CALIFORNIA ENERGY COMMISSION

California Energy Commission

Clean Transportation Program

FINAL PROJECT REPORT

Chula Vista Elementary School District

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Gavin Newsom, Governor

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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-12-605 to support installation of new natural gas fueling infrastructure and upgrades to existing natural gas fueling infrastructure. In response to PON-12-605, the recipient submitted an application which was proposed for funding in the CEC's notice of proposed awards August 2, 2013 and the agreement was executed as ARV-13-004 on December 5, 2013.

ABSTRACT

Chula Vista Elementary School District replaced equipment and upgraded the components of its 21-year-old compressed natural gas station to sustain the District's ability to provide a publicly accessible compressed natural gas station that is modern, safe, and efficient, and has the capacity to not only meet existing needs for compressed natural gas, but also meet increasing demand.

The District's 21-year-old compressors were replaced with new, modern, safe, and efficient compressors, all related piping and valves were replaced, and the compressed natural gas dispensers that will facilitate ease of use and function for compressed natural gas station users were also replaced. This included incorporating a credit card reader system.

The District performed an analysis in compliance with Government Code Section 4217.12. The Governing Board conducted a public hearing and adopted a resolution making findings related to energy conservation services. In addition, they approved a performance contract with Allsup Corporation for upgrades to the District's existing compressed natural gas station in May 2014. Allsup Corporation completed the engineering and design for the upgrades after meeting with the District representatives and San Diego Gas and Electric engineers on July 24, 2014. Equipment was ordered, received, and installed between May 2014 and November 2014. The renovated compressed natural gas station was commissioned in December 2014.

In March 2015, the District began replacing petroleum fueled vehicles with cleaner compressed natural gas vehicles. The District estimates displacing approximately 5,220 gallons of gas per year with the four compressed natural gas vehicles purchased in March and May of 2015. The District has also increased non-district compressed natural gas consumers from 25 to 80 per month because of the increased efficiency of the station and the ability to pay with credit cards.

Keywords: California Energy Commission, Compressed Natural Gas, School District

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EXECUTIVE SUMMARY

Chula Vista Elementary School District is the largest elementary school district in California. The District is in Chula Vista, California, seven miles from the Mexican border in San Diego County. The District owns and operates a publicly accessible retail vehicle fueling compressed natural gas facility located at 84 East J Street, Chula Vista, California 91910. The facility, built in 1991, was severely in need of equipment replacement and upgraded components to support the District's existing natural gas vehicle fleet, other public and private school fleets, and various other vehicles. Increasing demand for clean fuel and air quality was quickly outstripping the District's ability to meet that demand. Without the upgrades to the District's compressed natural gas station, it would have been unable to continue to supply clean burning compressed natural gas fuel.

The District provides the only publicly accessible compressed natural gas station within a seven-mile radius. Vehicles from neighboring school districts that would not otherwise have convenient access to compressed natural gas, making owning and operating compressed natural gas vehicles infeasible.

New and upgraded components increased the station's efficiency and the District began replacing petroleum fueled vehicles with cleaner compressed natural gas vehicles. By providing a convenient and publicly accessible compressed natural gas station, others are encouraged to replace fossil fueled vehicles with compressed natural gas vehicles. The District has experienced an increase in compressed natural gas consumers outside the District because of the increase in efficiency of the station and the ability to pay with credit cards.

The District used knowledgeable staff as well as a competitive bid process to ensure that the District obtained the best cost for the project

The projected cost of the project was $299,157. However, due to compatibility issues between the old equipment and the new equipment, the actual final cost of the project was $498,036. There was no matching requirement for the District. Therefore, the District provided the equivalent of $10,000 dollars in manpower and overhead to aid in the success of the project in addition to $198,879 to make up the balance of the funds needed to complete the project.

The renovated compressed natural gas station was commissioned in December 2014 and the District filed an Acceptance of Work and Notice of Completion for Allsup Corporation, the performance contractor, on April 23, 2015.

In March 2015 the District began replacing petroleum fueled vehicles with cleaner compressed natural gas vehicles. The District estimates displacing approximately the consumption of 5,220 gallons of gas per year with the 4 vehicles purchased in March and May of 2015. The District also increased the number of non-district compressed natural gas consumers from 25 to 80 per month, as a result of the increase in efficiency of the station and also by gaining the ability to pay with credit cards.

CHAPTER 1:
Project Purpose

The purpose of the project is to sustain the Chula Vista Elementary School District's (CVESD) ability to provide a publicly accessible compressed natural gas (CNG) station that is modern, safe, and efficient, and has the capacity to not only meet existing needs for compressed natural gas, but also to meet the increasing demand as public and private entities comply with ever-changing legislation requiring the use of cleaner burning fuel and decreased toxic emissions.

The objectives included replacing 21-year-old compressors with new modern, safe and efficient compressors, increasing safety and efficiency of the station by replacing all related piping and valves, and replacing the CNG dispensers that will facilitate ease of use and function for CNG station users. This included incorporating a credit card reader system that both increased the ease with which customers outside CVESD could utilize the station and saved staff time in taking cash payments for each transaction.

Figure 1 below shows a picture of CVESD's newly renovated CNG pump.

Figure 1: CVESD's Newly Renovated CNG Pump

Source: Robin Phillips, Chula Vista Elementary School District

Introduction

The existing CNG fueling station at CVESD is located at 84 East J Street, Chula Vista, California 91910, one mile west of Interstate 804 and one mile east of Interstate 5. The station was installed in 1991 and eventually, after over 50,000 hours of well-maintained use, the equipment was beyond economic repair. The gradual failure of the compressors over the years

had a negative impact on the CVESD's transportation program due to frequent system failures. The CNG station had been operating at diminishing capacity since February 2012.

Increasing demand for clean fuel and air quality was quickly outstripping the CVESD's ability to meet that demand. Without the upgrades to the CVESD's CNG station, it would have been unable to continue to supply clean burning CNG fuel.

The principal barrier to the completion of this project was that the CVESD lacked the financial resources to fund the proposed project and required outside grants to fund the needed repairs and upgrades to the CNG station.

Goals and Objectives

Goal of the Project

The goal of this project is to provide a publicly accessible CNG station that is modern, safe, and efficient, has the capacity to meet existing needs for CNG, comply with ever-changing legislation requiring the use of cleaner burning fuel, and decrease toxic emissions.

Objectives of the Project

The objectives included replacing 21-year-old compressors with new modern, safe, and efficient compressors, increasing safety and efficiency of the station by replacing all related piping and valves, and replacing the CNG dispensers that will facilitate ease of use and function for CNG station users. This included incorporating a credit card reader system that both increased the ease with which customers outside CVESD could utilize the station and saved staff time because they previously had to manually take cash payments for each transaction.

CHAPTER 2:
Project Approach

Engineering and Design

CVESD performed an analysis in compliance with Government Code Section 4217.12. On May 21, 2014, the Governing Board of the CVESD conducted a public hearing and adopted a resolution making findings related to energy conservation services and approved a performance contract with Allsup Corporation for upgrades to the CVESD's existing CNG station.

Allsup Corporation completed the engineering and design for the upgrades after meeting with CVESD representatives and San Diego Gas and Electric engineers on July 24, 2014.

This project was designed by Keith Sharpe P.E. (Allsup Corporation) using all current applicable codes (California Building Code (CBC), NFPA 52, etc.). Mr. Sharpe had previously 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 Corporation placed orders for the equipment needed.

Concurrent with contract award, Allsup Corporation provided the major equipment supplier (Angi Energy Systems) with a purchase order. This initiated the equipment procurement process, which resulted in the production of shop drawings, that were provided to CVESD shortly thereafter. These shop drawings were approved by CVESD and Allsup Corporation which then allowed Angi Energy Systems to release the project for production. 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 (Model #GD-18-S-N-120-150-2)
2. CNG Compressors: 2 each. Angi Energy Systems 50 Hp natural gas compressors, each capable of producing 75 scfm (Model #NG50E)
3. CNG Dispenser: 1 each. Angi Energy Systems dual hose CNG dispenser (Model #Series II)
4. Credit Card Reader hardware and software

CNG Equipment Delivered and Installed

Equipment was received in September and October and installed in November and December 2014. Full installation was completed, and station was commissioned in November 2014. A final punch list was prepared in February 2015 and the Acceptance of Work and Notice of Completion was filed in April 2015.

CNG Station Start-up and Commissioning

Prior to commissioning, it was necessary to provide Angi Energy Sytems with a completed 'Pre-Commissioning Check List.' This document contains pertinent information that enables Angi Energy Systems to approve the commissioning of the facility. The new upgraded CNG facility was commissioned (by Angi Energy Systems approved technicians) on December 18, 2014 and two each subsequent training sessions were provided to the CVESD personnel. Angi Energy Systems provided Operations and Maintenance manuals that were left on-site for field consultation and the commencement of the one-year warranty period began.

CHAPTER 3:
Project Results

Results

Data Collection Plan

Data was collected as part of normal operations. This newly upgraded CNG facility is unique in the regard that it cannot only quantify the amount of CNG dispensed through the 'fast-fill' system but also quantifies CNG that is dispensed through the 'time-fill' system. Both amounts have been tabulated on a monthly basis per the attached table. Data was collected by the system, District Transportation Records, and San Diego Gas & Electric billing statements. This data is presented in Table 1 below.

Project Data

Table 1: Six Months Data Collection

	Jan 2015	Feb 2015	Mar 2015	Apr 2015	May 2015	June 2015
Therms as Documented by Utilities Bills	1,928	1,951	2,727	1,975	4,310	3,647
Average Number of Non-District Vehicles Fueled per Month	25	40	55	65	80	80
Number of Days per Month Vehicles Were Fueled	20	18	22	20	20	22
Maximum Capacity of the New Fueling System (SCFM)	150 SCFM	150 SCFM	150 SCFM	150 SCFM	150 SCFM	150 SCFM
Miles Traveled by Vehicles Replacing Gasoline/Diesel Fueled Vehicles by Odometer Reading	0	0	979	1,436	3,740	2,288
Gallons of Gasoline and/or Diesel Fuel Displaced by Using Natural Gas (with Associated Mileage Information)	0	0	140	140	220	220

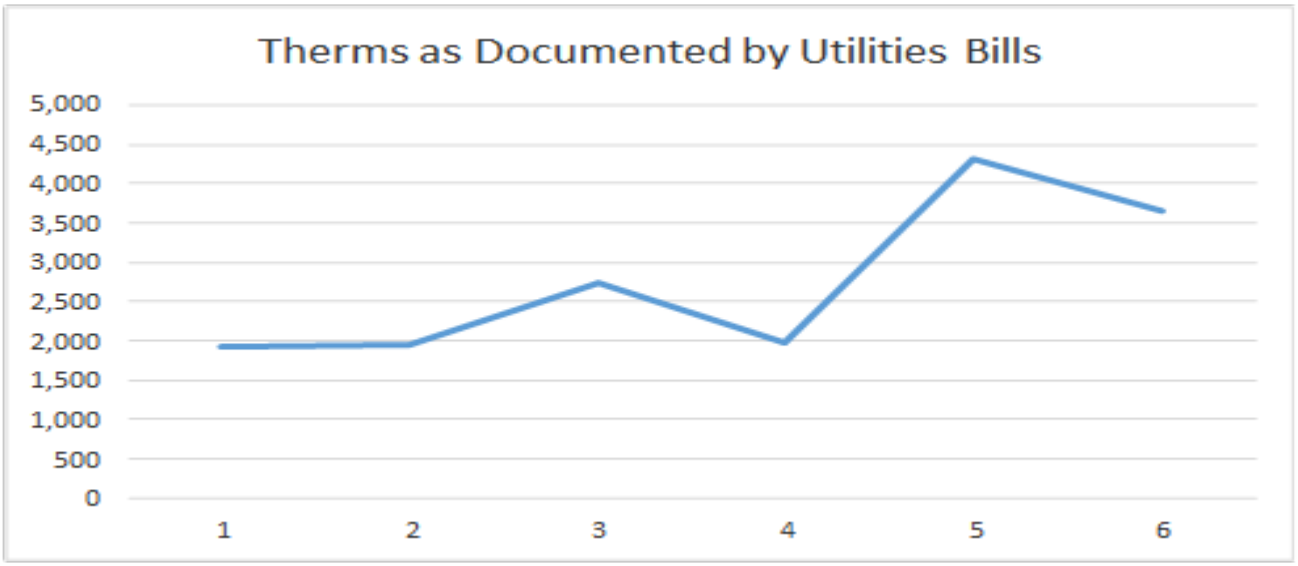
Source: Chula Vista Elementary School District Staff Calculations

Analysis

It is estimated that a petroleum-fueled bus uses approximately 1,660 gallons of gas per year and trucks used to haul trailers use approximately 950 gallons per year. During the period of the project, the CVESD purchased two CNG busses in March 2015 and two Chevrolet Silverado Trucks in May 2015, displacing approximately of 5,220 gallons of gas per year.

The therms purchased by CVESD increased significantly during the 6-month study period. The CVESD continues to replace its petroleum fueled vehicles with CNG vehicles. Figure 2 below shows the increase in therms purchased.

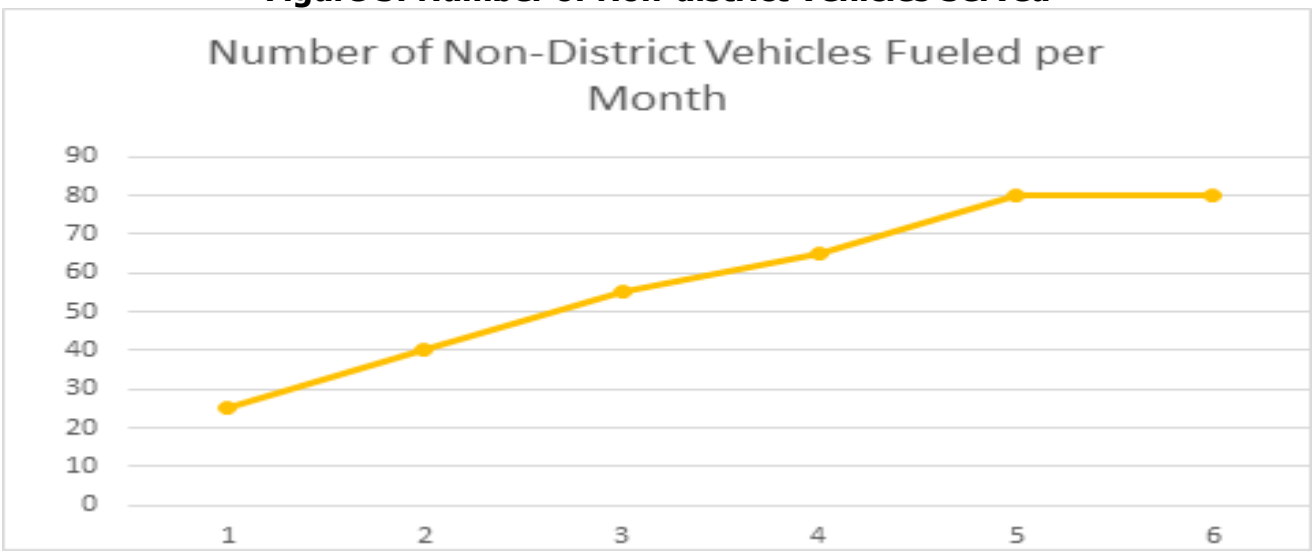
Figure 2: Increase in Therms Purchased



Source: San Diego Gas & Electric Billing Statements

As expected, the impact of the CVESD's ability to accept credit cards is substantial. During the six-month study period, the number of non-district vehicles served by the station more than doubled from 25 to 80. However, without the increased capacity and efficiency that resulted from the project, CVESD could not have accommodated this increase in non-district vehicles. Figure 3 below shows the number of non-district vehicles served by the station each month.

Figure 3: Number of Non-district Vehicles Served



Source: School district staff

CHAPTER 4:
Project Conclusion

Conclusion

This CNG facility was originally constructed in 1991 and the equipment (compressors and CNG dispenser) were of a generation that did not readily lend themselves to reliable public access fueling and could only output 3000 pounds per square inch of fueling pressure. The newly upgraded facility (new compressors, new dispenser and a new 'Fuel Management' system) now provide reliable, 3600 fueling. During the six-month study period the amount of 'public access' fueling had risen by from 25 vehicles to 80 vehicles per month.

Due to the upgrades made possible by this project, the CVESD has a reliable source of fuel for its CNG vehicles. CNG vehicles now make up 26 percent of the CVESD's bus fleet.

CVESD will continue to replace petroleum fueled vehicles with CNG fueled vehicles.

GLOSSARY

CALIFORNIA ENERGY COMMISSION (CEC)—The state agency established by the Warren-Alquist State Energy Resources Conservation and Development Act in 1974 (Public Resources Code, Sections 25000 et seq.) responsible for energy policy. The Energy Commission's five major areas of responsibilities are:

1. Forecasting future statewide energy needs
2. Licensing power plants sufficient to meet those needs
3. Promoting energy conservation and efficiency measures
4. Developing renewable and alternative energy resources, including providing assistance to develop clean transportation fuels
5. Planning for and directing state response to energy emergencies.

CHULA VISTA ELEMENTARY SCHOOL DISTRICT (CVESD)[1]—The Chula Vista Elementary School District is located in San Diego County. It has 49 schools and serves 29,600 students and was founded in 1892.

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.

[1] Chula Vista Elementary School District https://www.cvesd.org/district