

PROJECT SUMMARY (FINAL REPORT)

For

CONTRACT **AB 2766/ML 14062**

EXPAND EXISTING CNG STATION

CITY OF SAN FERNANDO

November 6, 2018

***Prepared for the Mobile Source Air Pollution Review Committee (MSRC) under the AB 2766 Discretionary Fund Work Program.***

## **Disclaimer**

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## Project Summary and Conclusions

The goal of the project was to expand (upgrade) the City's existing Compressed Natural Gas (CNG) station. To achieve this goal, the project scope consisted of the design and engineering of new system, fabrication and installation of new equipment, commissioning and testing of new equipment, and training of City staff associated with how to run and maintain the new system.

### Reason for Station Upgrade

In 2006, the City constructed a CNG Station within the Civic Center (120 Macneil Street). During the 11 year period that the station has been in operation, it serviced City vehicles, Metropolitan Transit Authority (Metro) buses, Caltrans vehicles, and the general public. From 2006 through 2009, the station fueled vehicles very efficiently and endured very few maintenance or repair issues.

But beginning in 2010, the station experienced a substantial increase in the number of vehicles utilizing the CNG station. This substantial increase uncovered a flaw in the original design of the station: station's fueling capacity was severely limited. In most cases, the station was capable of only filling approximately 50-55% of a large vehicle's (trucks or buses) fuel tank prior to the system shutting down to replenish its fuel storage vessels. On average, it took 90 minutes for the station's fuel storage vessels to be replenished.

Vehicles were able to fuel during the replenishing process. But the amount of fuel received would be very limited and the time it took to fuel would be extremely long (e.g., 2 gallons of fuel after 12 minutes of pumping). This was due to competing factors; system trying to create fuel while at the same trying to dispense fuel. These competing factors led to:

- Continual stress on CNG system leading to consistent breaking down of equipment
- Increase in energy cost related to operating station
- Further increase in the amount of time for fuel storage vessels to be replenished

So due to the yearly increase in costs associated with maintaining, repairing and operating CNG station, the inability to fuel vehicles to capacity, and the fact that the station's mechanical equipment was near and eventually at the end of its useful life, in 2015, the City made the decision to begin the process of upgrading its CNG station.

### The Project

After a formal procurement process was completed and City Council approval was obtained, Clean Energy was awarded a "Design-Build" contract for the expansion of the City's CNG fueling station.

The work performed by Clean Energy started with creating a design that would solve one major issue; installing much larger equipment within the same footprint as previous station. After numerous revisions, a design was created which would allow the installation of larger CNG equipment and provide adequate room for staff to perform maintenance.

Once the 100% design was approved, Clean Energy sent equipment out for production and prepared for the upgrading of utilities located at the site. Utility upgrades included:

- Southern California Gas trenched site and installed new gas line; removed all two inch pipe and replaced with four inch pipe
- Southern California Edison installed new electrical panel (switchgear) and transformer and established connection from electrical panel to transformer
- Clean Energy pulled all electrical wiring used for previous CNG equipment and replaced with new wiring needed to properly run new, larger and more powerful equipment

After CNG equipment was released from production, all equipment was delivered to the project site for installation. Clean Energy installed the following equipment:

- 1 Gas Dryer with the capacity of 750 Standard Cubic Feet Per Minute (SCFPM)
  - Compared to the previous unit- doubles the amount of natural gas that can be processed during drying stage
- 2 Electric-motor driven 150 HP/256 SCFPM Compressors
  - Compared to previous units- provides three times more compressing power per minute
  - Has reduced the time to refill storage vessels from 90 minutes to nine minutes
- 1 Priority Valve Panel
  - New panel provides the technology necessary to handle the increased flow of the CNG and efficiently prioritize and sequence the flow of CNG to the six storage vessels and the two new dual-nozzle CNG dispensers
- Total of 6 Storage Vessels (Three of the vessels are from previous station)
  - 2 new (48" inside diameter) storage spheres with 33.5 cubic feet of water volume and 250 gallon capacity (Total of three installed)
  - 1 new (20" outside diameter / 19' in length) storage tube with 34.15 cubic feet of water volume and 255 gallon capacity (Total of three installed)
  - With a total of six storage vessels- the new expanded station has twice the amount of fuel storage capacity compared to previous set-up.
- 2 (5,000 psi) Dispensers with dual 12 inch hoses
  - Both dispensers have one nozzle specifically for transit vehicles and one nozzle specifically for passenger vehicles

- Having two dispensers instead of one, had only one dual-hose dispenser prior to station expansion, now allows the City to serve twice as many vehicles at any given time

The following information details additional aspects of the CNG station expansion project:

- A new concrete island was constructed to accommodate the two new dispensers and canopy
- A 24'- 0" X 24'- 0" canopy was constructed over the fuel dispensers to provide protection from the elements for both the CNG equipment and individuals patronizing the station
- 12 Solar panels were installed on top of canopy to power lighting, and electronic signage
- Electric Gate used to access the City of San Fernando Operations Center, location of CNG station operating equipment, was relocated to provide the additional space needed to house new equipment
- Per National Public Discharge Elimination System requirements, a trench drain was installed adjacent to CNG fuel dispensers

### Emissions Benefits

The emission benefits of the CNG station, itself, are very difficult to quantify. With that being the case, it is easier to determine the emissions benefits created by a CNG station by looking at the results of having a CNG station readily available for use by public agencies and the general public. When a vehicle runs on natural gas, greenhouse emissions are reduced by as much as 25%, Sulfur Dioxide (SO<sub>2</sub>) emissions by as much as 99%, Nitrogen Oxide (NO) emissions by as much as 17% and fine particulate emissions by as much as 97% ("Alternate Fuels Data Center," 2018).

The GREET model (an analytical tool that simulates the energy use and emission output of various vehicle and fuel combinations: sponsored by the U.S. Department of Energy) estimates the life cycle petroleum use and greenhouse gas (GHG) emissions of light-duty vehicles running on compressed natural gas (CNG) and liquefied natural gas (LNG). Based on this model, natural gas emits approximately 6% to 11% lower levels of GHGs than gasoline throughout the fuel life cycle.

To back up the GREET model, in 2007, a study for the California Energy Commission (CEC) found that both CNG and LNG reduce life cycle GHG emissions in both light- and heavy-duty vehicles compared to their gasoline and diesel counterparts. This is primarily due to the low petroleum usage in the production phase (specifically CNG) and the low-carbon intensity of the fuel during

use. Further, studies have shown that CNG uses far less petroleum over its life cycle; estimated greater than 90% reduction in petroleum use for CNG compared to gasoline over its life cycle (“Emission Comparisons,” 2018). Based on the information provided, CNG does far less harm to the environment in both the production phase and fuel use phase when compared to its gasoline and diesel counterparts.

### Recommended Future Actions

The City of San Fernando will continue to pursue grant opportunities which help fund the purchase of CNG vehicles for the City’s fleet until zero emission utility trucks are more readily available. The City will also make a more concerted effort to educate the public on the importance of transitioning to cleaner more environmentally friendly fuels.

### Acknowledgements

This report was submitted in fulfillment of Contract **AB 2766/ML 14062** to (Expand CNG Station) and submitted by the City of San Fernando under the (partial) sponsorship of the Mobile Source Air Pollution Reduction Review Committee (MSRC). Work was completed as of October 31, 2018.

## References

Alternate Fuels Data Center. (2018). Retrieved from [https://www.afdc.energy.gov/vehicles/natural\\_gas\\_emissions.html](https://www.afdc.energy.gov/vehicles/natural_gas_emissions.html)

Emission Comparisons. (2018). Retrieved from <http://www.midwestenergysolutions.net/cng-resources/emissions-comparisons>