DISCLAIMER

Staff members of the California Energy Commission prepared this report. As such, it does not necessarily represent the views of the Energy Commission, its employees, or the State of California. The Energy Commission, the State of California, its employees, contractors and subcontractors make no warrant, express or implied, and assume no legal liability for the information in this report; nor does any party represent that the uses of this information will not infringe upon privately owned rights. This report has not been approved or disapproved by the Energy Commission nor has the Commission passed upon the accuracy or adequacy of the information in this report.
ACKNOWLEDGEMENTS

The construction of the San Jose hydrogen refueling station has been possible only because of the substantial efforts and funds provided by a number of stakeholders. FirstElement Fuel, Inc. graciously thanks Toyota for its vision and fortitude; Air Products and Chemicals Inc., Black & Veatch, and Aliantel for bringing the project together; Tyson Eckerle for helping push the lease over the goal line; and of course, Jean Baronas, Sarah Williams, Jim McKinney, Vice Chair Janea Scott, and many others at the California Energy Commission for tremendous, sustained confidence in clean, alternative transportation.
Assembly Bill 118 (Núñez, Chapter 750, Statutes of 2007) created the Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP). The statute authorizes the California Energy Commission 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 ARFVTP 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) for hydrogen station development until at least 100 stations are operational.

The ARFVTP 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 non-road 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 annual ARFVTP Investment Plan. The Energy Commission issued Program Opportunity Notice (PON)-13-607 to provide funding opportunities under the ARFVTP for hydrogen refueling stations. In response to PON-13-607, the recipient submitted an application that was proposed for funding in the Energy Commission’s notice of proposed awards May 1, 2014 and the agreement was executed as ARV-14-013 on July 22, 2014.
ABSTRACT

FirstElement Fuel, Inc. designed, engineered, permitted, constructed, and commissioned a hydrogen refueling station at 2101 North First Street, San Jose (Santa Clara County). FirstElement Fuel, Inc. plans to own and operate the hydrogen refueling station until at least 2025. The station consists of a concrete reinforced block compound that encloses hydrogen storage, compression, and cooling equipment, a dispenser with two fueling hoses, a customer payment interface, a canopy, and a dedicated concrete fueling position for fuel cell electric vehicle drivers.

Keywords: California Energy Commission, FirstElement Fuel, Inc., hydrogen refueling station, hydrogen infrastructure, fuel cell electric vehicles, San Jose.

Please use the following citation for this report:
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EXECUTIVE SUMMARY

Hydrogen fuel cell electric vehicles (FCEV) and hydrogen refueling stations are expected to play key roles in California as the state transitions to lower-carbon and zero-emission vehicle technologies for light-duty passenger vehicles, transit buses, and truck transport fleets. Numerous government regulations and policy actions identify FCEV as a vehicle technology that will be available to meet the California Air Resources Board Zero Emission Vehicle Regulation and the Governor’s Zero Emission Vehicle Mandate. More specific actions to bring FCEV to California markets are specified in the Governor’s Zero Emission Vehicle Action Plan.

Hydrogen fuel cell electric drive technology offers tremendous potential for the light-duty passenger vehicle market and medium- and heavy-duty truck and bus markets. Fuel cell electric passenger vehicles can drive more than 300 miles on a tank of hydrogen and can be refueled in 3 to 4 minutes the way gasoline passenger vehicles are fueled. They have zero tailpipe emissions, while the carbon footprint of these vehicles is nearly the same as plug-in electric vehicles. The technology can be readily scaled up for sports utility vehicles, family passenger vans, pick-up trucks, urban package and beverage delivery trucks, and even heavy-duty trucks and buses. Most auto industry analysts and agencies view fuel cell electric drive technology as a complement to battery electric drive technologies rather than as a competing technology. Both battery and fuel cell electric vehicle technologies will be needed in California to achieve the zero-emission-vehicle deployment goals.

Assembly Bill 8 (AB 8, Perea, Chapter 401, Statutes of 2013) reauthorized the original Assembly Bill 118 funding program (Núñez, Chapter 750, Statutes of 2007) and created new legal requirements for the California Energy Commission’s Alternative and Renewable Fuel and Vehicle Technology Program. The bill directs the Energy Commission to allocate up to $20 million per year, or up to 20 percent of each fiscal year’s available funding, to develop hydrogen refueling stations “until there are at least 100 publicly available hydrogen-fueling stations in operation in California” (Health and Safety Code 43018.9[e][1]).

The site selected for this project is 2101 North First Street, San Jose (Santa Clara County). A hydrogen refueling station at this location will serve as a core station in Northern California for at least the next 10 years. FirstElement Fuel, Inc. accomplished this goal through the steps outlined below.

The California Energy Commission contributed $1,451,000 of the total $2,269,760 cost to design, engineer, permit, construct, and commission the station.

The owner at San Jose is excited to bring a clean, alternative fuel to his station. Lease terms were negotiated, and FirstElement Fuel, Inc. and the San Jose owner executed a lease on March 4, 2014.
FirstElement Fuel, Inc. developed the site configuration and design, and Black & Veatch performed the detailed engineering design. The zoning process in San Jose did not require a public hearing, and approval was granted May 6, 2015.

Permits for zoning, building, mechanical, electrical, plumbing, and fire were filed December 5, 2014 and finalized August 5, 2015. Because the San Jose station is located close to a neighboring property line, the fire authority in this jurisdiction required an additional wall to ensure the proper protection was met. The permitting process from application to finalization took a total of 243 days.

Hydrogen refueling station equipment was purchased from Air Products and Chemicals and the remainder of materials were sourced from a variety of general and specialty vendors. Aliantel from Murrieta, CA was selected as the contractor for the project because of their relatively low bid, excellent safety record, good standing with Black & Veatch, and willingness to work with FirstElement Fuel, Inc. on multiple projects.

Construction began on August 17, 2015 and was complete on October 30, 2015 for a construction time of 77 days from operational status to open-for-retail status.

Station commissioning began on October 26, 2015 and was complete on October 30, 2015. The FirstElement Fuel, Inc. team performed all of the commissioning tasks including cleaning, purging, and pressure testing and final start-up.
CHAPTER 1: 
Station Design and Construction

The following summarizes the steps required to bring the San Jose hydrogen refueling station project to completion.

Site Acquisition - Construction (Fall 2013 – October 2015)

Beginning in the fall of 2013, First Element Fuel, Inc. took steps to identify and acquire appropriate sites for the station. FirstElement Fuel, Inc. worked with historical vehicle sales data, academic publications, automakers, and the station location areas designated within the Energy Commission’s PON-13-607 solicitation to select desired market locations. FirstElement Fuel, Inc. then analyzed specific properties within the target locations to find sites that could meet the space requirements for hydrogen fueling equipment.

After selecting general locations and specific sites, FirstElement Fuel, Inc. contacted station owners and operators to negotiate lease opportunities. FirstElement Fuel, Inc. executed a letter of intent with the property owner of 2101 North First Street, San Jose (Santa Clara County) on February 1, 2014. A binding 10-year lease was later executed on March 4, 2014.

FirstElement Fuel, Inc. selected Air Products equipment because of the cost, capacity, reliability, and more mature supply chain as compared to other suppliers as detailed in the FirstElement Fuel, Inc. PON-13-607 application. FirstElement Fuel, Inc. executed a contract with Air Products for the equipment on September 16, 2014 and equipment was delivered to the site on October 2, 2015.

FirstElement Fuel, Inc. and Black & Veatch surveyed the site to begin the site layout on August 12, 2014. They generated initial engineering drawings on September 25, 2014. These drawings are referred to as “construction drawing 30s” because they represent 30 percent complete construction drawings and contain only two pages. Figure 1 shows the equipment compound drawing from the construction drawing 30 drawing set. As shown, the drawing lacks specific detail and serves only to outline the site plan.

On October 29, 2014, Clark Survey performed a detailed engineering survey for the San Jose station site, as shown in Figure 2.

On June 8, 2015, zoning drawings were also generated that provide an accurate but relatively high level depiction of the project for review by planners at the jurisdiction. These drawings are signed and sealed by the professional engineer of record to ensure accuracy and completeness. The equipment compound page of the zoning drawings is shown in Figure 3.
Because the site location is close to a property line, special consideration was required to obtain the fire permit. The local jurisdiction required an extra length of firewall on the equipment compound.

The local jurisdiction initially requested FirstElement Fuel, Inc. to perform substantial additional site work, including widening sidewalks and utility upgrades estimated to cost over $150,000. Thanks to hard work by the Energy Commission and GoBiz, FirstElement Fuel, Inc. was able to negotiate with the city of San Jose to remove these provisions.

On May 18, 2015, draft final construction drawings (or “construction drawing 90s”) were completed that depict all the details required for both construction and the permit review. Final construction drawings (or “construction drawing 100s”) were completed with 60 pages that depict all the details required for both construction and the permit review on August 4, 2015. These drawings are similarly signed and sealed by the professional engineer of record to ensure accuracy and completeness. The equipment compound page of the construction drawing 100 set is shown in Figure 4.
Figure 1: Coarse Detail of Equipment Compound

Source: FirstElement Fuel, Inc. Original figure is higher resolution.
Figure 2: Survey of San Jose Hydrogen Station Location

Source: FirstElement Fuel, Inc. Original figure is higher resolution.
Figure 3: Equipment Compound from Zoning Drawing Set

Source: FirstElement Fuel, Inc. Original figure is higher resolution.
Figure 4: Equipment Compound from Construction Drawing 100 Set

Source: FirstElement Fuel, Inc. Original figure is higher resolution.
FirstElement Fuel, Inc. and Black & Veatch submitted the zoning application to the authority having jurisdiction on December 5, 2014. The local planning department must verify that the project meets the zoning requirements of the proposed location and approve any aesthetic, landscaping, or other details that are important to the community. Approval was received through an administrative process on May 6, 2015.

All building permit applications were submitted on May 25, 2015, and approved on August 5, 2015.

FirstElement Fuel, Inc. and Black & Veatch submitted a bid package on July 14, 2015. The contract was awarded to Aliantel on August 13, 2015. The bulk of Aliantel's construction experience lies in constructing cell towers. Cell towers are roughly similar to hydrogen stations in size, have similar foundations and block walls, and have similar electrical requirements. Aliantel provided a reasonable bid, had a desire to get involved with hydrogen projects, and had a willingness to work in northern California.

Construction started August 17, 2015. Figure 5 shows the equipment conduit “stub-ups” before the concrete foundation was poured.

**Figure 5: Station Conduit “Stub-ups”**
Figure 6 shows hydrogen storage, compression, cooling, and dispensing equipment that was delivered to the site on October 2, 2015. Construction was completed on October 30, 2015. Construction progressed quickly, in part because of the time spent throughout the project to gain a common understanding of project requirements, especially those listed in the National Fire Protection Association hydrogen technologies code.

Figure 6: Crane Lowering Hydrogen Ground Storage Unit into Place

Source: FirstElement Fuel, Inc.
Making the Station Operational (October 26, 2015 – October 30, 2015)
The commissioning of the San Jose hydrogen station included the cleaning and purging of lines, pressure testing, and hydrogen sampling. Figure 7 shows the gas purity results.

Station Declared Operational (October 30, 2015)
The San Jose hydrogen station met the Energy Commission's definition of operational in PON-13-607 by completing installation of all station/dispenser components, obtaining all the required permits from the local jurisdiction, filling the station’s storage tubes with pressurized hydrogen gas, successfully passing a hydrogen quality test (Figure 7), successfully fueled one fuel cell electric vehicle with hydrogen, and opening to the public. FirstElement Fuel, Inc. declared the station operational on October 30, 2015.
Figure 7: Hydrogen Fuel Quality Report on October 8, 2015

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<td>Oxygen</td>
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<td>Methyl</td>
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<td>Nitrogen, Argon</td>
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<td>Argon</td>
<td>5 ASTM D7449</td>
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<td>Carbon Sulfide</td>
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<td>Ethyl Mercaptan (ETM)</td>
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<td>Dimethyl Sulfide (DMS)</td>
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<tr>
<td>Carbon Disulfide</td>
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<td>Tert-Butyl Mercaptan (TBM)</td>
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<td>n-Butyl Mercaptan</td>
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<tr>
<td>Hydrogen Chloride</td>
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<tr>
<td>Hydrogen Bromide</td>
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<tr>
<td>Organic Halides (32 compounds in red and bold listed in “Other Hydrocarbons”)</td>
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<tr>
<td>Tetrachloro benzfluorobutanes</td>
<td>0.0017 ASTM D7452</td>
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Particulate Concentration Calculation Sheet

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<th>Particulate Size (microns)</th>
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<td>0.02 0.01</td>
<td>8</td>
<td>0.02 0.01</td>
<td>8</td>
</tr>
</tbody>
</table>

Hydrogen Fuel Index ~

99.99861%

Source: FirstElement Fuel, Inc.
Certification (January 7, 2016)

The California Department of Food and Agriculture (CDFA), Division of Measurement Standards (DMS) is responsible for enforcing California weights and measures laws and regulations and must certify any device used for metering the sale of commercial items within California.

For the first time, FirstElement Fuel, Inc. acted as a Registered Service Agent (RSA) and achieved station certification by dispensing a measured amount of fuel, and confirming the quantity dispensed is accurately reflected by the dispenser in accordance with examination procedures (EPO NO. 40-A)\(^1\). The certification process is witnessed by the local county weights and measures officer and the DMS can perform audits as needed to assure adherence to EPO NO. 40-A. The momentous occasion was attended by a number of FirstElement Fuel, Inc. and Santa Clara county onlookers (Figure 8).

Figure 8: Certification Process at San Jose Hydrogen Station

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Figure 9 shows the County of Santa Clara certification sticker affixed to the dispenser at the 2101 North First Street station in San Jose (Santa Clara County).

**Figure 9: Certification Seal on the H70 Dispenser**

Source: FirstElement Fuel, Inc.

**Station Use (October 30, 2015)**

Figure 10 shows the first vehicle filled at the North First Street station, was a Hyundai Tucson on October 30, 2015. The station has been used regularly since then. Based on
an average FCEV use of 0.7 kilograms per day, this station’s 180 kilogram per day dispensing capacity is enough to support up to 260 FCEVs, although this number can vary depending on actual FCEV geographical deployment relative to other open retail station locations and FCEV driver habits.

**Figure 10: First Fueling at the San Jose Hydrogen Station on October 30, 2015**

![First fueling at the San Jose Hydrogen Station](source: FirstElement Fuel, Inc.)

**Station Operational Status System**

The California Fuel Cell Partnership, Station Operational Status System (SOSS) is a website portal designed to provide hydrogen station status for motorist use. This system is important to FCEV drivers during the development phase of the hydrogen refueling station network because it lets drivers know that the hydrogen station they intend to use is operational before they depart. The San Jose hydrogen station began sending automated updates (FirstElement Fuel, Inc. software) on a regular basis, to SOSS on January 15, 2016.

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3 [https://m.cafcp.org/](https://m.cafcp.org/)
**Environmental Impacts**

The environmental impacts at the San Jose station are minimal. Hydrogen will be stored as a compressed gas in an above ground tank concealed behind a wall. In accordance with the funding agreement with the Energy Commission, 33.3 percent of the hydrogen sold at the Playa Del Rey hydrogen station will be produced from renewable sources including biogas. Hydrogen is non-toxic, colorless, and odorless so the station equipment is outfitted with appropriate sensors to provide immediate notification in case a leak occurs. No solid or liquid waste will be produced at this site.

Minimal water was consumed for this project. There was also minimal additional landscaping, that uses water, added because of the hydrogen refueling station.

The station use will not cause any unsightly appearances, such as noise, glare, dust, or odor. The facility is a modern addition to an existing gasoline station. No outdoor sound amplification systems were installed; however, lighting was installed at the facility to illuminate evening fueling.

**San Jose Station in the Network**

The station is open and ready for use as shown in Figure 11.

*Figure 11: San Jose Hydrogen Station*
Figure 12 shows the greater San Francisco area map which indicates where the San Jose station is situated in relationship to other facilities in the northern part of the state. The North First Street Station is close to the U.S. 101 Freeway.

Figure 12: San Francisco Area Hydrogen Stations: Open Retail and Planned

Source: California Energy Commission Staff
Schematic Layout of the San Jose Station

Figure 13 depicts an overview of the San Jose hydrogen station components and the steps in the refueling process.

**Figure 13: Schematic Depicting Hydrogen Station Equipment and Refueling Process**

1. Hydrogen gas is delivered to the medium pressure storage tanks by truck.
2. Hydrogen gas is compressed as needed to fill the high pressure tubes.
3. Hydrogen flows from the high pressure tubes through a cooling system as each car is refueled.
4. Refueling is similar to gasoline. Self-serve, pay with credit card, and takes about 3 minutes.

Source: FirstElement Fuel, Inc.
Final Configuration and Budget

Figure 14 shows a detailed view of the actual final, as-built configuration of the San Jose hydrogen station.

**Figure 14: Enlarged View of Final San Jose Station Layout**

Source: FirstElement Fuel, Inc.
Figure 15 shows a detailed view of the budget to construct the San Jose hydrogen station.

**Figure 15: The Project Grant Funding and Match Funding**

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<thead>
<tr>
<th>Vendor</th>
<th>Services</th>
<th>Cost</th>
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<tr>
<td><strong>Air Products and Chemicals, Inc., Allentown, PA</strong></td>
<td>H2 station equipment</td>
<td>$1,479,873.56</td>
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<tr>
<td><strong>Black &amp; Veatch, Overland Park, KS</strong></td>
<td>Construction</td>
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<td>Engineering</td>
<td>$47,300.00</td>
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<td>Permitting</td>
<td>$68,756.88</td>
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<td>Project Management</td>
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<td><strong>Various Vendors</strong></td>
<td>Construction Materials (tubing, wire, etc.)</td>
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<td>Fixtures (doors, lights, etc.)</td>
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<td><strong>MSI Tech, Irvine CA</strong></td>
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<td><strong>Karen Calhoun, Newport Beach, CA</strong></td>
<td>Legal services</td>
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<td><strong>Vertical Advisors LLP, Newport Beach, CA</strong></td>
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<td><strong>Total Project Costs</strong></td>
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<tr>
<td>Remaining match funding provided by FirstElement Fuel, Inc.</td>
<td>$818,760.68</td>
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**Total Energy Commission cost share** 63.9%

Source: FirstElement Fuel, Inc.
CHAPTER 2:  
Energy Analysis

The San Jose hydrogen refueling station is supplied by hydrogen generated via steam methane reformation that converts methane (CH₄) and water (H₂O) to hydrogen (H₂) and carbon dioxide (CO₂):

\[ CH₄ + 2H₂O \rightarrow 4H₂ + CO₂ \]

Per California Senate Bill 1505 (Lowenthal, Chapter 877, Statutes of 2006) and PON-13-607, which funded this project, at least one-third of the hydrogen sold by FirstElement Fuel, Inc.’s state funded hydrogen refueling stations will be produced from renewable sources. Hydrogen is supplied to the hydrogen fueling stations from Air Products’ hydrogen production facilities in Wilmington/Carson, California. Renewable biogas will be procured as feedstock for the facilities, resulting in delivered hydrogen product that meets the requirements of this PON and the 33.3 percent renewable hydrogen requirements of California Senate Bill 1505 as shown in Table 1. Renewable hydrogen at 100 percent is achievable through the same supply pathway, however at a higher cost.

**Table 1: Renewable Biomethane Supply Sources**  
Shell Energy North America (US), L.P.

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<th>Supply Source</th>
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<th>Pipeline/LDC</th>
<th>Receipt</th>
<th>Delivery</th>
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<td>635 Toby Road</td>
<td>National Fuels Gas</td>
<td>Landfill meter</td>
<td>Bristoria NGPL-Sweet Lake</td>
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<td></td>
<td>Kersey, PA 15846</td>
<td>TETCO EPNG Socal Gas FAR</td>
<td>Nat Fuel-Bristoria</td>
<td>EPNG Jal 3083 Topock</td>
</tr>
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<td></td>
<td></td>
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<td>Socal Citygate</td>
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<td></td>
<td>EPNG Jal 3083 Topock</td>
<td></td>
</tr>
<tr>
<td>Imperial Landfill</td>
<td>11 Boggs Road</td>
<td>National Fuels Gas</td>
<td>Landfill meter</td>
<td>Bristoria NGPL-Sweet Lake</td>
</tr>
<tr>
<td></td>
<td>Imperial, PA 15126</td>
<td>TETCO NGPL EPNG Socal Gas FAR</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Tetco-Sweet Lake 3825</td>
<td>Socal Citygate</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>EPNG Jal 3083 Topock</td>
<td></td>
</tr>
</tbody>
</table>

Source: FirstElement Fuel, Inc.

Air Products has a contract for sourcing of the renewable biogas that meets Public Resources Code Section 2574(b)(1); documentation is provided in Figure 16. Although California has a substantial amount of biogas, local supply cannot be injected into California pipelines under California Health & Safety Cost Section 25420. Air Products’ biogas supply for this project is being sourced outside California and transported to California with connection to a natural gas pipeline in the Western Electricity Coordinating Council⁴ region that delivers gas into California.

⁴ The Western Electricity Coordinating Council promotes Bulk Electric System reliability in the Western Interconnection.  
[https://www.wecc.biz/Pages/AboutWECC.aspx](https://www.wecc.biz/Pages/AboutWECC.aspx)
Hydrogen is delivered to all FirstElement Fuel, Inc. stations (including San Jose) by a Department of Transportation-certified high-pressure delivery trailer.

The San Jose hydrogen station can dispense 180 kilograms/day. Based on average hydrogen use by FCEVs, this station’s dispensing capacity is enough to support up to 260 FCEVs, depending on driver habits. Assuming FCEV average 52 miles/1 kilograms according to *Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation*
Models, and consumption of 180 kilograms/day for the next 10 years, the station will offset 8,300 metric tons of total Greenhouse gas compared to equivalent gasoline vehicles. Furthermore, the San Jose hydrogen station will eliminate more than 1.54 million gallons of gasoline, assuming the 2013 national passenger fleet average fuel economy of 21.6 mpg⁶.

Data on the operation of the station will be collected and reported to the Energy Commission throughout the term of the grant. Data collected and reported will include throughput, vehicle usage, gallons of gasoline displaced, and a comparison of the actual performance of the project to proposed expectations.

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5 GREET® Model [https://greet.es.anl.gov/](https://greet.es.anl.gov/).

FirstElement Fuel, Inc. intends to own and operate the San Jose refueling station for at least 10 years. FirstElement Fuel, Inc. has invested substantial capital to build the station and will require many years of operation to recoup the development costs. FirstElement Fuel, Inc. has executed an initial 10-year lease with the landowner with the possibility for extension.

In addition, FirstElement Fuel, Inc. is building an in-house maintenance team that will have the personnel and equipment resources to maintain and repair any of our stations as quickly as possible throughout California. Figure 17 shows a flow diagram of the FirstElement Fuel, Inc. Operations and Maintenance Control Plan for response from the Operations and Maintenance team.

To augment onsite personnel across the FirstElement Fuel, Inc. network, a comprehensive data collection and monitoring system has been implemented. Figure 18 shows a screenshot of one page of the data collection and monitoring system. FirstElement Fuel, Inc. maintenance personal can access a breadth of real-time performance and sensor data, live video feeds, and historic usage data, and can control some features of the station remotely, 24 hours a day.

In addition to remote monitoring, FirstElement Fuel, Inc. has implemented a rigorous Computerized Maintenance Management Systems and an Enterprise Asset Management systems to schedule and track maintenance, repairs, and inventory. Work orders will be generated, completed, and logged for all maintenance and repair activities for the San Jose station. This will help to maximize station up-time and enable tracking of key performance indicators of the station.
Figure 17: FirstElement Fuel, Inc. Response Flow Chart

Source: FirstElement Fuel, Inc.
Figure 18: Screenshot of FirstElement Fuel, Inc.’s Remote Monitoring System

Source: FirstElement Fuel, Inc.
CHAPTER 4:
Conclusions

The following considers findings from the 33.3 percent renewable hydrogen San Jose hydrogen refueling station project.

Because the site location was close to a property line, special consideration was required to obtain the fire permit. The local jurisdiction required an extra length of firewall on the equipment compound.

The local jurisdiction initially requested FirstElement Fuel, Inc. to perform substantial additional site work, including widening sidewalks and utility upgrades estimated to cost over $150,000. Thanks to hard work by the Energy Commission and GoBiz, FirstElement Fuel, Inc. was able to negotiate with the city of San Jose to remove these provisions.

National Fire Protection Association hydrogen technologies code is a critical tool for technical projects of this nature. The code clearly defines fire guidelines that enable local jurisdictions and contractors to uniformly construct hydrogen facilities and ensure safety. The key is for both station builders and station permit agencies to fully understand and appreciate the content of National Fire Protection Association hydrogen technologies code.
Acronyms

Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP)
California Department of Food and Agriculture (CDFA)
California Energy Commission (Energy Commission)
Carbon Dioxide (CO₂ or CO2)
Division of Measurement Standards (DMS)
Fuel Cell Electric Vehicle (FCEV)
Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation Model (GREET)
Hydrogen (H₂)
Methane (CH₄)
Program Opportunity Notice (PON)
Station Operational Status System (SOSS)
Water (H₂O)