ATTACHMENT 2: PROJECT NARRATIVE AND WORK PLAN

PROJECT NARRATIVE

In support of the California Air Resources Board's (CARB's) vision of transformative emissions reduction, the City of Los Angeles Harbor Department (Harbor Department) proposes to partner with a team of very important industry leaders to establish a new forward-looking framework for future movement of goods throughout Southern California and other parts of the State. The team is dedicated to developing this concept in several phases, and to ultimately encompass activity in Southern California, the California Central Coast Area, and Merced County in the California Central Valley.

The City of Los Angeles Harbor Department (Port, Harbor Department, POLA) requests $41,122,260 from the CARB's Zero- and Near-Zero Emission Freight Facilities (ZANZEFF) Project funding, to conduct the **Zero Emission Freight "Shore-to-Store" Project** (S2S), which is summarized in the table and graphic below. Industry and End User partners are all contributing to the success of this project either financially or by providing in-kind assistance.

Project Title:	Zero-Emission Freight "Shore-to-Store" Project
Total Project Budget:	$82,568,872
Funding Amount Requested:	$ 41,122,260
Match Funding Total:	$ 41,446,612 (50.2 %)
Match Funding Breakout:	Cash: $ 14,317,281 In-Kind: $27,129,331
Applicant:	Port of Los Angeles, Public Entity
OEM and Infrastructure Industry Partners (Technology Development Team):	Equilon Enterprises LLC (d/b/a Shell Oil Products US) (Shell) Toyota Motor North America (Toyota) Kenworth Truck Company (Kenworth)
End Users (Demonstration Partners):	Toyota Logistics Services, United Parcel Service, Total Transportation Services, Inc., Southern Counties Express, Port of Hueneme, Air Liquide
Independent Third-Party Data Collection and Analysis Provider	National Renewable Energy Laboratory
Technical Advisor and Agency Funding Partner	South Coast Air Quality Management District (SCAQMD)
Community Advisor	Coalition For A Safe Environment
Disadvantaged Community Zip Codes	90220, 90247, 90248, 90731, 90744, 90802, 91761
Equipment funded with a public incentive program and state its incentive program status (Shell/POLB H2 Station)	The hydrogen refueling station at the Port of Long beach has been awarded $8 million from CEC's Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP) and $1.2 million from SCAQMD's Clean Fuels Program.[2]
Equipment funded with a public incentive program and state its incentive program status (POLA/Everport ZE and NZE demonstrations)	CEC Agreement ARV- 15-069 for 25 ZE and NZE yard tractors, and CEC Agreement ARV-16-025 for ZE yard tractors and top handlers and advanced smart charging, in the amount of $7,237,000 and $6,762,331, respectively.

[2] Appendix B provides evidence of funding approval for these projects.

1. Applicant Qualifications

The Port of Los Angeles is the nation's number one container port and a global model for sustainability and social responsibility. The Port brings extensive experience developing, implementing, and administering both large-scale air quality incentive projects and programs and technology demonstrations through its landmark Clean Air Action Plan (CAAP) and through other initiatives that support CAAP objectives. The CAAP, a joint effort with the Port of Long Beach, is a comprehensive program to reduce port-related emissions to make the region a cleaner, healthier place to live and work. In 2016, the California Air Resources Board (CARB) awarded the Port $15 million from its Air Quality Improvement Program (AQIP) for the Port's Green Omni Terminal Demonstration project. This AQIP experience ensures that the Port is fully aware of the detailed and active project management that is required for successful implementation of large demonstration projects and already has the tools in place to implement the proposed S2S Project, if grant funding is awarded. The proposed project has the full commitment of the Port's Executive Director and the Director of Environmental Management, ensuring that resources will be available throughout implementation of the project at the levels necessary for success. Through the project team's existing relationships and extensive coordination with OEM technology providers and vehicle/equipment manufacturers, freight fleet operators, as well as other project stakeholders, the project team has met the match funding requirements for this project. In addition, a number of projects are summarized below that further support the Port's robust grant implementation experience.

Experience with Large-Scale Air Quality Incentive/Technology Demonstration Projects

Green OMNI Terminal Demonstration Project – In 2016, Pasha and the Port of Los Angeles began the Green Omni Terminal Demonstration Project. The project involves testing clean cargo handling equipment and infrastructure at the Pasha terminal to create a working laboratory for advancing zero and near-zero emission technologies at the Port. Additionally, Pasha is working to install a solar-powered microgrid with a 1.03 megawatt photovoltaic rooftop array, a 2.6 megawatt-hour battery storage system, charging equipment that can both receive and supply power and an energy management control system. This project received a $14,510,400 grant from the California Air Resources Board. To date, 66% of the funds have been received.

Advanced Yard Tractor Deployment/Eco-FRATIS Drayage Project – This project includes testing of a new fleet of 25 zero and near-zero emission yard tractors at the Everport marine container terminal in the Port of Los Angeles. Additionally, a companion project will equip 100 more drayage trucks with smart technology aimed at reducing emissions by streamlining their time on the road and improving the flow of containers to and from the port complex. This project received a $5,833,000 grant from the California Energy Commission's (CEC) Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP). Subrecipient agreements are fully executed and the electric and renewable LNG yard tractors are under development. This project initiated POLA's zero-emission pathway vision.

Advanced Cargo Handling Demonstration Project, Everport – This project expands on existing demonstrations of zero-emission goods movement technologies by taking another step toward implementation of a zero emissions pathway for loading and unloading cargo throughout an entire marine container terminal with the demonstration of two zero-emission top handlers and three next generation yard tractors. The top handlers will be charged with standard infrastructure and the yard tractors will be "fueled" by a state of the art Automated SmartCharger System (ASCS), the first of its kind at the Port of Los Angeles. This project was awarded a $4,600,000 grant from the California Energy Commission's ARFVTP, and all subagreements are fully executed. This project is underway, and POLA is close to issuing bids for the infrastructure construction.

2. Project Team Capabilities and Degree of Industry Collaboration

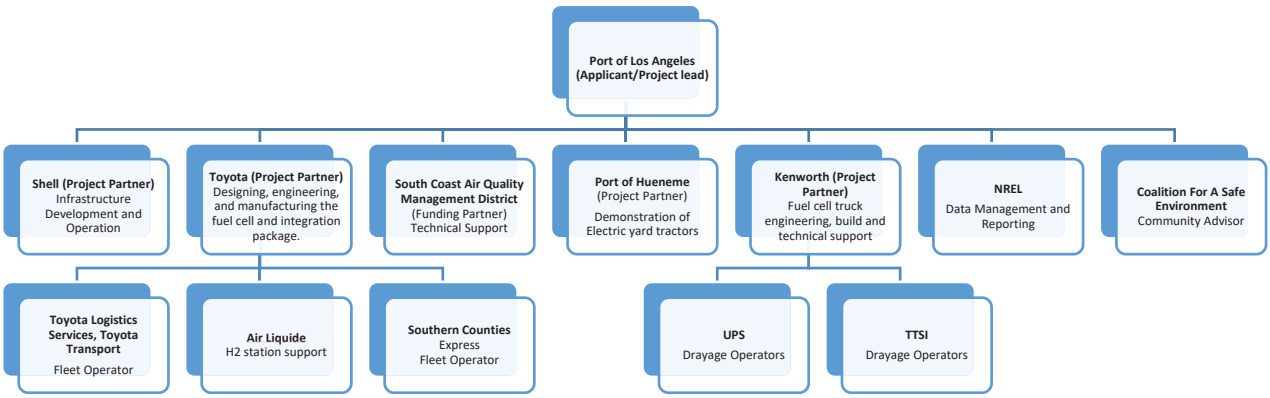
The Harbor Department has carefully assembled an industry-leading team of technology manufacturers (OEMs) and industry partners/end users to provide scalable zero-emission hydrogen fuel cell trucking solutions and enhanced market acceptance for heavy-duty hydrogen fuel cell technology. The Harbor Department's project partners and subcontractors include:

Key Participant	Role	Responsibilities and *Relationship to Harbor Department
Harbor Department	Applicant/Grantee	Grant Administration and Reporting, Project Leadership, Oversight of Technology Demonstration, Oversight of Data Collection and Reporting Subcontractor
Shell	H_2 Station Lead	Design, Build and Operate the high-capacity H_2 station for freight in Ontario, CA, in Wilmington, CA and in the Port of Long Beach, CA
Toyota Motor North America	Technology Manufacturer	Design and integrate Fuel Cell Electric Drive systems for Class 8 trucks, site location for hydrogen stations in POLB and Gardena, and warehouse location of ZE forklifts.
Kenworth Truck Company	Technology Manufacturer	Design and build ten Class 8 FCEV trucks, integration of the Toyota drive system, support interface with Data Collection Team
Port of Hueneme	Demonstration Partners	Electric Yard Tractors for POH
TTSI, SCE, UPS, Toyota Logistics Services, Port of Hueneme	End Users Demonstration Partners[3]	Equipment Operations for Demonstration (14 zero-emission units total, including both fuel cell and battery electric)
Air Liquide	H_2 Station Support	Operations and maintenance support for medium-capacity stations at Toyota Logistics Services in POLB and Toyota Technical Center in Gardena
National Renewable Energy Laboratory	Data Collection and Analysis Provider	Data Collection, Analysis and Reporting – Lead, proposed scope will be covered under direct contract with POLA
South Coast Air Quality Management District	Technical Advisor	Zero-Emission Technology Demonstration and Commercialization Advisor, direct co-funding support
Coalition For A Safe Environment	Community Advisor	Community Advisor– Provide comments and advice from community perspective and assist w/ outreach

Technical Qualifications, Capabilities and Industry Collaboration

Below is a summary of the technical qualifications and capabilities of the project partners as well as the key personnel serving as project leads. Key personnel were selected for this team based on their ability to successfully carry out the project tasks in their areas of expertise. The OEM partner technology manufacturers are critical members of the team, without which the Harbor Department would not be able to conduct the proposed demonstration. The technology manufacturers are established and well-respected manufacturing companies, with incredibly experienced engineering and product development professionals well-matched to this project and the proposed technical approach. The depth of this industry collaboration provides an excellent opportunity to accelerate zero-emission freight technology to widespread commercial use. A project organization chart is provided below:

[3] In support of this project, POLA is working with Everport to demonstrate 30 ZE and NZE cargo handling equipment and advanced smart charging technology; these projects have benefits that are accounted for in other grant allocations (See Appendix B) and are therefore not detailed as part of the scope of this proposed project.



Please refer to Attachment 11, Applicant Qualifications, for additional information regarding projects that demonstrate the Harbor Department's experience is well-matched to implement this proposed project. Resumes for the below individuals have been included with our Application in Appendix A to document our team's depth of experience. Below is a summary of each partner's role in the project and key personnel.

Applicant/Grantee, Grant Management and Administration Qualifications

The **Port of Los Angeles Harbor Department** is the Applicant for the Zero-Emissions Shore-to-Store Project. As discussed above in subsection 1, as well as Attachment 11, Applicant Qualifications, the Port brings extensive experience developing, implementing, and administering both large-scale air quality incentive projects and programs and technology demonstration projects. The Port's extensive technology development and demonstration project experience illustrates that the collaborative efforts between the Harbor Department and equipment owners and technology providers span decades. In addition, these projects demonstrate the Harbor Department's ability to successfully implement cooperative agreements, manage resources, meet reporting requirements, evaluate projects/initiatives, and document progress. The Port's extensive history implementing grant projects from both sides (grantor and grantee) uniquely positions the Harbor Department for this proposed project in that it has both managed and implemented technology development and demonstration programs for zero-emission vehicles and equipment. Consistent with its CAAP strategies, the Port will work with its industry business partners to see these technologies through commercialization and beyond to widespread implementation, as it will benefit all stakeholders and help the Port reach its environmental goals. Resumes are provided in Attachment 11 for the following key personnel, including:

- Christopher Cannon, Director, Environmental Management Division and Chief Sustainability Officer, will have overall responsibility for the success of the demonstration project, and will be supported by the Harbor Department's Environmental Management Division's Grantee Liaison/Technical Project Manager.
- Jacob Goldberg, Environmental Specialist, will serve as Grantee Liaison/Technical Project Manager for this project.
- Tim DeMoss, Marine Environmental Supervisor, will serve as a general advisor to the project, having significant prior experience with grant funded projects.

Technology Manufacturer Qualifications

Through the S2S Project, **Equilon Enterprises LLC (d/b/a Shell Oil Products US) (Shell)** is building on an established collaboration with Toyota Motor North America (Toyota) in which the two industry leaders joined forces in California to increase the number of light-duty hydrogen refueling stations, and heavy-duty hydrogen refueling stations as part of the ongoing H2Freight project. This follow-on project will move the industry forward with two additional high capacity heavy-duty hydrogen-fueling stations and regional zero-emission trucking for the Port of Los Angeles and its project partners. For this project, Shell has already started designing, evaluating and selecting the equipment for installation. Shell has also engaged with the local authorities, leveraging years of experience in building

hydrogen stations. Shell has previous experience in managing a grant from CARB (Grant Hydrogen Highway Station GHHS 006). This grant was successfully implemented on time and within budget. Shell's organization has been involved in the development of hydrogen as a viable fuel for the transportation sector for more than 20 years. In the last decade, Shell has participated in hydrogen fueling station operations, industry and R&D steering committees, infrastructure demonstration projects, technology development, and commercial planning in the United States, Europe, and Asia. Shell personnel have meticulously developed and recorded lessons learned over two decades to preserve institutional knowledge in a handbook and other internal resources. This information has been used to help Shell formulate step-by-step plans for a hydrogen fuel mass market, design hydrogen infrastructure networks, and streamline the build-out of hydrogen fueling stations. Shell is dedicating the requisite personnel to ensure the long-term viability and reliability of public hydrogen stations. Resumes are provided in Attachment 11 for the following key personnel:

- Oliver Bishop, General Manager, Hydrogen, will have overall responsibility for the success of the hydrogen infrastructure deployment.
- Hechem Nadjar, Hydrogen Business Development Manager, will serve as project leader.
- Dr Wayne Leighty, Business Development Manager, is accountable for hydrogen business development in North America, reporting to Oliver Bishop.
- James Martin, Hydrogen Retail Projects Manager, will perform project engineering for development of the Hydrogen Refueling facilities. And develop scope of work, engineering standards, permitting, construction and operation of retail facilities.

Toyota Motor North America (Toyota)

Toyota is one of the world's largest manufacturers of vehicles, including advanced vehicles using hybrid electric and fuel cell electric technology. For the past 16 years in North America, Toyota has worked closely with hydrogen refueling providers both large and small. Its groundbreaking alliances have catalyzed the market for FCEVs in California and the Northeast. In April 2017, Toyota unveiled its plans to develop a heavy-duty prototype built on an existing Class 8 vehicle body. Toyota will be responsible for ensuring the availability of prototype trucks for operation during the project timeframe. S2S is yet another demonstration of Toyota's commitment as a trailblazer for hydrogen and fuel cell technology. The Toyota project team brings strong experience and expertise with hydrogen and fuel cell technology. Their broad experience with business development, engineering, project management, and environmental policy demonstrates industry leadership with fuel cell electric vehicles and the supporting hydrogen infrastructure. This includes direct involvement with both the light-duty Toyota Mirai, and the newly developed heavy-duty Class 8 fuel cell truck application deemed 'Project Portal'. As a strong supporter of hydrogen infrastructure build-out, the core team will bring their knowledge and experience to the project where they look forward to providing a zero-emission solution for freight movement at the ports. The demonstration piece of Toyota's commitment involves Toyota Logistic Services (TLS) who will operate the ZE forklifts. TLS also oversees Toyota Transport, which will operate the fuel cell electric trucks. Key personnel for the S2S project include the following key individuals.

- Andy Lund, Chief Engineer, will oversee the research and development activities of the fuel cell electric truck project.
- Tak Yokoo, Senior Executive Engineer, will be responsible for product development and execution for fuel cell powertrain system development.
- Craig Scott, Senior Manager, is the project lead for business and strategy development with responsibility for successful project execution.
- Ash Corson, Alternative Fuels Vehicle Manager, will support business development through active coordination of project stakeholders.
- James Kast, Fuel Cell Business Analyst, will support the business and strategy group with project development.

Kenworth Truck Company (Kenworth)

Kenworth Truck Company is the manufacturer of The World's Best® heavy and medium duty trucks. With an excellent heritage of quality, innovation and technology, Kenworth has produced over 1.1 million trucks for thousands of customers since the company began in 1923. Over the past 95 years, Kenworth has played an essential role in the development of trucks that are more fuel efficient, productive and economical to operate. Today, Kenworth is developing important advancements in Class 8 truck aerodynamics, engine and powertrain efficiencies under the $8 million SuperTruck II program funded by the Vehicle Technologies Office of the U.S. Department of Energy (DOE). Goals for the program include the demonstration of greater than 100 percent improvement in freight efficiency* over 2009 equivalent product, and a 55 percent engine increase in brake thermal efficiency performance. Kenworth is collaborating with UPS on this major program. The Kenworth T680 HECT (Hybrid Electric Cargo Transport), and T680 is ZECT (Zero Emission Cargo Transport) Class 8 truck projects are funded in part by the Office of Energy Efficiency and Renewable Energy (EERE), the U.S. Department of Energy and the South Coast Air Quality Management District. The T680 HECT tractor incorporates a parallel hybrid electric propulsion system and Cummins Westport ISL G Near Zero emission engine fueled by compressed natural gas, in combination with a generator to extend the truck's battery range. The T680 ZECT tractor uses a hydrogen fuel cell that combines compressed hydrogen gas and air to produce electricity, with only water vapor emitted at the exhaust pipe. This spring, Kenworth announced delivery of the first near-zero emission 12-liter natural gas truck – a Kenworth T680 – to AJR Trucking, a port drayage and mail delivery fleet, in Southern California. The Cummins Westport 12-liter ISX12N engine is the only engine to be certified by the California Air Resources Board as meeting the California Air Resources Board's toughest optional Low NOx standard, which is 90% cleaner than current federal EPA emission standards. The truck was purchased with funds from the Proposition 1B (Prop 1B) incentive pool managed by the South Coast Air Quality Management District (SCAQMD). A total of 20 T680s with this engine are entering the AJR Trucking fleet. Resumes are provided in Attachment 11 for the following key personnel, including:

- Mark Brown, Executive Program Manager - Advanced Technologies, is responsible for the advanced technology programs including the current SuperTruck program with the U.S. Department of Energy.
- John Luoma, Assistant Chief Engineer, is responsible for Kenworth's product development. He is responsible for managing engineering teams that design major product development programs, Electrical/Electronics systems, Chassis systems, and Cab structure.
- Brian Lindgren, Director - Research and Development, is responsible for the R&D team and Kenworth's two R&D facilities.
- Stan Delizo, Research Engineering Manager, is responsible for Anti Idling Systems and Hybrid Vehicles for Kenworth Truck Company.

Port of Hueneme (POH)

The Port of Hueneme is the only deep water port between Los Angeles and the San Francisco Bay. It services many of the cargo needs of the Central Coast and Valley of California and the Southern California markets. Specializing in the fresh produce and automobile niche markets, the Port of Hueneme is integral to the supply chain of exports and imports throughout California. In fiscal year 2017, about 1.49 million tons of cargo moved via these terminals and were produced and consumed by exporters and importers located within the metropolitan region, the State of California, as well as throughout the Southwest and the Western States. This Shore-to-Store Project (S2S) project will fund two significant innovations at the Port of Hueneme: (1) Installation of electrical infrastructure to power a new generation of zero-emission cargo handling equipment, and (2) Acquisition of the Port's first all-electric, zero-emission cargo handling equipment. The electrical infrastructure and zero-emission (ZE) cargo handling equipment will make possible the starting of a new era of zero and near-zero emission cargo movement at the Port. Once installed, this infrastructure will immediately power the Port's first electric, zero-emission yard tractors. In addition to the infrastructure and ZE yard tractors at the Port of Hueneme, one of the new hydrogen fuel-cell, zero-emission trucks included in the S2S Project will be dedicated to bringing the world's first zero-emission avocados to and from the Port of Hueneme and the packing facility in Oxnard. This truck will also carry shipments of avocados grown in the Port of Hueneme region to the Port of Los Angeles for export. These elements combine to support a

groundbreaking pilot program spanning multiple counties, two commercial seaports, two air quality control districts. The S2S Project will demonstrate how new technology can reduce the carbon emissions from cargo movement while improving air quality throughout disadvantage communities, all while leading the way for the future of zero-emission cargo logistics from ship to the consumer's store. Appendix D provides additional background for the Port of Hueneme.

Data Collection and Analysis Qualifications

National Renewable Energy Laboratory (NREL) NREL conducts research and development in all aspects of advanced vehicle technologies for the USDOE and other clients. We have active research in the areas of battery technology, electric motors, power electronics, efficient mobility systems, electric vehicle charging systems, grid integration, fuel cells, hydrogen, hydrogen infrastructure, advanced fuels and combustion research. Our Renewable Fuels and Lubricants Laboratory (ReFUEL) has heavy-duty chassis dynamometer with full emissions characterization that can test up to class 8 vehicles. NREL has successfully worked with project team members on performance evaluations of zero emission yard tractors and drayage trucks using both field evaluation and their heavy-duty truck dynamometer. NREL is currently working with Kenworth on ZECT II project, DOE's Super Truck II, and DOE-funded project to develop a range extended EV medium-duty delivery vehicle. NREL has worked successfully collecting data and evaluating vehicle technologies with the Ports of Long Beach and Los Angeles, and several fleets (TTSI, Cal Cartage, Dependable Highway Express) ZECT I & II. NREL has successfully executed a number of collaborative research project with Toyota North America. NREL has also worked extensively with California State agencies including Californian Air Resources Board, California Energy Commission, SCAQMD, and others. Expanded qualifications are provided in Attachment 11 and resumes are provided in Appendix A for the following key personnel:

- Ken Kelly has over 25 years of experience working on clean transportation research and integrated deployment and currently leads the Commercial Vehicle Technologies team at NREL. Ken will lead the program management and provide technical oversight for the project.
- Jason Lustbader has over 15 years of experience in efficient transportation energy research and development. He has successfully led multiple DOE and industry funded projects. He will provide project management and technical leadership to the data analysis team.
- Andrew Kotz is an expert in data collection, analysis, and analytics. He focuses on analysis of large, real-world vehicle operational datasets using spatial computing and big data techniques. Andrew will support data management, processing, and analysis.
- Leonard Strnad is a data scientist with expertise in mathematics and statistics. Leonard will provide advanced analytical and statistical method expertise which could include advanced clustering methods, deep learning, and geospatial analysis methods.
- Eric Miller has expertise in fleet data analysis and will support the data analysis and analytics tasks.
- Leslie Eudy manages transit bus evaluations and will provide expertise on maintenance data processing and analysis methods. Additional qualifications and resumes are provided in Attachment 11.

Shore-to-Store Operator Fleet Partners (UPS, TTSI, SCE, Toyota Logistics and Port of Hueneme)

The project team has assembled an impressive group of four influential and progressive fleet operators to be a part of the S2S project. United Parcel Services (UPS), Total Transportation Services Inc. (TTSI), Southern Counties Express (SCE), and Toyota Logistics Services (TLS) all bring a wealth of experience and expertise from the freight movement industry and have a strong local presence in the Southern California region. The strong interest from these successful freight movement companies demonstrates that there is not only a market push of ZEV technology from OEM's, but there is also a strong market pull and demand for ZEV solutions in the freight movement industry. Key individuals from each operator are listed below, with the key points of contact identified, should you have any questions:

- UPS – Scott Phillippi and Michael McDonald will oversee UPS's involvement as a featured fleet operator
- TTSI – Vic La Rosa. Phone: (310) 816-0260, email: vicla@tts-i.com

- SCE – Sherry Hertel and Gordon Reimer will oversee SCE's involvement as a featured fleet operator
- Toyota Logistics Services – Lee Hobgood: Lee.Hobgood@toyota.com , (469) 292-1160, and Kirk Welch: Kirk.Welch@toyota.com , (469) 292-1335

Air Liquide

In the US, Air Liquide is embarking on an ambitious plan to construct and operate a large network of public hydrogen fueling stations for light-duty Fuel Cell Electric Vehicles in California and in the Northeast United States. As the U.S. auto market continues to shift to more efficient vehicles and fuels, we believe *(along with most of the major automakers)* that hydrogen offers the best solution for reducing transportation-related emissions while still providing a user-experience the typical American driver expects. As we have entered the hydrogen mobility market in California, Air Liquide has partnered with the state to own and operate five public refueling stations, with open stations in Anaheim, LAX, and Long Beach and new stations under development in Palo Alto and Santa Nella. We have opened new industrial gas manufacturing facilities and distribution fleets in Etiwanda, CA, and in Sacramento, CA to provide dedicated supply of hydrogen to our growing network of mobility customers across the state. Altogether, we have committed more than $50M in investments into the state to date as we anticipate significant new investments in production, distribution, and dispensing in the future. Our objective is to bring cost competitive hydrogen to the market with a low carbon intensity at a scale that supports the ambitious state targets for vehicle introductions. Aaron Harris and David Fernandes will oversee Air Liquide's involvement in this project.

- David Fernandes: davida.fernandes@airliquide.com, (281) 804-8118: Business Development Manager, Hydrogen Energy: Will serve as the prime business contact for the Air Liquide stations.
- Aaron Harris: aaron.harris@airliquide.com , (713) 624-8359: Technical Director, Hydrogen Energy: Will serve as the lead technical contact for the Air Liquide stations.

South Coast Air Quality Management District (SCAQMD)

Matt Miyasato, PhD, Deputy Executive Officer Science and Technology Advancement Office

SCAQMD will be a technical advisor to the project team on development and commercialization of the zero-emission technology. SCAQMD is committed to undertaking all necessary steps to protect public health from air pollution, with sensitivity to the impacts of its actions on the community and businesses. SCAQMD's Science and Technology Advancement Office is supporting this project with a direct cost-share contribution[4] of $1,000,000, without which this project application would not have been possible. Dr. Matt Miyasato will serve as a technical advisor to the project. He has an undergraduate degree in Mechanical Engineering, and a masters and Ph.D. in Engineering, specializing in combustion technologies and air pollution control.

Coalition For A Safe Environment

Jesse Marquez, Founder and Executive Director, Coalition for a Safe Environment (CFASE)

The Coalition For A Safe Environment (CFASE) is a community based non-profit environmental justice, public health and public safety advocacy organization. CFASE is primarily a Latino EJ Organization founded in 2001 by Wilmington resident Jesse N. Marquez. CFASE has been a member of numerous state, regional and local governmental agency committees on ports, freight transportation, goods movement transportation corridors, air quality plans, air pollution monitoring, ship electric shorepower, emissions capture and treatment technologies. CFASE has additionally conducted its own community based scientific research on zero emission and near zero emission technologies status. Jesse will serve on the project team as the community outreach advisor. He has been Executive Director of the CFASE for sixteen years. Please refer to CFASE's Letter of Commitment in Attachment 7.

[4] Subject to final SCAQMD Board approval.

3. Project Objectives and Work Plan

Project Objectives

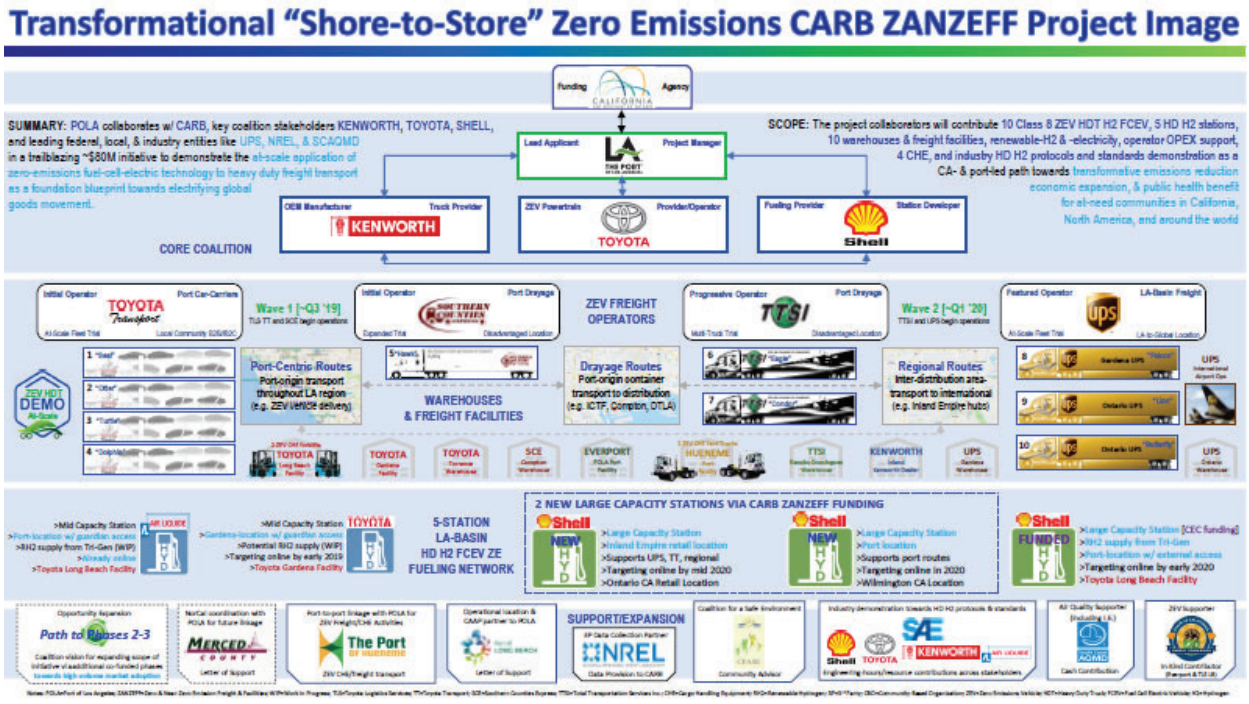
The Zero-Emission Shore-to-Store Project meets ARB's goals under the ZANZEFF Project Solicitation and the FY 2017-18 funding plan by:

- **Support bold, transformative emission reduction strategies that can be emulated throughout freight facilities statewide.** Through robust testing and careful data logging, this project will demonstrate that zero-emission battery and fuel cell powered CHE and Class 8 trucks, with their increased range and reliability, can be a cost effective and efficient solution for the goods movement industry, thus fast-tracking advanced emissions reduction technologies into the market place. Without this demonstration and testing platform, the industry would not be able to view the potential of battery and fuel cell power in heavy-duty freight operations. This project provides a snapshot of a ZE supply chain in operation, providing a model that can be emulated in operations throughout the state.
- **Potential for widespread commercialization and significant transformation of the industry while holistically achieving greenhouse gas, criteria pollutant, and toxic emission reductions benefitting disadvantaged communities.** This project has the potential to be a cost-effective alternative to meet zero-emission transportation technology goals, thereby having the potential to enhance widespread commercialization, and subsequent transformation of the industry. Since CHE, drayage and regional Class 8 trucks typically operate in and around disadvantaged communities, the benefit of zero-emission freight movement is directly relevant to those communities near port areas. Additionally, with the forecasted increase in goods movement activity in the San Pedro Bay ports, the use of zero-emission CHE and trucks can have even longer term benefits.
- **Build upon advances from prior demonstration projects by expanding the type and numbers of zero emission and near-zero-emission equipment used in goods movement operations and facilitating the opportunity for technology transfer from other applications.** This project closes the remaining gap in an all-electric goods movement system, from the wharf to the consumer. Advances in electric cargo handling equipment have expanded the potential for all goods movement equipment to move toward zero-emissions as the vehicle/equipment technology and zero emission fueling infrastructure are more and more supported. Further, this project will evaluate the capabilities of zero-emission technology in one of the last remaining diesel dominant applications in goods movement: regional trucking.
- **Reduce GHG emissions and provide economic, environmental, and public health co-benefits to disadvantaged communities, while synergistically demonstrating the practicality and economic viability of widespread adoption of advanced zero-emission technologies.** This project will reduce toxic, criteria and GHG emissions from the baseline, and even further than baseline comparison if replacing older, higher polluting equipment. This technology can provide a cost-effective and scalable model for sustainable and zero-emission freight operations at marine terminals and warehouses throughout the state, nation, and world.
- **This project can be implemented, demonstrated and tested by April 15, 2021.** The maturity of this project's technology combined with the proposed work plan and pre-existing relationships of the project team, ensures that the project can be completed by April 15, 2021.

As the largest container port in the western hemisphere, the Port of Los Angeles has established itself as a leader in the goods movement industry. However, facilitating global trade while protecting the environment is a delicate balance at the nation's largest trade gateway. To strike that balance, the Port is leading the way internationally when it comes to reducing air emissions and cultivating the development of new technologies that will help ensure good jobs and a brighter future for millions of people. Achieving this balance requires a far-reaching vision that must include all aspects of the supply chain. To achieve this end, the Port envisions a future wherein large goods movement centers work closely together to ensure that freight transport occurs with minimal impact to the environment. While this certainly includes the equipment used at a given facility, each such center, be they marine or inland ports, warehouses, or distribution centers, has a responsibility to look beyond their direct control to the mechanisms by which freight moves between them.

With the goal of realizing this vision in mind, the Port has joined together with myriad partners, such as other agencies, private industry, and our local communities to construct a multi-phase sequence of projects and investments needed to achieve efficient and clean goods movement throughout the state. Specifically on this phase, the Port, Equilon Enterprises LLC (d/b/a Shell Oil Products US) (Shell), Toyota Motor North America (Toyota) and Kenworth Truck Company (Kenworth) are partnering with, the Port of Hueneme (POH), United Parcel Services (UPS), Total Transportation Services Inc. (TTSI), Southern Counties Express (SCE), Toyota Logistics Services (TLS), Air Liquide, National Renewable Energy Laboratory (NREL), Coalition For A Safe Environment (CFASE), and the South Coast Air Quality Management District (SCAQMD) to implement the first phase of a long-term industry collaboration to transform the freight market in southern California to zero emissions.

This proposal is the first step of a much larger vision that the Port, alongside its project partners, believes is vital to ensuring the transition of the freight industry towards clean technologies and improving the overall efficiency of goods movement to handle the rising demands of the future. The image below details the specifics of the currently proposed project[5]:



The initial phase described in this application focuses on the introduction, demonstration, and support of the at-scale zero emission on-road and off-road equipment together with supporting infrastructure in inland areas near the Port of Los Angeles to and from Southern California's Inland Empire and the Port of Hueneme. Once this foundation is developed, subsequent phases will increase the amount of zero emissions equipment operating in warehouses and between the Port of Los Angeles and Southern California inland areas, as well as expand the zero emissions pathway between the Port of Los Angeles and the Inland Empire, the Port of Hueneme and the California central coast. An especially exciting part of the next phases of this project will be their contribution to an already planned development at the Mid-California International Trade District in Merced County that will include processing activities to help facilitate the movement of cargo to and from the central valley of California by truck and rail. A Memorandum Of Understanding with a facility in Merced has already been signed by the Port of Los Angeles[6]. Merced County, a

[5] Please refer to Appendix F for a larger version of this graphic.
[6] Link to press release documenting MOU approval:
https://www.portoflosangeles.org/newsroom/2017_releases/news_102417_MercedCountyPortOfLaAgreement.pdf

supporter of this S2S project, is particularly interested in seeing expanded efficiencies for movement of cargo in and out of the California Central Valley, which would support development of the Mid-California International Trade District.

The initial phase of this proposed project described in this application contains three key elements.

- First, ten hydrogen fuel cell zero emission Class 8 on-road trucks would be developed through a partnership between Toyota Motor North America (Toyota) and Kenworth Truck Company (Kenworth) to move cargo from the Port of Los Angeles to inland locations such as Riverside County, the Port of Hueneme, and eventually Merced, California. This fleet will transport commercial cargo – such as international drayage loads, regional delivery parcels, and zero-emissions passenger vehicles – in revenue service between POLA terminals, Los Angeles and Inland Empire warehouses, facilities and businesses, and Port of Hueneme. The hydrogen fuel cell design for these trucks offers the advantage of increased range, which is expected to help reduce near-term concerns about range limitations for longer trips between the Port of Los Angeles and Southern California inland areas, and especially to the Port of Hueneme and eventually Merced County. The hydrogen fuel cell trucks can also be refueled in about the same amount of time as a standard diesel truck, thereby limiting recharging down time for operation of these trucks.
- The second key element of this proposed project is foundational infrastructure that would be developed by Equilon Enterprises LLC (d/b/a Shell Oil Products US) (Shell) to support the operation of the zero emission on-road trucks. Shell initially proposes in S2S to establish a strategically-developed, -situated, and -integrated hydrogen fueling network, in key locations in order to enable zero-emissions freight transport flowing through the ports and across the greater Los Angeles basin. Two large Shell stations will be funded in S2S at the retail station of Travel Center of America, in Ontario CA and at the Shell Lubricant Blending Plant, in Wilmington CA. They will be complemented by the future Shell station at the Port of Long Beach that will come as a match share in S2S, and two smaller stations that will not be financed through this solicitation, including one existing Air Liquide station at Toyota Logistics Services in Port of Long Beach and one planned at the Toyota Technical Center in Gardena. In summary, the S2S project proposes the design and construction of two new, high capacity hydrogen stations by Shell at:

  - ✓ Travel Center of America retail station of, 4325 E. Guasti Road., Ontario, CA 91761
  - ✓ Shell Lubricant Blending Plant, 1926 East Pacific Coast Hwy., Wilmington, CA 90744
  - ✓ Shell's future hydrogen refueling station at 785 Edison Ave., Long Beach, CA 90813 (as an in-kind match share)

  And S2S will leverage three medium- and high-capacity stations currently under development by Air Liquide at:

  - ✓ Toyota Logistic Services, in Port of Long Beach, CA
  - ✓ Toyota Technical Center, in Gardena, CA

  More fueling centers would be established in later phases of this project along the California central coast near Port of Hueneme and in the Merced area. A key feature is that, in addition to hydrogen fueling infrastructure, the centers could be designed to offer natural gas to support operation of near-zero on-road trucks in the next few years, as well as eventually plug-in capability for battery operated trucks operating in the area. ARB's ZANZEFF Solicitation, Appendix C, H2 station requirements are met and addressed in Appendix C.

- The third key element of this proposed project involves development of zero-emission off-road equipment to be operated at inland port warehouses operated by Toyota, and at cargo handling terminals in the Port of Hueneme. It is this team's vision, that warehouses can quickly move to operate with substantially reduced use of the electrical grid, through the installation of solar panels on warehouse roofs, and the use of battery electric or hydrogen fuel cell electric (depending upon the duty cycle) zero emission equipment inside the

facilities themselves. This set-up would also help to support charging and infrastructure for on-road trucks that could operate moving goods to and from the warehouses. The model for this vision is under development at the Port of Los Angeles' Pasha terminal, where zero emission equipment will eventually allow that terminal to operate fully off the grid. That project does include the testing of an on-road zero emission truck as well.

Solar power is not proposed for this initial phase of this S2S project, but as the project expands, it is the hope of the project partners that each of their warehouses will substantially be able to reduce their dependence on the electric grid, if not become capable of achieving full grid independence in emergencies. Since the duty cycle of off-road cargo handling equipment is different than for on-road drayage trucks, two types of off-road equipment could provide a viable ZE solution. At the Toyota warehouse at TLS in the POLB, the current ZE forklifts within the fleet will be expanded by replacing two conventional propane[7] forklifts with two battery electric forklifts. The entire warehouse operation will be powered by 100% renewable electricity provided by the fuel cell Tri-Generation facility onsite. TLS has a goal to convert the entire forklift fleet to ZE technology, and have interest in demonstrating fuel cell forklifts in the future, as it would integrate well with the Toyota on-road FCETs that would move to and from these locations. UPS has a large warehouse operation located at the Ontario airport, and has also expressed interest in demonstrating fuel cell material handling equipment to help achieve their environmental goals. At the Port of Hueneme, battery-electric yard tractors would be owned and operated by POH, with the plan to lease them to Port terminals. The S2S project will provide POH its first opportunity to evaluate ZE technology in cargo operations.

These proposed project elements complement the extensive ZE and NZE equipment that are already under development for testing at Los Angeles terminals through partnership with the California Energy Commission (i.e., Everport). These investments, viewed together as a single project, showcase a clear and concise snapshot of the ZE supply chain of the future, and will provide a model by which freight facilities can structure their operations to support ZE/NZE emissions operations.

Review and input on project development and implementation will be provided by the National Renewable Energy Laboratory (NREL) and the South Coast Air Quality Management District (SCAQMD). The San Joaquin Valley Air Pollution Control District will also be consulted for overall conceptual direction, especially as this project expands to include movement to and from central valley locations such as Merced County. The Coalition for A Safe Environment (CFASE), an important community activist group in the Port of Los Angeles area, will attend project meetings to monitor potential community benefits, and overall provide input on strategy and project management.

The proposed team of industry leaders believes this project will provide a model for the development and implementation of zero emission technology and supporting infrastructure in California by world-wide industry leaders, and a meaningful pathway towards emissions reduction, economic expansion, and public health benefit for communities in California, North America, and around the world. This trailblazing effort features a deeply qualified coalition and a complete value chain implementation—including a multi-operator ZE hydrogen fuel-cell-electric-vehicle (FCEV) truck fleet, dedicated heavy-duty hydrogen fueling network, renewable hydrogen and electricity generation, ZE cargo handling equipment, and local freight operator support—to help initiate port- and southern California-based ZE freight movement. This proposed S2S Project will build upon the project team's experience in impactful ongoing projects already undertaken at or near the Port of Los Angeles, through funding from CARB and other sources towards the realization of the Port's vision of ZE freight operations and will serve as a foundational ZE blueprint for the sustainable electrification of port, regional, national, and global goods movement. .

Benefits to California

SCAQMD, CARB and CEC support hydrogen and fuel cell technologies and recognize that light-, medium- and heavy-duty vehicles must achieve zero or near-zero emissions for the region to meet state and federal air quality

[7] Note that since ARB Appendix D guidance did not provide factors for propane, the emissions calculations for this equipment are based on a CI engine baseline.

attainment standards. This project will help ensure that sufficient hydrogen infrastructure is available to support the demonstration and early-market introduction of zero emission fuel cell vehicles, including drayage and regional Class 8 trucks for goods movement. Use of zero emission heavy-duty trucks further supports the state's goals in reducing emissions from goods movement programs, including the Sustainable Freight Action Plan. Successful demonstration and greater deployment of fuel cell vehicles are expected to provide reduction of criteria pollutants from heavy-duty trucking activities, especially in disadvantaged communities that are disproportionately exposed to harmful diesel emissions, such as the San Pedro Bay Ports and Inland Empire area.

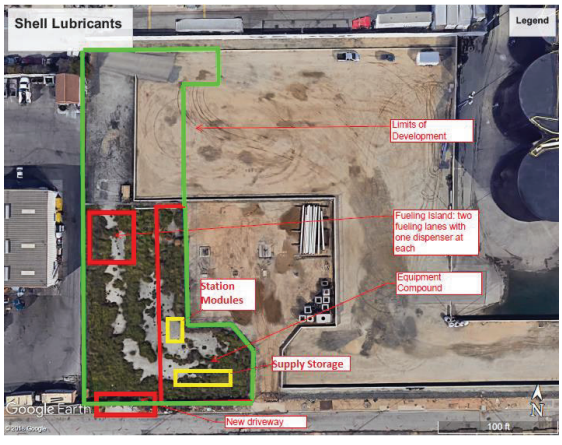
The Ports of Los Angeles and Long Beach have emissions reduction goals laid out in the San Pedro Bay Ports Clean Air Action Plan. One of the goals included in the plan is to phase out non-zero emission drayage trucks by 2035. Using only POLA and POLB as an example, a total of ~17,000 drayage trucks operate in and out of these two ports. The transition plan alone at POLA and POLB represents a significant fleet of trucks targeted for replacement with zero emission technologies such as hydrogen fuel cells. While the ability to expand the volume of freight handled is always a consideration for the ports, they are constrained by stringent emissions regulations. Expanded operations means the addition of more trucks servicing the ports, however, additional vehicles would have to utilize zero emission technologies to meet emissions regulations. If the ports aim to double freight capacity, there is a potential need for 30,000+ zero emission trucks in the San Pedro ports alone.

This proposal is the culmination of a long series of investments and demonstrations made at and by POLA over the last decade. As several successful and ongoing demonstrations of ZE and NZE technologies in a wide variety of applications have begun to show the ability to perform the tasks needed, the focus must now shift to the future, and focus on widespread deployment and infrastructure support to allow for ZE and NZE freight movement across the region, state, and beyond. Together with our industry, agency, and community partners, POLA believes that the scope of this specific proposal, and the pathway laid out herein for future projects, demonstrates the clearest and quickest path towards clean and efficient freight transport in California.

It is noteworthy that this project is scheduled as an informational item for the upcoming Board of Harbor Commissioners meeting on August 2, 2018. This educational effort will streamline the final approval process, should the Harbor Department ultimately be selected for an award under this program. A copy of this Board Report is included in Appendix B.

Station Parameters for Wilmington CA Site (Shell Lubricants Facility)

To meet the daily fueling capacity of 12 trucks per day with a peak capacity of four trucks per hour, the station will have two fueling positions (dispensers). Each fueling position will have its own station module, such that should one station module experience a failure the other would be able to continue fueling to fully meet the daily fueling needs. The hydrogen supply will be stored on site in pressure vessels at a nominal charge pressure of 45 MPa. An on-site storage capacity of 1,500 kg of hydrogen will be sufficient to meet the daily required fueling needs. Hydrogen will be supplied to site by compressed gas tube trailer.



Electrical Power: Power to run station compressors and chillers as well as ancillary equipment will be delivered from the local utility at 480 VAC 3-phase. The estimated electrical maximum power need will be approximately 290 kW, with an average power draw during fueling estimated at 220 kW. At the Shell Lubricants site, the existing utility will have spare capacity to provide the needed additional power for the station.

Site Layout: The fueling station storage vessels and station modules will be sited on a concrete slab construction and occupy a total of approximately 750 square feet. This comprises a supply storage skid occupying 12 ft by 40 ft and 2

station modules occupying a total of 18 ft by 28 ft. In addition, an area will be added for roadside access and for two fueling positions for two trucks. For the proposed site at Wilmington, the aerial view layout indicates there is ample room for the proposed equipment on site and easy access for truck fueling and for refueling of the station.

Station Parameters for Ontario CA Site (Travel Center of America)
To meet the daily fueling capacity of 12 trucks per day with a peak capacity of four truck per hour, the station will have two fueling positions (dispensers). Each fueling position will have its own station module, such that should one station module experience a failure the other would be able to continue fueling to fully meet the daily fueling needs. The hydrogen supply will be stored on site in pressure vessels at a nominal charge pressure of 45 MPa. An on-site storage capacity of 1,500 kg of hydrogen will be sufficient to meet the daily required fueling needs. Hydrogen will be supplied to site by compressed gas tube trailer.

Electrical Power: Power to run station compressors and chillers as well as ancillary equipment will be delivered from the local utility at 480 VAC 3-phase. The estimated electrical maximum power need will be approximately 290 kW, with an average power draw during fueling estimated at 220 kW. At the Ontario travel center, the existing utility will have spare capacity to provide the needed additional power for the station.

Site Layout: The fueling station storage vessels and station modules will be sited on a concrete slab construction and occupy a total of approximately 750 square feet. This comprises a supply storage skid occupying 12 ft by 40 ft and 2 station modules occupying a total of 18 ft by 28 ft. The modules will be behind barriers to not interfere with normal travel center truck operations. Room for the dispensers will be accommodated at the current truck fueling island.

For the proposed travel center site, the layout is shown in this aerial view. As shown, there is ample room for the proposed equipment on site and easy access for truck fueling and for refueling of the station using the existing road access.

A Note about the Work Plan
The Zero-Emission Shore-to-Store Project Work Plan, which provides a task-by-task breakdown of the important steps and milestones necessary to successfully implement this project, is provided at the end of the Narrative, since the Work Plan discussion does not count toward the 25-page limit. Please refer to it after Section 13.

4. Budget, Match Funding, and Financial Capabilities

The table below lists the tasks required to successfully complete the S2S Project, the associated budget and the source of funding associated with each task (i.e., grant vs. match type). No administrative fees are requested from CARB for this project.

The total project cost is $82,568,872, with project partners providing 50.2%, or $41,446,612 in match funding ($14,317,281 cash and $27,129,331 in-kind). Each funding partner's cost share commitment is documented by a Letter of Commitment signed by an authorized representative provided in Attachment 7. Further, no match funding is dependent on a future award under any other solicitation. The project team consists of major OEM companies that are technology innovators who have already demonstrated a strong commitment to the long-term success of the proposed zero-emission goods movement strategies proposed under the S2S project. The table below documents the source and type of match funding for each project task. Attachment 4 provides additional budget information, including the project milestone and disbursement schedule.

Description	Match Funding Source	Cash	In-kind	ARB Grant Request	Total
Task 1.0 Administration & Project Management	POLA/ SCAQMD	$1,000,000	$13,999,331	$0	$14,999,331
Task 2.0 Design and Construction of Hydrogen Infrastructure	Shell	$1,400,000	$12,000,000	$17,100,000	$30,500,000
Task 3.0 Truck Fleet Design and Build	Kenworth/ Toyota	$9,820,000	$0	$20,430,000	$30,250,000
Task 4.0 Yard Tractors and Charging Infrastructure	POH	$0	$200,000	$3,000,000	$3,200,000
Task 5.0 Technology Demonstrations	Toyota/UPS/ TTSI/SCE	$2,097,281	$930,000	$0	$3,027,281
Task 6.0 Data Collection and Analysis	N/A	$0	$0	$592,260	$592,260
Totals		**$14,317,281**	**$27,129,331**	**$41,122,260**	**$82,568,872**

The cash and in-kind match funding commitments include the following:

- **Harbor Department** is providing a total in-kind match contribution of $13,999,331 from the concurrent CEC projects at its Everport Terminal.
- **Shell is providing $1,400,000 of cash match dedicated to the infrastructure in Wilmington and Ontario and an in-kind match contribution of $12,000,000 from the concurrent CEC project at Port of Long Beach (H2Freight)**
- **Toyota** is providing a total cash match contribution of $9,41,848 which includes the design, engineering, integration, and support of 10 fuel cell electric powertrain systems for Class 8 trucks; operational, requisite fuel, maintenance, and administrative expenses to operate 4 FCETs during the demonstration period.
- **Kenworth** is providing a cash match of $1.32M in the form of ten (10) class 8 day cab gliders that will be the basis upon which the fuel cell electric vehicles will be built.
- **UPS** is providing an in-kind match contribution of $930,000 for operational, requisite fuel, maintenance, and administrative expenses to operate three FCETs during the demonstration period.
- **TTSI** is providing a cash match contribution of $545,433 for operational, requisite fuel, maintenance, and administrative expenses to operate two FCETs during the demonstration period.
- **SCE** is providing a cash match contribution of $310,000 for operational, requisite fuel, maintenance, and administrative expenses to operate one FCET during the demonstration period.
- **Port of Hueneme** is providing a cash match contribution of $200,000 for the engineering and construction of electric charging infrastructure to support two battery electric yard trucks at POH.
- **SCAQMD**: will contribute a cash match contribution of $1,000,000 to support the overall success of this project which will provide significant emissions reductions in the South Coast Air Quality Basin.

5. Potential Emission Reduction Benefits

The innovative technology proposed in the Zero-Emission Shore-to-Store Project will directly help California achieve its climate change and air quality goals by reducing GHG, criteria pollutant, and toxic air contaminant emissions from the project vehicles and equipment as they operate throughout several disadvantaged communities (DAC). The Harbor Department itself is located in a designated DAC and there are several other DACs directly adjacent to the Port of Los Angeles. In addition, there are nine additional sites for this project that are directly located in a designated DAC, with the on-road trucks traversing many more DAC. Our partner fleets have indicated a strong interest in

expanding the zero-emission freight transport capability throughout their fleets, and if successful, this project could lead to implementation at other ports throughout California and the United States. The emission reductions presented below reflect an estimate (using ARB's Appendix D methodology) of the project equipment relative to the ARB-prescribed Tier 4 baseline (for off-road equipment) and 2017 engine standards for on-road Class 8 trucks. The below tables summarize the project benefits expected from the demonstration vehicles and equipment on an annual basis as well as a two-year and ten-year project life, as required by page 32 of the CARB Solicitation.

	Reductions in Tons/Year per unit type				
Equipment Type	**NOx**	**ROG**	**PM10**	**WER**	**GHG (MT)**
Fuel Cell Electric Class 8 Truck	0.038	0.002	0.002	0.08	74.66
ZE Yard Tractor	0.0629	0.0145	0.0022	0.1214	23.41
ZE Industrial Forklift	0.0364	0.0012	0.0001	0.0396	22.29

	Total Fleet Emission Reductions			
	Total Fleet Emissions over 2 years		Total Fleet Emissions over 10 years	
Equipment Type	**WER (tons)**	**GHG (MT)**	**WER (tons)**	**GHG (MT)**
Ten (10) Fuel Cell Electric Class 8 Trucks	1.6	1,493	8.0	7,466
ZE Yard Tractors	0.4856	94	2.428	468
ZE Industrial Forklift	0.1584	89	0.792	446

The emissions reduction benefits quantified for the S2S project do not double count the emissions reductions for the CEC funded project H2Freight, which is being provided by Shell as in-kind match share. The H2Freight project is supporting the development of a heavy duty hydrogen fueling station at the Toyota facility in the Port of Long Beach. The emissions reductions claimed within H2Freight only claimed the potential emissions benefits for a total of 100,000 kg of hydrogen by the end of the project demonstration period in April 2022. This amount of hydrogen only assumes 250 total days of fueling at an average of 400 kg/day demand to fuel FCETs. After the conclusion of the proposed S2S project in April 2021, the H2Freight fueling station is projected to exceed 400 kg/day of demand for the next year of project life to achieve the quantified emissions reductions outside the scope of the S2S project.

6. Cost-Effectiveness

Please refer to Attachment 3 for a detailed, step-by-step evaluation of the cost effectiveness of the proposed project, as defined by ARB's Methodology for Determining Emission Reductions and Cost-Effectiveness (Appendix D) of the ARB Solicitation:

1. The project equipment's incremental cost at time of the demonstration, based on a 2-year project life;
2. The project equipment's incremental cost two years after completion of the demonstration, based on a 10-year project life; and
3. To comply with the Solicitation (p. 33), the project equipment's incremental cost two years after completion of the demonstration, based on a 5-year project life is provided for off-road equipment.

7. Benefits to Disadvantaged Communities

The POLA Shore-to-Store Project includes several project sites, as detailed below, all located within designated disadvantaged communities. Note that while POH is not located in an identified DAC, it is situation directly adjacent

to DACs. Overall, the proposed project will provide environmental, social, and economic benefits to the surrounding disadvantaged communities, as detailed in Attachment 5.

Census Tracts	Population	CalEnviroScreen3.0 Score
1. Toyota Hydrogen Refueling Station, 1630 186th Street, Gardena, CA 90248 (Census Tract 6037291300)	2,601	90-95%
2. 785 Edison Ave, Long Beach, CA 90802 (Census Tract 6037980033), includes three project elements: -Shell Hydrogen Refueling Station -Air Liquide Hydrogen Station -Toyota Logistics Services (battery-forklift demo)	61	NA (Pollution >95)*
3. Shell Hydrogen Refueling Station, 4325 E Guasti Road, Ontario, CA 91761 (Census Tract 6071012700)	4,052	75-80%
4. Shell Wilmington Sales Terminal, 1926 E. Pacific Coast Highway, Wilmington, CA 90744 (Census Tract 6037980014)	239	99%
5. Southern Counties Express, 18020 Santa Fe Ave, Rancho Dominguez, CA 90220 (Census Tract 6037543305)	2,666	95-100%
6. TTSI, 18735 S Ferris Pl, Rancho Dominguez, CA 90220 (Census Tract 6037543305)	2,666	95-100%
7. UPS Freight Facility, 3140 Jurupa St., Ontario, CA 91761 (Census Tract 6071012700)	4,052	75-80%
8. UPS Gardena Facility, 17115 S Western Ave, Gardena, CA 90247 (Census Tract 6037603302)	3,804	90-95%
9. Everport Terminal Services, 389 Terminal Island Way, TI, CA 90731 (Census Tract 6037980033)	61	NA (Pollution >95)*

8. Technology and Innovation

The first area of innovation is the sheer scale of the shore-to-store project. A daily fueling capacity of 1,000 kg for Fuel Cell Electric Trucks (FCET) at three sites demonstrates the scalability that will be needed for future station infrastructure supporting widespread deployment of FCEVs, both in the light-duty and heavy-duty sectors. Deploying larger stations with higher throughputs will continue to attract large station developers and gas suppliers because of the cost reduction which is realized by selling high volumes of hydrogen fuel. Simply scaling up is one method needed in order to reach dispensed fuel cost targets. The scale of the station also provides insight into the demand of heavy-duty vehicles. A station of this size may only be able to provide fuel for tens of trucks as opposed to hundreds of cars. This level of understanding is valuable to the heavy-duty industry and an entity such as a port specifically which is currently planning for the transition to zero-emission trucks by 2035.

FCETs for Class 8 applications are still early in their product development, with only a few prototypes on the road today including Toyota's Project Portal truck. The team has already obtained many valuable lessons learned from actual on-road demonstration data, but much further development with more prototype trucks is needed. The entire electrified powertrain system consisting of major components such as the fuel cell, battery, electric motor, transmission, and power control units requires significant engineering and optimization to meet the performance needs of fleet operators without affecting their operations. Total cost of ownership, durability, and payload are also key factors that must be considered. Simultaneously meeting all of these needs of the freight movement industry requires significant innovation in powertrain optimization, effective packaging of components, performance improvements, and cost reduction of components. The S2S project provides a great opportunity for the industry to

learn from real world operations at-scale, which will provide valuable feedback to the necessary research and development efforts throughout the industry.

The prototype trucks are a developing product which will require greater innovation and cost reduction to become a viable alternative for heavy-duty fleets. These stations, specifically designed to fuel heavy-duty vehicles, allow for real world demonstrations of the prototype trucks in daily fleet operations. The project team will collect valuable data from the trucks' operation to identify system components that need improvement. The durability of the powertrain is an important factor which can be tracked throughout the life of the project as the trucks accrue much higher annual mileage than their light-duty FCEV counterparts. These data for heavy-duty truck operation are invaluable for developing a powertrain system that can meet the demanding needs of heavy-duty fleet customers.

It is apparent that this project will require innovation to be successful, while also enabling numerous areas of further improvements to the heavy-duty fuel cell market throughout project life. The large scale of the system also shows the greatest promise for cost reduction, while providing a blueprint for further cost reduction in future stations.

a) Commercially available subsystems

Overall station design is a major factor that can help identify areas for cost reduction. With high station capacity and throughput, there are more options to consider how to best optimize the station to achieve the desired reliability and performance. This engineering design exercise will enable cost reduction due to the modularity and redundancy of station components. By following a modular approach to design, component suppliers will begin to produce more units and thus make faster improvements to their product, all while continuing to reduce cost. As more large stations like this one are developed, the supply chain will continue to grow as standardized parts are required in greater numbers. The project intends to build the station from commercially available subsystems procured from suppliers that all have a proven record of accomplishment and fully approved by Shell in terms of technical performance, safety, regulations and standards. The use of standard equipment will ultimately reduce their unit price and maintenance costs at scale.

b) Fueling profile

Another area of innovation is realized from the process of fueling the trucks. Fueling protocols, dispenser design, station throughput, and station reliability are just some examples that can be evaluated through this project. Light-duty fueling protocols have taken years to develop, and heavy-duty truck fueling will require similar parallel development. This station will provide lessons learned for fueling requirements of heavy-duty trucks, which will help inform and develop the appropriate protocols for safe and fast fueling for the heavy-duty market as a whole. Considering the longer refueling times and the need for higher flow nozzles, dispenser design can also be integrated and tested as innovative technologies are developed. The project intends to build two stations capable of fueling up to four trucks every hour at peak capacity from two fueling positions working simultaneous and 10 - 15 trucks in a 12-hour shift per weekday. Each fill is expected to be 30+ kg initially, with the potential for 50+ kg fills that should take between 20 to 30 minutes. This corresponds to an initial average daily demand of ~400 kg/day and will increase as the project matures.

The station will employ a fueling profile that will be designed to spread compression work in time, thereby reducing peak compressor power demand in exchange for longer compressor run time. This allows smaller compressor sizing and lower electricity demand charges and is expected to significantly improve the operating costs.

To achieve the targeted fueling capability, two compressor skids should be used to compress gas to 90 MPa, reliably and with a maximum redundancy.

c) Station Availability and Reliability

Optimization of station design will play a major role in the reliability of the station. Compared to early adopters of light-duty FCEVs, commercial users of the technology for hauling freight demand the highest reliability and station uptime. Even short periods of unexpected downtime could result in significant losses to freight businesses. Because of this strong need for station reliability, innovation in station design, component design, and redundancy will all be necessary to meet the needs of heavy-duty fleet customers. Therefore a complete fault model of the station design has been prepared to ensure better than 96% full fueling availability and better than 99% reduced throughput availability. At reduced throughput, the station will be capable of meeting daily fueling needs, albeit without simultaneous fueling of two trucks. For instance, if one compressor, one chiller or one dispenser fails, the system will not be able to supply peak flow rate, and therefore not be able to maintain simultaneous fueling capability. It will however be able to fuel one truck at a time and meet daily fueling requirements. The site will also allow another four trucks to line up safely on the station forecourt away from the main road.

Emissions Testing

Fuel cell and battery-electric zero-emission equipment and vehicles have no tailpipe emissions; therefore emission testing is not necessary to prove zero-emission capability.

9. Potential for Market Penetration and Commercialization of the Technology

Target Markets for Zero-Emission Class 8 Trucks and Freight Facility Equipment

Technological innovations being demonstrated through the Zero-Emission Shore-to-Store Project have broad commercialization potential. About 17,000 Class 8 trucks are registered to operate in the Port of Los Angeles, with anywhere from 8,000 to 12,000 making at least one move on a given day. Additionally, almost 2,000 yard tractors and hundreds of other pieces of heavy-duty cargo handling equipment operate on a daily basis at the Port of Los Angeles' various marine container terminals. The San Pedro Ports Clean Air Action plan sets ambitious goals to transition all terminal equipment to zero-emissions by 2030, and all heavy-duty trucks to zero-emissions by 2035. This is just one California specific example that demonstrates the need for viable zero-emission technology solutions that this project scope aims to develop and demonstrate. The San Pedro ports can serve as a proving ground for ZEV freight movement which could then be applied to ports throughout the U.S. and across the globe. But freight movement doesn't end near the ports. Regional and long haul distribution are also potential markets for ZEV freight movement. This project scope will focus on the port drayage and regional haul duty cycles associated with freight movement.

Battery electric and fuel cell electric technologies are ZE solutions that are available today to meet the needs of freight movement. Depending on the specific operation needs and duty cycle, certain technology solutions may be better suited for certain applications. This project will demonstrate fuel cell electric technology for class 8 on road applications and potentially forklifts, and battery technology for terminal equipment. In general, applications that require long range, heavy cargo, and fast fueling are best suited for fuel cell electric propulsion. Applications that have shorter range, lighter cargo, and longer downtime are well suited with batteries.

Vehicle, Equipment and Facility Growth Projections

The need for freight movement continues to grow as a result of global trends. Globalization of industries, increasing population, rapid growth of developing countries, and the increasing percentage of online shopping are just a few examples that demonstrate the consistent growth in freight movement that is likely to continue for some time. All of these macro trends require more goods movement, which translates to more trucks, ships, planes, and material handling equipment to move those goods. All of this growth comes at time when there is also a strong push to reduce emissions. In order to achieve increased growth while simultaneous decreasing emissions, ZE solutions are needed in all aspects of freight movement. To use the San Pedro ports as an example, the goal is to achieve 100% ZE trucks and terminal equipment while simultaneously continuing to increase the container throughput of the port.

Barriers to Entry for Zero-Emission Hydrogen Fuel Cell Vehicles and Equipment

There are a number of potential barriers to consider when bringing a new technology to the market.

- Some of the key factors to consider for freight movement are total cost of ownership, reliability, fueling infrastructure, and driver acceptance. Moving freight is a business that requires cost competitiveness and high uptime to deliver a service. Operators are unable to absorb the higher initial costs of zero-emission technology, especially if new infrastructure investments are needed to support the equipment. Maintaining an operational schedule is an integral part of effective freight movement. This requires reliable equipment with well understood maintenance practices to keep vehicles on the road in revenue service. Logistics of refueling the vehicles also plays a major role in daily operations.
- At this early stage of Fuel Cell Electric Truck (FCET) development, all of these factors present a challenge to the operators because costs are higher, infrastructure is limited, and they must learn about the operational nuances of a new technology. The industry team assembled for this project combines the perspectives of OEMs, infrastructure providers, and freight operators to better understand and address the requirements of new ZE technology. The technology development within the project scope is an important step towards overcoming these barriers and enabling widespread adoption of ZE equipment for freight movement.
- Hydrogen refueling stations designed for heavy-duty trucks are needed in California, and more importantly, in ports, to make FCETs a viable zero-emission transportation option for freight transport. This project will help address scientific and technical barriers, including the unproven design and fueling protocols for freight applications, and also limited availability of hydrogen refueling infrastructure performance data. The project will provide evidence of scalability by delivering station performance data for very large capacity stations (800 kg of hydrogen in 12 hours), which will augment current data collection efforts managed by the National Renewable Energy Laboratory (NREL). The industry also lacks the demonstration and standardization of stations utilizing on-site renewable hydrogen production and critically important protocols to develop standards for safely and quickly refueling trucks at 700 bar pressure. The delivery method proposed in this project will provide valuable experience that can inform efforts to develop industry-wide standards.
- Market barriers that need to be overcome include the ability to predict future behavior related to FCET deployments and the availability of hydrogen refueling infrastructure. The deployment and operation of a large-capacity station servicing a fleet of 10 or more FCETs will provide real world data on market drivers, fuel supply logistics, and station demand — all key variables to feed the analysis necessary to understand future market scenarios. Finally, cost and financial barriers may be the most significant hurdles to overcome. Early station deployments will be significantly underutilized, and a limited number of companies with the technical expertise and financial resources are able to bear this level of financial burden and risk, especially during early stage deployment. Another key barrier is the high cost of station equipment, in particular, the costs associated with pre-cooling systems and redundancy systems to ensure uptime and availability.

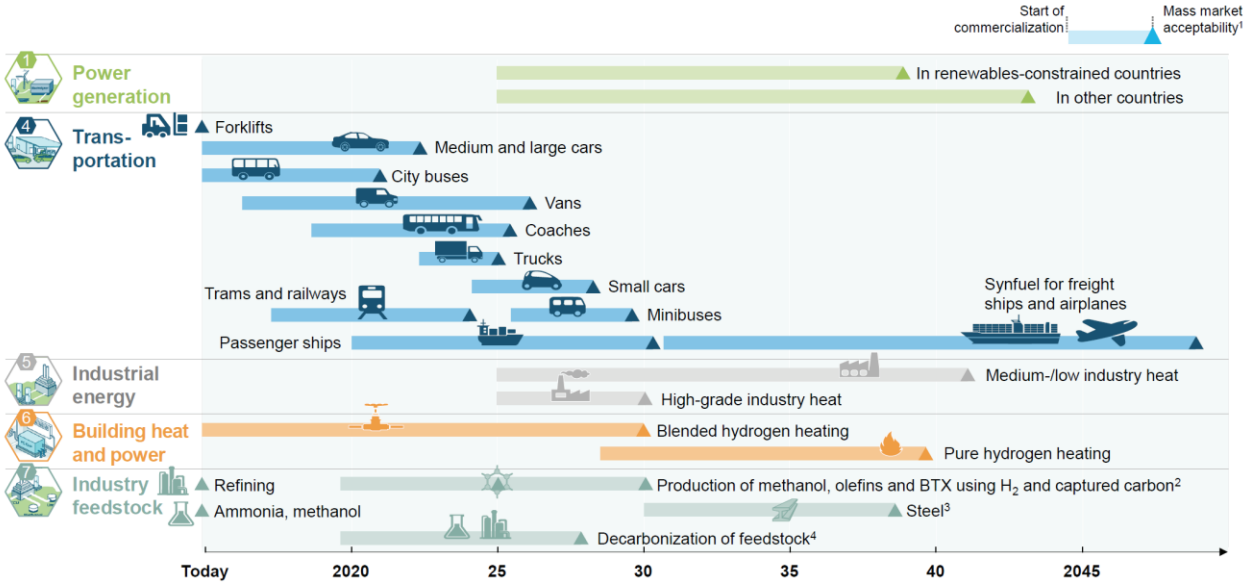
Commercialization Plans

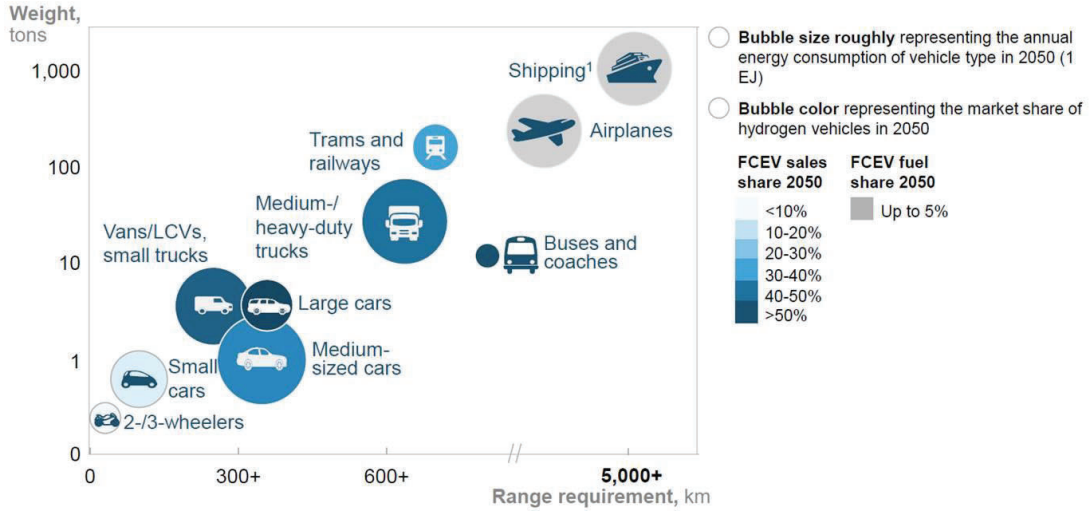
Heavy duty FCETs are a pre-commercial technology today, but the need for commercial heavy duty ZEV solutions is clear. Both Toyota and Kenworth have already begun demonstration of their first FCET prototypes and are excited by this transformative CARB opportunity that is key to enabling the next stage of expanded vehicle development. New technology development requires considerable financial, engineering, and facilities resources over multiple development cycles, and Class 8 FCETs are no exception. Successful implementation of S2S will push the development ahead from a single prototype, to the next generation of prototypes, but several more development cycles are still needed to assess the potential commercial viability of the product. All potential OEMs in the FCET space will benefit greatly from the learnings of this project to further the development of FCETs. As large scale vehicle OEMs, Toyota and Kenworth treat new product development very seriously to ensure that any new product performs well and is safe, reliable, and cost effective for customers. The learnings from this project will be no different, and will provide invaluable experience to CARB and all interested industry stakeholders.

The Hydrogen Council[8] has created a detailed global roadmap for hydrogen and fuel cell technology development for a variety of transportation applications. The first figure below outlines the estimated commercialization timelines for

[8] *http://hydrogencouncil.com/*

each application with input from the world's industry leaders from their respective industries. The timeline shows a rapid development of FCET's from early commercialization beginning in the early 2020's, to mass market acceptability by 2025. The second figure further demonstrates the potential future market for fuel cell technology in key transportation sectors, and medium and heavy duty trucks represent a significant future market. A project team consisting of Toyota, Kenworth, Shell, UPS, and Air Liquide represent key global industry leaders in the hydrogen mobility, freight movement, and hydrogen infrastructure sectors that require further growth, development, and scale to realize a viable market for zero-emissions freight. Successful demonstration of the S2S project is another critical step towards the path of commercialization for heavy duty FCETs, and the project team looks forward to playing an integral role in future project phases. The strong focus on hydrogen infrastructure buildout for S2S displays the future vision of the project team. The construction of two new high capacity heavy-duty stations coupled with three additional heavy-duty stations within the scope of S2S represents a total local network that could supply up to ~4,000 kg/day of hydrogen for freight movement, with the ability to serve ~50+ trucks upon project completion. Further investment and public funding support will be needed to build upon the success of S2S to continue development, demonstration, and scale up of the FCET's, hydrogen supply, and supporting fueling infrastructure.





CARB Certification Plan

OEM's are directed by the California Air Resources Board to follow a set product development plan. As these vehicles are demonstration, as opposed to production units, they will follow the standard production certification process but meet less stringent or less parameters that will be negotiated with US EPA, ARB and Kenworth representatives. All aspects of the agreed upon certification process will be tested for adherence to federal and state emissions certifications as they pertain to respective power train vehicles contained within this proposal. Vehicles will be made available for Kenworth agreed to limited testing once they meet minimum Kenworth reliability and performance standards.

Economic Impacts for Operators of Advanced Technologies from this Project

The significant role freight-movement plays in California's economy is undeniable. In 2014, more than five million jobs were attributed to freight-dependent industries, which translate to 33% of jobs in the state[9]. Projected growth of transported freight tons between 2015 and 2045 in the U.S. as a whole translates to 59% growth in California[10]. To attract the growth anticipated in the freight-movement sector—and the associated jobs—facilities such as ports must remain competitive. S2S contributes to the competitiveness of the Port of Los Angeles, Port of Long Beach and Inland Empire by supporting strategies to achieve zero-emissions goods movement. Building and operating successful large-scale hydrogen fueling stations will be essential in furthering the commercialization goals and rollout of FCETs and transport equipment. Many of the jobs created to accommodate the growth in the freight-movement sector will be long-term. A recent report by The Boston Consulting Group and CG/LA Infrastructure found "very high" sustainability for port-related job creation, largely due to the ongoing operations and maintenance positions required and attributed creation of 5,100 jobs at seaports for every $1 billion invested in infrastructure[11]. Short-term construction jobs also result from infrastructure investments such as port expansion projects and projects to enhance existing facilities.[12] The transition to sustainable freight movement will create a need for a skilled workforce, expanding opportunities for well-paid jobs.[13]

Deployment of new technology creates a supply chain that with growth will require more jobs. For example, Toyota is currently supporting one demonstration truck, but growth is needed in order to develop and support an expansion of prototype vehicles. Even growth to a fleet of 10+ trucks will require more engineering jobs, technicians, and business support both within Toyota, Kenworth and other partners responsible for component supply and vehicle service. Growth in hydrogen fueling for trucks will require investment in additional hydrogen production and both temporary and permanent jobs in engineering, technicians, and business support. Many of these jobs would be located in the L.A. area to properly support the vehicles where they are operating. This growth is also for permanent positions as the fuel cell business continues to grow, and not just temporary support for S2S. Job growth is not the only economic metric associated with the ports. According to the California Transportation Plan 2040, more than $40 billion in annual economic activity is attributed to the state's ports.[14] Overall, more than $740 billion of the state's gross domestic product is associated with freight-dependent industries.[15] While key to the state's economy, the impacts of freight-movement can be detrimental to communities and the environment. The development and implementation of the California Sustainable Freight Action Plan with a focus on deployment of zero-emission technologies is key to maintaining and growing the economic activity associated with freight movement. When discussing the Economic Context of Freight, the California Freight Mobility Plan notes trade does not have to pass through California and if the state fails to remain competitive, the shipments (along with jobs) could go elsewhere. [16]

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[9] Brown, Jr, Governor Edmund G. "California Sustainable Freight Action Plan." 2016, p-G-1.
[10] Ibid. pp. G-2- G-3
[11] Freedman, Mark, Norman Anderson, Jeff Hill, Daniel Acosta, Santiago Ferrer, Tina Zuzek, and Karan Mistry. "A Jobs-Centric Approach to Infrastructure Investment." 2017, pp. 6-7.
[12] Ibid. pp. 8-9.
[13] Brown. p. 7.
[14] Caltrans. "California Transportation Plan 2040." 2016, p. 43.
[15] Brown. p. 1.
[16] CalSTA and Caltrans. "California Freight Mobility Plan." 2014, p. 175.

Projects such as S2S provide support and encourage the use of zero-emission trucks at the ports and freight facilities. Perhaps the largest effect to the local region is the increased activity of fleet operators at the port which is enabled through the deployment of zero-emission trucks. This expansion may be small with respect to the overall operation of the ports, but the site will provide a successful blueprint that the ports can learn from and deploy as part of their portfolio of zero-emission solutions. Currently, fuel cell-electric and battery-electric vehicles are the only zero-emissions technologies at the tailpipe, and they enable full well to wheel zero emissions by sourcing hydrogen and electrons from renewable sources. Demonstrating the fuel cell and hydrogen pathway at the port brings the industry one step closer to realizing a zero-emission solution that enables future economic growth. By directly enabling the use of zero-emission technology, ports reduce emissions and operate in a sustainable, competitive manner. This allows ports to continue to be a major contributor to the state's overall economy.

Safety Measures

As an operator and a demonstrator of the equipment, safe working conditions and careful cargo handling are paramount to the demonstration partner fleets. The project partner fleets maintain strong safety standards and safe working conditions at all times. They provide on-going safety training for management, staff, and union labor to ensure federal and state OSHA requirements are not just met, but are surpassed. Safety training on the project vehicles and equipment will be provided by the OEM manufacturers to all operations and maintenance personnel. Operations and Maintenance Manuals will contain written safety instructions. Shell will prepare safety manuals and training classes for Shell operations staff and First Responders. Shell will work with Shell's equipment provider and maintenance contractor, the California Fuel Cell Partnership's Safety Officer, and other state and local fire officials familiar with hydrogen fueling, to conduct training sessions prior to full commissioning of each station. In order to ensure the maximum number of trained first responders, classes will be held at nearby fire stations, and an effort will be made to schedule site visits of each fueling station with as many first responders as possible, depending on their availability. Taking the appropriate safety measures to ensure safe project implementation is a high priority for the entire project team. Please see Appendix E for a detailed description of the safety measures to be followed.

Training Requirements

During the project demonstration, any powertrain installation and maintenance will be handled by Toyota and Kenworth personnel. The truck operators will receive initial training from the project team so they understand how to operate and fuel the vehicles. Routine maintenance of standard truck components can be handled by the end users, but any maintenance to the fuel cell electric powertrain is the responsibility of Toyota and Kenworth.

10. Potential of Project to Act as a Showcase of Technology

The simple name of the project 'Shore to Store' is meant to capture the broad transformative nature of the project which touches the full ecosystem of regional freight movement:

<u>It is transformative:</u> Envision cargo arriving at the ports being carried by ZE cargo handling equipment at the Ports of Los Angeles, Long Beach, and Hueneme. Four unique operators then take this cargo to warehouses, distribution centers, railheads, airports, and businesses throughout the Southern California region using 10 prototype Class 8 ZE FCETs emitting nothing but water. Existing and future ZE cargo handling equipment continues the ZE journey of the cargo at several warehouse hubs. 33% minimum renewable hydrogen (100% in POLB) and electricity generated directly from CA feedstock will even be produced to support a portion of the project scope. All of this ZE freight movement is enabled by significant hydrogen infrastructure buildout specifically designed to support heavy duty vehicles. In total, 5 hydrogen refueling stations located in the San Pedro Ports, Gardena, and the Inland Empire, will be leveraged and expanded to support this project, with freight movement between 10+ key freight facilities in the region. Attachment 5 provides detailed maps and addresses for these locations. This exceptional showcase of regional freight movement requires an impressive consortium of project contributors, and POLA has successfully assembled that coalition of forward thinking industry influencers. POLA has teamed with Toyota, Shell, Kenworth, UPS, TTSI, SCE, Air Liquide, SCAQMD, Port of Long Beach, Port of Hueneme, NREL, Merced County, and others to deliver a government, community, and industry stakeholder collaboration initiative to demonstrate the at-scale

application of zero-emissions to heavy duty transport via H2-fuel-cell-electric technology as a port-led path towards transformative emissions reduction, economic expansion, & public health benefit for CA's at-need communities and a foundational zero-emissions blueprint for the sustainable electrification of port, regional, national, and global goods movement.

It is cost effective: POLA, Shell, Toyota and Kenworth will need to contribute significant financial and professional resources to ensure reliable operation and to encourage increased consumer demand for hydrogen fuel-cell electric freight vehicles. The total contribution from Toyota and Shell is expected to be higher than the investment made by the CARB over the lifetime of the trucks and the stations. Shell, Toyota and Kenworth are committing to the long-term development of the market, the project partners understand that CARB funding for this proposal is crucial to develop FCET and its infrastructure of this size and scale to jumpstart the promotion and adoption of FCEV for freight. In reality; the total contribution required by the partners combined for the HRS and the prototype trucks is estimated to be more than that provided by CARB. Shell, Toyota and Kenworth are able to provide the public a high level of assurance in their ability to be successful. They bring considerable knowledge, experience, skills, and practical know-how to fulfill its commitments and meet its goals and objective. They have extensive experience effectively managing large-scale projects for over decades. The partners will apply their Governance and Control standards to the project to ensure adequately accounting for and controlling cost.

Environmental benefits: Enabling deployment of zero emission vehicles will eliminate the emissions associated with the operation of these vehicles not only on ports property, but as they travel along the I-710 corridor. Of further significance, this sizeable first-stage deployment of Class 8 zero-emission prototypes, developed by two of the largest automotive and truck OEMs in the world, will open the door to a complete transformation of the fleet of thousands of diesel trucks now serving the ports and freight facilities. This has the potential and promise of nearly eliminating all of the harmful criteria emissions impacting nearby southern California neighborhood communities. Additionally, while the project will not reduce traffic, zero emission vehicles offer quiet operation, eliminating the noise pollution typically associated with heavy-duty vehicles. The use of fuel cell technology proposed in **S2S** allows for a greater range of operation of the prototype trucks and the ability to utilize zero emission technology on drayage trucks. The I-710 corridor is a key thoroughfare for container traffic to and from POLB and the Port of Los Angeles. The route allows for not only near-dock transportation, but also transport to intermodal facilities, warehouses, and distribution centers in the region.

Plans to share results and lessons learned: The positive impacts of this project cannot be overstated. The successful implementation of this initial phase 1 scope will already result in significant infrastructure buildout, immediate emissions reductions, and industry stakeholder investment. The S2S project will provide a blueprint for what is possible with ZE freight movement, and all of the learnings will be publicly available for other regions in California, the U.S., and internationally to benefit from and consider their own demonstration. By its nature and the number notorious partners involved, the results and lessons will be shared broadly and naturally at the Ports but also in the private sector. Press releases, media interviews, opening ceremonies will have a local and global reach.

Multiple facilities, end-users, vehicle, and equipment types operating in concert: S2S tries to reflect what the future may look like – a comprehensive mix of technologies operating in concert depending on the end use, which is made possible by this unique consortium of major private and public entities. The below table illustrates the variety of usages.

End use	End users	Vehicles	Equipment types
Freight facility	TLS	ZE Forklift	BEV
Port centric routes	POLA, POH	Clean cargo handling equipment Zero-emission top handlers 25 zero and near-zero emission yard tractors	BEV, LNG 1.03MW photovoltaic 2.6MWh battery storage
Drayage routes	TLS, TTSI, SCE	10 Class 8 FCETs	Hydrogen fuel cell electric 5 HRS (3 large, 2 medium size)
Regional routes	UPS		

11. Application Completeness

All parties participating in the demonstration have read and agree to abide by the Sample Grant Agreement (Appendix B) and are committing to fulfill the obligations detailed in the application package.

12. Timeline for Project Completion (Project Schedule)

The project is anticipated to begin following the kick off meeting with ARB. All project components will be accomplished by April 15, 2021 as detailed in the project schedule summarized below. Please review Attachment 4 for a detailed Milestone and Disbursement Schedule and Project Schedule. A larger size is available in Appendix F.

Project Schedule

		Entity	Days	Start	Completion
Administration	Preliminary Grantee Selection	CARB	1	9/6/2018	9/6/2018
	Final CEQA Documentation	SHELL	124	7/1/2018	11/1/2018
	Execute Grant Agreement and Return to CARB	POLA	72	9/6/2018	11/16/2018
	Sub-agreements execution	POLA	166	7/19/2018	12/31/2018
	Draft final report	POLA	16	2/28/2021	3/15/2021
	Final report	POLA	32	3/15/2021	4/15/2021
Infrastructure – Hydrogen Refueling Station in Wilmington	Engineering and Permitting	SHELL	329	9/6/2018	7/31/2019
	Equipment Procurement (secure materials)	SHELL	421	9/6/2018	10/31/2019
	Construction, equipment installations and testing (construction services)	SHELL	213	8/1/2019	2/29/2020
	Stations commissioning and operations start-up	SHELL	92	3/1/2020	5/31/2020
Infrastructure – Hydrogen Refueling Station in Ontario	Engineering and Permitting	SHELL	329	9/6/2018	7/31/2019
	Equipment Procurement (secure materials)	SHELL	390	9/6/2018	9/30/2019
	Construction, equipment installations and testing (construction services)	SHELL	215	7/1/2019	1/31/2020
	Stations commissioning and operations start-up	SHELL	90	2/1/2020	4/30/2020
Truck Fleet	Concept design	Kenworth/Toyota	269	9/6/2018	6/1/2019
	Vehicle build (unit 1-5)	Kenworth/Toyota	208	9/6/2018	4/1/2019
	Validation & Design refinement	Kenworth/Toyota	489	3/1/2019	7/1/2020
	Vehicle build (unit 6-10)	Kenworth/Toyota	247	8/1/2019	4/3/2020
	Demonstration preparation, service, and support	Kenworth/Toyota	1096	1/1/2019	12/31/2021
Yard Tractors & Charging Infra	Engineering and Design	POH	138	12/15/2018	5/1/2019
	Infrastructure Bid Process	POH	62	5/1/2019	7/1/2019
	Utility Permitting and Construction	POH	518	1/1/2019	6/1/2020
	Site Construction and Commissioning	POH	398	7/1/2019	8/1/2020
	Yard Truck Delivery	POH	92	7/1/2020	8/1/2020
Tech. Demos	Truck Fleet Demonstrations	UPS,TTSI,SCE,Toyota	541	7/30/2019	1/20/2021
	Yard Tractor Demonstrations	POH	173	8/1/2020	1/20/2021
	Forklift Demonstrations	Toyota	541	7/30/2019	1/20/2021
Data and Analysis	Data Collection	NREL	572	7/30/2019	2/20/2021
	Data Analysis	NREL	572	7/30/2019	2/20/2021
	Advanced Data Analytics	NREL	206	7/30/2020	2/20/2021