Final Technical Report

Advancing Fuel Cell Electric Vehicles in San Francisco and Beyond

Project Period:	10/1/2016 – 6/30/2019
Submission Date:	September 2019
Recipient:	City and County of San Francisco 1 Dr. Carlton B. Goodlett PL, Room 300 San Francisco, CA 94102-4694
Website (if available)	https://sfenvironment.org/ https://http://www.cleancitiessf.com/
Award Number:	DE-EE0007599
Working Partners:	Frontier Energy (on behalf of the California Fuel Cell Partnership; formerly known as BKi), Newcomb Anderson McCormick, the Business Council on Climate Change
Cost-Sharing Partners:	San Francisco Planning Department
PI:	Lowell Chu, Energy Program Manager
Submitted by: (if other than PI)	Suzanne Loosen, Clean Cities Coordinator
DOE Project Team:	DOE Contracting Officer – Lalida Crawford DOE Project Managers – Greg Kleen Project Engineer – Sara Emmons

Acknowledgment: "This material is based upon work supported by the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE) under the Hydrogen and Fuel Cell Technologies Office (HFTO) Award Number DE-EE0007599."

Contents

Tables

Acronyms and Abbreviations

AHJ	Authorities Having Jurisdiction
BAPDA	Bay Area Planning Directors Association
BC3	Business Council on Climate Change
BEV	Battery Electric Vehicle
CaFCP	California Fuel Cell Partnership
CARB	California Air Resources Board
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CNG	Compressed Natural Gas
EV	Electric Vehicle
FCEV	Fuel Cell Electric Vehicles
GFO	Grant Funding Opportunity
GO-Biz	Governor's Office of Business and Economic Development
H2	Hydrogen
NARC	National Association of Regional Councils
NDEW	National Drive Electric Week
NOPA	Notice of Planned Awards
NREL	National Renewable Energy Laboratory
OEM	Original Equipment Manufacturer
PNNL	Pacific Northwest National Laboratory
RFI	Request for Information
RFP	Request for Proposal
SF Environment	City and County of San Francisco Department of the Environment
STEM	Science, Technology, Engineering, Mathematics
TRSC	Transportation Research and Sustainability Center
U.S. DOE	United States Department of Energy
ZEV	Zero Emission Vehicle

Executive Summary

This presents final reporting for the Advancing Fuel Cell Electric Vehicles in San Francisco and Beyond program for the period of October 1, 2016 through June 30, 2019. The purpose of the program was to support the introduction of fuel cell electric vehicles (FCEVs) and retail hydrogen fueling stations in San Francisco and the nine-county Bay Area (Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma).

Project activities were conducted in partnership with the California Fuel Cell Partnership (CaFCP; a public/private partnership managed by Frontier Energy) and the Business Council on Climate Change (BC3), which manages the SunShares group procurement program. In addition, we worked closely with the Governor's Office of Business and Economic Development (GO-Biz), the California Air Resources Board (CARB), and the California Energy Commission (CEC), and Pacific Northwest National Laboratory (PNNL) to implement program activities.

Objectives

By applying lessons learned from the market transformation the solar industry experienced over the last decade, our objective was to help reduce soft costs tied to two primary barriers. The first is the cost and complexity of permitting and inspection processes associated with hydrogen station development among multiple Authorities Having Jurisdiction (AHJs), and the second is a lack of consumer awareness of hydrogen and FCEVs. In collaboration with project partners, our goals were:

- Increase community awareness through educational opportunities on the viability, safety and availability of hydrogen fuel and FCEVs in the San Francisco Bay Area.
- Update and standardize best practices in permitting and inspection of hydrogen fueling infrastructure.
- Develop and implement a group procurement program to reduce the cost and complexity of FCEVs for the community.

The Statement of Project Objectives for this program is included in Appendix A, and detailed information on activities is included in Appendices B through G. This report summarizes those objectives into the following chapters:

- Program Development and Implementation
- Training
- Station Development and Permitting
- Zoning
- Community Engagement
- Group Procurement
- Reporting and Dissemination

Highlights of Conclusions

Permitting and Inspection Processes

This program tested the approach of streamlining permitting processes, which has been very successful in reducing soft costs for residential solar and electric vehicle charging installations in California. In practice, we found that permitting liquid or gaseous fueling stations is much more varied and context-dependent in AHJs. Specifically, with local interpretations of the California Environmental Quality Act (CEQA) requirements by planning departments and of the fire safety code by fire departments.

When it became clear that streamlining permitting processes was not feasible, we focused on making sure that AJHs were aware of the Hydrogen Station Permitting Guidebook and the assistance offered by GO-Biz and SF Environment through this grant program. To accomplish this, we used the best practice of identifying and working through an affinity organization to reach AHJs, in this case the Bay Area Planning Directors Association.

Outreach Events

The most successful consumer event was the EV Week Ride-and-Drive event during Fleet Week in October 2017, which featured eight BEV/PHEV models and three FCEV models (Honda Clarity, Hyundai Tucson, Toyota Marai) for test drive. During the two-day event, 497 drivers tested those vehicles. Post drive surveys indicated that 36% of respondents preferred the FCEV to the BEV or PHEV.

Newsletter

We published 27 monthly editions from March 2017 through May 2019 of the *San Francisco Clean Cities Coalition Hydrogen and Fuel Cell Electric Vehicle Newsletter* to engage and educate stakeholders and public officials (http://www.cleancitiessf.com/projects/; Appendix B). The peak audience reached 390 newsletter subscribers with a peak open rate of 35% and a final open rate of 25%, which exceeds the industry average open rate of 23%. Additionally, the hyperlinks to relevant articles provided in the newsletter reached an impressive peak click rate of 17%. Although the newsletter was popular, we lack ongoing funding to retain it in our work plan.

Hydrogen 101

One of our goals was to present at three national, state, regional, and local events. As shown in Table 6, we presented at eight events, including a C40 international workshop. A best practice we identified is to precede technical presentations with *Hydrogen 101* (a case study and copy of the presentation are included in Appendix G).

Hydrogen and fuel cell technology are inherently complex topics and subject matter specialists can be difficult to follow for audiences with little or mixed knowledge of the technology. To ensure that conference audiences were well-oriented to the technology, we developed a *Hydrogen 101* presentation, which is intended to precede panel presentations by subject matter specialists. We found that audiences were more engaged and had better questions about the overall content.

Group Procurement Program

Our goal was to implement FCEVs in two years of the SunShares group procurement program. Fortunately, we were able to begin a year early in 2016, which was the last year of the $8,000 FCEV tax credit. The $7,500 BEV tax credit was in full effect through 2018, making FCEVs less economically competitive than BEVs. In the 2016 program, four FCEVs were sold with only six hydrogen refueling stations were open in the Bay Area. In 2017 and 2018, no FCEVs were sold through the program (Appendix E).

Introduction

This presents final reporting for the Advancing Fuel Cell Electric Vehicles in San Francisco and Beyond program for the period of October 1, 2016 through June 30, 2019. The program was extended by three quarters after the original end date of September 30, 2018, to align activities with hydrogen station openings. The purpose of the program was to support the introduction of fuel cell electric vehicles (FCEVs) and retail hydrogen fueling stations in San Francisco and the nine-county Bay Area (Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma).

Project activities were conducted in partnership with the California Fuel Cell Partnership (CaFCP; a public/private partnership managed by Frontier Energy) and the Business Council on Climate Change (BC3), which manages the SunShares group procurement program. In addition, we worked closely with the Governor's Office of Business and Economic Development (GO-Biz), the California Air Resources Board (CARB), and the California Energy Commission (CEC), and Pacific Northwest National Laboratory (PNNL) to implement program activities.

Project Objectives

By applying lessons learned from the market transformation the solar industry experienced over the last decade, our objective was to help reduce soft costs tied to two primary barriers. The first is the cost and complexity of permitting and inspection processes associated with hydrogen station development among multiple Authorities Having Jurisdiction (AHJs), and the second is a lack of consumer awareness of hydrogen and FCEVs. In collaboration with project partners, our goals were:

- Increase community awareness through educational opportunities on the viability, safety and availability of hydrogen fuel and FCEVs in the San Francisco Bay Area.
- Update and standardize best practices in permitting and inspection of hydrogen fueling infrastructure.
- Develop and implement a group procurement program to reduce the cost and complexity of FCEVs for the community.

The Statement of Project Objectives for this program is included in Appendix A.

Approach

To address the cost and complexity of permitting, we provided training and technical assistance to AHJs and station developers in proposed project areas. This included organizing and facilitating pre-application meetings, documenting permitting processes among AHJs, publishing a monthly newsletter, and developing specialized trainings. As stations neared project completion, we organized local community awareness events in partnership with the AHJ and station developer.

To address the lack of consumer awareness, we worked with the SunShares group procurement program to provide discounts on FCEVs coupled with consumer workshops for residents throughout the greater Bay Area, leveraging established communication channels to reach consumers (e.g., affiliate groups, employers, and local government). We also incorporated FCEVs in our annual Clean Cities Coalition workshops and local ride-and-drive events.

Background: Hydrogen Refueling Station Development

California Context

When the program was launched in fall 2016, the state of California had a goal of 100 hydrogen refueling stations by 2020. As of summer 2019, there are 40 stations open to the public in California. Over 7,000 FCEVs have been sold in the US, mostly in California.

A January 2018 Executive Order from the Governor's office increased California's goal to 5 million zero emission vehicles on the roads by 2030, including FCEVs. To support deployment of ZEVS, the state intends to support development of 200 hydrogen stations by 2025. Details about California's program can be found in the 2019 Annual Evaluation of Fuel Cell Electric Vehicle Deployment & Hydrogen Fuel Station Network Development (https://ww2.arb.ca.gov/sites/default/files/2019-07/AB8_report_2019_Final.pdf).

Bay Area Context

In April 2016, the CEC announced a grant funding opportunity (GFO 15 605) for hydrogen fueling stations. Proposals were submitted in August; proposed awards were anticipated in November 2016.

On February 17, 2017, the CEC announced the Notice of Planned Awards for 16 fueling stations, of which eight were proposed for the Bay Area. Three of the Bay Area stations were developed in the City of San Francisco. Of the stations awarded in this GFO, all were constructed, except for Walnut Creek, which was withdrawn.

Table 1: 2017 Awards for Hydrogen Fueling Stations—Bay Area

City	Street Address	Developer	Estimated Completion Date
San Francisco	551 Third St, San Francisco, CA 94107	Equilon Enterprises LLC (Shell)	Fall 2019
San Francisco	3550 Mission St, San Francisco, CA 94110	Equilon Enterprises LLC (Shell)	Fall 2019
San Francisco	1201 Harrison St, San Francisco, CA 94103	Equilon Enterprises LLC (Shell)	Fall 2019
Berkeley	1250 University Ave, Berkeley, CA 94702	Equilon Enterprises LLC (Shell)	Fall 2019
Sunnyvale	1296 Sunnyvale Saratoga Rd, Sunnyvale CA 94087	FirstElement Fuel Inc	Spring 2020
Walnut Creek	2900 N Main St, Walnut Creek, CA 94587	Equilon Enterprises LLC (Shell)	Withdrawn
Oakland	350 Grand Ave, Oakland CA 94610	FirstElement Fuel Inc	Summer 2019
Campbell	337 East Hamilton Ave, Campbell CA 95008	FirstElement Fuel Inc	Spring 2020

Program Activities

This final report documents activities for all task in the grant, however some Budget Year 2 tasks were continuations of Budget Year 1 tasks. Therefore, the report is organized into workstream chapters as presented in Table 2 below.

Table 2: Report Organization

Chapter Title	Task Numbers and Descriptions
Program Development and Implementation	Task 1: *Project Communications*
Training	Task 2: *Determine requirements for stakeholder training, develop training materials and assemble stakeholder list to be used in the coordination of events.* Task 8: *Deliver a comprehensive training package that will engage local governments to help them understand the benefits of hydrogen and FCEVs in their communities, understand hydrogen safety and longevity in the U.S., and ensure first responders are properly trained in the Bay Area.*
Station Development and Permitting	Task 3: *Document existing municipal permitting and inspection processes and create streamlined permitting processes throughout the Bay Area* Task 10: *In order for market transformation of FCEVs to be realized, customers need to feel confident that a supporting infrastructure for refueling is in place. Deploying hydrogen fueling stations will require cities to streamline permitting and inspection requirements to ensure soft cost reductions.*
Zoning	Task 4: *Perform Zoning Analysis in San Francisco*
Community Engagement	Task 5: *Develop and Implement Community Engagement Plan* Task 9: *Assist identified potential station owner(s), and hydrogen industry partners on siting of fueling station in San Francisco.*
Group Procurement	Task 6: *Drive sales volume through a group purchase model that will create economies of scale while reducing complexity of decision making for consumers. Promote these through coordinated activities.* Task 11: *Engage additional employers, local governments and other affinity groups in the program, especially those where hydrogen fueling station development has been completed.*
Reporting and Dissemination	Task 12: *Monitor cost and schedule performance and reports. Ensure proper and timely execution of tasks and review all deliverables before submittal. Monitor weekly progress, including the work of project partners. Prioritize project resources to meet goals and objectives, maximize stakeholder buy-in. Share best practices and lessons learned broadly through various outlets.*

Program Development and Implementation

The project was awarded and launched in fall 2016. The project team set up a schedule of regular partner meetings with CaFCP that were held throughout the project. In January 2017, we organized a kickoff meeting to bring together key staff from California agencies involved in hydrogen transportation projects to discuss program tasks and how to leverage our mutual work. In attendance were representatives from CaFCP, GO-Biz, CEC, and CARB. This meeting helped establish strong working relationships to support the program.

California Hydrogen Update Call

To integrate our work with other agency activities, staff participated in the monthly government Hydrogen Update Call (every first Thursday) on implementation-level hydrogen activities, hosted by CARB. The call includes participants from the CARB, CEC, U.S. DOE, Department of Measures and Standards, regional air quality management districts, and local government. The call was an excellent source of information on the complexity of station implementation and provided participants with insights into our education, outreach, and permitting work.

The San Francisco Clean Cities Hydrogen and Fuel Cell Electric Vehicle Newsletter

The San Francisco Clean Cities Coalition developed the Hydrogen and Fuel Cell Electric Vehicle Newsletter to engage and educate stakeholders and public officials. The newsletter was an effective way of promoting the Coalition's activities and sharing the latest news about FCEVs and hydrogen in light-, medium- and heavy-duty on- and off-road transportation. The Coalition published 27 monthly newsletter editions from March 2017 to May 2019, which are posted on the San Francisco Clean Cities Coalition website (http://www.cleancitiessf.com/projects/) and included in Appendix B. The peak audience reached 390 newsletter subscribers. The newsletter proved to be a hit with a peak open rate of 35%, and even the final open rate of 25% remained above the industry average open rate of 23%. Additionally, the hyperlinks to relevant articles provided in the newsletter reached an impressive peak click rate of 17%.

Table 3: Hydrogen Newsletter Statistics

Subscribers	**Open Rate**	**Click Rate**
Peak: 390	Peak: 35%	Peak: 17%
Average: 250	Final: 25%	Final: 4.5%
Final: 290	Industry average: 23%	

Training

This section provides a summary of training events held during the program. Details about the process for developing the training schedule and descriptions of the trainings are presented in Appendix C.

Table 4: Summary of Trainings

Topic	Audience	Dates	Description
Hydrogen Safety for Permitting Authorities	Building Officials, Planning and Sustainability Staff	June 30, 2017	Outreach to six Bay Area AHJs with proposed stations included introduction w/Hydrogen Station Permitting Handbook, link to online module for code officials, invitation to e-newsletter, and "stay tuned" for a July webinar on permitting and safety best practices.
Hydrogen Safety for Permitting Authorities	Building Officials, Planning and Sustainability Staff	July 19, 2017	Presentations from GO-Biz on permitting best practices and CaFCP on safety best practices (attendance 29).
Electric Vehicles & Hydrogen Fuel Cells 101	Clean Cities members, stakeholders, and public	December 20, 2017	Western Washington Clean Cities Clean Fuels 101 Webinar series.
“Regional Briefings” Hydrogen and FCEVs for Decision Makers	Elected officials, Department/Division Leaders, General Public	January 23, 2018	South Bay at Prospect Silicon Valley in San Jose (attendance 70). FCEV available to test ride.
“Regional Briefings” Hydrogen and FCEVs for Decision Makers	Elected officials, Department/Division Leaders, General Public	January 26, 2018	North Bay at Bay Area Metro Center in San Francisco (attendance 30).
Overview of hydrogen and fuel cell technology, California goals, and permitting best practices	Bay Area Planning Directors Association (BAPDA)	July 13, 2018	Presented to BAPDA Steering Committee, followed by mailing to their membership of Planning and Community Development Directors in about 100 Bay Area AHJs.
Hydrogen/FCEV Safety for First Responders	First responders and safety officials	October 3, 2018	North Bay at San Francisco Fire Training Facility, Treasure Island (low attendance due to rainstorm).
Hydrogen/FCEV Safety for First Responders	First responders and safety officials	October 4, 2018	South Bay at Sunnyoaks Fire Station/McCormack Training Center in Campbell (attendance 40).

Station Development and Permitting

Streamlining Permitting Among Jurisdictions

The approach of streamlining permitting processes has been very successful in reducing soft costs and supporting market transformation for residential solar and electric vehicle charging installations in California. Solar and charging stations generally require non-discretionary electrical and building permits, depending on the AHJ. State law required California AHJs to adopt streamlined permitting for EV charging stations by September 2017.

In practice, we found that permitting liquid or gaseous fueling stations is much more varied and context-dependent in AHJs. Solar and EV charging stations require planning and building departments permits and are exempt from California Environmental Quality Act (CEQA) review. Automotive fueling stations may require zoning determinations, fire plan safety checks, design review, public outreach (including community meetings), and are subject to local interpretations and requirements under CEQA. Permitting examples from 2017 show a range of approaches:

- A proposed station in Citrus Heights, California was allowed concurrent review by planning, building, and fire safety and received approval to build within a few months.

- A proposed station in Berkeley, California required an outside consultant to prepare an additional CEQA review (at the applicant's expense) and only allows sequential review of applications.

- San Francisco allows concurrent review by planning, building, and fire safety for significant fees. That fee and the potential time savings are forfeited if the permit is sent back to another department for a second round of review. San Francisco permits were delivered in 8-12 months.

Most importantly, staff at AHJs generally approach hydrogen station permitting as a one-off project to be approached based on local knowledge and political context. While AHJ staff in other cities have been willing to discuss their hydrogen permitting experience, there is a lack of appetite for investing to support the design of a streamlined process for hydrogen permitting that would ultimately need to be adopted by the AHJ.

We found that AHJs are more receptive to assistance from state agencies versus other AHJs. In the case of Berkeley, when the station developer experienced delays in the CEQA process, San Francisco worked with the station developer in the background to coordinate a meeting between GO-Biz and CEC representatives and City of Berkeley staff. That meeting was successful in finding an approach that met Berkeley's CEQA requirements without causing significant delays to the project.

San Francisco Planning Department

San Francisco is known for its complex planning regime and therefore provides a Planning Information Center as a gateway to assist project proponents in submitting the required materials to the appropriate departments.

In practice, it was easy to arrange a pre-application meeting with the relevant departments, as demonstrated in our July 2016 and May 2017 meetings. According to the station developer, these

meetings and the subsequent review process were straightforward. In addition, San Francisco's DataSF website features a permitting tracking database where permit application status can be looked up by number (https://data.sfgov.org/Housing-and-Buildings/Building-Permits/i98e-djp9/data).

Beginning in February 2017, we held several meetings with San Francisco planning staff to discuss the possibility of streamlining the local permitting process. It was determined that permitting for hydrogen fueling stations would not qualify for an expedited pathway, given San Francisco's strict requirements for formalizing expedited processes.

Once we determined that streamlining was not possible, we worked with planning staff to develop a process diagram or "cheat sheet" that could aid station developers in navigating the permitting process. After several rounds of development, it was determined that there were simply too many variables to create a useful diagram.

Although we were unsuccessful in designing and organizing a streamlined permitting process, we ensured that AJHs were aware of the state's efforts to expand the hydrogen refueling network and had access to best practices via the Bay Area Planning Director's Association (BAPDA; see Training for details).

AHJ Interviews

As discussed, the initial approach of documenting gasoline/CNG permitting processes with the goal of designing a streamlined process across several AHJs was not successful. To find out what would be useful to planning and building officials, staff reached out to local planning departments that have already permitted hydrogen stations to gain a better understanding of barriers and opportunities. Of those contacted, most didn't respond, one agency could not locate a record of permits for the station in question, and one agency, City of Mountain View, agreed to be interviewed for this report.

The hydrogen station in the city of Mountain View was one of the most difficult to permit—it took over a year. The managers of the planning and building departments made time for a one-hour interview in hopes that their input might benefit others. Mountain View had three main suggestions to future station developers:

- Select an appropriate site per local planning rules
- Work with an experienced station development consultant
- Use only approved/listed components

Zoning

This task included an analysis of the potential for expedited permitting of hydrogen refueling stations and consideration of hydrogen refueling for density bonuses in housing development in San Francisco. Analysis concluded that these were not feasible in San Francisco.

Expedited Permitting

The Planning Code and Zoning Map regulate the use of land in the City of San Francisco and identifies where certain types of land uses are allowed and what approvals or requirements may be necessary for authority to construct. The San Francisco Planning Code's definition of "Automotive Service Station"

(Sec. 102) refers to a "Retail Automotive Use that provides motor fuels." The Planning Department interprets "fuels" as including alternative fuels such as hydrogen fueling. Generally, wherever the Zoning Map identifies Zoning Districts that allows an "Automotive Service Station," a hydrogen fueling station would be allowed. Given the existing Zoning Map and Planning Code requirements and recognition of various fuel types, the Planning Department did not see a need to offer explicit permission for Automotive Service Stations that provide hydrogen fuel.

Zoning Determination

To identify whether or not a hydrogen fueling station would be allowed at a specific site within San Francisco, developers should consult the Zoning Map and Planning Code. The City is divided into a number of specialized zoning districts that allow and disallow certain uses. The recommended steps are as follows:

1. Identify a possible site or area to be considered for a fueling station
2. Identify zoning district(s) for the site/neighborhood
3. Review the Planning Code for that particular Zoning District. Look for *Automotive Service Station.*
4. Review the Zoning District table for the Zoning District for *Automotive Service Station*.
5. Review the table to see if *Automotive Service Station* is P (Principally Permitted), NP (Not Permitted) or C (Conditional Use Authorization is required).

Staff collaborated with the Planning Department to develop Planning Process Summaries for each of the three stations proposed for San Francisco. Those were provided to the station developer in June 2017 to inform their subsequent permitting applications.

Density Bonus for Hydrogen Station Development

The City of San Francisco is governed by a "Transit-First Policy" (Charter Sec. 8A.115) stating, "Public transit, including taxis and vanpools, is an economically and environmentally sound alternative to transportation by individual automobiles. Within San Francisco, travel by public transit, by bicycle and on foot must be an attractive alternative to travel by private automobile." Given the recognized impacts of private vehicles (regardless of fuel type) on traffic congestion, the City's public transit system and pedestrian safety, the City seeks to prioritize travel by alternative modes (transit, biking, walking). Density bonuses are currently granted by the Planning Department for certain residential developments that meet affordability requirements along with other criteria. Alternative fueling stations for private vehicles have not risen to a level of policy priority to be considered eligible for density bonuses in San Francisco. Large development projects negotiated under specific Developer Agreements with the City have the potential to include specific requirements for infrastructure such as alternative fuel stations if it is determined they may provide a compelling public benefit. However, these would be evaluated on a case-by-case basis and balanced against a number of other competing needs such as public open space, streetscape design, affordable housing and other infrastructure demands.

Community Engagement

Staff collaborated with CaFCP and local organizations to partner on a wide variety of community and affinity group engagement events to familiarize a broad sector of the public with fuel cells and hydrogen fuel for transportation. Detailed descriptions of events are presented in Appendix D.

Table 5: Community Engagement Events

Event	Dates	Description and Attendance
First Element Bay Area FCEV Earth Day Tour	April 20, 2017	Press event featuring CARB Chair Mary Nichols and CEC Commissioner Janea Scott touring Bay Area hydrogen stations.
Northern California Alt Car Expo, Oakland (half-day workshop for fleet managers)	May 11, 2017	Fleet technology panel included overview of hydrogen station network. FCEV on display (50 attendees).
Presidio Trust – Presentation and Test Drive	June 19, 2017	Workshop for Presidio Trust staff, tenants, and area federal employees with emphasis on federal procurement. FCEV test drives; AC Transit hydrogen bus on display (25 attendees).
Advanced Automotive Battery Conference and Expo	June 20-22, 2017	Test drive and static display hosted by Bill Elrick of CaFCP (33 attendees).
SEMICON WEST Conference	July 10-13, 2017	Static FCEV Display hosted by CaFCP with representatives on hand to promote and answer questions about the vehicles.
Intersolar North America	July 12-13, 2017	Static FCEV Display hosted by CaFCP with representatives on hand to promote and answer questions about the vehicles.
National Drive Electric Week at Sunset Community Festival	September 23, 2017	Ride and drive event featuring Honda Clarity FCEV (attendance: hundreds).
East Bay Regional Park District Green Expo	October 4, 2017	The CaFCP hosted a static FCEV display at the Green Expo event for park staff (attendance 300).
Hydrogen Day Exhibit in conjunction with the STEM Village at Fleet Week	October 7 and 8, 2017	Demonstration featuring Toyota Marai, hydrogen fueling station, and fuel cell generators. Fleet Week attracts 1.2 million visitors.
EV Week ride and drive in conjunction with Fleet Week	October 7 and 8, 2017	Ride and drive featuring EVs and FCEVs: Honda Clarity, Hyundai Tucson, and Toyota Marai. 497 unique participants. Post drive surveys indicated that 36% of respondents preferred the FCEV to the BEV or PHEV.
Fleet Week, San Francisco	October 6-7, 2017	CaFCP hosted a static display and limited test drive at Fleet Week. Staff promoted FCEVs, answered questions about hydrogen fueling, and promoted the SunShares Program.
Earth Day SF at Civic Center	April 21, 2018	Earth Day event with EV showcase and booth, featuring Toyota Mirai, Honda Clarity PHEV, and Nissan Leaf BEV. Attendance in the thousands; about 200 at the booth.

Event	Dates	Description and Attendance
Hydrogen Community Meeting	January 30, 2019	Information workshop for neighbors in the areas adjacent to the three San Francisco hydrogen stations (attendance 25)
Berkeley Community Meeting	March 30, 2018	Community meeting to engage community members in the vicinity of the proposed University Avenue station in Berkeley.
Community Meeting: Hydrogen and Fuel Cell Transportation in San Francisco	June 11, 2019	Information workshop for Bay Area residents to provide information about hydrogen and fuel cells in transportation locally and globally, including the Water Go Round ferry (attendance 35).

Group Procurement

This section describes the SunShares group procurement program outlined in Subtasks 6 and 11. The original scope of work included two years of the SunShares program, but we were able to engage the program before the launch of the 2016 program and collaborate on three program years. Discussion of challenges and opportunities for individual programs years are presented in Appendix E.

Bay Area SunShares

The Bay Area SunShares Program was initiated in 2011 to pool the buying power of individual participants and thereby reduce the cost of residential solar for Bay Area residents. The key to success of the SunShares model is collaboration with existing affinity groups—employers, city governments, trusted community organizations. Using existing communication channels reduces soft costs for all parties.

In 2015, SunShares added EVs to the offering. In 2016, the non-profit Business Council on Climate Change (BC3) began administering the program in collaboration with SF Environment and the San Francisco Clean Cities Coalition. BC3 is a member organization of major Bay Area employers and their employees working together on sustainability initiatives. Member organizations include Google, Facebook, LinkedIn, Salesforce, Genentech, CH2M, Autodesk, the GAP, Whole Foods, Wells Fargo, and others.

Program Results

SunShares program results covering 2016 through 2018 are presented below. It is important to note that $8,000 federal tax credit for FCEVs expired in December 2016, while the $7,500 tax credit for BEVs remained in full effect for these program years making FCEVs less economically competitive with BEVs.

SunShares Program Results			
Category	**2016**	**2017**	**2018**
Outreach Partners	37	50	40
Potential Reach	800,000	1,000,000	900,000
Workshops Held	30	16	20
Total Workshop Attendance	525	672	588
Residential Solar Offerings	3	3	3
BEV Offering (Leaf)	1	1	1
FCEV Offering (Mirai)	1	1	1
Bay Area Hydrogen Fueling Stations	6	8	11
Stations in Development	2	12	9
Total Information Requests	1,817	1,584	1,396
Vehicle Information Requests	1,070	623	624
BEVs Purchased/Leased	25	14	12
FCEVs Purchased/Leased	4	0	0
Residential Solar Contracted	144	208	148
kW of Solar Installed	402	1,082	700

Funding Applications for Hydrogen Stations

For the stations proposed in San Francisco, staff coordinated two pre-application meetings with San Francisco planning, zoning, building, and fire safety departments to review application components, establish roles and responsibilities, identify a planning project lead, and lay out an expedited permitting pathway for hydrogen fueling to be added to three existing gasoline service stations. The first meeting was held in July 2016 before the station funding application were submitted to CEC. The second was held in May 2017 after the funding was awarded. San Francisco applications were submitted in October 2017 and all had been received by October 2018.

In addition, staff contacted Planning and Sustainably departments in each Bay Area city with a proposed station and provided best practice information and offered technical assistance. Staff assisted the station developer and City of Berkeley planning department to resolve issues and potential delays in the permitting process for the station proposed for University Avenue.

Details about the meetings are provided in Appendix F.

Reporting and Dissemination

This section describes case studies and presentations delivered during the program. Descriptions of presentations and copies of case studies are included in Appendix G.

Presentations

Table 6: Presentations at National, State, Regional and Local Events.

Venue	Date	Topic
U.S. DOE Annual Merit Review, Washington, DC	June 7, 2017	Delivered slide presentation on project status.
Bay Area AltCar Expo, Oakland, CA	March 21, 2018	Update on Hydrogen in the Bay Area and Beyond (with Dr. Tim Lipman of the UC Berkeley Transportation Sustainability Research Center).
Green Transportation Summit and Expo, Tacoma, WA	April 17, 2018	Hydrogen Fuel Cells and Fuel Cell Electric Vehicles: Emerging Applications and Safety Management (with Nick Barilo of Pacific Northwest Laboratories).
U.S. DOE Annual Merit Review, Washington, DC	June 13, 2018	Delivered poster presentation on project status.
C40 Cities Zero Emission Vehicle Network, Nanjing, China	October 24, 2018	Presented overview of California and Northeast Region hydrogen fueling networks, as well as the larger hydrogen projects being implemented or proposed at the ports of Los Angeles and Long Beach.
Clean Cities National Peer Exchange, Cocoa Beach, FL	November 7, 2018	Panel discussion of California and Northeast hydrogen fueling networks and best practices for Clean Cities Coordinators.
Tennessee Hydrogen Working Group, via conference call	December 10, 2018	Presented Hydrogen 101, provided an overview of recently funded hydrogen projects, and answered general questions about hydrogen and fuel cell vehicles.
Green Transportation Summit and Expo, Tacoma, Washington	May 23, 2019	Presented Hydrogen 101 as part of panel discussion on “Roles of Hydrogen & Fuel Cell Electric Vehicles in Transportation and a Decarbonized Economy”

Case Studies

Hydrogen 101

Staff prepared a case study, *The Case for Hydrogen 101*, which recommends prefacing technical presentations with a basic orientation to hydrogen fuel and FCEVs, or Hydrogen/Fuel Cell 101. Hydrogen and fuel cells are technically complex topics in the early stages of mainstream acceptance. Over the course of this grant program, we presented hydrogen to a variety of audiences and found that they were much more engaged and had better questions about the overall content when the presentation is preceded by Hydrogen/Fuel Cell 101.

SunShares

Staff prepared a case study on the SunShares program, *Group Procurement Case Study: Bay Area SunShares 2016-2017, What a Difference a (Tax) Break Makes*.

Hydrogen Permitting

Staff completed a *Hydrogen Permitting Case Study*, which discusses the barriers to streamlining permitting processes among AHJs.

Conclusions

Our overall objective was to help reduce soft costs associated with two primary barriers:

1. the complexity of permitting and inspection processes associated with hydrogen station development among multiple AHJs
2. lack of consumer awareness of hydrogen and FCEVs

Permitting and Inspection Processes

This program tested the approach of streamlining permitting processes, which has been very successful in reducing soft costs for residential solar and electric vehicle charging installations in California. In practice, we found that permitting liquid or gaseous fueling stations is much more varied and context-dependent in AHJs. Specifically, with local interpretations of CEQA requirements by planning departments and of the fire safety code by fire departments.

When it became clear that streamlining permitting processes was not feasible, we focused on making sure that AJHs were aware of the Hydrogen Station Permitting Guidebook and the assistance offered by GO-Biz and SF Environment through this grant program. To accomplish this, we used the best practice of identifying and working through an affinity organization to reach AHJs, in this case the Bay Area Planning Directors Association.

For future station development, the following best practices can help reduce complexity and potential delays in permitting hydrogen refueling stations.

Pre-Application Meeting with AHJ. This meeting helps set expectations among the parties and is an opportunity to discuss local interpretation of codes. To receive match funding from the CEC for the development of a hydrogen refueling station, applicants must hold a pre-application meeting with the appropriate AHJ in advance of submitting their application.

Hydrogen Station Permitting Guidebook. The *Hydrogen Station Permitting Guidebook: Best Practices for Planning, Permitting and Opening A Hydrogen Fueling Station*, published by GO-Biz in 2015 provides robust information to help station developers and AHJs.

Fire Safety Trainings. In advance of station inspections and openings, we hosted safety trainings by CaFCP for Bay Area fire department personnel to familiarize them with the technology.

Consumer Awareness

To increase awareness of the viability, safety and availability of hydrogen fuel and FCEVs in the San Francisco Bay Area, we participated in a variety of outreach and education events targeting consumers and AJHs (see Tables 4 and 5). In addition, we published a newsletter and presented on best practices at regional and national events. Major accomplishments are summarized below.

Outreach Events

The most successful consumer event was the EV Week Ride-and-Drive event during Fleet Week in October 2017, which featured eight BEV/PHEV models and three FCEV models (Honda Clarity, Hyundai Tucson, Toyota Marai) for test drive. During the two-day event, 497 drivers tested those vehicles. Post drive surveys indicated that 36% of respondents preferred the FCEV to the BEV or PHEV.

Newsletter

We published 27 monthly editions from March 2017 through May 2019 of the *San Francisco Clean Cities Coalition Hydrogen and Fuel Cell Electric Vehicle Newsletter* to engage and educate stakeholders and public officials (http://www.cleancitiessf.com/projects/; Appendix B). The peak audience reached 390 newsletter subscribers with a peak open rate of 35% and a final open rate of 25%, which exceeds the industry average open rate of 23%. Additionally, the hyperlinks to relevant articles provided in the newsletter reached an impressive peak click rate of 17%. Although the newsletter was popular, we lack ongoing funding to retain it in our work plan.

Dissemination

One of our goals was to present at three national, state, regional, and local events. As shown in Table 6, we presented at eight events, including a C40 international workshop. A best practice we identified is to precede technical presentations with *Hydrogen 101* (a case study and copy of the presentation are included in Appendix G).

Hydrogen and fuel cell technology are inherently complex topics and subject matter specialists can be difficult to follow for audiences with little or mixed knowledge of the technology. To ensure that conference audiences were well-oriented to the technology, we developed a *Hydrogen 101* presentation, which is intended to precede panel presentations by subject matter specialists. We found that audiences were more engaged and had better questions about the overall content.

Following are summaries of our most successful presentations in this program.

Green Transportation Summit and Expo

When we initially proposed a hydrogen panel at GTSE in Tacoma Washington, the 2018 Steering Committee stated that their Pacific Northwest stakeholders were not interested in hydrogen fueling (Washington is not a ZEV Mandate state and lacks funding mechanisms to support development of alternative fuel infrastructure). Eventually, we were invited to present at a pre-conference workshop on the day before the conference. Over 50 people attended the workshop, which was conducted in collaboration with the Pacific Northwest Laboratories. In 2019, GTSE featured hydrogen in the opening plenary on alterative fuels and held two sessions on hydrogen (attendance exceeded seating in both).

Clean Cities National Peer Exchange

Over the course of our work on hydrogen, stakeholders pointed out that Clean Cities Coordinators outside of California know little about hydrogen. For the 2018 Clean Cities National Peer Exchange, we organized coordinators to lobby for including hydrogen on the agenda. The session was well attended and lead to an additional speaking opportunity for the newly formed Tennessee Hydrogen Working Group. Details are included in Appendix G.

Group Procurement Program

Our goal was to implement FCEVs in two years of the SunShares group procurement program. Fortunately, we were able to begin a year early in 2016, which was the last year of the $8,000 FCEV tax credit. The $7,500 BEV tax credit was in full effect through 2018, making FCEVs less economically competitive than BEVs. In the 2016 program, four FCEVs were sold with only six hydrogen refueling stations were open in the Bay Area. In 2017 and 2018, no FCEVs were sold through the program (Appendix E).

Appendix A: Statement of Project Objectives

STATEMENT OF PROJECT OBJECTIVES

San Francisco Department of the Environment

Advancing Fuel Cell Electric Vehicles in San Francisco and Beyond

A. PROJECT OBJECTIVES

This project aims to harmonize local regulations and building codes to ease the siting and construction of hydrogen fueling stations for zero-emission Fuel Cell Electric Vehicles (FCEVs). This will be accomplished through the following objectives:

- Increase community awareness through educational opportunities on the viability, safety and availability of hydrogen fuels and fuel cell electric vehicles (FCEV) in the Bay Area.
- Update and standardize best practices in permitting and inspection of hydrogen fueling infrastructure.
- Develop and implement a "group-buy" program that reduces the cost and complexity of FCEVs to the community. This includes enrolling members of Business Council on Climate Change (BC3 - employer organizations) in a zero emission vehicle (ZEV) "group-buy" program that includes FCEVs.

B. TECHNICAL SCOPE SUMMARY

Budget Period 1: First, project startup meetings and internal communications will be established. Initial community stakeholders (e.g., building code, public safety, and planning officials) will be introduced and interfaced with original equipment manufacturers (OEMs), hydrogen safety experts, and station developers. This collaborative working group will provide input for training workshops for authorities having jurisdiction (AHJ) and permitting officials that include areas of planning, building code, safety and fire departments, city council members, and sustainability.

Next, specific guidelines and training for fire departments and emergency responders pertaining to hydrogen fueling stations will be created, along with train-the-trainer workshops. Furthermore, an education campaign supported by the Governor's Office of Business and Economic Development and BKi, administrators of the California Fuel Cell Partnership (CaFCP) will create an industry overview briefing for local officials, including city council members, department directors, legislators, and city officials. The briefing will cover topics such as vehicle technology, basic hydrogen education/familiarization, and infrastructure information. The City will leverage work conducted through a California Energy Commission (CEC) Alternative Fuel Vehicle Readiness Planning grant to support these tasks.

Plans will also be created to streamline the existing approval process for station development. With this in mind, the California Energy Commission (CEC) Hydrogen Fuel Cell Readiness

Planning grant will be leveraged to identify future fueling station development in San Francisco, at which the streamlined process could be implemented.

BC3 members will be engaged, and provided with a "group-buy" program opportunity for ZEVs. The program will require a developed procurement process and web tool to enable participation in program, along with outreach activities to the target audience (i.e., employees of participating employer organizations).

Budget Period 2: Pursue further station development in San Francisco, along with a second ZEV/FCEV group-buy program with an estimated 5 additional organizations. There will be increased education and outreach activities such as hosting webinars on project progress for AHJs nationwide to highlight Budget Period 1 accomplishments. In addition, community events will be organized to inform residents on the viability, safety and availability of hydrogen fueling infrastructure in the Bay Area.

Finally, project findings and data will be gathered, analyzed and reported on in addition to 3 case studies that will be developed for analysis. These case studies will highlight outcomes of group procurement campaigns; education, outreach and training events; and steps taken to streamline station development processes. We will host project summary webinars and present at conferences to highlight project progress and outcomes. A final report will be drafted and submitted to the U.S. Department of Energy (DOE).

C. TASKS TO BE PERFORMED

BUDGET PERIOD 1
Project Development and Implementation

Task 1: Project Communications (Q1-Q4)
Task Summary: Set up contracts, set up and implement communication plan and provide an outside portal for interested parties. Team will conduct bi-weekly phone calls for BKi on behalf of the CaFCP and SFE coordination. Others may join depending on the agenda.

Subtask 1.1 Set up and sign contracts and agreements between partners. (Q1)

Subtask 1.2 Hold kick-off meeting with project partners and DOE to review tasks, roles, responsibilities, deadlines. Meeting scheduled by SFE and will include BKi on behalf of the CaFCP, BC3 and the San Francisco Bay Area Clean Cities Coalition. Disseminate meeting minutes via file sharing and update the Clean Cities Coalition webpage with details on the project. (Q1)

Subtask 1.3 Conduct ongoing stakeholder/partner meetings. Develop and disseminate monthly e-newsletter highlighting project progress and achievements; post to the San Francisco Clean Cities Coalition website. (Q2-Q4)

Task 2: Develop and Implement Training Plan (Q1-Q4)
Task Summary: Determine requirements for stakeholder training, develop training materials and assemble stakeholder list to be used in the coordination of events.

Subtask 2.1 Develop target stakeholder list (ex. emergency responders, permitting / code officials, local government officials). Interview various stakeholders and develop agenda for training events based on feedback. Determine specific training materials needed for each target audience. (Q1)

Subtask 2.2 Identify dates for training events, schedule venue, and send invitations to stakeholder groups. Conduct training events. (Q2-4)

Task 3: Streamline Permitting Process for Station Development (Q1-Q4)
Task Summary: Document existing municipal permitting and inspection processes and create streamlined permitting processes throughout the Bay Area.

Subtask 3.1 Understand and document AHJ permitting and inspection processes throughout the Bay Area Clean Cities Coalition for gasoline or CNG stations and for completing the inspection process, including contact information for primary staff in the Planning Department, the Department of Building Inspection and the Fire Department. (Q2-3)

Subtask 3.2 Create an expedited permitting process in San Francisco for hydrogen stations that can be replicated. Create instruction sheets to guide developers and inspectors through the key requirements of hydrogen station development including but not limited to submission of drawings, completion of building permit application, identification of whether location may require neighborhood notification. (Q4)

Subtask 3.3 Test the permitting and inspection process with key stakeholders including local government officials (e.g. permitting staff, inspectors, and first responders) to identify areas in need of improvement. (Q4)

Task 4: Perform Zoning Analyses in San Francisco (Q3-Q4)
Task Summary: Permits are **required** in San Francisco to **operate businesses** and to **perform construction activity**. The Planning Department **reviews most applications** for these permits in order to ensure that what is being proposed complies with the zoning regulations (e.g. **The Planning Code**). Every project requires an applicant to have information about a property's Zoning Use District. Knowing the Zoning Use District for varying areas of the City as it applies to hydrogen fueling station development will help San Francisco identify what's allowed in each zone and the specific limits that may apply to project development.

Subtask 4.1 Examine land use mix and determine in which zoning classifications, if any, to prioritize for explicit permission in the zoning ordinance for hydrogen stations. (Q3)

Subtask 4.2 Leverage CEC Hydrogen Readiness Planning grant, identify options for station development in San Francisco Collaborate with station owner, developers, fuel providers and applicable City departments. (Q1-Q3)

Subtask 4.3 Consider hydrogen fueling as an option for density bonus when negotiating with developers interested in higher density construction on sites than zoning code normally allows. Density bonuses are granted for projects in which the developer agrees to include a certain number of affordable housing units. Essentially, for every one unit of affordable housing built, a jurisdiction allows the construction of a greater number of market rate units than would be allowed otherwise. Extending a hydrogen fueling infrastructure density bonus could provide more residents with access to zero emission vehicle options. (Q4)

Task 5: Develop and Implement Community Engagement Plan (Q1-Q4)
Task Summary: Increase community awareness through educational opportunities on the viability, safety and availability of hydrogen fuel and FCEVs in the Bay Area.

Subtask 5.1 Work with local companies to create a display at the Exploratorium, San Francisco's popular hands-on science museum, to demystify hydrogen and fuel cells. Display to open in conjunction with National Hydrogen Day. (Q3-Q4)

Subtask 5.2 Integrate hands on activities around ZEVs and hydrogen fueling stations into Earth Day and other regional events. Work with project partners to update organizational websites to reflect current state of ZEV/FCEVs. (Q1-Q4)

Subtask 5.3 Develop and launch workshop / webinar series in collaboration with BKi on behalf of the CaFCP and the Clean Cities Coalition for local government officials and the general public. (Q2-Q4)

Task 6: Develop and Implement ZEV/FCEV Group-Buy Program(s) (Q2-Q8)
Task Summary: Drive sales volume through a group purchase model that will create economies of scale while reducing complexity of decision making for consumers. Promote these through coordinated activities.

Subtask 6.1 Identify and confirm BC3 member participants; develop request for proposals (RFP). (Q2)

Subtask 6.2 Launch program website to enable registration in group-buy. Develop collateral materials and provide to participating BC3 members two times per month during group-buy campaign. (Q3-Q4)

Subtask 6.3 Organize evaluation committee to review proposals submitted by OEMs. Select OEMs / dealers; negotiate discount pricing. BC3 will directly contract with dealers to ensure pricing and vehicle options. (Q3)

Subtask 6.4 Launch program, respond to participant questions, conduct workshops and webinars, and facilitate leads to selected dealers. Prepare case study on group-buy results. (Q3-Q4)

Task 7: Support CEC funding applications for hydrogen station development (Q1-Q4)
Task Summary: Support station developer(s) funding applications to the State of California for deployment of hydrogen refueling solutions in the City and County of San Francisco.

Subtask 7.1 Coordinate with station developer(s) awarded CEC funding for project implementation to ensure they are working with they are working with the appropriate City departments on project permitting / approval.

BUDGET PERIOD 2
Project Implementation Scaled, Evaluate, and Disseminate

Task 8: Ongoing Implementation of Training Plan (Q5-Q7)
Task Summary: Deliver a comprehensive training package that will engage local governments to help them understand the benefits of hydrogen and FCEVs in their communities, understand hydrogen safety and longevity in the U.S., and ensure first responders are properly trained in the Bay Area.

Subtask 8.1 Identify dates and venues for training events, confirm and schedule. Invite stakeholders to events. Conduct training events, integrating workforce development needs on FCEV repairs. (Q5-Q7)

Subtask 8.2 Draft summaries for U.S. DOE review on training event outcomes (Q8)

Task 9: Community Engagement Conducted (Q5-Q8)
Task Summary: A lack of familiarity with a technology can raise questions about safety and impacts on local neighborhoods. This can stall project implementation due to concerns that range from safety, to increased traffic, to noise. By engaging the community and stakeholders early, the City can reduce soft costs and complexity tied to the deployment of hydrogen stations and FCEVs.

Subtask 9.1 Assist identified potential station owner(s), and hydrogen industry partners on siting of fueling station in San Francisco. (Q5-Q7)

Subtask 9.2 Conduct workshop/webinar series in collaboration with BKi on behalf of the CaFCP and Clean Cities Coalition for local government officials and the general public in areas where station development will occur. (Q5-Q8)

Subtask 9.3 Work with partners to update organizational websites to reflect current state of ZNE/FCEVs. Integrate hands on activities into Earth Day events. (Q5-Q8)

Task 10: Hydrogen Fueling Station Development (Q5-Q8)
Task Summary: In order for market transformation of FCEVs to be realized, customers need to feel confident that a supporting infrastructure for refueling is in place. Deploying hydrogen fueling stations will require cities to streamline permitting and inspection requirements to ensure soft cost reductions.

Subtask 10.1 Implement streamlined permitting process in San Francisco and evaluate implementation of streamlined permitting process in 5 Bay Area cities. (Q5-Q7)

Task 11: Replicate and Expand ZEV Group-Buy Program (Q5-Q8)
Task Summary: Engage additional employers, local governments and other affinity groups in the program, especially those where hydrogen fueling station development has been completed.

Subtask 11.1 Confirm BC3 member participants; enlist a minimum of 5 new organizations including Clean Cities Coalition local governments. Launch program website to enable registration in group-buy. Develop collateral materials and provide to participating BC3 members two times per month during group-buy campaign. (Q5)

Subtask 11.2 Organize evaluation committee to review proposals submitted by OEMs. Select OEMs / dealers; negotiate discount pricing. BC3 will directly contract with dealers to ensure pricing and vehicle options. (Q5)

Subtask 11.3 Launch program, respond to participant questions, conduct workshops and webinars, and facilitate leads to selected dealers. (Q5-Q6)

Task 12: Reporting and Dissemination (Q5-Q8)
Task Summary: Monitor cost and schedule performance and reports. Ensure proper and timely execution of tasks and review all deliverables before submittal. Monitor weekly progress, including the work of project partners. Prioritize project resources to meet goals and objectives, maximize stakeholder buy-in. Share best practices and lessons learned broadly through various outlets.

Subtask 12.1 Prepare three case studies on training, community engagement; completed group buy programs; and streamlined permitting process for hydrogen station development. Disseminate reports to stakeholders & networks. (Q5-Q8)

Subtask 12.2 Participate in U.S. DOE network calls, webinars, and conferences. Prepare quarterly narrative and financial reports. (Q1-Q8)

Subtask 12.3 Present at least 3 national, state, regional and local events. (Q4-Q8)

D. PROJECT MANAGEMENT AND REPORTING (Deliverables)

1. List of stakeholders for each stage of the project.
2. Outreach plan, training materials, presentations, e-newsletters; develop 3 case studies
3. List of BC3 employers engaged in group-buy; report on outcome including lessons learned.
4. List of potential sites for station development in San Francisco.
5. Report on permitting and inspection best practices.
6. Overall report on project process, issues, and results.
7. Fulfill all reporting requirements as prescribed by the Federal Assistance Reporting Checklist (FARC)

Appendix B: Hydrogen Newsletter

Hydrogen Newsletters are posted on the San Francisco Clean Cities Coalition website: https://www.cleancitiessf.com/fcevs/

March 2017: **Introducing the Hydrogen and FCEV Newsletter**

April 2017: **FCEVs Available to Consumers**

May 2017: **Hydrogen and FCEVs Featured at 2017 ACT Expo**

June 2017: **FCEV Sales and Market Forecast**

July 2017: **Webinar for Code Officials on Hydrogen and FCEVs**

August 2017: **Annual Hydrogen Fuel and Vehicle Evaluation**

September 2017: **Four Ways Fuel Cells Power Up the U.S. Military**

October 2017: **Hydrogen and FCEVs Featured at Fleet Week and EV Week in SF**

November 2017: **Toyota to Build New Hydrogen and Renewable Energy Plant in CA**

December 2017: **Regional Hydrogen Briefings for Officials**

January 2018: **Success Story: Regional Hydrogen Briefings for Officials**

February 2018: **Governor Brown Sets New Targets for Zero Emission Vehicles**

March 2018: **Spreading the Word About Hydrogen and Fuel Cell Applications and Safety Management**

April 2018: **Realizing the Potential of Renewable Hydrogen**

May 2018: **Anheuser-Busch Places Big Order for Nikola Fuel Cell Semi**

June 2018: **Hydrogen Fuel Cell Ferry Coming to the San Francisco Bay**

July 2018: **A Closer Look at the Heavy-Duty FCEV Industry**

August 2018: **2018 Evaluation of FCEV and Hydrogen Development**

September 2018: **A Commitment to 100% Carbon-Free Hydrogen for Transportation by 2030**

October 2018: **Hydrogen and Fuel Cells for Military Use**

November 2018: **Liquid Hydrogen Production Plant for Western U.S.**

December 2018: **Automakers Pushing Toward a Zero Emission Future**

January 2019: **Fuel Cell Buses in US Nearing and Exceeding Targets**

February 2019: **Community Meetings on Hydrogen Fueling Stations**

March 2019: **Hydrogen Fuel Cell Cruise Ships**

April 2019: **Nikola Makes Another Splash**

May 2019: **Community Meeting: Hydrogen and Fuel Cell Transportation in San Francisco**

Appendix C: Trainings

This appendix provides an overview of the process for developing the training schedule and detailed descriptions of the trainings presented in Table 3 of the report.

To develop our training content and schedule, we developed a targeted stakeholder list, interviewed contacts from local AHJs and agencies, organized training materials, and developed a schedule for delivering the program.

Target Stakeholder List

From our Metropolitan Planning Organization, staff acquired a contact list of over 700 planning, building, inspection, and sustainability staff from each city within the nine-county Bay Area. This list was used as the basis for training outreach.

AHJ Interviews

To assess training needs, staff interviewed the following staff and subject-matter experts:

- Captain Clyde Christobol, Division of Training, San Francisco Fire Department (1/20/17)
- Deputy Director Elizabeth Watty, Jessica Range, Corey Teague, and Jenny Delumo, City and County of San Francisco Planning Department (2/13/17)
- Sarah Moore, Sustainability Planner, City of Berkeley (2/22/17)
- Rachel DiFranco, Sustainability Coordinator, City of Fremont (2/22/17)
- Gia Brazil Vacin, California Governor's Office of Business and Economic Development (GO-Biz) (multiple meetings)
- Jennifer Hamilton, Juan Contreras, and Keith Malone, California Fuel Cell Partnership (CaFCP) (multiple meetings).

Key Takeaways from stakeholder interviews:

- It is important to provide consistent information for Authorities Having Jurisdiction (AHJs) across the region to avoid conflicts in interpretation.
- It is important for training to be relevant to and timed with the permitting cycle. For example: planners, building officials, and fire safety inspectors need information to coincide with station development applications, but emergency responder training should be scheduled closer to station opening.
- Recordable webinar trainings are preferred over in-person workshops for efficiency and future reference.
- Half-day "Regional Briefings" featuring FCEVs have been successful in engaging city leaders and champions.
- Keep it simple and relevant—the quantity of information can be overwhelming.

Training Materials

SF Clean Cities leveraged existing training materials from the U.S. DOE-sponsored Hydrogen Tools website (h2tools.org), GO-Biz, and CaFCP.

For Planning and Code Officials:

- Online training module "Introduction to Hydrogen for Code Officials": https://www.hydrogen.energy.gov/training/code_official_training/ (users need approximately 45 minutes to complete).
- GO-Biz's "Zero-Emission Vehicles in California: Hydrogen Station Permitting Guidebook" for best practices.
- Slide presentation based on the "National Hydrogen and Fuel Cell Emergency Response Training Resource," the "Zero-Emission Vehicles in California: Hydrogen Station Permitting Guidebook," and the online module "Introduction to Hydrogen for Code Officials" for delivery in-person and via webinar.

For Fire Safety Officials:

- Online training module "Introduction to Hydrogen Safety for First Responders."
- Slide presentation based on the "National Hydrogen and Fuel Cell Emergency Response Training Resource," and online module "Introduction to Hydrogen Safety for First Responders" for delivery in-person and via webinar.

Training Descriptions

Following are detailed descriptions of trainings conducted during the program.

Hydrogen Safety for Permitting Authorities: Mailing to AHJs with Proposed Stations (June 2017)

In June 2017, staff sent the following email to AHJs with newly proposed stations (Berkeley, Campbell, Oakland, San Francisco, Sunnyvale, and Walnut Creek):

> A hydrogen station has been proposed for <<address>> in your community. The CEC will vote on the final approval of station funding on June 28, 2017. Station developers will begin requesting pre-planning meetings with Authorities Having Jurisdiction (AHJs) in the spring/summer timeframe.
>
> SF Environment, in partnership with the California Fuel Cell Partnership, is available to provide technical assistance, staff training, and community outreach to support stakeholders in your city. Funding has been provided to SF Environment for this assistance through a grant from the U.S. Department of Energy (U.S. DOE).
>
> California's ZEV Action Plan has a goal of 1.5 million zero-emission vehicles (ZEVs) on California's roads by 2025. Hydrogen Fuel Cell Electric Vehicles (FCEVs) are ZEVs that "fill up" in five minutes at a hydrogen fueling station and have a range of 300 miles.
>
> To support FCEVs in California, the state has committed up to $20 million per year to support continued construction of at least 100 hydrogen fuel stations by 2022.
>
> To assist you and your colleagues in becoming familiar with permitting best practices for hydrogen fueling stations, we recommend the following materials:

- U.S. DOE online training module "Introduction to Hydrogen for Code Officials": https://www.hydrogen.energy.gov/training/code_official_training/ (approximately 40 minutes)
- California Governor's Office of Business Development's "Zero-Emission Vehicles in California: Hydrogen Station Permitting Guidebook."

To stay up to date on activity in the Bay Area, we invite you to subscribe to the "SF Clean Cities Hydrogen and Fuel Cell Electric Vehicle Newsletter" to receive program updates and training opportunities.

Please stay tuned for a webinar covering these topics in July 2017. In the meantime, please feel free to contact us for technical assistance and additional resources. We're here to make your project a success.

Hydrogen Safety for Permitting Authorities: Webinar for Code Officials (July 2017)

On Wednesday, July 19, 2017, SF Clean Cities, CaFCP, and GO-Biz presented a Webinar for Code Officials on Hydrogen & Fuel Cells.

On June 19 and July 7, co-presenter CaFCP sent invitations for the July 19 Webinar for Code Officials to a targeted list of over 300 contacts, including AHJs with proposed stations. In addition, invitations were sent to California Clean Cities Coalitions; industry contacts; and Clean Cities Coalitions in states participating in the Northeastern Hydrogen Station Network. Of the 86 individuals who viewed the registration link, 50 registered, and 29 attended the webinar.

Final Agenda for Code Officials Webinar:

- Introduction
- Zero-Emission Vehicle (ZEV) Action Plan and California hydrogen investments
- Stations awarded to date (map and status)
- Fuel cell electric vehicles (FCEVs) available in 2017 and 2018
- Review Hydrogen Permitting Guide
  - Point out key features
  - Permitting Checklist for AHJs
- Best practices from previous projects
- Question/Answers
- Technical assistance contacts: SF Clean Cities, GO-Biz, CaFCP, plus hydrogen e-newsletter
- Close

The following post-event announcement was posted to the San Francisco Clean Cities Coalition website http://www.cleancitiessf.com/projects/) and published in the July Hydrogen Newsletter.

Webinar for Code Officials on Hydrogen and FCEVs

On Wednesday, July 19, the City and County of San Francisco's Department of the Environment (SFE) partnered with the California Governor's Office of Business and Economic Development (GO-Biz) and the California Fuel Cell Partnership (CaFCP) on a webinar for code officials on the codes and standards and permitting best practices for deploying hydrogen fueling stations.

During the webinar, attendees were informed of how fuel cells work, how the cars and fueling stations work, and the safety elements of each. Code officials were directed to helpful resources, such as

h2tools.org, a hydrogen safety knowledge-focused website created by the Pacific Northwest National Laboratory. Attendees also received an overview of GO-Biz's Hydrogen Permitting Guide, which features a list of applicable codes and product standards, an introduction to the California Environmental Quality Act (CEQA), a permitting checklist for authorities having jurisdiction (AHJs), and much more.

The webinar was packed with many more important details, and was recorded for future use by AHJs. The recording can be accessed here, and a PDF of the presentation is available here.

Electric Vehicles & Hydrogen Fuel Cells 101 Webinar (December 2017)

In the fall of 2017, staff assisted Western Washington Clean Cities in identifying speakers for a webinar on Electric Vehicles and Hydrogen Fuel Cells, as part of their Clean Fuels 101 series. Staff contacted two hydrogen experts who agreed to present: Dr. Timothy Lipton, from the University of California, Berkeley, Transportation Sustainability Research Center, and Dr. Jacob Leachman, from Washington State University in Pullman. The following description is from the Western Washington Clean Cities website.

December 20: Electric Vehicles & Hydrogen Fuel Cells

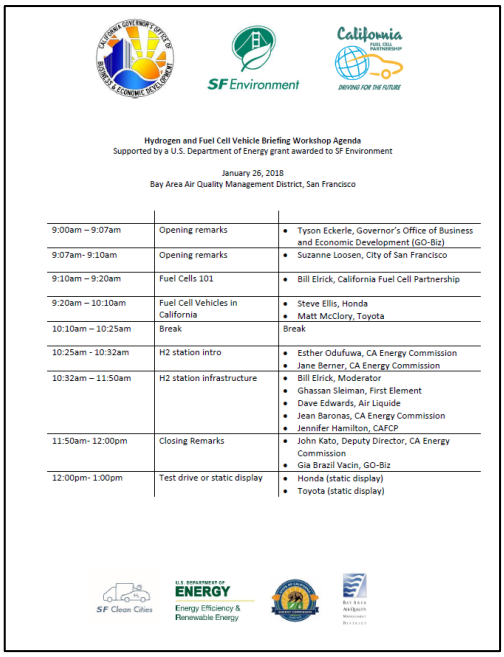
This session focuses on the rapidly-advancing technologies of electric, hybrid electric and hydrogen fuel cell vehicles. We will give a technical overview of how each technology works inside a vehicle, and the current state of the art. Various sources of electricity and hydrogen will also be discussed, along with information about the carbon intensities associated with different pathways. This information can be used to inform decision-making to help our region drive into the electric future as cleanly and sustainably as possible!

Presenters:

- Robin Gold, Western Washington Clean Cities [Slideshow]
- Timothy Lipman, University of California - Berkeley [Slideshow]
- Jacob Leachman, Washington State University [Slideshow]

Regional Briefings (January 2018)

San Francisco Clean Cities, in partnership with GO-Biz and CaFCP, hosted two *Regional Briefings on Fuel Cell Electric Vehicles and Hydrogen Station Development* in the South Bay (San Jose) and North Bay (San Francisco) on January 23 and 26, respectively. The Regional Briefings provided updates to Bay Area elected officials, local agency representatives, planners, code officials, and fire safety staff on California's growing hydrogen fueling network and developments in fuel cell electric vehicles.



Hydrogen and Fuel Cell Vehicle Briefing Workshop Agenda
Supported by a U.S. Department of Energy grant awarded to SF Environment

January 26, 2018
Bay Area Air Quality Management District, San Francisco

9:00am – 9:07am	Opening remarks	• Tyson Eckerle, Governor's Office of Business and Economic Development (GO-Biz)
9:07am- 9:10am	Opening remarks	• Suzanne Loosen, City of San Francisco
9:10am – 9:20am	Fuel Cells 101	• Bill Elrick, California Fuel Cell Partnership
9:20am – 10:10am	Fuel Cell Vehicles in California	• Steve Ellis, Honda • Matt McClory, Toyota
10:10am – 10:25am	Break	Break
10:25am - 10:32am	H2 station intro	• Esther Odufuwa, CA Energy Commission • Jane Berner, CA Energy Commission
10:32am – 11:50am	H2 station infrastructure	• Bill Elrick, Moderator • Ghassan Sleiman, First Element • Dave Edwards, Air Liquide • Jean Baronas, CA Energy Commission • Jennifer Hamilton, CAFCP
11:50am- 12:00pm	Closing Remarks	• John Kato, Deputy Director, CA Energy Commission • Gia Brazil Vacin, GO-Biz
12:00pm- 1:00pm	Test drive or static display	• Honda (static display) • Toyota (static display)

This approach was based on similar successful events hosted by GO-Biz and CaFCP in 2015 and were specified in our work plan. Invitations to the Regional Briefings were sent in mid-December to approximately 700 individuals.

The South Bay event included a ride-and-drive opportunity for participants. The North Bay event included a static display of FCEVs (staff could not identify a North Bay site with sufficient capacity, access to transit, *and* access to streets appropriate for a ride-and-drive event).

State and local agency representatives, automaker representatives, hydrogen fueling station developers, and hydrogen fuel producers and distributors provided an overview of activity in the FCEV market (including passenger vehicles, trucks, and buses) and the growing hydrogen fueling network in California and beyond.

Attendees of the San Jose briefing also got the opportunity to test drive the Toyota Mirai, and got to hear about Hyundai's new hydrogen SUV, the NEXO, which has a range of 370 miles. Attendees of the San Francisco briefing also heard from Honda and Toyota about their FCEVs and hydrogen plans.

Both events received high praise and resulted in impressive attendance as the San Francisco and San Jose events reached about 30 and 70 attendees, respectively, from an invitation list of over 700 across the Bay Area.

Bay Area Planning Director's Association (BAPDA; July 2018)

As discussed previously, the approach of documenting gasoline/CNG permitting processes with the goal of designing a streamlined process across several AHJs was not successful. However, we believed it was important for Bay Area AHJs to be aware of California's goals and permitting best practices so that local governments were prepared to work with hydrogen station developers.

Although we hosted Regional Briefings in January 2018 and invited Bay Area planning staff, we conducted an additional outreach effort to BAPDA, a membership organization that includes planners and planning directors at most of the nearly 100 AHJs in the Bay Area. Through our outreach effort each of those AHJs received comprehensive information about permitting best practices and sources of technical assistance.

Staff contacted BAPDA's co-chairs and was invited to present an overview of hydrogen and fuel cell technology to their Steering Committee in July 2018. The Steering Committee was very enthusiastic about the technology and approved the following to be sent to their membership in August 2018.

> Dear Planning Director,
>
> I want to make sure you are aware of the hydrogen fueling station developments in your community and provide resources that will help in evaluating and permitting them.
>
> Currently there are 9 hydrogen fueling stations operating in the Bay Area, with 12 more in permitting or construction to meet growing consumer demand. As I'm sure you are aware, California is planning on developing a network of 200 stations by 2025 to reach its goal of 5 million electric cars by 2030.
>
> A brief overview on hydrogen fueling and fuel cell electric vehicles (FCEVs) can be found here, and I have provided a list of other helpful resources below.
>
> Please feel free to contact me with questions. The San Francisco Clean Cities Coalition is here to help.
>
> Best regards,
>
> San Francisco Clean Cities Coalition Coordinator
>
> **Hydrogen Fueling Station Permitting Resources**
>
> - The Governor's Office of Business Development Zero Emission Vehicle Team provides technical assistance to station developers and local governments, and publishes a best practice guidance: California Hydrogen Station Permitting Handbook.
>
> - The U.S. DOE's Hydrogen Tools Portal website includes tools and content on the safety aspects of hydrogen and fuel cell technologies to inform those approving or using systems and facilities, such as local governments.
>
> - The California Fuel Cell Partnership is a public-private non-profit member organization that tracks market information and maintains a California hydrogen station map (which also shows the status of each station).
>
> This information is provided by the San Francisco Clean Cities Coalition as part of a U.S. Department of Energy grant to support hydrogen station development in the Bay Area and beyond. We can help connect you to the right resources. Keep up to date and sign up for our monthly Hydrogen Newsletter.

Emergency Responder Training (October 2018)

In fall 2018, we held two "train the trainer" sessions on hydrogen and fuel cell safety for emergency responders. Our initial plan was to host two "train the trainer" sessions in summer 2018, and we were asked to delay trainings until a date closer to station openings. After further consultation with the station developer and the trainer from the CaFCP, we scheduled these trainings for fall 2018. For geographic coverage, we hosted the workshops at the North Bay and South Bay, as follows:

- Wednesday, October 3, 9:00 am - 3:00 pm, at the San Francisco Fire Training Facility on Treasure Island.
- Thursday, October 4, 9:00 am - 3:00 pm, at the Sunnyoaks Fire Station/McCormack Training Center in Campbell.

The workshops were led by Jennifer Hamilton of the CaFCP. Coffee, pastries, and lunch were provided to attendees. The first session in San Francisco had very low attendance likely due to overnight rain; however, the second session in Campbell was attended by nearly 40 people.

Appendix D: Community Engagement Events

Following provides detailed descriptions of community engagement events, as summarized in Table 4.

First Element Bay Area FCEV Earth Day Tour, April 20, 2017

CaFCP and True Zero hosted a Bay Area Hydrogen tour, in partnership with the CARB, CEC, GO-Biz, Honda, Toyota, and Energy Independence Now. CARB Chair Mary Nichols and CEC Commissioner Janea Scott took part in a tour of Bay Area hydrogen stations. They were joined by Tyson Eckerle, Deputy Director of ZEV Infrastructure at GO-Biz and Joel Ewanick, CEO of First Element Fuel.

These hydrogen stations are part of the growing statewide network. Participants toured in fuel cell cars, including the Toyota Mirai and the Honda Clarity, and visited two True Zero hydrogen fueling stations: one in Hayward and one in San Jose.

Northern California Alt Car Expo, Oakland, May 11, 2017

This annual event is co-sponsored with East Bay Clean Cities Coalition. SF Clean Cities staff participated in the Steering Committee and moderated the Sustainability Panel, covering general actions by the cities of Oakland, San Jose, and San Francisco.

A second panel on fleet technology included a presentation on the hydrogen station network and the availability of FCEVs by Dr. Tim Lipman from the UC Berkeley Transportation Sustainability Research Center. The event was opened by Oakland Mayor Libby Schaaf. Approximately 50 attended the half-day event, which included static displays of charging stations and FCEVs.

Presidio Trust – Presentation and Test Drive, June 19, 2017

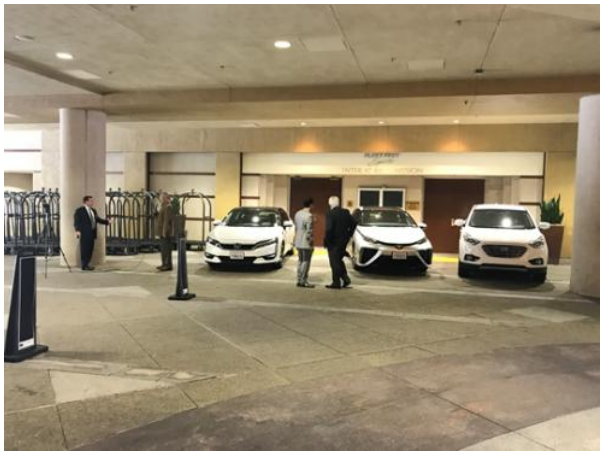
The Presidio Trust event was coordinated among CaFCP, the National Renewable Energy Laboratory (NREL), and SF Environment to provide education and vehicle experience to Presidio Trust staff and tenants, with an emphasis on federal procurement. Invitations were sent to other federal employers in the Bay Area. FCEVs were made available for test drives, and an AC Transit hydrogen bus was on static display. Approximately 25 attended the midday event.

Presidio Trust Presenters:

- Bill Elrick; CaFCP
- Melanie Caton; NREL THSC
- Derick Furuya; Honda North America
- Dwight Zuck; Air Liquide
- Roland Fecteau; AC Transit
- Suzanne Loosen; City and County of San Francisco
- Luis MacDonald; AutoFlex FV

Advanced Automotive Battery Conference and Expo, June 20-22, 2017

Test drive and static display hosted by Bill Elrick of CaFCP. Attendance: 33



SEMICON WEST Conference, July 10-13, 2017

Static FCEV Display hosted by CaFCP with representatives on hand to promote and answer questions about the vehicles.

Intersolar North America, July 12-13, 2017

Static FCEV Display hosted by CaFCP with representatives on hand to promote and answer questions about the vehicles.

National Drive Electric Week, September 23, 2017

Held in conjunction with San Francisco's Sunset Community Festival for the second consecutive year, 350 SF (the local branch of 350.org; http://350bayarea.org/350-san-francisco) will host a ZEV ride and drive. The Sunset Community Festival is an outdoor event that brings the community located in San

Francisco's Sunset District together for food, music, a flea market, kid-friendly activities, games, dance performances and cultural demonstrations. Exposing people to ZEVs at these kinds of events gets neighbors talking to each other about the cars, increasing the likelihood of ZEV adoption in that area. Vehicles included Chevrolet, Mercedes-Benz, BMW, and the Honda Clarity FCEV.

In support of the National Drive Electric Week (NDEW) event, SF Environment/Clean Cities hosted a ZEV Incentives workshop on Wednesday evening, September 6, at the Ortega Branch Library adjacent to the Sunset Community Festival site. The workshop reviewed incentives for BEVs and FCEVs and included a presentation of the SunShares program. The workshop was well received and attended by 46 members of the public.

East Bay Regional Park District Green Expo, October 4, 2017

CaFCP hosted a static FCEV display at the Green Expo event attended by approximately 300.

Fleet Week, San Francisco, October 6-7, 2017

CaFCP hosted a static display and limited test drive at Fleet Week. Staff promoted FCEVs, answered questions about hydrogen fueling, and promoted the Sunshares Program.

Hydrogen Day Exhibit in conjunction with the STEM Village at Fleet Week, October 7 and 8, 2017

Our workplan included creating a hydrogen display at the Exploratorium, but ultimately the Exploratorium was not able to incorporate this into its programming. Therefore, we identified an opportunity to participate in a Hydrogen Day exhibit in conjunction with Fleet Week, which attracts about 1.2 million visitors to San Francisco each year.

The Salvation Army San Francisco Metro and Golden Gate Division's Emergency Disaster Services team host a Humanitarian Village/STEM Center with a fuel cell demonstration during Fleet Week. This year's demonstration featured Toyota's Mirai FCEV, an Air Liquide hydrogen fueling station, and hydrogen fuel cell generators.

EV Week during Fleet Week, October 7 and 8, 2017

The 2017 EV Week ride and drive event was held in conjunction with Fleet Week, which attracts about 1.2 million visitors to San Francisco, and about 200,000 to Pier 39 near the EV Week ride-and-drive location. SF Environment tabled both days of the event to support the SunShares program and answered many questions about vehicle types and fueling. Most attendees were unaware and happily surprised that FCEVs were available.

During the two-day EV Week event, 497 drivers had the option of testing battery electric vehicles and FCEVs. Of the 12 cars available to drive, six were FCEVs.

- Honda Clarity
- Hyundai Tucson
- Mercedes -¬-Benz B-¬-class (static)
- Toyota Mirai (3)

Post drive surveys indicated that 36% of respondents preferred the FCEV to the BEV or PHEV.

Earth Day SF, April 21, 2018

On Saturday, April 21, Save the Redwoods League hosted Earth Day SF at Civic Center Plaza in front of City Hall from 11am to 7pm. The event featured speakers, including candidates for the Mayor of San Francisco, State Assembly Members, and the Executive Director of the California Academy of Sciences. Among the many different features of the event was a "clean energy zone" and an electric vehicle showcase, which included electric bikes in addition the hydrogen fuel cell electric Toyota Mirai, the plug-in hybrid electric Honda Clarity, and the new battery electric Nissan Leaf.

San Francisco Clean Cities partnered with the City and County of San Francisco's Department of the Environment to host an information table at the event. SF Clean Cities staff provided handouts with information about battery electric and hydrogen fuel cell electric vehicles, including information about the available federal, state, and local incentives. At the event, staff collaborated with representatives from Toyota, Honda, and Nissan to ensure that event attendees who were interested in the vehicles on hand received the information provided by SF Clean Cities and were directed to staff for further information about operating those vehicles in San Francisco.

Attendance at Earth Day SF was in the thousands, and approximately 200 people stopped by the table.

Hydrogen Community Meeting, January 30, 2019

The San Francisco Hydrogen Stations Community Meeting was held on Wednesday, January 30, from 6-7:30 pm at the Bernal Heights Branch Library, 500 Courtland Ave., San Francisco, CA 94110. This location is the most populated of the neighborhoods near the three stations. Permits for all three San Francisco stations were approved by October 2018, and will be open in fall 2019.

About 25 attended the meeting. Last-minute guest, Tom Escher from the Red & White Ferry Fleet, talked about the Water Go Round fuel cell ferry that will be on the Bay in October 2019. The audience was inspired to make the connection between passenger cars and the potential for hydrogen in larger projects.

Residents and stakeholders were notified of the meeting electronically:

- Households within one mile of the proposed stations using NextDoor.
- Clean Cities stakeholders (80)
- EV 101 attendees (200)
- San Francisco District Supervisors in the neighborhoods with proposed stations for distribution to their networks
- Fleet contacts and fire safety personnel within the City and County of San Francisco

Community Meeting: Hydrogen and Fuel Cell Transportation in San Francisco, June 11, 2019

A Community Meeting: Hydrogen and Fuel Cell Transportation in San Francisco was held on Tuesday, June 11, 6-7:30 pm at the Main Library. Notices for the meeting were sent to all San Francisco neighborhoods via NextDoor. The meeting was further publicized to sustainability and transportation contacts in San Francisco and other Bay Area communities. About 35 attended the meeting, which was intended to provide information about hydrogen and fuel cells in transportation in San Francisco and around the world, including San Francisco's incoming hydrogen refueling stations and the Water Go Round fuel cell ferry.

Appendix E: Group Procurement

The SunShares group procurement program is outlined in Subtasks 6 and 11 of the SOPO. This appendix provides background, challenges, and opportunities about the 2016, 2017, and 2018 SunShares program years.

Bay Area SunShares 2016

For the 2016 SunShares program, BC3 partnered with local governments and expanded its outreach via Bay Area municipalities. The program was available to BC3 members, family, and friends; residents of the nine-county Bay Area; and residents of Sacramento and Yolo counties. SF Clean Cities leveraged existing relationships with automakers to encourage participation in the program. Ultimately Toyota submitted a proposal to include the Mirai FCEV in the 2016 program.

BC3 staff held 30 workshops in the Bay Area in late summer 2016 to provide information on the program. SF Clean Cities staff attended the workshops to present information on EVs and FCEVs and provide technical assistance to program participants.

In addition to the workshops, the Mirai was featured at the fifth annual EV Week in October, which was held in conjunction with San Francisco Fleet Week.

In total, 1,817 Bay Area residents registered to participate in the 2016 SunShares program, learning more about rooftop solar systems and ZEVs. Subsequently, 144 households signed solar contracts and 29 purchased ZEVs, including four FCEVs. We see this as an absolute success and a testament to the Bay Area's early adopter community and the effectiveness of the $8,000 federal tax credit for FCEVs, which expired in December 2016.

Bay Area SunShares 2016 Program Results

Description	Quantity
Total Registrations	1,817
Solar registrations	1,236
ZEV registrations	1,070
Solar Contracts Signed	144
Kilowatts to be installed	402 kW
Nissan Leaf	25
Toyota Mirai	4

Bay Area SunShares 2017

The 2017 Bay Area SunShares program was open from August 7 through November 15, 2017. The two vehicles offered in the program in 2017 were the Nissan Leaf and the Toyota Mirai. The SunShares Program worked with 50 different outreach partners throughout the Bay Area to host 16 informational workshops and events. 672 people attended these events, and 1,638 people signed up on the SunShares website for more information. Of those, 642 requested the vehicle discount code.

Communities: Albany, Antioch, Berkeley, Brisbane, Burlingame, County of San Mateo, County of Santa Clara, Concord, Cupertino, Daly City, Dublin, Emeryville, Foster City, Fremont, Hayward, Lafayette, Menlo Park, Oakland, Palo Alto, Pinole, Portola Valley, Richmond, Redwood City, San Carlos, San Mateo, San Francisco, and Walnut Creek.

Companies: Arup, Autodesk, Blue Shield of California, Genentech, Google, Hotel Council of San Francisco, Interfaith Power and Light, LinkedIn, Salesforce, Sustainable San Mateo County, UCSF, USGBC, VMware, Webcor Builders, Whole Foods, and Workday.

FCEVs were not procured by program participants in 2017. The FCEV tax credit expired in 2016, while the $7,500 tax credit for BEVs was still in full effect. In addition, in 2017 there were competing group procurement programs that may have affected OEM participation, which are discussed below.

Automaker Participation

The RFPs for the SunShares program were distributed on June 2, 2017 to approximately 50 parties, with a submittal deadline of June 30. Our 2016 SunShares contact list was supplemented with contacts from the Mayors' West Coast Request for Information (RFI) in early 2017 (see below). Staff made many follow up calls to ensure that RFPs were received and correctly routed. As of the close of the RFP, only three original equipment manufacturers (OEMs) expressed intention to participate: Toyota, Honda, and Nissan.

- Toyota's corporate team stated their intention to supply a bid, and staff worked with local dealerships to assist.

- Nissan created a new division and program to move end-of-year models and previously leased vehicles from the 2012-2014 model years. The program provided a short-term discount (30-90 days) of $10K on a new Leaf to employers with Nissan fleet identification numbers. Some Bay Area cities are already offering the program to their employees. Unfortunately, Nissan was unable to format this program to fit BC3's RFP guidelines. BC3 investigated options for including the program alongside other offers selected through the RFP process. Ultimately, local dealerships participated in the program.
- Honda stated its intention to bid the Clarity FCEV and BEV models into the program and asked for extra time because of staff unavailability. Ultimately, they decided not to participate.

Based on participation in the 2016 SunShares program, we anticipated a better response from OEMs. During our follow up contact with OEMs, staff learned the following:

- General Motors generally doesn't participate in group procurement programs because discounts can erode their lease market, which is their current business model.
- Hyundai was still establishing its Bay Area dealership network to support the introduction of the Tucson FCEV, which was discontinued in 2017.

Competing Group Procurement Programs

It may also be that the space is somewhat diluted because SunShares is now competing with new, larger group fleet procurement programs launched since 2016.

- **EV Smart Fleets** (CALSTART): A project team of CALSTART, Atlas Public Policy, California Department of General Services, Georgetown Climate Center, NESCAUM and Ross Strategic have developed an aggregate purchasing model for EVs. By developing a new type of buying system that could lower costs and expand product availability for EVs, this project supports the U.S. DOE's Clean Cities program and the work they do with nearly 100 local coalitions to decrease the use of petroleum in transportation.
- **Fleets for the Future** (NARC): This national partnership of regional councils, Clean Cities coalitions, and industry experts is charged with coordinating five regional procurement initiatives, and one national scale procurement initiative, designed to consolidate bulk orders of alternative fuel vehicles and related infrastructure.
- **Accelerating Electrification through Municipal Demand Aggregation** (Mayors' National Climate Action Agenda and West Coast Alliance of Mayors, led by City of Los Angeles, aka "the Mayors' West Coast RFI"): This was the first step in a formal bidding process, inviting automakers to describe their plans for meeting a potentially record-breaking order of EVs. The cities of Los Angeles, Portland, Seattle and San Francisco could buy or lease up to 24,000 EVs for their fleets, if manufacturers are able to meet the demand and provide appropriate pricing. About 30 different manufacturers submitted information.

Bay Area SunShares 2018

The 2018 SunShares program launched on August 1 and remained open through November 15. As in previous years, the program featured three residential solar providers and two zero-emission vehicles: the Nissan Leaf and the Toyota Marai. The program had over 40 outreach partners and conducted 20 workshops and webinars to promote the program.

For the second year after the expiration of the FCEV tax credit, the Mirai was not price competitive with the battery electric vehicle for which the tax credit is still available; none were sold through the program.

SunShares program results for 2018 are presented below.

Bay Area SunShares 2016 Program Results

Description	**Quantity**
Outreach Partners	40
Potential Reach	900,000
Workshops Held	20
Total Workshop Attendance	588
Residential Solar Offerings	3
BEV Offering (Leaf)	1

FCEV Offering (Mirai)	1
Total Information Requests	1,396
Vehicle Information Requests	624
BEVs Purchased/Leased	12
FCEVs Purchased/Leased	0
Residential Solar Contracted	148
kW of Solar Installed	700

Appendix F: Funding Applications for Hydrogen Stations

Preapplication Meeting with Hydrogen Station Developer (July 2016)

California Assembly Bill 8, which reauthorized the Alternative and Renewable Fuel and Vehicle Technology Program, specifies that the CEC allocate up to $20 million per year (or up to 20 percent of each fiscal year's funds of approximately $100 million) in funding for hydrogen station development up to 100 stations through January 1, 2024.

In April 2016, the CEC announced (Grant Funding Opportunity) GFO-16-605 for Light Duty Vehicle Hydrogen Refueling Infrastructure. Stations funded under this grant were intended to provide refueling service for FCEV drivers in markets needing redundancy and in new and expanding markets. The CEC requires station developers to document pre-application meetings with AHJs.

SF Environment, in collaboration with Jaimie Levin of the Center for Transportation and Environment, organized a "pre" pre-application meeting for hydrogen station applicant, Shell, and our city permitting, zoning, and inspection stakeholders on July 12, 2016 (an official pre-application involves fees). In the meeting, we discussed roles and responsibilities, identified the planning project lead, and laid out an expedited permitting pathway for hydrogen fueling to be added to three existing gasoline service stations. The developer proposed three stations to strengthen the possibility of winning the two that were planned in San Francisco for this funding cycle.

Meeting Participants:

- San Francisco Department of Environment
- San Francisco Planning Department
- Department of Building Inspection
- Bureau of Fire Prevention – Fire Plan Check Section
- UC Berkeley Transportation Sustainability Research Center
- Station Developer (Shell)
- Center for Transportation and the Environment (Developer's Consultant)

During the post-meeting debrief, SF Environment recommended that the station developer consider procuring 100% renewable electricity from CleanPowerSF to provide power at these new hydrogen stations, including the existing gas pumps and convenience stores.

CleanPowerSF is a community choice aggregation (CCA) program managed by the San Francisco Public Utilities Commission (SFPUC). This commitment strengthened the Shell/Toyota CEC application, which beat two other applicants. Shell's proposal for San Francisco stations scored at the top of the selection criteria and resulted in the award of three stations versus the anticipated two.

As stated above, awards from CEC for new hydrogen fueling stations have been significantly delayed. Three of the proposed stations were approved on June 14, 2016 (Campbell, Oakland, Sunnyvale); the remaining eight Bay Area stations are expected to be approved at the August business meeting. Based on the funding requests, developers have 18 months to complete installation of the fueling stations, or they will face penalties.

Post Award Meeting with Hydrogen Station Developer (May 2017)

SF Environment convened a meeting on May 15, 2017 with San Francisco's Planning Department and Shell and station development consultant Fiedler Group to discuss project-specific questions about the Planning Department's review process and requirements.

Representatives from the Planning Department discussed the site plan review of the three proposed San Francisco fueling stations, identifying unique attributes of each location (e.g., zoning restrictions) and the processes for moving through these attributes at each site. San Francisco allows a developer to concurrently submit plans to planning, building, and sometimes, public safety. Permitting packages were submitted in October 2017; all permits were received by October 2018.

Additional Technical Assistance

San Francisco

In August 2018, staff assisted San Francisco hydrogen station developer, Fiedler Group, to expedite utility review and approval for their Harrison Street station. There had been a change of staff at PG&E and the resulting six-month delay in review would have affected the station construction schedule. As a result, staff worked with contacts at PG&E to escalate the application for priority review to keep the station on schedule.

In September 2018, an electric vehicle advocate who recently learned of the proposed hydrogen stations approached his San Francisco Supervisor to block station development on the basis that hydrogen is not a viable fuel source and that the city should focus only on battery electric technology. Staff worked with our communications team to educate Supervisor staff about hydrogen and defuse the situation. We were also able to show that the station developer, at staff's suggestion, had offered to meet with Supervisors in the areas of station development around the time that building permit applications were submitted in October 2017.

Berkeley

The City of Berkeley only allows serial review of projects, not concurrent. The developer identified this as a critical issue with planning staff, which understands the short funding timelines.

In December 2017, Fiedler Group, which developed the station at 1250 University Avenue in Berkeley, experienced a potential delay regarding the CEQA Initial Study requirement. SF Clean Cities staff connected Fiedler with the GO-BIZ, which in conjunction with the CEC, arranged a meeting with City of Berkeley planning staff to identify a pathway that would meet CEQA requirements within the project schedule timeframe.

Fiedler Group organized a community outreach meeting on March 30, 2018. Staff from Shell/Equilon (station owner), GO-Biz, CaFCP, CEC, SF Clean Cities, and the Hydrogen Safety Panel, as well as a Berkeley City Councilmember, presented or were available for questions. Attendance was very low, likely because it was a Friday night on the weekend of Easter and Passover, and because the mailing lists used to notify neighbors in the vicinity of the station were mailed to the property owners rather than residents. In addition to mailing, a Fiedler representative went door-to-door in the days preceding the meeting to notify as many residents as possible

Appendix G: Reporting and Dissemination

Following provides detailed descriptions of presentations delivered at national, state, regional and local events, as summarized in Table 5.

U.S. DOE Annual Merit Review, June 7, 2017

Staff presented on the project at the Annual Merit Review on June 7.

U.S. DOE Annual Merit Review, June 13, 2018

Staff presented a poster on the project at the Annual Merit Review on June 13.

Bay Area AltCar Expo, March 21, 2018

SF Clean Cities partnered with Dr. Tim Lipman from the UC Berkeley Transportation Sustainability Research Center to present an *Update on Hydrogen in the Bay Area and Beyond* at the Fifth Annual Bay Area AltCar Expo on March 21, 2018 (https://www.altcarexponorcal.com/). AltCar is attended by municipal and private sector fleet managers, regulatory officials, and staff and industry representatives, and was sold out.

Green Transportation Summit and Expo (GTSE), April 17, 2018

SF Clean Cities was invited to present on hydrogen in transportation at the Green Transportation Summit and Expo (GTSE) in Tacoma, Washington, on April 17 (http://gtsummitexpo.socialenterprises.net/). After initial discussions with the organizers, the GTSE steering committee expressed doubts that their stakeholders would be interested in this topic because Washington State lacks policies to support market development of hydrogen (although there is a movement to establish a Low Carbon Fuel Standard, similar to California). Eventually it was decided that hydrogen would be offered as a pre-conference workshop from 10a-12p the day before GTSE began.

Staff invited Nick Barilo, P.E., Hydrogen Safety Program Manager, Pacific Northwest National Laboratory to co-present the workshop, *Hydrogen Fuel Cells and Fuel Cell Electric Vehicles: Emerging Applications and Safety Management*. Slides and sign in sheet are attached.

GTSE stakeholders were very interested in learning about hydrogen. Over 50 people attended, and the presentation room was at capacity 20 minutes before the presentation.

C40 Cities Zero Emission Vehicle Network, October 24, 2018

Staff attended the C40 Cities Zero Emission Vehicle Network workshop in Nanjing, China, during the week of October 22. Cities in attendance included London, Madrid, Warsaw, Auckland, Salvador (Brazil), Nanjing, Shanghai, Shenzhen, and Houston. During the workshop, which was focused on transportation electrification, participants expressed an interest in learning more about U.S. hydrogen projects. Staff presented on the California and Northeast Region hydrogen fueling networks, as well as the larger hydrogen projects being implemented or proposed at the ports of Los Angeles and Long Beach through the California Air Resources Board Zero- and Near-Zero Freight and Facilities (ZANZEFF) program.

Clean Cities National Peer Exchange, November 7, 2018

Over the course of our work on hydrogen, stakeholders pointed out that Clean Cities Coordinators outside of California know little about hydrogen. With the prospect of Nikola's Class 8 trucks and the Nels national fueling network affecting all Clean Cities Coalitions, staff worked with the Clean Cities organization to lobby for including hydrogen on this year's agenda.

Staff co-presented with the Greater New Haven Clean Cities Coalition on Hydrogen at Clean Cities National Peer Exchange on November 7, 2018. The session was attended by The Greater New Haven Clean Cities Coalition, which has been deeply involved in the northeast hydrogen network, will co-present. The SF Clean Cities Hydrogen 101 PowerPoint was distributed as a handout and basis for the discussion.

Tennessee Hydrogen Working Group, December 10, 2018

As an outcome of the Clean Cities presentation, staff was invited to present via conference call on December 10 to a newly formed hydrogen working group coordinated by the East Tennessee Clean Fuels Coalition. Staff presented hydrogen 101, provided an overview of recently funded hydrogen projects, and answered general questions about hydrogen and fuel cell vehicles.

Green Transportation Summit and Expo (GTSE), May 21-23, 2019, Tacoma, Washington

The 2019 GTSE featured a plenary session on renewable fuels, including hydrogen, and two breakout sessions on hydrogen and fuel cells. Staff presented Hydrogen 101 in the panel "Roles of Hydrogen & Fuel Cell Electric Vehicles in Transportation and a Decarbonized Economy." GTSE sessions that included hydrogen are described below.

Opening Plenary | Fossil Free Fuels: What's Next for Renewables | Hall B

Moderator: Rick Wallace | Senior Policy Analyst, Oregon Department of Energy
Jeremy Baines | Vice President of Sales, Americas, Neste
Todd Ellis | Executive Director of Sales, Western Region & Canada, Renewable Energy Group
Jim Jensen | Bioenergy & Alternative Fuels Specialist, Washington State University
Keith Malone | Public Affairs, California Fuel Cell Partnership
Heather L. Manuel | Director of Corporate Communications, Gevo, Inc.

The Roles of Hydrogen & Fuel Cell Electric Vehicles in Transportation and a Decarbonized Economy |
Fuel Cell Electric Vehicles will be an important component of the zero-emission fleet. We also expect Hydrogen to be a key enable of the high level of renewables we expect in the future low carbon economy. This session will discuss these topics and appeal for the need to start building out the first phases of hydrogen infrastructure as soon as possible.

Introduction: Chris Hostetter | Group Vice President, Advanced Technology Research, Toyota Motor North America

Moderator: Michael Grainey | Principal, Michael Grainey, Consulting LLC
Michael Penev | Sr. Transportation Analyst, National Renewable Energy Laboratory

Dave Edwards, PhD | Director and Advocate for Hydrogen Energy, Air Liquide
James Kast | Fuel Cell Business Analyst, Corporate Strategy & Planning, Toyota Motor North America
Suzanne Loosen | Zero Emission Vehicles Coordinator, San Francisco Department of the Environment

Fuel Cell and Hydrogen; A Compelling Value Proposition for Zero Emission Heavy Duty Transportation
Many cities and bus and truck operators are struggling today with the currently conflicting objectives of shifting to zero emission vehicles while keeping operational flexibility and maintaining budgets under control. We will look at the current market drivers; regulations as well as incentives which are driving the electrification of heavy-duty transportation. With the rapid progresses of battery technology and cost reduction of electric drive train; electric buses and trucks are starting to be deployed in our cities. However, there are unique challenges with heavy duty transportation that battery alone might not be able to solve; range (over 200 miles), vehicle weight versus payload, refueling time versus vehicle utilization as well as charging infrastructure scalability and cost.

Moderator: Michael Penev | Sr. Transportation Analyst, National Renewable Energy Laboratory
Alan Mace | HD Market Manager, Ballard Power Systems
Lauren Skiver | General Manager & CEO, Sunline Transit
Keith Malone | Public Affairs, California Fuel Cell Partnership
James Kast | Fuel Cell Business Analyst, Corporate Strategy & Planning, Toyota Motor North America

SF Clean Cities

Advancing Fuel Cell Electric Vehicles in San Francisco and Beyond
The Case for Hydrogen 101

This case study discusses education and outreach as part of the U.S. Department of Energy-funded grant program, *Advancing Fuel Cell Electric Vehicles in San Francisco and Beyond*.

Over the course of this grant program, we presented or co-presented at the following meetings and conferences:

- Northern California Alt Car, Oakland (May 2016)
- Northern California Alt Car, Oakland (March 2018)
- Green Transportation Summit and Expo, Tacoma (April 2018)
- Bay Area Planning Directors Association Steering Committee (July 2018)
- C40 Cities Zero Emission Vehicle Network (October 2018)
- Clean Cities Peer Exchange (November 2018)
- Tennessee Hydrogen Working Group (December 2018)
- San Francisco Hydrogen Station Community Meeting (January 2019)

Hydrogen and fuel cell technology are inherently complex topics. What we learned through these presentations is that subject matter specialists can be difficult to follow for audiences with mixed knowledge of the technology. We learned that this is the case with most audiences. As fuel cell electric vehicles (FCEVs) become more prevalent, it will be important to clearly communicate their benefits to public audiences.

This recommends prefacing presentations with a basic orientation to hydrogen fuel and FCEVs, or Hydrogen/Fuel Cell 101. We tried three different approaches: with 101, without 101, and with 101 mixed into a longer slide deck. We found that audiences were much more engaged and had better questions about the overall content when the presentation is preceded by Hydrogen/Fuel Cell 101. It serves to establish a mental architecture for more complex information to follow.

We developed a hydrogen 101 slide deck with the following content, which can be delivered in about 10 minutes.

1. Introductory slide	
2. Zero Emission Vehicle Goals	Why we're doing this
3. Battery Electric *and* Fuel Cell Electric	Why not just battery electric vehicles?
4. How do Fuel Cells work?	Simple diagram
5. The Cars	Photos of available vehicles
6. The Stations	A representative station
7. The Station Map (California)	Show where the stations are
8. More Than Just Light-Duty	Transit applications
9. More Than Cars and Buses	Trucks, off road, marine
10. Closing slide	

An example presentation is posted here: https://bit.ly/2IuBJRq

Advancing Fuel Cell Electric Vehicles in San Francisco and Beyond
Hydrogen Permitting Case Study

This case study discusses activity to streamline permitting processes for station development among Bay Area authorities having jurisdiction (AHJs) as part of the U.S. Department of Energy-funded grant program, *Advancing Fuel Cell Electric Vehicles in San Francisco and Beyond*.

Streamlining permitting processes has been successful in reducing soft costs and supporting market transformation for residential solar and electric vehicle charging infrastructure installations, which generally require non-discretionary electrical and building permits. State law required California AHJs to adopt streamlined permitting for EV charging stations by September 2017.

AHJ Approaches

In practice, we found that permitting liquid or gaseous fueling stations is much more varied and context-dependent in AHJs, involving not just planning and building departments, but also zoning determinations, fire plan safety checks, design review, and public outreach, including community meetings. Examples from 2017 show a range of approaches:

- A proposed station in Citrus Heights, California was allowed concurrent review by planning, building, and fire safety officials and received approval to build within a few months.
- A proposed station in Berkeley, California required an outside consultant to prepare an additional California Environmental Quality Act (CEQA) review (at the applicant's expense) and only allows sequential review of applications.
- Three proposed stations in San Francisco were concurrently reviewed by planning, building, and fire safety officials for a fee. That fee and the potential time savings are forfeited if the permit is sent back to another department for a second round of review.
- A proposed station in Mountain View, California required several plan reviews and took over a year to permit.

Most importantly, staff at AHJs view hydrogen station permitting as a one-off project to be approached based on local knowledge and political context. AHJ staff have been willing to discuss their experience, but there was little interest in documenting local gasoline or CNG station permitting processes to support a streamlined process, which would need local adoption.

AHJ Interviews

Since the initial approach of documenting gasoline/CNG permitting processes with the goal of designing a streamlined process across several AHJs was not successful, Clean Cities staff attempted to learn what would be useful to planning and building officials. We reached out to local planning departments that have already permitted hydrogen stations to gain a better understanding of barriers and opportunities. Of those AHJs contacted, most did not respond, one agency could not locate a record of permits for the station in question, and one agency agreed to be interviewed.

The hydrogen station in the city of Mountain View was one of the most difficult to permit—it took over a year. The managers of the planning and building departments made time for a one-hour interview in

SF Clean Cities

Group Procurement Case Study
Bay Area SunShares 2016-2017

What a Difference a (Tax) Break Makes

SunShares is an annual group procurement program that pools the buying power of Bay Area residents to reduce the cost and complexity of acquiring residential solar and electric vehicles (EVs). EVs include Battery Electric Vehicles (BEVs) and Fuel Cell Electric Vehicles (FCEVs). The program works through outreach partners—businesses and municipalities—to reach employees and residents with educational workshops that increase knowledge about the financial and air quality benefits of emission-free living.

The SunShares program is managed by the Bay Area Business Council on Climate Change (BC3), whose members include large Bay Area employers with corporate sustainability programs (e.g., Google, Genentech, Blue Shield, etc.). SunShares also counts more than 25 municipal partners across the nine-county Bay Area that use existing communication channels to reach residents. BC3 organizes discounts on solar installations and electric cars from pre-vetted providers that includes third-party technical support. The program is open from August to November each year.

As shown on Table 1, SunShares leveraged its 2016 experience to increase reach and efficiency in 2017. Workshop attendance was up and solar procurement nearly tripled, but EV procurements fell off significantly. Why?

Table 1: SunShares Program Results

Category	**2016**	**2017**
Outreach Partners	**37**	**50**
Potential Reach	800,000	1,000,000
Workshops Held	**30**	**16**
Total Workshop Attendance	525	672
Residential Solar Offerings	**3**	**3**
BEV Offering (Leaf)	**1**	**1**
FCEV Offering (Marai)	**1**	**1**
Bay Area H2 Fueling Stations	6	8
Stations in Development	2	12
Total Information Requests	**1,817**	**1,584**
Vehicle Information Requests	**1,070**	**623**
BEVs Purchased/Leased	**25**	**14**
FCEVs Purchased/Leased	**4**	**0**
Residential Solar Contracted	**144**	**208**
kW of Solar Installed	402	1,082