*. California Energy Commission. Publication Number: CEC-600-2020-045.

TABLE OF CONTENTS

Page

LIST OF FIGURES

Page

LIST OF TABLES

Page

EXECUTIVE SUMMARY

SoCalGas, with funding support from the California Energy Commission, designed, constructed, and now operates a public/private compressed natural gas fueling station with fueling capacity of five (5) gasoline gallon equivalent per minute. The new station is located at SoCalGas's Lancaster office. This station includes a 554 standard cubic feet per minute compressor, two dispensers and one shared 377 gasoline gallon equivalent compressed gas storage system. The public access portion of the station is located outside the SoCalGas facility gate and consists of a newly constructed fueling island, a dispenser with one 3,600 pounds per square inch gauge nozzle and one 3,000 per square inch gauge nozzle, a universal card reader, and capacity to add a second dispenser in the future.

The public portion of the station supports existing fleets from the City of Lancaster and SoCalGas, as well as customers from the local Honda compressed natural gas dealership and the public. This new station also provides back-up service to the Antelope Valley Schools Transportation Agency compressed natural gas school buses and the existing AT&T natural gas fleet. The publicly accessible dispensers are open 24 hours/day, 7 days/week.

The station is located approximately two miles from the main regional highway, California State Route 14. It is also located one block from a major local thoroughfare, Sierra Highway. This location provides excellent accessibility for natural gas-fueled goods movement trucks that travel to Antelope Valley, fleet vehicles and the public, and provides an important link in the state's compressed natural gas fueling network. There is significant growth opportunity for throughput from local and goods movement fleets as well as passenger vehicles.

This project station location offers an important addition to the state's compressed natural gas fueling infrastructure network. Station throughput was estimated to displace 28,200 gasoline gallon equivalent per year within the first year of operation, with an associated reduction in greenhouse gases of approximately 76 tons per year. Operational results from the first six months indicate SoCalGas has almost doubled the projected throughput with 24,500 gasoline gallon equivalent usage measured. Greenhouse gas emission reductions exceeded projections by 77% on an annualized basis; actual reductions reached 67 tons over six months, annualized to 134 tons over twelve months. Criteria pollutant results have been reduced by 399 pounds of Nitrous Oxide and 24 pounds of particulate matter over the six-month data collection period. Extensive public outreach has been undertaken: a grand opening was attended by the local state senator, Lancaster's vice-mayor, and the City of Palmdale's mayor, as well as representatives of local chambers of commerce. Websites covering transportation news for business covered the event, and both the City of Lancaster and SoCalGas prepared promotional videos and posted them on YouTube.

The maximum station throughput design limit is over two (2) million gasoline gallon equivalent per year; the SoCalGas marketing team will implement a strong local effort to build load at this station to reach this maximum.

CHAPTER 1: Purpose and Approach

1.1 Purpose of the Project

The purpose of the Lancaster Compressed Natural Gas (CNG) Station is to increase availability of CNG infrastructure in order to enhance California's energy independence by reducing petroleum-based transportation fuel consumption. This project station provides convenient, clean, publicly accessible CNG service for a high-growth region of southern California. The station initially serves fleet vehicles operated by the SoCalGas (SoCalGas) and the City of Lancaster, as well as a natural gas vehicles (NGVs) operated by the public.

A secondary purpose is to increase throughput at this new CNG infrastructure location. The station itself, and SoCalGas' marketing efforts to increase station throughput, will address the primary barriers to CNG implementation: lack of customer familiarity with the product and limited supply infrastructure. Figures 1 and 2 depict the project station at its official grand opening on April 15, 2014, six months after initial commissioning.

1.1.1 Project Goals

The primary operational goal of this project is to increase availability of CNG infrastructure in order to enhance California's energy independence by reducing petroleum product consumption. Secondary operational goals include the reduction of criteria and toxic air pollutants, as well as greenhouse gas emissions, while providing a more stable fuel source in times of high petroleum-based fuel costs. Because Gas Company CNG prices are rate-based rather than market based and are set and reviewed by the California Public Utilities Commission (CPUC), customers can be assured of the most fairly priced, affordable fuel available.

1.1.2 Project Objectives

Project objectives include the following:

- Meet projected throughput estimates, initially displacing 28,200 gasoline gallon equivalent (GGE)/year.
- Reduce greenhouse gas emissions by about 76 tons Carbon Dioxide Equivalent (CO_2e)/year.
- Reduce criteria and toxics air pollutant emissions.
- Increase awareness, accessibility, and market penetration of natural gas as a transportation fuel, thus contributing to reduced dependence on foreign oil and reduced greenhouse gas emissions.

1.2 Project Approach

The project approach was to design, oversee construction, and operate a public/private compressed natural gas (CNG) fueling station following current best practices for CNG station construction and operation. The Lancaster site was selected for a CNG station because of the significant growth expected in the area and the high and growing number of people with long daily commutes. Also, the region's growth and the construction of the proposed High Desert Corridor/E220 highway are expected to increase the volume of medium- and heavy-duty vehicle traffic in the area.

The station has a fueling capacity of five (5) GGE per minute, a 554 standard cubic feet per minute (scfm) compressor, two dispensers and one shared 377 GGE compressed gas storage system. The public access portion of the station is located outside the SoCalGas facility gate and consists of a newly constructed fueling island, a dispenser with one 3,600 pounds per square inch gauge (PSIG) nozzle and one 3,000 PSIG nozzle, a universal card reader, with capacity to add a second dispenser in the future. This new station supports state and local goals to increase petroleum fuel displacement in the region while enhancing air quality by reducing criteria pollutant and greenhouse gas emissions. The compression, dryer and storage facilities are depicted below in Figure 1. The public access area is depicted below in Figure 2.

Figure 1: SoCalGas Compression, Dryer and Storage Facilities, Lancaster

Photo Credit: SoCalGas

Figure 2: SoCalGas Public Access Dispenser Area, Lancaster

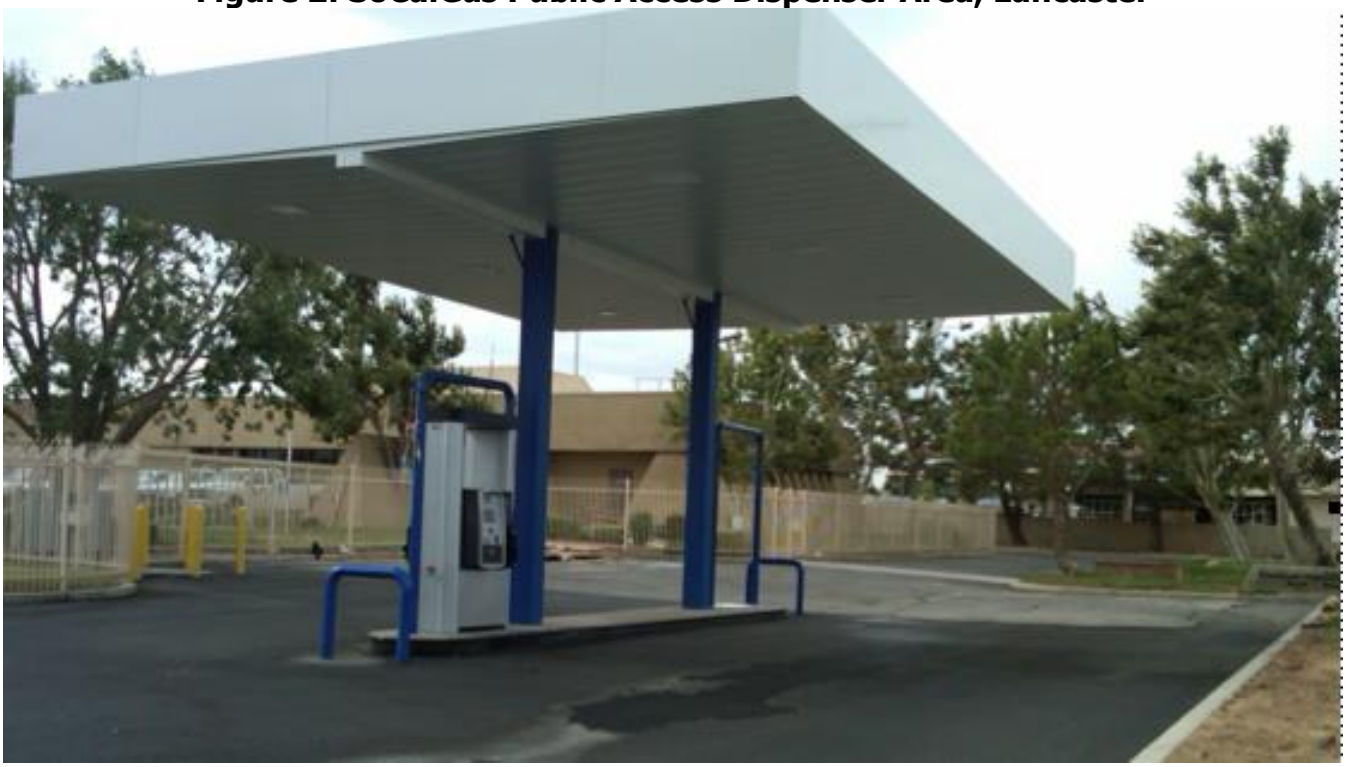

Photo Credit: SoCalGas

1.3 Activities Performed

The station construction and start-up followed well-established best practices for CNG station implementation (i.e., design, construction and commissioning). This station was designed to meet all applicable codes and standards for CNG fueling stations. These codes and standards were met in order to obtain approved plumbing, electrical and building permits and ultimately commission the station. No obstacles or problems were encountered during design, construction and start-up.

Following station commissioning, the station was operated without incident for a period of six months while data were collected in accordance with the Energy Commission agreement. Results of this data collection effort are documented in Section 2.3, below.

Once reliable and consistent station operation was demonstrated for a period of six months, SoCalGas hosted a grand opening event to kick-off its marketing efforts. This event was well-attended by California State Senator Stephen Knight, City of Lancaster Vice Mayor Marvin Crist, City of Palmdale Mayor James C. Ledford Jr., representatives of local chambers of commerce, Time Warner cable news, local Antelope Valley press, and other local fleets. SoCalGas was represented by Rodger Schwecke, Vice President of Customer Solutions, and members of the Media and Employee Communications and NGV teams.

CHAPTER 2: Project Results

Chapter 2 provides a comprehensive discussion of station operation metrics and project results, in the context of, and when applicable, compared to, the original goals and objectives.

2.1 Results

2.1.1 Station Commissioning

The station was successfully commissioned and "open for business" on July 23, 2013 and has been successfully dispensing CNG to its public customers 24-hours per day, 7-days per week, without incident.

2.1.2 Station Throughput

The initial natural gas throughput projected for the project was to displace 28,200 GGE/year. The actual measured throughput during the six-month data collection period was 24,427 GGE. At this current rate, SoCalGas projects annualized throughout to exceed 48,855 GGE/year.

2.1.3 Greenhouse Gas Emissions

Original projections for this station estimated greenhouse gas emission reductions of about 76 tons CO_2e/year. During the six-month data collection period, 67 tons of CO_2e were avoided. When annualized, this value results in Greenhouse Gas (GHG) reductions of 134 tons/year, which far exceeds original projections. According to the California Air Resources Board, the carbon intensity of natural gas is 68.00 grams CO_2e/megajoule, compared to 94.71 grams CO_2e/megajoule for diesel fuel and 95.86 grams CO_2/megajoule for gasoline.[1]

2.1.4 Reduce Criteria and Toxic Air Pollutant Emissions

Table 1 below compares the original criteria and toxic air pollutant emission projections to current estimates based on the six-month data collection period.

Table 1: Criteria and Air Toxic Pollutant Emissions Reduction Results

Pollutant	Original Annual Estimate	Actual 6-month	Annualized Projection
Nitrous Oxide (lbs.)	239	399	798
Particulate Matter (lbs.)	16	24	49

Source: Stan Sinclair, SoCalGas

Based on the first six months of operation, the station is on track to far exceed the GHG emission reductions and petroleum displacement goals. Further, the results shown in Table 1 indicate that our emission reduction projections for criteria and toxic air pollutants also exceed original projections, though while the Particulate Matter reductions are greater than projected, the excess Particulate Matter reductions are not proportional to the other excess benefits (i.e., less than would be expected based on the higher throughput). SoCalGas believes that this is

[1] California Air Resources Board. "Carbon Intensity Lookup Table for Gasoline and Fuels that Substitute for Gasoline." http://www.arb.ca.gov/fuels/lcfs/121409lcfs_lutables.pdf. Accessed April 29, 2014.

primarily due to our projections in the project grant proposal that relied on a greater proportion of medium- and heavy-duty vehicles. It appears, though, that the majority of our station's fueling transactions are supporting light-duty vehicles, which provide a different mix of criteria pollutant reduction benefits.

2.1.5 Increase Awareness, Accessibility and Market Penetration of Natural Gas as a Transportation Fuel

Meeting this goal is the primary responsibility of the SoCalGas local account executive and Marketing Department. Through active engagement with the City of Lancaster, the City of Palmdale, local chambers of commerce, marketing efforts with existing and potential fleet operators, and continued media outreach, efforts will continue to expand station throughput.

The Lancaster station is the first to use SoCalGas brand on its signage. This branding approach helps build on the familiarity and trust customers feel with natural gas and extend it to the idea of vehicle fueling. Figure 3 below shows the prominent display of SoCalGas's name and trademark blue color on station signage.

Figure 3: SoCalGas Name on Station Signage

Photo Credit: SoCalGas

In order to mark the successful implementation of the project station, and to maximize awareness of the station's reliable operation and availability to the NGV driving public, a grand opening event was held on April 15, 2014. The event was attended by a variety of business, community and government partners. Attendees included State Sen. Stephen Knight, City of Lancaster Vice Mayor Marvin Crist, City of Palmdale Mayor James Ledford, and representatives from all the local chambers of commerce. SoCalGas was represented by Rodger Schwecke,

Vice President of Customer Solutions, as well as members of the Media and Employee Communications and NGV Marketing teams. In addition, local Antelope Valley press, Time Warner cable news, and the City of Lancaster video news bureau covered the event. SoCalGas promoted the event through a press release, tweets, a video and photo documentation for its social media channels. Figure 4 below documents this press event.

Following the Grand Opening, the CNG station received news coverage in several outlets:

- An article was published on fleetsandfuels.com, a business-oriented website that provides information on clean transportation. The article announces the station opening and promotes its benefit of a low-cost fuel with "tremendous air quality benefits." The link to the article was tweeted out by the editor of Fleets and Fuels.
- Next-Gen Transportation, another business-to-business website focusing on transportation innovation, published an article about the station. This article provides information about the station and cites the low cost of CNG. http://www.ngtnews.com/e107_plugins/content/content.php?content.9653#.U1VPbFf4LPs
- The City of Lancaster published a YouTube video promoting the new station. The video features Rodger Schwecke, Vice President, Customer Solutions at SoCalGas; and Marvin Crist, Vice Mayor of the City of Lancaster, discussing CNG's environmental and economic the economic benefits of CNG. The video has received 42 views as of May 7, 2014. http://www.youtube.com/watch?v=6t7yOhh0XJM
- SoCalGas also published a video about the Grand Opening on YouTube. This video promotes the cost benefits of natural gas. It also features Stephen Knight, the State Senator representing the Lancaster area, discussing the energy security benefits of natural gas. This video has been viewed 157 times as of May 7, 2014. https://www.youtube.com/watch?v=HHCS4QRegcM

In addition to the above, SoCalGas developed an iPhone app that, among other features, helps customers locate CNG stations like the Lancaster station.

Figure 4: Grand Opening Event for Lancaster CNG Station

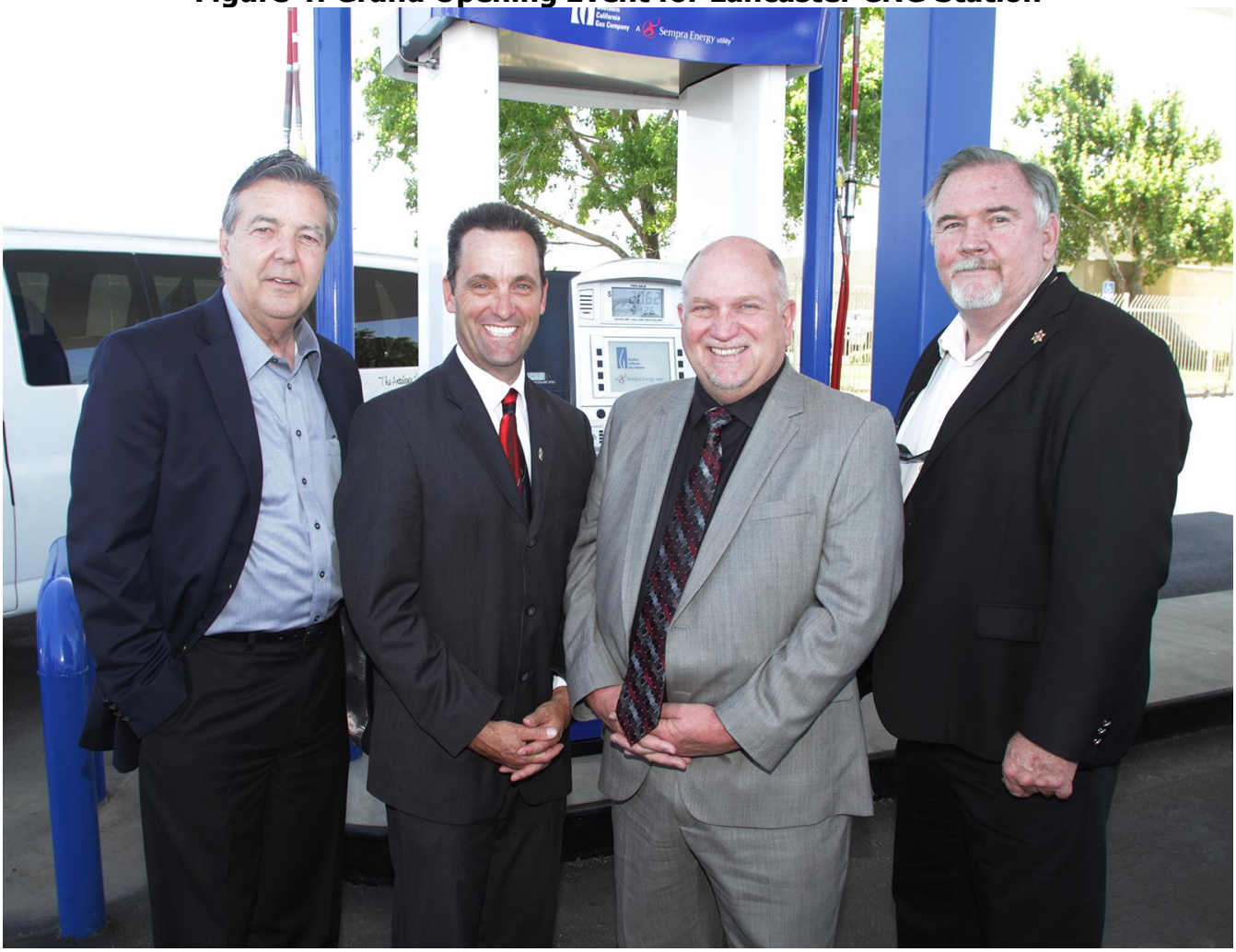

Photo Credit: SoCalGas

2.2 Advances in Science

This project did not rely on, or lead to, specific advances in science related to the implementation of CNG fueling stations. However, the successful implementation of this station supports the continued transition to clean transportation fuels, which is an extremely important aspect of the State's strategy to reduce its dependence on foreign oil imports and to increase the penetration of advanced transportation vehicle technologies based on CNG fuel. A reliable CNG station network contributes directly to continued implementation of advanced CNG fueled vehicles and engines to support a variety of duty cycles.

2.3 Data Collection and Analysis

This section discusses the results of the six-month data collection effort.

2.3.1 Throughput, Usage and Operations Data Collected

Table 2 below summarizes the results of the six-month data collection effort.

Table 2: Data Collection Results (August 1, 2013 through January 31, 2014)

Description (averages, where applicable)	**Value**
Number of public vehicles fueled per day	16
Number of fleet vehicles fueled per day	4
Number of total vehicles fueled per day	20
Fleet consumption per day	15 GGE
Public consumption per day	119 GGE
Total consumption per day	134 GGE
Number of days or hours per year that the station was inoperative	0
Maximum capacity of the new fueling system	5 GGE/min, 554 scfm, yearly throughput > 2 million GGE/year
Electricity required to power CNG compression equipment on a daily basis	125 kWh/day

Source: Stan Sinclair, SoCalGas

2.3.2 Petroleum Fuel Displaced

Table 3 provides a summary of the actual CNG fuel (in units of GGE) purchased at the Lancaster CNG station. These results are based on actual transaction data for the first six months of station operation; these data are annualized to provide a projection for the gallons per year results. Station transaction records do not track the vehicle class associated with each purchase. As such, SoCalGas estimated the fuel consumption for each vehicle class based on the amount of fuel purchased in each transaction (i.e., a transaction less than 12 GGE are light-duty vehicles, between 12 and 20 GGE are medium-duty and over 20 GGE are heavy-duty). This data is presented in Table 3. Measurements in GGE have been converted to DGE using a factor of 1.14 DGE/GGE.[2]

[2] California Energy Commission. "Energy Almanac: Gasoline Gallon Equivalents (GGE) for Alternative Fuels." http://www.energyalmanac.ca.gov/transportation/gge.html. Accessed April 29, 2014.

Table 3: CNG Fuel Consumption, estimated by Vehicle Class (GGE)

	6-month CNG Fuel Consumption (GGE)	Annualized Estimate (GGE)
LDV	13,680	27,361
MDV	5,875	11,749
HDV	4,872	9,745
Total	24,427	48,855

Source: Stan Sinclair, SoCalGas

Table 4 provides the assumed fuel economy of each vehicle class[3] that is applied to the throughput in Table 3 to determine an estimate of the gasoline and diesel gallons displaced by using natural gas, which are summarized in Table 5, below.

Table 4: CNG Fuel Consumption, estimated by Vehicle Class (GGE)

Vehicle Class	Miles per Gallon (mpg)
LDV	24.60
MDV	7.30
HDV	5.80

Source: Stan Sinclair, SoCalGas

Table 5: Gasoline and Diesel Gallons Displaced, estimated by Vehicle Class

Class and Fuel Type Displaced	6-month Petroleum Fuel Displacement	Annualized Estimate
Gasoline Gallons, LDV	13,680	27,361
Diesel Gallons, MDV	5,153	10,306
Diesel Gallons, HDV	4,274	8,548
Diesel Gallons, Total	9,427	18,854
Petroleum Gallons, Total (gasoline and diesel)	23,107	46,215

Source: Stan Sinclair, SoCalGas

The twelve-month annualized volume far exceeds the projected volume of 28,200 GGE of petroleum gallons displaced.

[3] Department of Energy, Alternative Fuels and Advanced Vehicles Data Center. "Petroleum Reduction Planning Tool." Table B-1. https://www.afdc.energy.gov/afdc/prep/methodology.html. Accessed 3/15/12.

2.3.3 Duty Cycles

Based on the results of the data collection effort, SoCalGas fuels 17 light-duty vehicles and two heavy-duty vehicles at the station. Based on projections of its own fleet operation plans, and on California Air Resources Board estimates of light- and medium-duty CNG vehicle sales, SoCalGas estimates an increase in light- and medium-duty NGVs using this station of almost 30 percent by the end of 2015. The HOV lane incentive will also support growth of the CNG passenger vehicle market through 2014, since many new CNG vehicles qualify for carpool lane access if the vehicle owner obtains the HOV-access sticker, though this incentive ends January 1, 2015.

In addition to serving SoCalGas vehicles, the station serves as back-up to the Antelope Valley School Transportation Agency and has already provided back-up service to the school bus fleet.

Table 6 uses the information provided in Section 2.3.2 to estimate the six-month actual and annualized projection of vehicle miles travelled for station customers.

Table 6: Estimated Station Customer Duty-Cycle Activity (miles)

	6-month miles travelled	Annualized Estimate (mi/yr.)
LDV	336,535	673,070
MDV	42,885	85,770
HDV	28,260	56,520
Total	407,680	815,359

Source: Stan Sinclair, SoCalGas

2.3.4 Jobs and Economic Development

This project resulted in significant funding paid to in-state companies that participated on the project team. In addition, State sales tax revenues were generated on equipment purchased for this project. See below for additional detail.

Contractors in California supporting this project, and the associated funding amount for their services, is listed below:

- PID Engineering and CN Peck, Inc. ($25,000)
- Amtek ($371,600)
- Calcraft ($18,600)

Major equipment purchased for this project included:

- Angi Compressor ($249,400)
- Kraus Dispenser ($69,700)
- PBS Industries Gas Dryer, CPI Pressure Vessels and Romac Switch Gear ($134,800)

2.3.5 Alternative Fuel Source and Renewable Energy
The project station is supplied by the SoCalGas's existing natural gas pipeline. As noted in the project proposal, this project does not have a renewable energy component.

2.3.6 Energy Efficiency
The project station meets all existing energy efficiency requirements.

2.4 Findings and Conclusions
2.4.1 Achievement of Goals and Objectives
The primary goal of this project was to increase availability of CNG infrastructure in order to enhance California's energy independence by reducing petroleum-based transportation fuel consumption. Secondary operational goals include the reduction of criteria and toxic air pollutants as well as greenhouse gas emissions and providing a more stable fuel source in times of high petroleum-based fuel costs. SoCalGas is pleased to report the successful achievement of all project goals and objectives based on the results during the first six months of station operation.

2.4.2 Results Obtained
The successful design, construction and reliable operation of the Lancaster CNG station demonstrates the excellent work of a terrific project team. The station project was implemented on time and within budget and had 3,009 transactions for vehicles operated by the public or fleets other than SoCalGas during its first six months of operation. As discussed earlier, the station is on track to far exceed original project projections. Key results are provided in Section 2.3 and summarized below:

- 24,427 GGE displaced
- 67 CO_2e tons reduced
- 339 and 24 pounds Nitrous Oxide and Particulate Matter emissions, respectively, reduced

2.4.3 Conclusions
SoCalGas is pleased with the results of this project. The project's success could not have been achieved without our committed project team and customer partners. The ability to remain on schedule and budget was due to excellent project planning and a thorough understanding of the project scope. The accelerated throughput achieved by the station is a result of SoCalGas' own commitment to NGVs as well as outreach and marketing efforts to other local fleets. This type of coordinated effort is key to success in similar CNG station construction projects.

2.4.4 Recommendations
SoCalGas is excited about the throughput already achieved by the project station. While the projected medium- and heavy-duty vehicle use has started out slower than projected, the light-duty vehicle customer usage has been much higher than projected. In light of this success, SoCalGas will track overall demand at the station against marketing plans and new customer growth to learn from this experience when planning future stations.

GLOSSARY

CALIFORNIA PUBLIC UTILITIES COMMISSION (CPUC)—A state agency created by constitutional amendment in 1911 to regulate the rates and services of more than 1,500 privately owned utilities and 20,000 transportation companies. The CPUC is an administrative agency that exercises both legislative and judicial powers; its decisions and orders may be appealed only to the California Supreme Court. The major duties of the CPUC are to regulate privately owned utilities, securing adequate service to the public at rates that are just and reasonable both to customers and shareholders of the utilities, including rates, electricity transmission lines and natural gas pipelines. The CPUC also provides electricity and natural gas forecasting, and analysis and planning of energy supply and resources. Its main headquarters are in San Francisco.

CARBON DIOXIDE EQUIVALENT (CO2e)—A metric used to compare emissions of various greenhouse gases. It is the mass of carbon dioxide that would produce the same estimated radiative forcing as a given mass of another greenhouse gas. Carbon dioxide equivalents are computed by multiplying the mass of the gas emitted by its global warming potential.

COMPRESSED NATURAL GAS (CNG)—Natural gas that has been compressed under high pressure, typically between 2,000 and 3,600 pounds per square inch, held in a container. The gas expands when released for use as a fuel.

DIESEL GALLON EQUIVALENT (DGE)—The amount of alternative fuel it takes to equal the energy content of one liquid gallon of diesel gasoline.

GASOLINE GALLON EQUIVALENT (GGE)—The amount of alternative fuel it takes to equal the energy content of one liquid gallon of gasoline. GGE allows consumers to compare the energy content of competing fuels against a commonly known fuel—gasoline. GGE also compares gasoline to fuels sold as a gas (natural gas, propane, and hydrogen) and electricity.

GREENHOUSE GAS (GHG)—Any gas that absorbs infrared radiation in the atmosphere. Greenhouse gases include water vapor, carbon dioxide (CO2), methane (CH4), nitrous oxide (NOx), halogenated fluorocarbons (HCFCs), ozone (O3), perfluorinated carbons (PFCs), and hydrofluorocarbons (HFCs).

POUNDS PER SQUARE INCH GAUGE (PSIG)—The pressure relative to atmosphere.

Southern California Gas Company (SoCalGas)

STANDARD CUBIC FEET PER MINUTE (SCFM)—The molar flow rate of a gas corrected to standardized conditions of temperature and pressure, thus representing a fixed number of moles of gas regardless of composition and actual flow conditions.