

# **FINAL REPORT**

**Construct New Public-Access CNG Station – Pico Rivera**

**MSRC Contract # MS12011**

Submitted by:  
Southern California Gas Company  
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Prepared for the Mobile Source Air Pollution Reduction Review Committee (MSRC) under the  
AB 2766 Discretionary Fund Work Program.

## **ACKNOWLEDGEMENTS**

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This report was submitted in fulfillment of MSRC Contract # MS12011, for the project entitled “Construct New Public-Access CNG Station – Pico Rivera” by Southern California Gas Company under the partial sponsorship of the Mobile Source Air Pollution Reduction Review Committee (MSRC). Work was completed and the station put in service as of June 24, 2016.

### **Disclaimer**

The statement and conclusions in this report are those of the contractor and not necessarily those of the Mobile Source Air Pollution Reduction Review Committee (MSRC) or the South Coast Air Quality Management District (SCAQMD). The mention of commercial products, their sources or their uses in connection with material reported is not to be construed as either an actual or implied endorsement of such products.

## **PROJECT DESCRIPTION & WORK PERFORMED**

The Mobile Source Air Pollution Reduction Review Committee (MSRC) provided grant funding support to the Southern California Gas Company (SoCalGas) new CNG station project. This project encompassed the design, construction, and operation of a public/private compressed natural gas (CNG) fueling station with dispensing capacity of five (5) gasoline gallon equivalents (GGE) per minute per hose. This station includes two 125 horsepower, two 524 standard cubic feet per minute (scfm) ANGI compressors (Ariel Model NG300E), two fast-fill dispensers with four hoses, seven time-fill posts that are equipped with 14 hoses, and one 34,000 standard cubic feet (scf) compressed gas storage system.

The public portion of the station consists of a single fueling island with two fast fill dispensers, each with two dispensing nozzles each rated at five (5) GGE/minute (minimum). This public-access fueling island is available 24 hours per day, seven days per week and support existing fleets from NASA trash trucks, Coca Cola, as well as natural gas vehicles (NGVs) from the general public. The time-fill equipment is located inside the company base to support overnight fueling of up to 14 SoCalGas fleet vehicles at one time.

The station is located at SoCalGas' Pico Rivera facility, less than one mile from the Interstate 5 FWY, at 8101 Rosemead Blvd., Pico Rivera, CA 90660. This location provides excellent accessibility for natural gas-fueled trash trucks, which serve several residential neighborhoods within the vicinity, and the general public. This project station location offers an important addition to the region's CNG fueling infrastructure network. In the first six months of station operation, throughput averaged 590 GGE per day. At this current rate, the station is projected to dispense over 215,000 GGE in the first year of operation.

## **PROBLEMS ENCOUNTERED**

The permitting process took several months longer than was originally anticipated. This project is located in an unusual location compared to other NGV stations. The project is located directly off a main thoroughfare and next to a train track and is also impacted by an adjacent residential community that is very sensitive to new developments in the area. Permitting was pursued through the City of Pico Rivera and because the station is directly off Rosemead Boulevard, which is a heavily travelled boulevard, a more rigorous plan check, permitting review and permitting requirements were required. An extensive CEQA review was also conducted resulting in additional permitting requirements. The City of Pico Rivera also required other agency reviews and approvals from the Los Angeles City Sanitation Department and from the SCAQMD, which were not originally anticipated. In addition, the City of Pico Rivera required SoCalGas to conduct a traffic study to determine the impact of traffic flow from the project facility to and from Rosemead Boulevard as part of the permitting process. The permitting process took 25 months, a full 19 months longer than was planned. All of these unusual and unexpected requirements contributed to the significant delays to the project

## EMISSIONS BENEFITS

Over the past 30 years, clean burning NGVs provided significant reductions<sup>1</sup> in criteria and toxic air pollutant emissions compared to conventional gasoline and diesel vehicles. When NGVs were first introduced to the transportation market, initial NGVs reduced key pollutants emissions such as oxides of nitrogen (NOx) and particulate matter (PM) by up to 98 percent. More recently, the light-duty CNG-fueled Honda Civic, which unfortunately is no longer being produced, emitted<sup>2</sup> half the NOx, 80 percent less non-methane hydrocarbon (NMHC) and 60 percent less carbon monoxide (CO) than the gasoline Civic. New CNG-fueled medium- and heavy-duty trucks and buses reduce NOx by more than 90 percent and PM by 98 percent, compared to older in-use diesel fueled versions. These benefits drive grant programs in California that fund the accelerated replacement of diesel fueled trucks and buses with natural gas technology, with grant funds targeted to cover the higher incremental cost of the cleaner technology over comparable diesel engines. It is noteworthy that natural gas technology's successful in-use operation in all vehicle classes over the past few decades contributed to CARB's ability to continually restrict vehicle and engine emissions, culminating in the current 0.2 and 0.01 gram per brake horsepower-hour NOx and PM standards, which have been met by both natural gas and diesel fuel technologies since 2010.

More recently, Cummins Westport Inc. certified its natural gas engine with both the U.S. EPA and CARB at the 90 percent NOx reduction level of 0.02 grams per brake horsepower-hour. The engine is currently available for medium heavy-duty vehicle applications, such as urban transit buses, school buses and refuse trucks. Technologies such as these have the potential to further support the market deployment of medium- and heavy-duty natural gas trucks. By using both biomethane and low-NOX engines, natural gas trucks have the potential to reduce criteria pollutant and GHG emissions to levels near those of zero-emission battery and fuel cell electric vehicles.

All NGVs fueling at the Pico Rivera station provide well-established environmental benefits, as evidenced by the South Coast Air Quality Management District's seven fleet rules<sup>3</sup>, which require the use of clean fuels such as natural gas in a variety of fleet applications. Table 1 is reproduced from the Natural Gas Vehicle Association's summary of environmental benefits for NGVs. Tables 1 and 2 show the percent emission reduction for various vehicle classes based on 2012 emission standards, compared to new and in-use vehicles, respectively. Since emission standards have not changed since 2012, this summary is current for the comparison of new vehicles or engines. Since PM certification levels of diesel engines now meet the same level of particulate matter of natural gas engines, new natural gas engines no longer offer quantifiable PM reductions compared to new diesel engines (diesel PM emissions are currently controlled by aftertreatment devices such as diesel particulate traps). Of course, when NGV technology is implemented to replace older diesel technology, valuable PM emission reductions are achieved.

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<sup>1</sup> Since detailed mileage information for customer vehicles is not available, a qualitative discussion of emissions benefits is provided.

<sup>2</sup> <http://automobiles.honda.com/civic-natural-gas/faq.aspx>, accessed 11/18/15.

<sup>3</sup> <http://www.aqmd.gov/home/regulations/fleet-rules> accessed 6/9/2016).

**Table 1: Percentage Emissions Reductions (%) of New NGVs Compared to New Gasoline and Diesel Vehicles**

	CNG v. Gasoline		CNG v. Diesel	CNG v. Diesel
	Passenger Car	Light-Duty Truck	School Bus	Heavy-Duty Truck
<b>GHG</b>	13	14	13	13
<b>NOx</b>	16	16	16	40

Source: NGV America, <http://www.ngvamerica.org/natural-gas/environmental-benefits/>. Accessed 6/9/16.

**Table 2: Percentage Emissions Reductions (%) of New NGVs Compared to In-Use Gasoline and Diesel Vehicles**

	CNG v. Gasoline				CNG v. Diesel		CNG v. Diesel	
	Passenger Car		Light-Duty Truck		School Bus		Heavy-Duty Truck	
	2002	2007	2002	2007	2002	2007	2002	2007
<b>GHG</b>	18	18	25	25	25	25	25	25
<b>NOx</b>	91	34	97	91	92	76	95	88
<b>PM10</b>	50	0	98	12	98	21	98	22

Source: NGV America, <http://www.ngvamerica.org/natural-gas/environmental-benefits/>. Accessed 11/2/15.

## PHOTOGRAPHS & OUTREACH

A grand opening event was held on July 13, 2016. Websites covering transportation news for business covered the event, and SoCalGas updated the maps on its website as well as the SoCalGas mobile app. Websites covering transportation news for business covered the event, and SoCalGas prepared informational material for the station which was distributed via a broad range of websites, including, but not limited to:

- PR Newswire
- SoCalGas Social Media sites
- San Diego Renewable Energy Society
- Green Fleet News
- US Gas Vehicles.com
- Natural Gas Vehicles Journal

Energy-efficient LED signage enables motorists to see the CNG fuel prices and drought-tolerant landscaping adds beauty together with energy and water-saving environmental benefits.

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.

Below are photographs of the project station. The compression, dryer and storage facilities are depicted below in Figure 1. The public access area is depicted below in Figure 2 and the time-fill area is depicted in Figure 3.

**Figure 1: SoCalGas Compression, Dryer and Storage Facilities, Pico Rivera**



**Figure 2: SoCalGas Public Access Dispenser Area, Pico Rivera**



**Figure 3: SoCalGas Time-Fill Area, Pico Rivera**



The Pico Rivera station uses the recently developed SoCalGas brand signage, which also provides excellent visibility of the fuel price. 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 4 below shows the prominent display of Southern California Gas Company's name and trademark blue color on the station's signage. Figure 5 depicts the MSRC logo on station equipment.

**Figure 4 – SoCalGas Name on Station Signage**





Figure 5 – SoCalGas Display of MSRC Decal at Pico Rivera

## SUMMARY & CONCLUSIONS

### Summary

This station includes a two 125 horsepower, 524 scfm compressors, two fast-fill dispensers, and seven time-fill posts, with a total of 14 hoses to provide simultaneous overnight fueling. Currently there are 5 SoCalGas fleet vehicles using the time-fill system regularly on week nights. There are other SoCalGas vehicles that use the time fill system from time to time.

The public and time-fill equipment share a 34,000 scf 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 with two dispensers, each with two nozzles, rated at minimum five GGE/minute, and a universal card reader. The publicly accessible dispensers are open 24 hours/day, seven days/week.

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. Upon commissioning, SoCalGas began a six-month demonstration, collecting operations data that included tracking utility bills to monitor the natural gas and electricity consumption of the station.

The actual measured throughput during the six-month data collection period was 115,448 GGE, just over 100,000 DGE<sup>4</sup>, well beyond the year three goal for this contract (67,300 DGE/year). At the current monthly throughput rate of approximately 19,241 GGEs, the annual throughput is projected to be 231,000 GGE/year at the current rate. For the 183-day demonstration period, which ran from July 13, 2016, through January 12, 2017, station operation consisted of the following:

- Non-SoCalGas fleet customer (public, miscellaneous credit card transactions):
  - More than 5,867 public transactions, or 32 transactions per day, on average.
  - A total of 107,542 GGE dispensed, or 587 GGE dispensed per day, on average.
  - Public station throughput represents 76 percent of total station throughput.
  
- SoCalGas fleet vehicle consumption:
  - Approximately 14 overnight time-fill connections.
  - 7,906 GGE dispensed in total, or 43 GGE dispensed per day, on average.
  - Fleet vehicle throughput represents 8.4 percent of total station throughput.

Table 3 summarizes the average daily throughput and operations data collected during the initial demonstration period.

**Table 3: Data Collection Results (July 13, 2016 through January 12, 2017)**

<b>Description</b> ( <u>averages</u> , where applicable)	<b>Value</b>
Number of days in reporting period	183
Average number of public vehicles fueled per day (estimated by dividing number of transactions by days per month)	32
Avg. GGE dispensed per day to the public	590 GGE
Total GGE dispensed during demonstration period	115,448 GGE
Number of days or hours that the station was inoperative	0
Natural gas that was compressed at the station during the demonstration period	149,736 therms <sup>5</sup>
Electricity required to power CNG compression per day	117 kWh/day

<sup>4</sup> One GGE = 0.88 DGE

<sup>5</sup> Based on this conversion factor: 1.297 therms per GGE.

The GHG reduction benefits of natural gas as a transportation fuel are demonstrated by comparing the carbon intensity (CI) of natural gas to baseline fuels. According to the California Air Resources Board (CARB), “carbon intensity means the amount of lifecycle greenhouse gas emissions, per unit of energy of fuel delivered, expressed in grams of carbon dioxide equivalent per megajoule (gCO<sub>2</sub>e/MJ), where gCO<sub>2</sub>e/MJ is defined as grams of carbon dioxide per megajoule. In the case of CNG, CI is typically less than gasoline and diesel. According to the CARB’s Low Carbon Fuel Standard (LCFS) regulation, the CI of CNG is 68.00 gCO<sub>2</sub>e/MJ. This compares with 98.03 gCO<sub>2</sub>e/MJ for diesel fuel and 99.18 gCO<sub>2</sub>e/MJ for gasoline. Based on current carbon intensity values, CNG provides a net reduction in greenhouse gas emissions of about 21 percent compared to gasoline and diesel.

A method to further reduce the CI of natural gas fuel is to procure natural gas that is derived from renewable feedstock, i.e., biogas, landfill gas or biomethane. Landfill gas (bio-methane) that is cleaned up to pipeline quality natural gas and compressed in California is rated by CARB with a CI of 11.26 gCO<sub>2</sub>e/MJ, far below existing pipeline natural gas. SoCalGas is investigating the availability of renewable feedstock for its pipeline. Should this become available, the CI of natural gas at this station would further improve (i.e., be lower than current estimates).

## **Recommendations**

The successful design, construction and reliable operation of the Pico Rivera CNG station have been demonstrated during the station demonstration period. The station had 5,867 transactions from vehicles operated by the public or fleets other than SoCalGas during its first six months of operation. In addition, the station fueled 7,906 GGE using its overnight time-fill equipment to SoCalGas fleet vehicles assigned to the base.

SoCalGas is excited about the throughput already achieved by the project station. SoCalGas will track overall demand at the station against marketing plans and new customer growth to learn from this experience when planning future stations.

SoCalGas recommends that future station projects include sufficient planning time to coordinate with the local permitting agencies. This will avoid unplanned delays in future projects.

Continued support for NGV implementation from state and local agencies in the form of vehicle buy-down incentives is important to ensure that existing and future natural gas fueling stations maximize their station throughput. The MSRC’s recently announced low-NO<sub>x</sub> vehicle incentives is a great example of a current program that will be instrumental in supporting the growth at this, and other California natural gas fueling stations.