



**CALIFORNIA
ENERGY COMMISSION**



California Energy Commission
Clean Transportation Program

FINAL PROJECT REPORT

Raisin City School District Compressed Natural Gas School Bus Replacement

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PREFACE

Assembly Bill 118 (Núñez, Chapter 750, Statutes of 2007) created the Clean Transportation 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 GFO-17-607 to replace the oldest, dirtiest school buses in California. In response to GFO-17-607, the recipient submitted an application that was proposed for funding in the CEC's notice of proposed awards November 29, 2018 and the agreement was executed as ARV-18-015 on April 10, 2019.

ABSTRACT

Raisin City School District applied for grant funding under the California Energy Commission (CEC) Solicitation GFO-17-607 to replace three old, diesel-powered school buses. Raisin City School District was awarded funding for one replacement compressed natural gas school bus. Raisin City School District placed a purchase order for one compressed natural gas school bus with the grant funding received from the CEC and placed this bus into service in June 2020. The old, diesel-powered bus was dismantled and removed from service.

Keywords: Raisin City School District, California Energy Commission, GFO-17-607, diesel, compressed natural gas, grant funding

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TABLE OF CONTENTS

	Page
Preface	i
Abstract.....	iii
Table of Contents	v
List of Figures	v
List of Tables.....	v
Executive Summary	2
CHAPTER 1: Introduction	4
Background	4
Current Fleet	6
Chapter 2: The Project.....	11
Project Background.....	11
Obstacles/Delays	12
Data Collection	12
Chapter 3: Conclusion.....	13
Glossary.....	14

LIST OF FIGURES

	Page
Figure 1: District Office at Raisin City School District.....	5
Figure 2: Raisin City School District CNG Bus.....	7
Figure 3: Front of Raisin City School District CNG Bus	7
Figure 4: Driver's Seat of Raisin City School District CNG Bus	8
Figure 5: Interior of Raisin City School District CNG Bus.....	8

LIST OF TABLES

	Page
Table 1: Raisin City School District Demographics.....	5

Executive Summary

Raisin City School District is a small, rural school district that provides 284 kindergarten through twelfth-grade students the support they need to be successful. Raisin City School District is in Fresno County within the San Joaquin Valley. The district consists of one elementary school. The district's mission is to promote an environment for success and create partnerships with parents and community so all students will achieve their full potential to become lifelong learners and responsible and productive citizens and leaders.

The pollution levels in the San Joaquin Valley are among the highest in the nation. The district strives to help reduced the emissions in our state. The school district's priority has always been the students' well-being as well as their educational success. The district embraces continuous improvements to help keep students safe and healthy. Raisin City School District makes sure they are doing all they can for the environment to ensure that students are provided a safe area to learn and grow.

The Raisin City School District features a school bus fleet of three buses. Of the three school buses, one is a compressed natural gas bus. The Compressed Natural Gas fueling infrastructure is located and maintained at the Southwest Education Support Center in Caruthers.

CHAPTER 1:

Introduction

Background

Raisin City Elementary School District, shown in Figure 1, is in the unincorporated area of Raisin City in Fresno County, California. Its student population had been declining since 2014. In 2014, the student population was 339, dropping to 284 in 2021. The school's student population, shown in Table 1, consists of 87.3 percent Hispanic, 3.9 percent White, 2.5 percent Asian, with 5.3 percent not reporting, and less than 1 percent of other demographic groups. Sixty-five percent are English learners, shown in Table 2, and 99.6 percent are socioeconomically disadvantaged. Most business at the school is conducted in both English and Spanish, since there is a large Spanish-speaking population. The school is often the hub of community activities. Agriculture is the only industry in the community. Town services include a few small grocery stores, small independent businesses, churches, a post office, and the school. Most students are bused to school through a contract with South County Support Services Agency.

The 2020–2021 school year brought challenges that Raisin City Elementary School had to overcome to provide distance learning to all its students. Raisin City families are among those with the lowest internet access rates in the San Joaquin Valley. The District provided a hotspot to each household to ensure internet connectivity, but even with the hotspots provided, some families had connectivity issues. A broadband rate of 4 megabytes per second is required to have decent connectivity, but it was confirmed that, in many sections of its attendance area, the rate was only 0.47. For these families, the district had to provide learning packets and monitor their progress closely. In the history of Raisin City Elementary, all classes, prior to 2018, were self-contained and taught by highly qualified multiple subject-credentialed teachers. For the 2018–2019 school year, the structure of sixth through eighth grades was modified to a departmentalized configuration, requiring single subject credentialed teachers, to improve the instructional culture of the school. Parents have given the leadership praise for doing so.

Figure 1: District Office at Raisin City School District



Source: Raisin City School District

Table 1: Raisin City School District Demographics

Ethnicity	Percentage
Hispanic	87.30%
White	3.90%
Asian	2.50%
Declined to State	5.30%
Other	<1%

Table 2: Raisin City School District Language Fluency

Language Fluency	Percentage
English Only	35.00%
English Learners	65.00%

Source: Raisin City School District

Raisin City Elementary School District promotes an environment for success and creates partnerships with parents and the community, to assist in providing all students the opportunity to achieve their full potential, to become lifelong learners, responsible and productive citizens, and leaders. The district's vision is for all students to be proficient at their grade level in language arts, mathematics, science, social studies, physical education and visual and performing arts.

For the 2021–2022 school year, Raisin City Elementary School District will be under the leadership of the Caruthers Unified superintendent, with an assigned site principal. This partnership will bring more resources to Raisin City Elementary School District, and the focus will consist of improving the structure of the K-5th self-contained setting and the departmentalized junior. High setting for sixth through eighth grades.

Most students in Raisin City School District are from socioeconomically disadvantaged families, and 100 percent of the students receive the Free and Reduced Meal Program. The school district takes advantage of as many funding opportunities as it can to help the disadvantaged community it serves.

The pollution in the San Joaquin Valley is evident as it features some of the worst air quality in the nation. One of the goals of the district is to help reduce greenhouse gas emissions. Its priority is the students, and it embraces continuous improvements to help keep them safe and healthy, as well as reducing emissions emitted into the environment.

Current Fleet

Raisin City School District contracts with South County Support Services Agency, located 12 miles away for all the home-to-school transportation services. South County Support Services Agency runs and manages the fleet. The three-bus fleet is owned by Raisin City School District, one of which is operated with compressed natural gas (CNG). This bus is shown in Figures 2 through 5.

Figure 2: Raisin City School District CNG Bus



Source: Raisin City School District

Figure 3: Front of Raisin City School District CNG Bus



Source: Raisin City School District

Figure 4: Driver's Seat of Raisin City School District CNG Bus



Source: Raisin City School District

Figure 5: Interior of Raisin City School District CNG Bus



Source: Raisin City School District

Raisin City School District school bus fleet is stored and maintained by South County Support Services Agency. The Southwest Education Support Center is home to Southwest Transportation Agency and South County Support Services Agency. These agencies provide the same services to its member and associate member districts. Services provided by these two agencies include:

Transportation

- Complete home-to-school contracts.
- Field trips statewide.
- Global Positioning System-equipped buses.
- Buses with DVD players and high-back seats.
- Bus lease.
- Substitute driver coverage.

Training

- School bus driver classroom training.
- Original/renewal.
- School bus driver behind-the-wheel training.
- In-service training.

Maintenance

- Bus maintenance.
- Preventative maintenance inspections.
- Engine overhaul.
- Transmission replacement.
- Automotive Service Excellence school bus-certified mechanics.

Other services

- Installation of cameras, radios, and Global Positioning Systems.
- CNG fueling station.
- Street sweeping.

The Southwest Transportation Agency is a public joint powers authority that serves 10 school districts in southwest Fresno County. The agency was formed by five school districts in 1988 and added five associate member districts as part of the South County Support Services Agency over the years. These transportation joint power authorities provide the safest, most cost-effective, home-to-school transportation possible for rural school districts in a geographically isolated part of Fresno County. Current school districts served by the agencies include original members Alvina Charter School, Monroe School District, Caruthers Unified School District, Laton Unified School District, and Riverdale Joint Unified School District. Associate members that are part of South County Support Services Agency include Kingsburg Elementary Charter School District, Pacific Union School District, Raisin City Elementary School District, and Washington Unified School District.

When Southwest Transportation Agency opened in July 1988, it operated 27 routes transporting 2,000 students (one-way) per day. Today, both agencies operate 55 home-to-

school routes, transporting an excess of 10,000 students per day while traveling more than 1.3 million miles per school year. The agencies also provide over 1,959 extracurricular trips annually.

The agencies opened the Southwest Education Support Center, a 17-acre state-of-the-art facility in 2004. The facility consists of a 16,000 square foot operations and maintenance center, parking for 100 school buses, and a public-access park and ride parking area with over 208 stalls. The agencies have been a pioneer in advancing CNG school buses in California. The cornerstone of the center is a 15,000-gallon state-of-the-art public access CNG fueling station. The launch of this station has allowed the agencies to expand its CNG school bus fleet from the original 10 CNG school buses received through the Katz Safe School Bus Program in 1991 to the operation of 51 CNG school buses today. The agencies are committed to operating a 100 percent CNG fleet.

CHAPTER 2:

The Project

Project Background

The primary objective of the School Bus Replacement Program through the California Energy Commission is to replace old diesel school buses with new electric school buses. However, there may be eligible applicants with bus route profiles not suited for an electric school bus. To be considered for a new CNG school bus, eligible applicants must (1) complete a series of questions and (2) provide a route profile evaluation completed by an independent third party. The applicant's answers to the CNG application questions and the route profile evaluation must meet at least two of the CNG bus selection criteria.

CNG Bus Selection Criteria

To be eligible for a CNG school bus, an applicant must demonstrate that an electric bus would not be sufficient to meet the needs of the applicant's regular school bus routes. To demonstrate this, the applicant's route profile evaluation and answers to the CNG application questions must establish at least two of the following criteria for the school district total bus fleet:

- Average route distance traveled daily exceeds 90 miles.
- More than 20 percent of service days have temperatures above 80 degrees Fahrenheit, or below 32 degrees Fahrenheit during the hours the bus is operated.
- Forty percent of routes are on roads with speed limits of 45 mph or higher.
- Fifty percent of routes include a 15 percent grade.

Raisin City School District was able to successfully demonstrate meeting the criteria set forth by the California Energy Commission and thus be awarded the grant to replace the old diesel school bus with a new CNG school bus.

Raisin City School District had owned the diesel bus replaced since 1992 and was in service for more than 16 years. Raisin City School District then had to rely on another district's bus fleet to continue providing home-to-school transportation to its district's students. Because of the association with South County Support Services Agency, Raisin City School District was able to continue providing home-to-school transportation to its students with minimal interruption. Since Raisin City School District is located in a disadvantaged, low-income rural community, the district had not been able to acquire the funding necessary to replace the inoperable bus. The district had applied to various grants through the California Air Resources Board Rural School Bus program and was not selected for a grant award. When Raisin City School District received notification of the School Bus Replacement program through the California Energy Commission, Raisin City School District sought Southwest Transportation Agency's help in applying for the grant to replace the old diesel school bus with a new CNG school bus.

Obstacles/Delays

The acquisition and placement of service of the new CNG school bus faced several issues that contributed to the delay of the project's completion. In normal times, the physical delivery of purchased school buses takes a few months from the date the order is placed to the actual delivery of the school bus. The COVID-19 pandemic played an enormous factor in not only the delivery of the new school bus but also the placement into service. There were numerous delays from the manufacturer, Blue Bird, in obtaining the parts to build the bus to the specifications requested by Raisin City School District.

Since the purchase/acquisition was made through a piggyback bid in place with South County Support Services Agency, there was no need to go through a bidding process in purchasing the new school bus. The piggyback allowed for the quick ordering of the bus from the date Raisin City School District received notification of being awarded the California Energy Commission School Bus Replacement grant.

It did, however, take over nine months to receive the new school bus. The school bus was delivered in May 2020, and upon the successful inspection by the California Highway Patrol, the new CNG school bus was placed in service in June 2020.

Data Collection

When placed into service, over a six-month period, the CNG replacement bus traveled 6,780 miles. The replaced diesel fuel bus had a miles-per-diesel-gallon average of 5 miles, as well as a total diesel fueling capacity of 100 gallons. This average and capacity equate to 1,356 gallons of diesel fuel used six months. The total CNG used for the six-month period was 1,520.33 gallons. The conversion of CNG gallons to diesel gallon equivalent (DGE) is 377 DGE. This amount equates to a reduction of 979 gallons of diesel over six months. The health benefits from this displacement of diesel are significant. Over a six-month period, this diesel displacement results in a reduction of 77.27 pounds of oxides of nitrogen (NO_x), 4.12 pounds of particulate matter 2.5 (PM_{2.5}), and 2.51 tons of greenhouse gas (GHG) emissions. Over the 20-year life of the replacement CNG school bus, the total reductions of emissions would equate to 2,341.53 pounds of NO_x, 125 pounds of PM_{2.5}, and 76.16 tons GHG emissions. The operating and maintenance cost to power the CNG bus was equal to \$0.50 cents per mile. The total operating cost for the six-month reporting period was \$3,390. The previous operating cost for the replaced diesel bus was \$0.65, which would represent a six-month total cost of \$4,407. This represents a six-month operating cost savings for the district of \$1,017.

CHAPTER 3:

Conclusion

The acquisition of the new CNG school bus was vital to the long-term success and continued home-to-school transportation for Raisin City School District students. Not only is it saving the district time and money, but it is helping reduce the amount of emissions placed into the environment. Raisin City School District strives to contribute to California's overall goals of decreasing greenhouse gas emissions. The district's next goal is to continue applying for funding that would allow the district to replace the remaining two old diesel school buses with new CNG school buses. Raisin City School District is dedicated to doing its part to help California achieve cleaner air.

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.

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.