California Energy Commission

Clean Transportation Program

FINAL PROJECT REPORT

San Jose Bernal Road Hydrogen Station

Prepared for: California Energy Commission

Prepared by: Equilon Enterprises LLC (dba Shell Oil Products US)

Gavin Newsom, Governor

December 2025 | CEC-600-2025-041

California Energy Commission

Jared Leventhal, Madeline Kelterborn, Joe Sawa
Primary Author(s)

Equilon Enterprises LLC (dba Shell Oil Products US)
650 California St, Suite 2250
San Francisco, CA 94108
Company Website (www.shell.com/hydrogen)

Agreement Number: ARV-17-004 & ARV-18-008

Mark Johnson
Commission Agreement Manager

Mark Wenzel
Office Manager
ADVANCED VEHICLE INFRASTRUCTURE OFFICE

Kevin Barker
Deputy Director
FUELS AND TRANSPORTATION

Drew Bohan
Executive Director

ACKNOWLEDGEMENTS

At Shell Hydrogen, we are focused on making hydrogen fuel a mainstream and competitive option for zero-emission transportation. Developing the network of hydrogen fueling stations under this grant funding opportunity has accomplished significant progress for fuel cell electric vehicle customers in California, including the fastest delivery of new stations to date in California for improving coverage and capacity in the fueling network, two fueling positions at each station for improving customer service, station reliability through two entirely redundant systems at each station, and integration under the canopy alongside other fuels for safety of traffic flow, convenience, shelter, and the normalcy of refueling. We would like to thank the following individuals and business partners for significant contributions to this success:

- The California Energy Commission (CEC) Lead Transportation Commissioner, Janea Scott, who provided visionary leadership and direction for the hydrogen mobility in the Clean Transportation Program, formerly known as the Alternative and Renewable Fuel and Vehicle Technology Program, CEC Hydrogen Unit Supervisor, Jean Baronas, who provided diligent program administration with helpful attention to detail and direct engagement, as well as the various Commission Agreement Managers and Officers who provided thoughtful and constructive oversight of the San Jose station delivery.
- AU Energy, which is a high-quality and forward-thinking owner and operator of the Shell retail stations in California. Varish Goyal, Sunny Goyal, and Kpish Goyal are important business partners for their successful introduction of hydrogen fuel in California and represent the model of family business in California.
- The leading manufacturers of fuel cell electric vehicles, Craig Scott with Toyota Motors North America and Robert Bienenfeld and Stephen Ellis with American Honda. They are important business partners for their direct financial contributions to these stations as well as their dedication to the introduction of fuel cell electric vehicles. Their ongoing collaboration ensures the highest quality of customer service.
- The Nel Service and Operations teams ("Nel") who are important business partners for increasing the quality and capacity of hydrogen fueling station equipment in these stations and ongoing partnership in the successful operation and maintenance of the stations.
- The Fiedler Group Team who was instrumental in managing the permitting process, which often entailed the challenging task of introducing jurisdictions to hydrogen refueling stations. Fiedler Group

also managed the detailed design and construction on site, drawing from their deep expertise in the retail refueling business.

- The team at Fueling and Service Technologies (Fastech) who did an exceptional job with the construction of the site and was on the front line of managing the daily hazardous aspects of construction.
- The local authorities having jurisdiction for the stations – Sacramento, San Francisco, Berkeley, Walnut Creek, and San Jose – who worked collaboratively throughout the evaluation and permitting of these stations, and in doing so have continued to expand upon the base of experience that will enable continued expansion of the hydrogen fueling network that is an important component of the infrastructure to transition to zero emission transportation.

PREFACE

Assembly Bill 118 (Nùñez, 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. AB 8 (Perea, Chapter 401, Statutes of 2013) reauthorizes the Clean Transportation Program through January 1, 2024, and specifies that the Energy Commission 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 approximately $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 ARFVTP, a project must be consistent with the Energy Commission's ARFVTP Investment Plan, updated annually. The Energy Commission issued solicitation GFO-15-605 to grant funds to expand the network of publicly accessible hydrogen fueling stations that serve California's light duty fuel cell electric vehicle (FCEV). In response to GFO-15-605, the recipient submitted an application which was proposed for funding in the Energy Commission's Notice of Proposed Awards on February 17, 2017 and the agreement was executed as ARV-17-004 on August 10, 20-17 and as ARV-18-008 on April 10, 2019.

After execution of ARV-17-004, the intended project site at 2900 N. Main Street, Walnut Creek, CA 94597 became non-viable. Recipient had submitted an application under GFO-15-605 for a different station to be located at 101 Bernal Road, San Jose, CA 95119. On November 8, 2017, the Energy Commission released a Revised Notice of Proposed Awards that includes the station located at 101 Bernal Road, San Jose, CA 95119, which was funded by grant agreement ARV-18-008. Therefore, Recipient moved forward with the 101 Bernal Road, San Jose station and did not continue with the 2900 N. Main Street, Walnut Creek station. Equipment acquired pursuant to incurred costs under ARV-17-004 was used for the 101 Bernal Road, San Jose station. Amendment 1 to ARV-17-004 resulted in a reduced Scope of Work ARV-17-004 to equipment acquisition only.

ABSTRACT

Equilon Enterprises LLC (dba Shell Oil Products US) ("Shell") designed, engineered, permitted, constructed, and made operational a hydrogen refueling station at 101 Bernal Road, San Jose, CA 95119. The station consists of a structural steel-reinforced, stucco-walled compound that encloses hydrogen storage, compression, and cooling equipment; two dispensers with one fueling hose each; and two-customer payment point of sale terminals. Hydrogen dispensers are located across the forecourt from the existing gasoline dispensers at an existing Shell gas station.

Keywords: California Energy Commission, San Jose, Equilon Enterprises, Shell Oil Products, fuel cell electric vehicles, hydrogen refueling station, infrastructure, FCEV

Author(s): Leventhal, Jared; Kelterborn, Madeline; Sawa, Joe. Equilon Enterprises, LLC dba Shell Oil Products US. 2023. *San Jose Bernal Road Hydrogen Station*. California Energy Commission. Publication Number: CEC-600-2025-041.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

Equilon Enterprises LLC (dba Shell Oil Products US) ("Shell") built a hydrogen fueling station at its existing gasoline station located at 101 Bernal Road, San Jose, CA 95119. Under its grant funding opportunity GFO-15-605, Energy Commission funded 40% of the total cost of the station while Shell provided the balance for a total station cost of $3,971,713. Energy Commission contributed a total of $1,589,500 for ARV-17-004 and ARV-18-008.

The Station has a refueling capacity of 400 kg per day, dispensed via two single-hose dispensers that are located under the canopy, in the same fueling lanes that gasoline cars use for refueling.

Shell's project team comprised Fiedler Group (as engineer of record), Nel Hydrogen, Herning, Denmark, ("Nel") (as equipment vendor, installer and O&M contractor), and Fueling and Service Technologies (Fastech, as general contractor).

The hydrogen station equipment, supplied by Nel, attained a Underwriter Laboratories Certificate of Compliance on October 25, 2018. This certification applies to all stations conforming to this design.

The station took 35 months to achieve an open retail status, from the time when Fiedler Group initiated preapplication meetings with authorities having jurisdiction to the open retail date of June 30, 2022. The first fueling of a fuel cell electric vehicle was on June 27, 2022. The time to open retail after construction crew mobilized was 17 months.

Shell initiated site acquisition negotiations with Terracommercial Real Estate Corporation, owner, and AU Energy, operator, for the San Jose – Bernal Road Shell gasoline station. A complete agreement was executed on August 17, 2016.

Fiedler Group initiated pre-application meetings with the AHJs in March 2017. An entitlement application package and a building department permit application was submitted concurrently to the City of San Jose in July 2019. Entitlement approval was received in December 2020. Building department's approval was obtained in February 2021.

Shell initiated equipment procurement with Nel Hydrogen in April 2017. Time-phased, on-site delivery and installation of equipment was completed in May 2021.

After a competitive bidding process, Fueling and Service Technologies (Fastech) was awarded the contract for civil construction. Fastech mobilized on February 9, 2021. The Station, with all H2 equipment installed, was ready for a pre-startup safety review (PSSR) on April 14, 2022.

Pre-commissioning activities began on July 14, 2021 and the first FCEV was filled on June 27, 2022 after obtaining a certificate of accuracy for the dispensers, on May 20, 2022 by the California Department of Food and Agriculture, Division of Measurement Standards (DMS).

Shell collected operational data which was submitted to the CEC from June 2022 through June 2023. These data include quarterly reporting of all fueling, maintenance, operations data; hydrogen quality reports; and reports of dispensed renewable hydrogen. If one average hydrogen FCEV takes one average gasoline midsized sedan off the road, the amount of gasoline displaced due to the Station operation during this time period would equal nearly 18,400 gallons displaced.[1]

Shell also operates other light-duty stations in California in addition to heavy-duty stations. Shell is a committed participant and supporter of California's vision for the hydrogen refueling station network.

[1] Calculation assumptions are:

- Average mileage of a mid-sized hydrogen FCEV is 312 miles per tank, and one tank is on average 5 kilograms of hydrogen.
- Average mileage of a mid-sized gasoline sedan is 434 miles per tank, and one tank is on average 12 gallons of gasoline.:

CHAPTER 1: Introduction

Objectives

The San Jose Station ("the Station") is one of seven stations that Shell is designing and constructing under awards from Energy Commission, granted under its grant funding opportunity GFO-15-605. The objective of this project was to design, build, commission, and open a retail hydrogen serviced station co-located at an existing Shell gasoline station at 101 Bernal Road, San Jose, CA 95119.The objective of this Station was to demonstrate that a hydrogen refueling station is capable of meeting FCEV consumer convenience needs safely and reliably.

Approach

Shell's overall approach to the development of its hydrogen refueling station infrastructure has the following key elements:

- Make the customers refueling experience as similar as possible to that of refueling gasoline powered vehicles. This is achieved by co-locating hydrogen dispensers and associated point of sale (POS) terminals with the gasoline dispensers under the canopy of its branded gas stations.
- Employ standardized equipment design, and performance characteristics across all its hydrogen refueling stations.
- Employ modular equipment with the smallest possible footprint to permit installation in existing stations that are space constrained. Such stations are typically located in urban, densely developed sites. This allows Shell to bring hydrogen refueling stations to city centers.
- Team with engineering firms, equipment manufacturers, and construction contractors with proven record of designing and building service stations.

Activities Performed

Shell performed the following activities:

- Site Acquisition
- Preliminary Investigations
- Equipment Procurement
- Entitlements
- Design and Permitting
- Bid Solicitation

- Construction
- Commissioning and Startup
- Operational and Open Retail Station
- Data Collection and Analysis

CHAPTER 2: Station Design, Construction and Startup

Major Activities and Timeline

Construction of the Station required many activities that are listed and described below along with an approximate timeline for their execution. Shell negotiated site acquisition agreement and procured the hydrogen station equipment.

Shell retained Fiedler Group (FG) to prepare documents required for design, entitlements, permitting, bid solicitation, and construction services. FG implemented its phased approach to accomplish the preparation of the documents, exhibits and attain a permit ready to issue (RTI) status. Shell self-managed the construction period. Shell's project team, comprised of Fiedler Group (as engineer of record), Nel (as equipment vendor, installer and O&M contractor) and Fueling and Service Technologies (Fastech, as general contractor), executed the following phases to achieve an open retail station:

- Site Acquisition
- Preliminary Investigations
- Equipment Procurement
- Entitlements
- Design and Permitting
- Bid Solicitation
- Construction
- Commissioning and Startup
- Operational and Open Retail Station

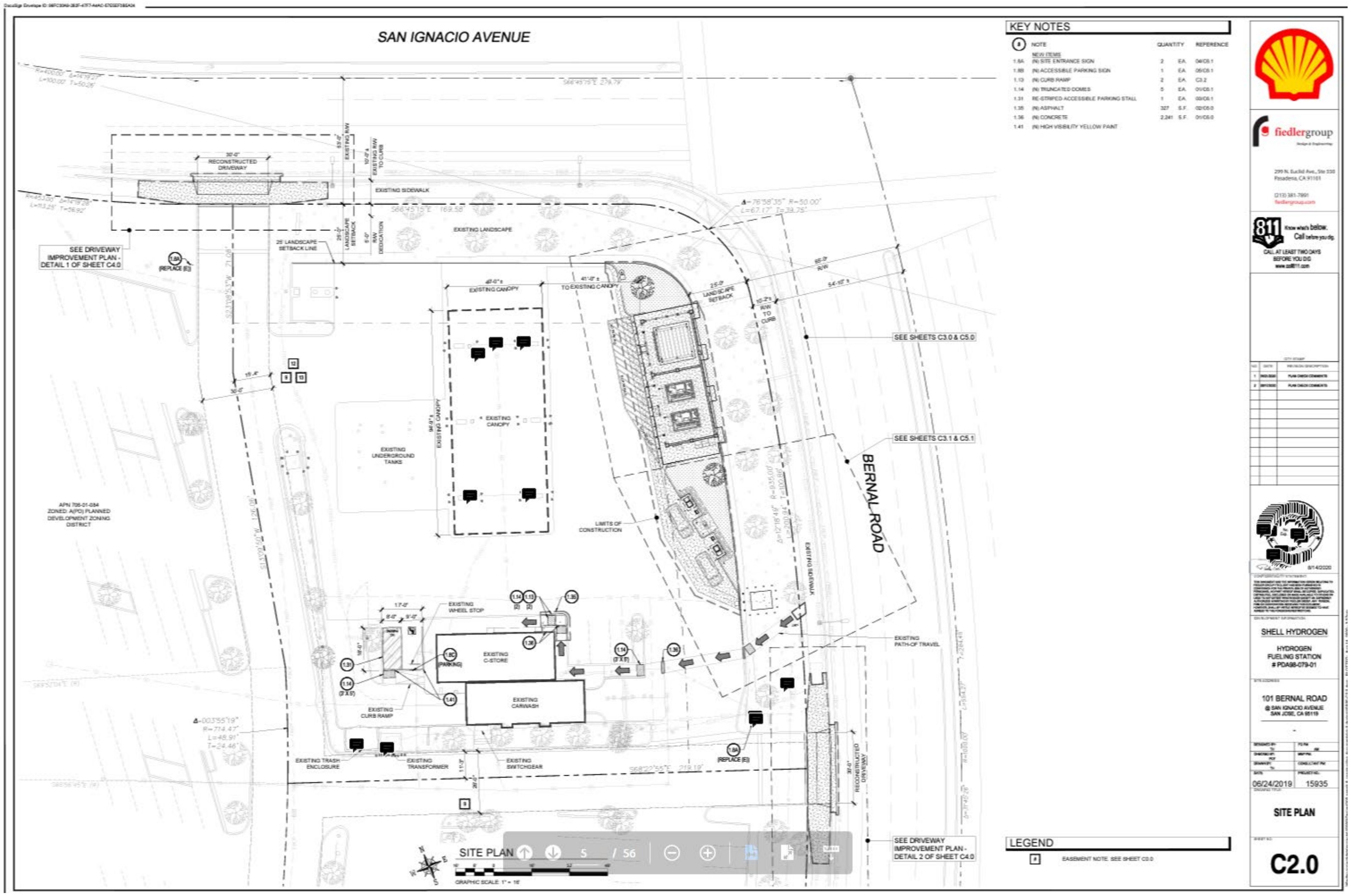
Site Acquisition (August 2016)

The Station is located at an existing Shell branded station operated by AU Energy (AUE). The site is owned by Terracommercial Real Estate Corporation and operated by AUE. Shell and AUE entered negotiations to build a H2 station and a completed agreement was executed on August 17, 2016.

Preliminary Investigations (March 2017 to June 2017)

FG investigated the requirements of various government agencies and utilities. This entailed discovery of requirements, codes, ordinances and regulations that impact entitlements, permitting, and design criteria. A site investigation report was developed based on agency contact. The following agencies were contacted: City of San Jose Planning Department, Building Department, Fire Department, Department of Public Health (Environmental Health), and local utility PG&E. A preliminary site plan was prepared based on Shell's design requirements, agency findings and site visit, illustrated in Figure 1.

Figure 1: Preliminary Site Plan



Source: Fiedler Group/Shell

Equipment Procurement (April 2017 to May 2021)

Shell selected NEL to supply the H2 station equipment. NEL was contracted to supply, install, and commission all equipment necessary to achieve an operational hydrogen station. NEL supplied the following major H2 station equipment: Station Module (compressor and H2 cooling system), Storage Module and associated valve panels, supply cabinet and associated HMI, hydrogen dispensers and all interconnecting mechanical pipe and tubing between the equipment. Equipment delivery was timed to synchronize with the construction schedule. All the equipment was delivered to the site and installed by May 17, 2021.Shell purchased the point of sale (POS) terminals from COMDATA.

Entitlement Process (July 2019 to December 2020)

FG submitted the entitlements drawing package to the AHJ on July 22, 2019. The planning department verified that the project meets the zoning requirements and approved aesthetic, landscaping and other details that are important to the community. Approval was received on December 28, 2020.

Site Design and Permitting (March 2020 to February 2021)

FG submitted the first design drawing package to the city on March 09, 2020. Final approval of the construction permit was obtained on February 05, 2021. Figure 2 illustrates the site plan approved for construction.

Bid Solicitation (September 2020 to December 2020)

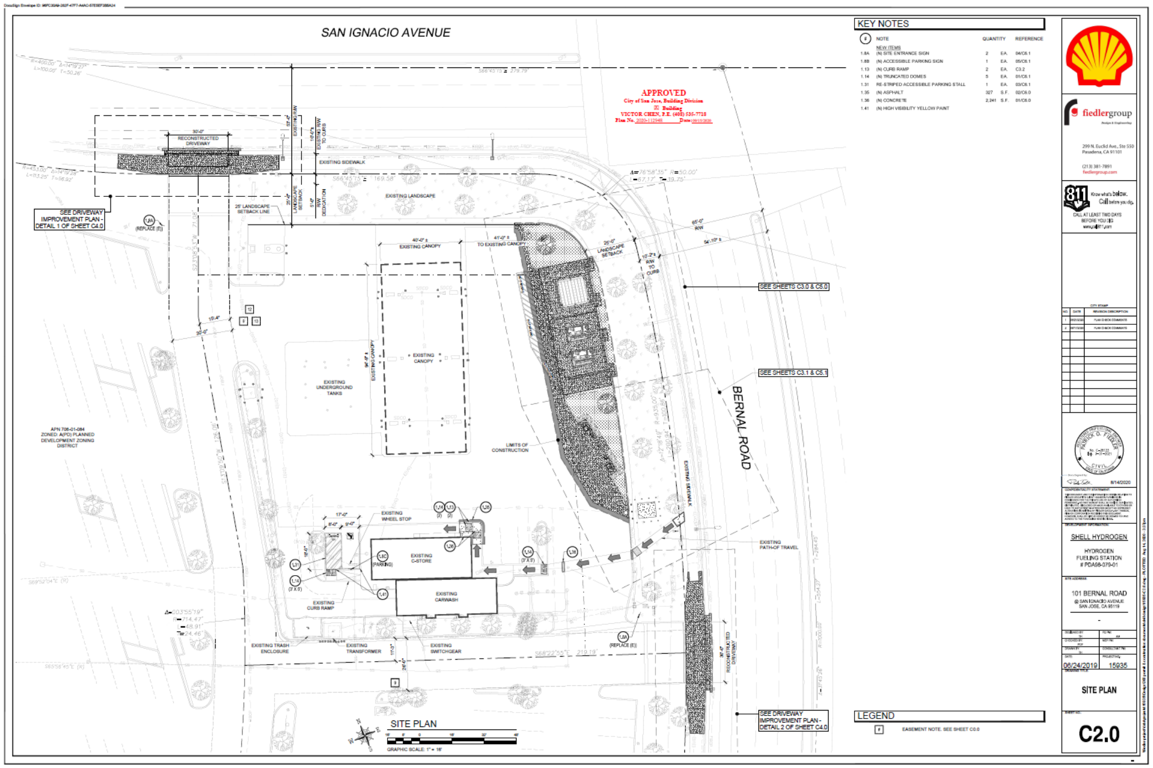
FG prepared a bid solicitation package consisting of the drawing set, technical documents, and project manual. Shell invited three prequalified general contractors to bid, with a pre-bid conference held on September 21, 2020. Shell received three bids and evaluated them against an engineer's independent cost estimate. In addition to cost, other factors that Shell used to evaluate bids were prior similar experience and current capability, safety performance, financial strength, and ability to mobilize and complete construction per required schedule. Shell awarded a construction contract to Fueling and Service Technologies, Inc. (Fastech) on December 8, 2020.

Construction (February 2021 to June 2021)

Construction Contractor, Fastech, broke ground on February 09, 2021. All hydrogen station equipment was installed by May 17, 2021. Substantial completion was achieved on June 11, 2021. Figure 3 illustrates the site plan after construction (as-built). Figure 4 illustrates the completed H2 station.

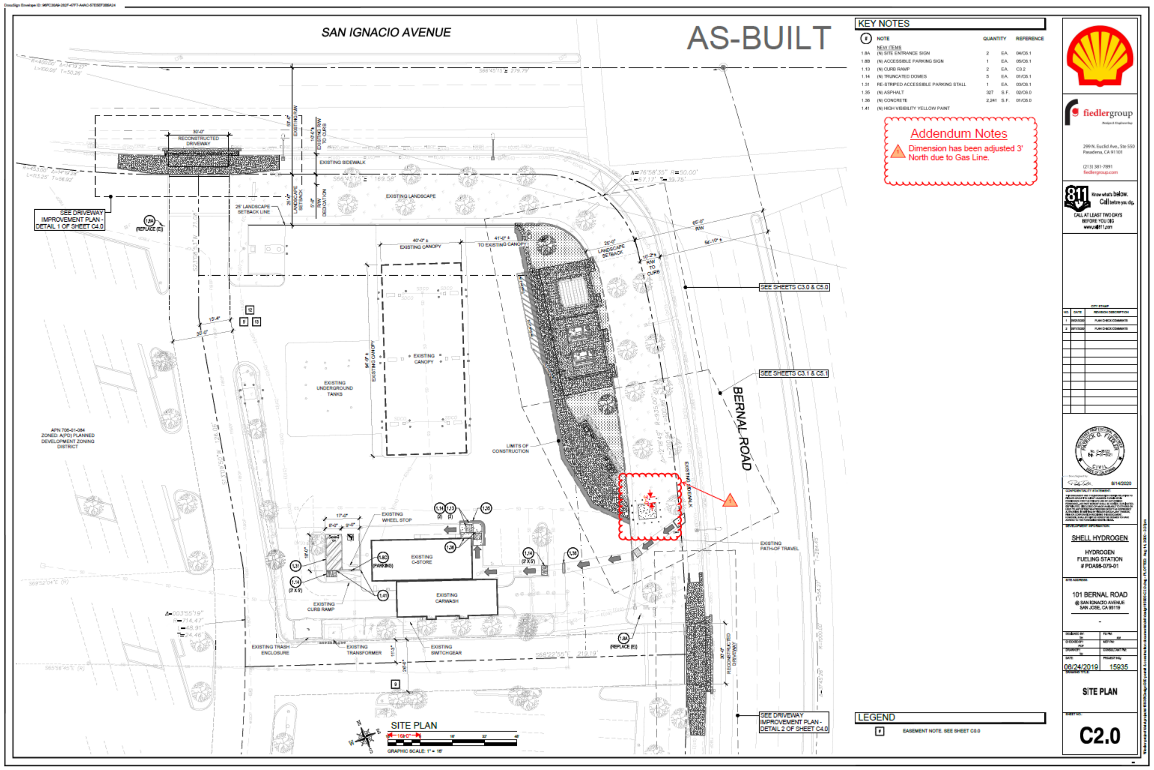
Utility service was energized on July 16, 2021. The pre-startup safety review (PSSR) was conducted by Shell project managers in conjunction with Fastech and the Operations & Maintenance contractor on April 14, 2022, and a checklist of actions was developed. The delay between utility service energization and PSSR was largely due to resourcing constraints.

Figure 2: Site Plan Approved by the Planning Department



Source: Fiedler Group/Shell

Figure 3: Site Plan after Construction



Source: Fiedler Group/Shell

Figure 4: Completed Hydrogen Station (Dispensers, above; equipment compound, below)

Source: Fiedler Groups/Shell

Source: Fiedler Group/Shell

Commissioning and Startup (July 2021 to June 2022)

PSSR actions that were deemed prerequisite for introduction of hydrogen into the system were completed on April 29, 2022. Hydrogen was introduced April 29, 2022. California Department of Food and Agriculture, Division of Measurement Standards (DMS) certified dispenser accuracy on May 20, 2022. Commissioning and startup activities continued until June 27, 2022, when the first FCEV was filled. Figure 5 illustrates fueling of the first FCEV. Figure 6 illustrates results of the hydrogen purity test.

Operational Station (June 2022)

The station was deemed "operational" as of June 30, 2022. Connection to the SOSS was achieved on June 07, 2022, with the station appearing as open on June 30, 2022.

Open Retail Station (June 2022)

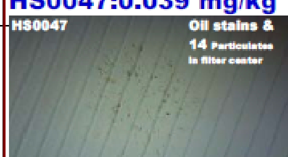
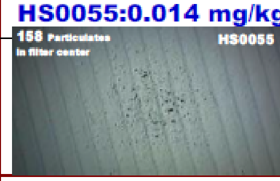
The station was deemed retail open on June 30, 2022. Figure 7 illustrates the SOSS status of the new San Jose – Bernal Road Hydrogen Station.

Figure 5: First Fueling of an FCEV on June 27, 2022

Source: Fiedler Group/Shell

Figure 6: Hydrogen Fuel Quality Report

SmartChemistry

SAE J2719-202003			Shell San Jose
GAS SAMPLED ON 05/10/2022 PARTICULATE ON 05/12/2022	SAE J2719 Limits µmol/mol	Smart Chemistry Limits µmol/mol	Concentration (µmol/mol)
H_2O (ASTM D7649)	5	1	1.4
Total hydrocarbons except methane (C_1 equivalent) (ASTM D7892)	2	0.01	0.057
Acetone			0.057
O_2 (ASTM D7649)	5	0.01	< 0.01
CH_4 (ASTM D5466)	100	0.001	0.022
He (ASTM D1946)	300	10	< 10
N_2 (ASTM D7649)	300	2	17
Ar (ASTM D7649)	300	0.2	1.2
CO_2 (ASTM D7649)	2	0.01	< 0.01
CO (ASTM D5466)	0.2	0.0001	0.0043
Total S (ASTM D7652)	0.004	0.00004	0.000010
Hydrogen Sulfide		0.000002	0.0000026
Carbonyl Sulfide		0.000001	0.0000044
Methyl Mercaptan (MTM)		0.000002	< 0.000002
Ethyl Mercaptan (ETM)		0.000004	< 0.000004
Dimethyl Sulfide (DMS)		0.000002	< 0.000002
Carbon Disulfide		0.000001	0.0000026
Isopropyl Mercaptan (IPM)		0.000004	< 0.000004
Tert-Butyl Mercaptan (TBM)		0.000004	< 0.000004
n-Propyl Mercaptan		0.000004	< 0.000004
Thiophene		0.000004	< 0.000004
Diethyl Sulfide		0.000004	< 0.000004
n-Butyl Mercaptan		0.000004	< 0.000004
Dimethyl Disulfide (DMDS)		0.000004	< 0.000004
Tetrahydrothiophene (THT)		0.000004	< 0.000004
Formaldehyde (ASTM D7892)	0.2	0.002	< 0.002
Formic Acid (ASTM D5466)	0.2	0.001	< 0.001
Ammonia (ASTM D5466)	0.1	0.004	< 0.004
Halogenated Compounds (halogen ion equivalent)	0.05		< 0.001
Cl_2 (ASTM D5466)		0.0004	< 0.0004
HCl (ASTM D5466)		0.0004	< 0.0004
HBr (ASTM D5466)		0.0007	< 0.0007
Organic Halides (R-XCl) (ASTM D7892, Smart Chemistry limit is for each individual organic halide)	32 compounds in bold red in Non-Methane Hydrocarbons report	0.001	< 0.001
Particulate Concentration (SAE J2719 Limit: 1 mg/kg)(ASTM D7651)	HS0047:0.039 mg/kg		HS0055:0.014 mg/kg
Particulates Found & Size (ASTM D7634)			
Hydrogen Fuel Index	99.97%		99.997977%
Total Non-Hydrogen Gases	300		20.2
CO + HCHO + HCOOH	0.2	0.00005	0.0043

Source: Shell/ SmartChemistry

Figure 7: Screen Shot of the SOSS Web Page With San Jose Listed

Source: Hydrogen Fuel Cell Partnership (https://m.h2fcp.org/)

Table 1: Total Project Cost and Total CEC Cost Share

Category	CEC Grant	Shell Match	Vendor Invoices Total
Equipment Total	$1,589,500	$1,305,600	$2,895,100
Subcontracts Total	0.0	$1,076,613	$1,076,613
Grand Total	**$1,589,500**	**$2,382,213**	**$3,971,713**
Total CEC Cost Share	**40%**	**N/A**	**N/A**

Source: Fiedler Group/Shell

CHAPTER 3: Data Collection and Analysis

Data Reporting

Shell collected one year of operational data and submitted to the CEC. This includes quarterly reporting of all fueling, maintenance, operations data; hydrogen quality reports; and reports of dispensed renewable hydrogen.

Economic Impact

The project required construction and high-tech firms to build and maintain the Station. The funding was predominantly awarded to California construction and technology firms who had the expertise and qualifications. The workers and firms developed hydrogen dispensing expertise during the construction and support of the refueling station which was valuable and will be directly transferable to other hydrogen refueling station developers in California and abroad for the foreseeable future.

The on-site jobs to handle the initial construction for the Station included roughly 25 full-time temporary positions including local engineering resources, masonry and electrical workers, pipefitters, welders, truck drivers, environmental engineers, and others. Internally, Shell created two full-time permanent roles to manage the construction and project phase of the development of the station, and two full-time permanent roles to maintain the station, collect and report the technical data, and support the operations. Shell also created one full-time role to develop future hydrogen refueling station growth within California.

Shell estimates the funding awarded to California-based companies and employees to be about $750,000 for the Station. The California-based companies that Shell contracted with included Nel and Air Products and Chemicals Inc. Nel supplied critical fueling dispenser and equipment for the station and established full-time positions solely to prepare market expansion and provision of equipment for California. The team consists of California-based technicians who are qualified and trained to conduct maintenance as well as any advanced station repair. Air Products and Chemicals Inc. supplied and transported the hydrogen fuel to the Station and manufactured the hydrogen fuel predominantly from California-based operations. Additional California based suppliers and transporters have also been onboarded to deliver hydrogen to the site.

The generation of California taxes is a direct and immediate economic benefit. These taxes can be utilized to provide government services to the disadvantaged communities, which can provide a direct benefit to the community. These taxes were generated upon launch of the project and continues through with the operation of the station.

Environmental Impact

The Station dispensed over 10,000 kgs of hydrogen from June 30, 2022 to June 30, 2023. If one average hydrogen FCEV takes one average gasoline midsized sedan off the road, the amount of gasoline displaced due to the Station operation would equal 18,400 gallons displaced.

The resulting air emissions reduction is estimated to be at least 160 metric tons of carbon dioxide equivalent (CO2e) per year. The assumptions used to calculate this emissions reduction are listed below.

- Average mileage of a mid-sized hydrogen FCEV is 312 miles per tank, and one tank is on average 5 kilograms of hydrogen.
- Average mileage of a mid-sized gasoline sedan is 434 miles per tank, and one tank is on average 12 gallons of gasoline.
- The amount of CO2e for a hydrogen FCEV is 145 grams of CO2e per mile.
- The amount of CO2e for a gasoline vehicle is 390 grams of CO2e per mile.
- Both of these CO2e values are simulated per the GREET (Greenhouse gases, Regulated Emissions, and Energy use in Transportation) model.[2]
- The calculation does not account for any offsets using greenhouse gas credits.

Carbon Intensity Value

The average carbon intensity value for the supply chain for the Station is 27 grams of CO2 per megajoule. The energy economy ratio for light-duty passenger vehicles is 2.5.

Energy Efficiency Measures

While a Title 24 report was not required for the San Jose station, Shell monitors and manages energy use and efficiency for continuous improvement and the global greenhouse gas emission inventory is subject to independent assurance.

[2] Argonne National Laboratory. The Greenhouse gases, Regulated Emissions, and Energy use in Technologies Model, https://greet.es.anl.gov/.

CHAPTER 4: Statement of Future Intent

Shell has further subcontracted with the equipment vendor, Nel, for the operation, maintenance and repairs of the station. Nel has local maintenance and engineering capability and staff in northern California. The system is outfitted with remote monitoring and automatic alarm communication systems that will send alerts to designated Shell, and Nel personnel.

Shell is a committed participant and supporter of California's hydrogen refueling station network. To this end, Shell matched funds with CEC for the construction of six other hydrogen refueling stations in Northern California. Shell's commitment is further demonstrated with its match share for the construction of a heavy-duty vehicle fueling station at the Port of Long Beach, Wilmington, and Ontario.

CHAPTER 5: Findings, Conclusions, and Recommendations

The San Jose – Bernal Road Hydrogen Station was built at a rapid pace. Time elapsed from the day of submission of the entitlement exhibits to "operational station" status was 35 months. Time elapsed from mobilization to operational station was 17 months.

The Station has contributed towards the fulfillment of the goals of CEC’s ARFVTP program and specifically towards the goals of GFO-15-605 by expanding the hydrogen infrastructure network to encourage greater FCEV adoption among consumers. This was achieved with extensive teamwork by Shell and contractors. Insights gained from the project are invaluable and will be applied toward future projects to further the success of hydrogen refueling stations.

Establishing new power service is a time-consuming process and it can very easily become the critical path for project's completion. Early engagement with the utility to obtain a detailed understanding of their process, procedures, inspection milestones and their time line is recommended.

National Fire Protection Association - Hydrogen Technologies Code (NFPA 2) is a critical tool for working with permit agencies. The code clearly defines fire safety guidelines that enable local jurisdictions and builders to reach common ground while ensuring safety via the rigorous NFPA code writing process. For, this project, the station siting and set back decisions were based on the Prescriptive provisions of the NFPA 2 code. This is an important tool in NFPA-2 that makes the construction of H2 stations in an urban environment practical and feasible.

The Station commissioning and startup was delayed due to resourcing constraints. A general recommendation for future projects is to proactively resource to support both operations and project commissioning activities.

GLOSSARY

Alternative and Renewable Fuels and Vehicle Technology Program (ARFVTP) – Created by Assembly Bill 118 (Nunez, Chapter 750, Statutes of 2007), the program with an annual budget of about $100 million supports projects that develop and improve alternative and renewable low-carbon fuels, improve alternative and renewable fuels for existing and developing engine technologies, expand transit and transportation infrastructures, and establishing workforce training programs, conduct public education and promotion, and create technology centers, among other tasks.

AU Energy (AUE) – a fuel wholesaler and retailer which owns and operates Shell retail stations in California.

Authority Having Jurisdiction (AHJ) – An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

California Division of Measurement Standards (DMS) – Enforcement of California weights and measures laws and regulations is the responsibility of the Division of Measurement Standards. The Division works closely with county sealers of weights and measures who, under the supervision and direction of the Secretary of Food and Agriculture, carry out the vast majority of weights and measures enforcement activities at the local level. Ensuring fair competition for industry and accurate value comparison for consumers are the primary functions of the county/state programs.

Carbon Dioxide Equivalent (CO2e) – A metric measure used to compare the emissions from various greenhouse gases based upon their global warming potential (GWP). Carbon dioxide equivalents are commonly expressed as "million metric tons of carbon dioxide equivalents (MMTCDE)" or "million short tons of carbon dioxide equivalents (MSTCDE)" The carbon dioxide equivalent for a gas is derived by multiplying the tons of the gas by the associated GWP. MMTCDE= (million metric tons of a gas) * (GWP of the gas) For example, the GWP for methane is 24.5. This means that emissions of one million metric tons of methane is equivalent to emissions of 24.5 million metric tons of carbon dioxide. Carbon may also be used as the reference and other greenhouse gases may be converted to carbon equivalents. To convert carbon to carbon dioxide, multiply the carbon by 44/12 (the ratio of the molecular weight of carbon dioxide to carbon). (EPA)

Fuel Cell Electric Vehicle (FCEV) – A zero-emission vehicle that runs on compressed hydrogen fed into a fuel cell "stack" that produces electricity to power the vehicle.

Human-Machine Interface (HMI) – the hardware or software through which an operator interacts with a controller. An HMI can range from a physical control panel with buttons and indicator lights to an industrial PC with a color graphics display running dedicated HMI software.

Hydrogen Station Equipment Performance (HyStEP) device – a device that has been designed to carry out the test methods of CSA HGV 4.3 to measure that stations follow the fueling protocols standard SAE International J2601.

Kilogram (kg) – The base unit of mass in the International System of Units that is equal to the mass of a prototype agreed upon by international convention and that is nearly equal to the mass of 1000 cubic centimeters of water at the temperature of its maximum density.

National Fire Protection Association (NFPA) – is a global self-funded nonprofit organization, established in 1896, devoted to eliminating death, injury, property and economic loss due to fire, electrical and related hazards.

Fueling and Service Technologies (Fastech) – the general contractor for the Station

Pre-startup safety review (PSSR) – a safety review conducted prior to startup of a new or modified facility to ensure that installations meet the original design or operating intent to catch and re-assess any potential hazard due to changes during the detailed engineering construction phase of a project.

Ready to issue (RTI) – The permit application is ready to be issued once the building permit issuance fees are paid.

Pacific Gas and Electric Company (PG&E) – an electric and gas utility serving the greater San Francisco, California, region.

Station Online Status System (SOSS) – a mobile-friendly website that shows station availability and provides other station information such as hours of operation, address, and the hydrogen station operator and developer.