

# FINAL PROJECT REPORT

Contract No. MS14053

FY 2015-2016

*Alternative Fuel Infrastructure Program*

## Upland Unified School District

### Replacement and Upgrade of Existing CNG Fuel Station



**AUGUST 2016**

Prepared for: **Mobile Source Air Pollution Review Committee**

**Under the AB 2766 Discretionary Fund Work Program**

Prepared by: **Upland Unified School District**

## **ACKNOWLEDGEMENTS**

This report was submitted in fulfillment of MS14053 and Replacement and Upgrade of Existing CNG Fuel Station by Allsup Corporation under the partial sponsorship of the Mobile Source Air Pollution Reduction Review Committee (MSRC). Work was completed as of October 14, 2015.

## **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 AND WORK PERFORMED**

The District owns and operates a CNG vehicle fueling facility located at 1428 West 9th Street, Upland, California 91786. The facility, built in 2005, and was in need of equipment replacement and upgrades in order to support the District's existing CNG-fueled vehicle fleet. Increasing demand for clean fuel and improved air quality was quickly outstripping the District's ability to meet that demand. Without the upgrades to the CNG fueling infrastructure, the District would not have been able to adequately fuel its CNG fleet.

The gradual failure of the compressors over the years had a negative impact on the District's transportation program due to frequent system failures. The CNG equipment had been operating at diminishing capacity since February 2012.

The new and upgraded equipment will increase the station's efficiency and allow the District to begin replacing petroleum-fueled vehicles with additional CNG vehicles.

Prior to November 2013, the District had 3 CNG-fueled vehicles and 21 diesel-fueled vehicles. In November 2013, it replaced 6 diesel vehicles with CNG vehicles, bringing the CNG vehicle total to 9, displacing approximately 17,304 GGE per year.

The projected cost of the project was \$456,358; however, due to compatibility issues between the old equipment and the new equipment, the actual final cost of the project was \$549,700.00. There was no matching funds requirement for the District, however, and it provided \$374,700 to complete the project.

## PROJECT PURPOSE

The purpose of the project is to increase the District's ability to provide CNG fueling infrastructure that is modern, safe, efficient, and has the capacity to not only meet existing needs for compressed natural gas, but also possible fleet expansion.

The objectives included replacing old, inefficient compressors, with new state-of-the-art compressors, piping and valves, and CNG dispensers that will facilitate ease of use and function for CNG station users.

Figure 1: The District's Newly Renovated CNG Pump

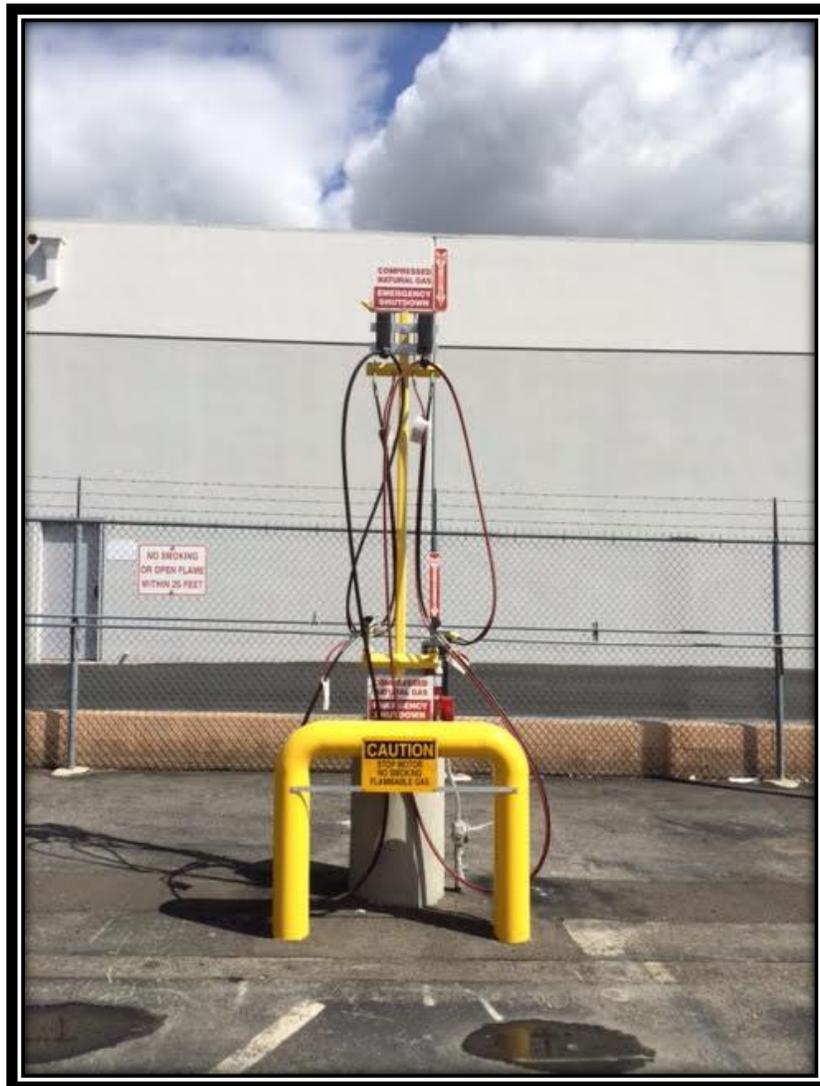


Photo Credit: Gary Hall, Upland Unified School District

## GOAL

The goal of this project is to provide reliable CNG that can meet existing and future fueling needs of the District, reduce greenhouse gas emissions, and decrease particulate matter emissions.

## OBJECTIVE

The objectives included replacing the aging CNG fueling infrastructure with new, modern, safe, and efficient equipment that will facilitate ease of use and function for CNG station users.

**Figure 2: New Compressors**



## PROJECT APPROACH

### Engineering and Design

The District performed an analysis in compliance with Government Code Section 4217.12, and on January 13, 2015 the Governing Board of the Upland Unified School District conducted a public hearing and approved a performance contract with Allsup Corporation (Allsup), which is also located in Upland, CA. The contract included replacing the existing CNG equipment and utilities with new equipment and utilities, which, in addition to new plumbing and electrical upgrades, included the ANGI Energy Systems Compressor Package NG50E and the outdated electronic time-fill panel used to fill vehicles over longer periods of time (which lowers electricity costs).

Allsup completed the engineering and design for the upgrades after meeting with the District representatives and Southern California Gas and Electric engineers in February 2015.

This project was designed by Keith Sharpe, P.E. Mr. Sharpe had designed over 50 CNG refueling facilities in the state of California. The new CNG facility was essentially designed around the existing infrastructure (gas/power supply etc.), which optimized the costs of the new, upgraded facility.

### **CNG Equipment Procurement**

After completing engineering and design of the station, Allsup placed orders for the equipment needed from ANGI Energy Systems (ANGI).

This initiated the equipment procurement process, which resulted in the production of design drawings from ANGI that were provided to the District. These design drawings were approved by the District and Allsup and the equipment was delivered to the site approximately 10 weeks later.

### **Infrastructure**

The following equipment was installed on this project:

1. Gas Dryer: 1 each ANGI Energy Systems desiccant-style low pressure gas dryer
2. CNG Compressors: 2 each ANGI Energy Systems 50 hp natural gas compressors, each capable of producing 75 scfm
3. CNG Fast-Fill Dispenser: 1 each ANGI Energy Systems dual hose post CNG dispenser
4. CNG Time-Fill Dispenser: 5 each ANGI Energy Systems dual hose post CNG dispenser
5. Electronic Time-Fill Panel: 1 each ANGI Energy Systems

### **CNG Equipment Delivered and Installed**

Equipment was received in April and May, 2015, and installed in May and June, 2015. The CNG fueling infrastructure was completed and commissioned in July 2015.

### **CNG Station Start-up and Commissioning**

Prior to commissioning it was necessary to provide ANGI with a completed pre-commissioning check list. This document contains pertinent information that enables

ANGI to approve the commissioning of the facility. The new CNG infrastructure was commissioned on July 23, 2015 and 2 training sessions were provided to District personnel. ANGI-provided operation and maintenance manuals were left on-site for field consultation and the commencement of the 2-year warranty period began.

**Figures 3 and 4: Gas Dryer and Priority Panel**



Photo Credit: Gary Hall, Upland Unified School District

## **PROBLEMS ENCOUNTERED**

At the time Contract No. MS14053 was executed in January 2015; we anticipated no problems completing the project by June 2015, however during fire department compliance inspection we experience a week delay. Due to the City's fire department, they requested additional time to

research compliance regulations since it was the first CNG Station completed within the City of Upland.

## EMISSIONS BENEFITS

Data was collected as part of normal operations. The new CNG equipment can measure the amount of CNG dispensed through both the ‘fast-fill’ system and the ‘time-fill’ system. Both of these amounts have been tabulated on a monthly basis per the attached table. Data was collected by the system, District Transportation Records, and SDG&E billing statements.

### Project Data

**Table 1: 6 Months Data Collection**

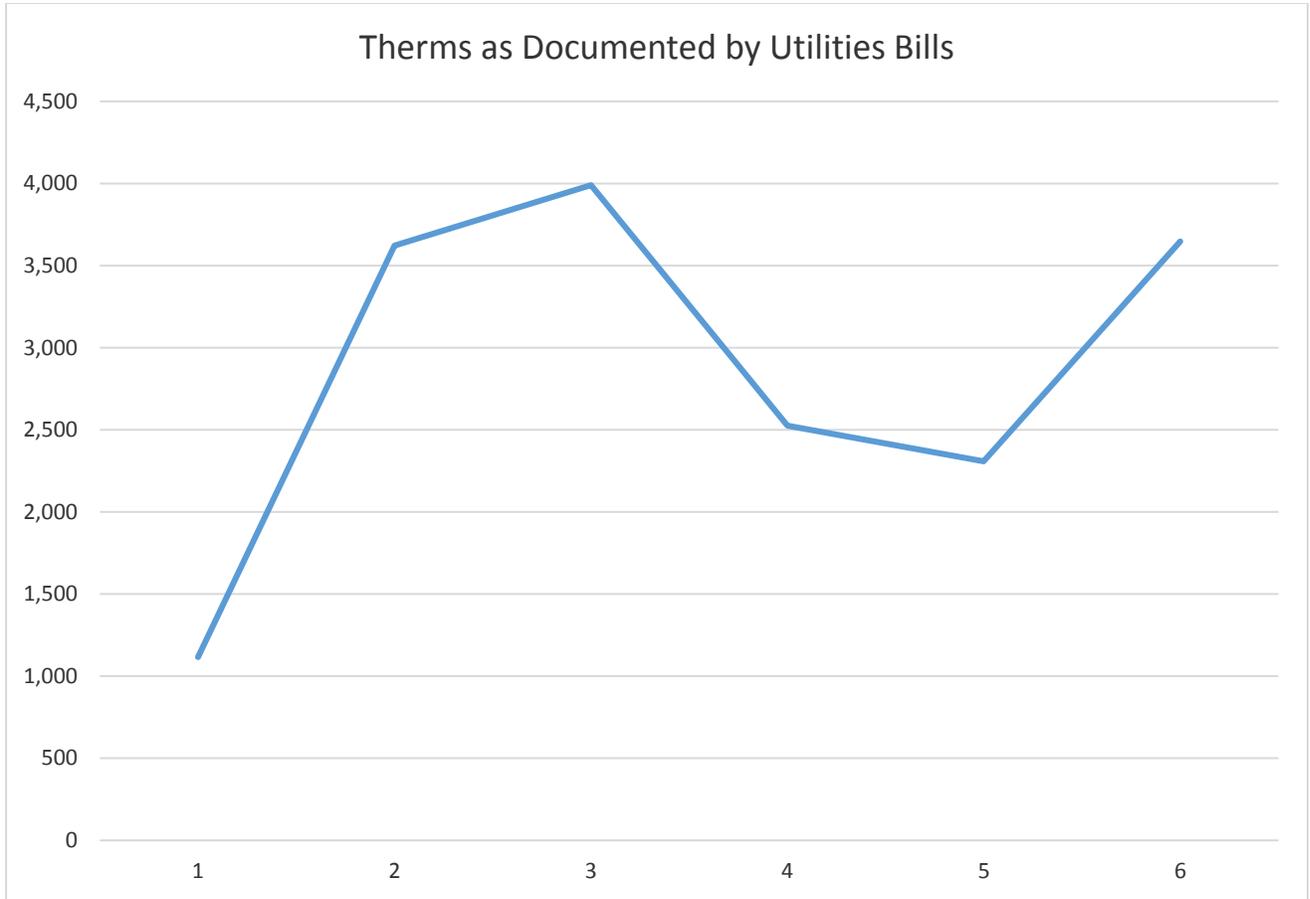
	<b>Aug 2015</b>	<b>Sep 2015</b>	<b>Oct 2015</b>	<b>Nov 2015</b>	<b>Dec 2015</b>	<b>Jan 2016</b>
Therms, as documented by utility bills	1,116	3,621	3,990	2,525	2,309	3,005
Gasoline Gallons Equivalent (calculated at 10 CNG Therms = 8.32 GGEs, per CEC’s Energy Almanac)	929	3,013	3,320	2,101	1,921	2,500
Miles traveled by combined 9 CNG vehicles (at approximately 5.5 GGE per mile)	169	548	604	382	349	546
Number of days vehicles driven	21	21	22	21	14	20
Particulate Matter (PM <sub>2.5</sub> ) in lbs. displaced by combined 9 CNG vehicles (measured at 15 lbs per day)	2,835	2,835	2,970	2,835	1,890	2,700
Oxides of Nitrogen (NOx) in lbs. displaced by combined 9 CNG vehicles (measured at 22 lbs. per day)	4,158	4,158	4,356	4,158	2,772	3,960

Source: School District staff calculations.

### Analysis

The District has 9 CNG-fueled school buses. It is estimated that a single school bus consumes an average of 5.5 GGE per mile. Taking into account the combined total of all 9 buses, this project represents an estimated annual displacement of 27,500 GGE of gross polluting diesel fuel, 35,640 lbs. of particulate matter, and 24,300 lbs. of NOx, and the District continues to replace its petroleum-fueled vehicles with CNG vehicles.

**Table 2: Increase in Therms Purchased**



**Figure 5: New Compressors Control Panel and Fueling Sphere**



Photo Credit: Gary Hall, Upland Unified School District

## **PHOTOGRAPHS AND OUTREACH**

To promote our newly rehabilitated facility, we distributed the press release to the local media informing them of our completed project. Our stakeholders were informed the completed improvements and enhanced amenities. We posted logos of the grant funding received on the compressor housing.

## **SUMMARY AND CONCLUSION**

This project, funded by Mobile Source Air Pollution Reduction Review Committee through AB 2766 grant MS14053, has achieved its goals. The primary objective was to replace the existing CNG fueling infrastructure built in 2005. Even though this project was built in the middle of the school year, the District was able to utilize other private and public CNG stations; therefore, the school bus downtime was near zero and had no impact on student achievement.

Upland Unified School District has also increased its CNG bus fleet. The current fleet now stands at 9 CNG buses in use. In the last two years, 6 gross polluting diesel buses were replaced by 6 CNG-fueled buses, increasing the total CNG-fueled buses to 9,

making up 50% of the District's fleet. Annual tailpipe emission reductions of the 9 gross polluting diesel buses equate to approximately 27,500 GGE, displacing 24,300 lbs. of PM<sub>2.5</sub>, and 35,640 lbs. of NO<sub>x</sub>.

**Figures 5: CNG Buses Connected to New Fuel Stations**



**Photo Credit: Gary Hall, Upland Unified School District**