South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 • www.aqmd.gov

Committee Members
Vice Mayor Rex Richardson, Chair
Supervisor Andrew Do
Board Member Gideon Kracov
Mayor Larry McCallon
Board Member Veronica Padilla-Campos
Mayor Carlos Rodriguez

October 21, 2022 ♦ 12:00 p.m.

Pursuant to Assembly Bill 361, a meeting of the South Coast Air Quality Management District Technology Committee will be held at 12:00 p.m. on Friday, October 21, 2022 through a hybrid format of in-person attendance in the Dr. William A. Burke Auditorium at the South Coast AQMD Headquarters, 21865 Copley Drive, Diamond Bar, California, and/or virtual attendance via videoconferencing and by telephone. Please follow the instructions below to join the meeting remotely.

Given health and safety concerns, meeting the format may be changed to full remote via webcast. Please refer to South Coast AQMD's website for information regarding the format of the meeting, updates if the meeting is changed to a full remote via webcast format, and details on how to participate:

http://www.aqmd.gov/home/news-events/meeting-agendas-minutes

Face coverings: In accordance with state and local public health department guidelines, people may choose to wear a mask based on personal preference while in South Coast AQMD facilities.

ELECTRONIC PARTICIPATION INFORMATION
(Instructions provided at bottom of the agenda)

Join Zoom Meeting - from PC or Laptop
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Audience will be able to provide public comment through telephone or Zoom connection during public comment periods.

PUBLIC COMMENT WILL STILL BE TAKEN

AGENDA

Members of the public may address this body concerning any agenda item before or during consideration of that item (Gov't. Code Section 54954.3(a)). If you wish to speak, raise your hand on Zoom or press Star 9 if participating by telephone. All agendas for regular meetings are posted at South Coast AQMD Headquarters, 21865 Copley Drive, Diamond Bar, California, at least 72 hours in advance of the regular meeting. Speakers may be limited to three (3) minutes total for all items on the agenda.

CALL TO ORDER

ROLL CALL

ACTION ITEMS (1-2):

1. Issue RFP, Execute Contracts, and Program Announcement for the Residential Air Filtration Program Within East Los Angeles, Boyle Heights, West Commerce and Eastern Coachella Valley AB 617 Communities *(Motion Requested)*

Frances Maes
Staff Specialist

Through a participatory budget process, the East Los Angeles, Boyle Heights, West Commerce (ELABHWC) Community Steering Committee (CSC) prioritized $1.8 million, and the Eastern Coachella Valley (ECV) CSC prioritized $1 million, in Community Air Protection Program funding for a Residential Air Filtration Program. These actions are to: 1) issue RFP #P2023-04 and Execute Contracts for air filtration units to offer through the Residential Air Filtration Program; 2) issue Program Announcement #PA2023-03 in an amount up to $2,625,000 from the Community Air Protection AB 134 Fund (77) to solicit applications from residents within ELABHWC and ECV for the Residential Air Filtration Program; 3) reimburse the General Fund for administrative costs of up to $167,000 from the Community Air Protection AB 134 Fund (77); and, 4) transfer and appropriate up to $8,000 from the administrative portion of Community Air Protection AB 134 Fund (77) into Technology Advancement's FYs 2022-23 and/or 2023-24 Budgets, Services and Supplies Major Object, Public Notice and Advertisement account for administrative costs to implement the Residential Air Filtration Program.

2. Recognize Revenue and Amend Contract Awards for Cleaner Freight California Projects *(Motion Requested)*

Seungbum Ha
Program Supervisor

In May 2022, the Board recognized a $2,349,995 award from U.S. EPA to replace diesel cargo handling equipment with innovative zero-emission electric alternatives for the Cleaner Freight California Projects. In August 2022, U.S. EPA awarded additional funding of $219,938 to South Coast AQMD's Cleaner Freight California Projects for a total of $2,569,933. These additional funds would be distributed to contracts with Albertsons Companies, McLane Company, and Long Beach Container Terminal. These

actions are to: 1) recognize revenue, upon receipt, of up to $219,938 from the U.S. EPA National Clean Diesel Program into the Advanced Technology, Outreach and Education Fund (17), and 2) execute contracts with Albertsons Companies, McLane Company, and Long Beach Container Terminal in amounts not to exceed $1,396,386, $775,770, and $273,150, respectively, from the Advanced Technology, Outreach and Education Fund (17).

INFORMATIONAL ITEM:

3. Clean Fuels Program Draft 2023 Plan Update — Sam Cao, Program Supervisor

(Written Report - No Motion Requested)

The Clean Fuels Plan Update is submitted every year with the Clean Fuels Annual Report as required by legislation. As part of that process, staff provides the Clean Fuels Program Draft Plan Update to the Technology Committee to solicit input on the proposed priority technology areas and potential projects for the upcoming year before requesting final Board approval for the Plan Update in early spring. Staff proposes continued support for a wide portfolio of technologies with particular emphasis on zero emission technologies for vehicles, off-road equipment, and supporting infrastructure for goods movement applications.

4. Other Business

Any member of the Committee, or its staff, on his or her own initiative or in response to questions posed by the public, may ask a question for clarification, may make a brief announcement or report on his or her own activities, provide a reference to staff regarding factual information, request staff to report back at a subsequent meeting concerning any matter, or may take action to direct staff to place a matter of business on a future agenda. (Gov't. Code Section 54954.2)

5. Public Comment Period

At the end of the regular meeting agenda, an opportunity is provided for the public to speak on any subject within the Committee's authority that is not on the agenda. Speakers may be limited to three (3) minutes each.

6. Next Meeting Date

Friday, November 18, 2022 at 12:00 p.m.

ADJOURNMENT

Document Availability

All documents (i) constituting non-exempt public records, (ii) relating to an item on an agenda for a regular meeting, and (iii) having been distributed to at least a majority of the Committee after the agenda is posted, are available by contacting Penny Shaw Cedillo at 909.396.3179, or send the request to pcedillo@aqmd.gov.

Americans with Disabilities Act and Language Accessibility
Disability and language-related accommodations can be requested to allow participation in the Technology Committee meeting. The agenda will be made available, upon request, in appropriate alternative formats to assist persons with a disability (Gov't Code Section 54954.2(a)). In addition, other documents may be requested in alternative formats and languages. Any disability or language-related accommodation must be requested as soon as practicable. Requests will be accommodated unless providing the accommodation would result in a fundamental alteration or undue burden to South Coast AQMD. Please contact Penny Shaw Cedillo at 909.396.3179 from 7:00 a.m. to 5:30 p.m., Tuesday through Friday, or send the request to pcedillo@aqmd.gov.

INSTRUCTIONS FOR ELECTRONIC PARTICIPATION

Instructions for Participating in a Virtual Meeting as an Attendee
As an attendee, you will have the opportunity to virtually raise your hand and provide public comment.

Before joining the call, please silence your other communication devices such as your cell or desk phone. This will prevent any feedback or interruptions during the meeting.

Please note: During the meeting, all participants will be placed on Mute by the host. You will not be able to mute or unmute your lines manually.

After each agenda item, the Chairman will announce public comment.

Speakers may be limited to a total of 3 minutes for the entirety of the consent calendar plus board calendar, and three minutes or less for each of the other agenda items.

A countdown timer will be displayed on the screen for each public comment.

If interpretation is needed, more time will be allotted.

Once you raise your hand to provide public comment, your name will be added to the speaker list. Your name will be called when it is your turn to comment. The host will then unmute your line.

Directions for Video ZOOM on a DESKTOP/LAPTOP:

- If you would like to make a public comment, please click on the **"Raise Hand"** button on the bottom of the screen.
- This will signal to the host that you would like to provide a public comment and you will be added to the list.

Directions for Video Zoom on a SMARTPHONE:

- If you would like to make a public comment, please click on the **"Raise Hand"** button on the bottom of your screen.
- This will signal to the host that you would like to provide a public comment and you will be added to the list.

Directions for TELEPHONE line only:

- If you would like to make public comment, please **dial *9** on your keypad to signal that you would like to comment.

BOARD MEETING DATE: November 4, 2022 AGENDA NO.

PROPOSAL: Issue RFP, Execute Contracts, and Program Announcement for Residential Air Filtration Program Within East Los Angeles, Boyle Heights, West Commerce and Eastern Coachella Valley AB 617 Communities

SYNOPSIS: Through a participatory budget process, the East Los Angeles, Boyle Heights, West Commerce (ELABHWC) Community Steering Committee (CSC) prioritized $1.8 million, and the Eastern Coachella Valley (ECV) CSC prioritized $1 million, in Community Air Protection Program funding for a Residential Air Filtration Program. These actions are to: 1) issue RFP #P2023-04 and Execute Contracts for air filtration units to offer through the Residential Air Filtration Program; 2) issue Program Announcement #PA2023-03 in an amount up to $2,625,000 from the Community Air Protection AB 134 Fund (77) to solicit applications from residents within ELABHWC and ECV for the Residential Air Filtration Program; 3) reimburse the General Fund for administrative costs of up to $167,000 from the Community Air Protection AB 134 Fund (77); and, 4) transfer and appropriate up to $8,000 from the administrative portion of Community Air Protection AB 134 Fund (77) into Technology Advancement's FYs 2022-23 and/or 2023-24 Budgets, Services and Supplies Major Object, Public Notice and Advertisement account for administrative costs to implement the Residential Air Filtration Program.

COMMITTEE: Technology, October 21, 2022; Recommended for Approval

RECOMMENDED ACTIONS:

1. Authorize the Procurement Manager, in accordance with South Coast AQMD Procurement Policy and Procedure, to issue RFP #P2023-04 to establish a list of eligible filtration units and replacement filters, and based on the results of the RFP, authorize Executive Officer to execute subsequent contracts with filtration company vendors to provide portable air filtration units and replacement filters requested by applicants to the Residential Air Filtration Program;

2. Issue #PA2023-03 in an amount up to $2,625,000 from the Community Air Protection AB 134 Fund (77) to solicit applications for the Residential Air Filtration Program, which will provide air filtration units and replacement filters to residents in:
   a) ELABHWC in an amount not to exceed $1,687,500 from the Community Air Protection AB 134 Fund (77), and
   b) ECV in an amount not to exceed $937,500 from the Community Air Protection AB 134 Fund (77).
3. Reimburse the General Fund for administrative costs of up to $167,000 from Community Air Protection AB 134 Fund (77);and
4. Transfer and appropriate up to $8,000 from the administrative portion of Community Air Protection AB 134 Fund (77) into Technology Advancement's FYs 2022-23 and/or 2023-24 Budgets, Services and Supplies Major Object, Public Notice and Advertisement account for administrative costs to implement the Residential Air Filtration Program.

Wayne Nastri
Executive Officer

AK:DG:KTG:FM:VT

Background

Assembly Bill (AB) 617 was signed into state law in July 2017 and focuses on improving air quality and reducing exposure to criteria air pollutants and toxic air contaminants in communities most impacted by air pollution. AB 617 recognizes the disproportionate impacts environmental justice (EJ) communities experience from sources of air pollution near residences and seeks to address these impacts through community-driven actions focused on developing and implementing community emissions reduction plans (CERPs) and community air monitoring plans (CAMPs).

In 2021 through a participatory budgeting process to allocate $36 million for Year 3 Community Air Protection (CAP) incentive funds to AB 617 communities, the ELABHWC and ECV Community Steering Committees (CSCs) prioritized $1.8 million and $1 million, respectively, for residential air filtration units. The CSCs are comprised of stakeholders (e.g., residents and local community groups) with community knowledge and provide input and guidance for implementation of the CERP and CAMP. The ELABHWC and ECV CERPs include measures to reduce

residential exposure to particulate matter (PM) by installing and maintaining air filtration units.

In June 2022, CARB approved the AB 617 Project Plan for Residential Air Filtration. This plan allows South Coast AQMD to allocate CAP incentive funds to portable residential air filtration units and replacement filters in the ELABHWC and ECV communities.

Proposal
South Coast AQMD staff proposes releasing RFP #P2023-04 to develop a list of eligible manufacturers to supply portable air filtration units and replacement filters to residents in the ELABHWC and ECV Community Boundaries through the Residential Air Filtration Program. Bidders selected through the RFP process will supply air filtration units that meet the unit qualifications set forth within the approved AB 617 Project Plan for Residential Air Filtration available at http://www.aqmd.gov/docs/default-source/tao-capp-incentives/project-plan-residential-air-filtration_6-28-2022.pdf?sfvrsn=6.

Following the results of the RFP, staff anticipates the release of the Residential Air Filtration Program, #PA2023-03, within the first half of 2023. Further, the solicitation will remain open to residents within the ELABHWC and ECV Community Boundaries until funds are exhausted.

Outreach
In accordance with South Coast AQMD's Procurement Policy and Procedure, a public notice advertising the RFP and Program Announcement will be published in the Los Angeles Times, the Orange County Register, the San Bernardino Sun, and Riverside County's Press Enterprise newspapers to leverage the most cost-effective method of outreach to the South Coast Basin.

Additionally, potential applicants may be notified utilizing South Coast AQMD's own electronic listing of certified minority vendors. Notice of the RFP and Program Announcement will be emailed to the Black and Latino Legislative Caucuses and various minority chambers of commerce and business associations and placed on South Coast AQMD's website (http://www.aqmd.gov) where it can be viewed by making the selection "Grants & Bids."

Benefits to South Coast AQMD
Health studies have determined that fine and ultrafine PM, including diesel PM, present the most significant air pollution health risk to sensitive receptors in EJ communities. Therefore, the Residential Air Filtration Program within ELABHWC and ECV communities will reduce exposure to diesel PM.

Resource Impacts
Up to $2,625,000 from the Community Air Protection AB 134 Fund (77) Year 3 CAPP funds will be used to provide air filtration units and replacement filters to residents within ELABHWC and ECV for the Residential Air Filtration Program, and reimbursement of administrative costs will not exceed $167,000. Transfer and appropriation to FYs 2022-23 and 2023-24 Budgets, Services and Supplies Major Object, Public Notice and Advertisement account will not exceed $8,000. Any funds not expended after the budget cycles will be returned to the Community Air Protection AB 134 Fund (77). The Residential Air Filtration Program in future years will be included as part of the annual budget process. Sufficient funds are available in Community Air Protection AB 134 Fund (77).

Attachments
RFP #P2023-04
PA #PA2023-03

Residential Air Filtration Program

Residential Air Filtration Program for the AB617 Community of East Los Angeles, Boyle Heights, West Commerce (ELABHWC) and Eastern Coachella Valley (ECV)

Program Announcement & Application PA 2023-03

PROGRAM INTRODUCTION

The East Los Angeles, Boyle Heights, West Commerce (ELABHWC), and Eastern Coachella Valley (ECV) AB 617 communities have prioritized $1,800,000 and $1,000,000, respectively, in Community Air Protection Program Incentives for residential air filtration projects. These air filtration projects will reduce residential exposure to Particulate Matter (PM) and diesel particulate matter (DPM), consistent with the goals of their Community Emission Reduction Plans. As a result, South Coast AQMD is allocating $2,625,000 to purchase residential air filtration units and three years of replacement filters within ELAGHWC and ECV communities.

In November 2022, the South Coast AQMD Board authorized the release of this program announcement to solicit applications from residents within the ELABWHC and ECV communities for air filtration units. This program aims to reduce exposure to PM and DPM from sources of air pollution near residences in the ELABHWC and ECV communities. Health studies have determined that fine and ultrafine PM, including DPM, present the most significant air pollution health risk to sensitive receptors in Environmental Justice communities. The Residential Air Filtration Program focuses on portable air filtration units available as small tabletop units and larger console units. These units clean the air within a single room or enclosed space. Studies have reported reductions in PM exposures using high-efficiency portable air cleaners on the order of approximately 50 percent or higher.

PROGRAM ELIGIBILITY GUIDELINES AND CRITERIA

Eligible Applicants – Residents within the AB 617 ELABHWC and ECV community and emissions boundaries are eligible to apply for air filtration units. Eligible residents will receive one or more air filtration units and three years of replacement filters.

Eligible Air Filtration Units - A list of qualifying air filtration units will be provided for residents to choose from. All air filtration units will be CARB and Energy Star certified and must include a high-efficiency particulate air (HEPA) filter rated to remove 99.97% of particles measuring 0.3 micrometers or greater. Additionally, the air filtration units must have a clean air delivery rate (CADR) for tobacco smoke (0.09-1.0 µM) or CADR equivalent manufacturer's rating for air filtration that is appropriate for a room or residence.

Funding Availability – A funding amount of $1,687,500 is available for residents within the East Los Angeles, Boyle Heights, and West Commerce designated 617 community from Year 3 CAPP Incentive Funds. For the first 30 days, air filtration units will be provided to residents of ELABHWC based upon household addresses closest to emission sources. After that, air filtration units will be available to applicants on a first-come, first-served basis for eligible residents of the ELABHWC designated 617 community area (ELABHWC Community Map) . Funding is limited and may be revised at any time.

A funding amount of $937,500 is available for the ECV from their Year 3 CAPP Incentive Funds. Funding is available to applicants on a first-come, first-served basis for eligible residents of ECV. Funding is limited and may be revised at any time (ECV Community Map).

Funding Limits – Project funding is limited to the purchase price, sales tax, and shipping costs of new equipment and three years of new replacement filters. Funding will cover up to a maximum total of $1,000 per residence (i.e., home address) for one or more air filtration units and three years of new replacement filters. Funds remaining from residences that consume less than $1,000 for one or more air filtration units and three years of new replacement filters will not be distributed to the applicant(s) of the residence. Instead, South Coast AQMD will disburse these funds toward subsequent applications for air filtration units under this program. Applicants and program participants are responsible for ongoing operation and maintenance, replacement filter storage costs, and any reporting during the project life. Ineligible costs are all costs outside the purchase price plus sales tax of the equipment and three years of replacement filters. The program will not pay for the cost of installation, electricity to operate units, repairs and replacement expenses, extended warranties, accessories, and other equipment. Manufacturer warranties will be provided directly from the air filtration unit manufacturer and program participants needing replacement units or repairs under warranty must reach out directly to the manufacturer.

South Coast AQMD may modify the funding limit for each applicant based on the number of applications to this program announcement. South Coast AQMD retains the discretion to make full, partial or no awards. If the program is undersubscribed, the South Coast AQMD may choose to re-open this Program Announcement. South Coast AQMD will retain a wait list if selected projects drop out of the program.

Program Schedule – Implementation schedule for the Residential Air Filtration Program Announcement PA

2023-03 is shown in Table 1 below.

Table 1: Schedule

Spring 2023	• Conduct outreach to residents in qualifying communities • Issue Program Announcement and begin accepting applications for PA 2023-03 • South Coast AQMD will begin accepting applications until funds are exhausted. For **ECV**, funding will be available to applicants on a first-come, first-served basis. For **ELABHWC,** applications received within 30 days of releasing this program announcement, South Coast AQMD will prioritize funding for residences near sources of DPM. After this period, funding will be available to applicants on a first-come, first-served basis.
Beginning July 2023	Delivery of Air Filtration Units and replacement filters

APPLICATION REQUIREMENTS

Eligible applicants must complete and submit an online application to receive the air filtration unit and three years of replacement filters. At a minimum the online application form will request the information below.

- Applicant's contact information (e.g., name, address, email, etc.)
- Residence information (e.g., residence address where unit will be used and square footage of home)
- Utility information (e.g., name of electricity utility provider and upload a recent copy of electricity utility bill)
- Air Filtration Unit(s) Selected – applicant to identify the type of unit(s) preferred
- Applicant agreement to program terms and conditions

Applications must be submitted in accordance with the instructions outlined below, and all requested information on the application must be provided.

Applicants can only participate in one residential air filtration program. Applicants that receive an air filtration unit through another program (e.g., a program administered by a local city or utility service provider), is ineligible to participate in the Residential Air Filtration Program in this program announcement. Applicants can only apply once to this program and only one application can be provided per residential address.

APPLICATION SUBMITTAL INSTRUCTIONS

Applications will only be accepted via the South Coast AQMD's online application link at: http://www.aqmd.gov/home/programs/business/community-air-protection-incentives/residential-air-filtration-incentives

Faxed applications will not be accepted. Applications will be accepted on a first-come first-served basis. The Program Announcement and application link PA 2023-03 can also be accessed by visiting South Coast AQMD's website at: http://www.aqmd.gov/nav/grants-bids

APPLICATION EVALUATION AND APPROVAL PROCESS

Applicants are subject to a maximum total of $1,000 per residence (i.e., home address) for one or more air filtration units and three years of new replacement filters. South Coast AQMD may modify the funding limit based on the number of applications to this Program Announcement with the intent to provide air filtration units to residents of the ELABHWC and ECV communities. If there are more applications than available

funding under this Program Announcement, each application will undergo additional evaluation with consideration to criteria for prioritization or ranking of applications listed below.

1. For applications from the ELABHWC Community received within 30 days of releasing this program announcement, South Coast AQMD will consider the applicant's residence (i.e., home address) proximity to sources of DPM and prioritize funding for applicants near these sources. After this period, funding will be available to applicants on a first-come, first-served basis.
2. For applications from the ECV Community, South Coast AQMD will prioritize applications on a first-come, first-served basis.

Upon application approval, eligible applicants will receive notice by email whether they qualified for an air filtration unit. South Coast AQMD staff will submit an order for the selected air filtration unit and three years of replacement filters directly to the manufacturer and have the unit sent to the applicant's residence.

ADDITIONAL INFORMATION & ASSISTANCE

This Program Announcement can be accessed at the South Coast AQMD website at http://www.aqmd.gov/nav/grants-bids. South Coast AQMD staff members are available to answer questions during the Program Announcement acceptance period.

For General, Administrative, or Technical Assistance, please contact:

Frances Maes
Staff Specialist
Technology Advancement
Office Phone: 909-396-2473
Fax: 909-396-3252
fmaes@aqmd.gov

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SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

REQUEST FOR PROPOSALS

FOR RESIDENTIAL AIR FILTRATION UNIT AND THREE (3) YEAR SUPPLY OF FILTERS P2023-04

South Coast Air Quality Management District (South Coast AQMD) requests proposals for the following purpose according to terms and conditions attached. In the preparation of this Request for Proposals (RFP) the words "Proposer," "Contractor," "Consultant," "Bidder" and "Firm" are used interchangeably.

PURPOSE

The South Coast AQMD is pleased to announce a Request for Proposals (RFP) to solicit qualified firms or sole practitioners to supply bulk-purchase pricing for a package containing a minimum of one air filtration unit and a three (3) year supply of associated replacement filter(s) per unit. The purpose of the Residential Air Filtration Program is to supply portable residential air filtration units to the Assembly Bill (AB) 617 East Los Angeles, Boyle Heights, West Commerce (ELABHWC), and Eastern Coachella Valley (ECV) communities. The program aims to reduce exposure to criteria air pollutants and toxic air contaminants in these AB 617 communities.

Work will be on an as needed basis. Due to the indefinite nature of the work, the actual contract amount cannot be determined at this time.

INDEX - The following are contained in this RFP:

SECTION I: BACKGROUND/INFORMATION

The South Coast AQMD is the air pollution control agency for the South Coast Air Basin, which is comprised of all of Orange County and the urban portions of Los Angeles, Riverside, and San Bernardino counties. This area of 10,743 square miles is home to approximately 17 million people and is the second most populated area in the United States.

Assembly Bill (AB) 617 addresses air pollution in environmental justice (EJ) communities. Since 2018 the California Air Resources Board (CARB) has selected six communities in the South Coast Air Quality Management District (South Coast AQMD) to participate in the AB 617 program. Each AB 617 Community has a Community Steering Committee (CSC). The CSCs advise South Coast AQMD on developing and implementing a Community Emissions Reduction Plan (CERP) for their respective community. Further, the CERP sets forth strategies, actions, and goals to reduce emissions and exposure to air pollution in the community.

Through a participatory budgeting process, the CSCs for two of the six AB 617 communities prioritized Community Air Protection Program (CAPP) Incentive funds for residential air filtration projects to reduce residential exposure to particulate matter and diesel particulate matter. These two communities are East Los Angeles, Boyle Heights, West Commerce (ELABHWC) and Eastern Coachella Valley (ECV). The ELABHWC and ECV CSCs prioritized $1,800,000 and $1,000,000 respectively in CAPP incentives for residential air filtration projects. As a result, South Coast AQMD anticipates allocating $2,625,000 to purchase residential air filtration units and three years of replacement filters for these two communities. The units selected from this Request for Proposal (RFP) will support the Residential Air Filtration Project Plan (available at http://www.aqmd.gov/docs/default-source/tao-capp-incentives/project-plan-residential-air-filtration_6-28-2022.pdf?sfvrsn=6) and supply air filtration units for communities within the ELABHWC and ECV Communities.

All air filtration units must meet the specifications detailed in Section VI of this RFP. This is an RFP only and is not an issue of award or purchase. Funding allocation is subject to change at South Coast AQMD's discretion. All air filtration units must meet the specifications detailed in Section III of this RFP. The bidder must provide pricing based on quantity price breaks per package as detailed in Attachment C of this RFP. Quotes shall be valid until *March 31, 2025*. South Coast AQMD may place recurring orders at varying frequencies and quantities until March 31, 2025.

SECTION II: CONTACT PERSON:

Questions regarding the content or intent of this RFP or on procedural matters should be addressed to:

Frances Maes
Staff Specialist
South Coast AQMD
21865 Copley Drive
Diamond Bar, CA 91765-4178
(909) 396-2473

SECTION III: SCHEDULE OF EVENTS

Date	Event
November 4, 2022	RFP Released
January 10, 2023	Proposals Due to South Coast AQMD - **No Later Than 2:00PM**
Beginning Jan 20, 2023	Proposal Evaluations
April 2023	Anticipated Contract Execution

SECTION IV: PARTICIPATION IN THE PROCUREMENT PROCESS

It is the policy of South Coast AQMD to ensure that all businesses including minority business enterprises, women business enterprises, disabled veteran business enterprises and small businesses have a fair and equitable opportunity to compete for and participate in South Coast AQMD contracts. Attachment A to this RFP contains definitions and further information.

SECTION V: STATEMENT OF WORK/SCHEDULE OF DELIVERABLES

The purpose of the Residential Air Filtration Program is to supply portable air filtration units and filters to households within AB 617 Environmental Justice Communities, thereby reducing exposure to particulate matter, including diesel particulate matter (a known carcinogen).

This project requires the following tasks:
1. Quarterly meetings with South Coast AQMD staff to discuss program logistics and implementation
2. Guaranteed delivery services
3. Warranty services

Potential bidders should address all tasks based on their background and expertise in their proposal based on the format provided in Section VII – Proposal Submittal Requirements. The three tasks listed below are integral to maximizing program participation and providing a streamlined and positive consumer experience. Proposals submitted may separately address Tasks 1 through 3.

Statement of Work

The selected contractor(s) shall perform assignments on an as-needed basis upon receiving written notification from the South Coast AQMD. Each assignment will have specific tasks to be conducted and resources to be utilized. No work can be implemented without South Coast AQMD authorization. Tasks include the following:

Task 1 – Quarterly meetings with South Coast AQMD staff to discuss program logistics and implementation

All contracting parties shall meet with South Coast AQMD staff at the beginning of project implementation to discuss and establish program coordination details, including training, chain of command, responsibilities, contacts, timelines, and other logistics before working on Tasks 2 through 3. South Coast AQMD staff will guide contractor staff, including all written materials and procedures necessary to meet program goals. Additionally, all contracting parties shall meet with South Coast AQMD staff quarterly throughout project implementation (i.e., until funds are fully liquidated). At these quarterly meetings, the contractor shall provide a verbal

and written report of program implementation (e.g., number of packages delivered and warranty issues), discuss matters impacting program implementation (e.g., logistical issues), and suggest improvements.

Task 2 – Guaranteed delivery services
Selected contractor(s) will be responsible for the timely delivery of air filtration units to multiple applicants within the Los Angeles and Riverside Counties. In addition, the contractor shall provide updated information regarding the status, timing, and confirmation of deliveries to each program participant and resolve any issues with shipping delays. Section VII, paragraph (a) of this RFP further outlines requirements for delivery services.

Task 3 Warranty services
The selected contractor(s) shall honor manufacturer warranties and resolve to replace defective air filtration units in a timely manner for the duration of the manufacturer warranty. All warranty replacements must be documented and reported to the South Coast AQMD. Section VII, paragraph (e) of this RFP further outlines requirements for delivery services.

Schedule of Deliverables

The South Coast AQMD will establish deliverables and schedules for task completion in writing when each task is authorized. Deliverables include preparing quarterly reports detailing the number of packages delivered, documentation of issues encountered, warranty replacements, and other program implementation measures.

SECTION VI: REQUIRED QUALIFICATIONS

A. An interested bidder shall provide Attachment C, a proposed pricing quote for bulk pricing for a package containing a minimum of one air filtration unit and a three (3) year supply of associated replacement filters per unit. If multiple packages are submitted for consideration, a copy of Attachment C is required for each package.

The air filtration unit must meet the following specifications to be considered under this RFP. If a proposed air filtration unit does not meet these specifications, it is not eligible under this RFP and will not be evaluated. The specifications below are the minimum acceptable by the South Coast AQMD.

B. **Minimum Specifications:**

1. The unit must use a certified true high-efficiency particulate air (HEPA) filter rated to remove 99.97% of particles measuring 0.3 micrometers or greater; air filtration units using HEPA-like, HEPA-type or non-HEPA filters are not eligible.
2. The unit must be a CARB-certified air cleaning device. The list of CARB-certified air cleaning devices is available at: https://ww2.arb.ca.gov/list-carb-certified-air-cleaning-devices.
3. The unit must be ENERGY STAR certified to ensure energy-efficient operation.
4. The unit's Clean Air Delivery Rating (CADR) must be certified by the Association of Home Appliance Manufacturers (AHAM) through AHAM's Portable Electric Room Air Cleaner Certification Program.
5. The unit must have an AHAM-certified CADR value of at least 97 for tobacco smoke (0.09-1.0 µM) or CADR equivalent manufacturer's rating.

C. **Additional Features:** South Coast AQMD will also consider the following features in the evaluation of the product:

1. Life of filter(s) with normal/daily use
2. Presence of other filters (i.e., pre-filter, carbon filter, etc.) in addition to HEPA filter
3. Portability of unit (size and weight)
4. Maneuverability of unit (e.g., unit has wheels)
5. Operating noise level of unit on high
6. AHAM-certified CADR value for smoke and dust
7. Affordability of the air filtration unit and replacement HEPA filter (and other filter[s] if applicable)

D. **Warranty**: Manufacturer warranties will be provided directly from the air filtration unit manufacturer, South Coast AQMD does not provide any additional warranty for the air filtration unit or the replacement filters.

SECTION VII: PROPOSAL SUBMITTAL REQUIREMENTS

Submitted proposals must follow the format outlined below and all requested information must be supplied. Failure to submit proposals in the required format will result in elimination from proposal evaluation. South Coast AQMD may modify the RFP or issue supplementary information or guidelines during the proposal preparation period prior to the due date. Please check our website for updates (http://www.aqmd.gov/grants-bids). The cost for developing the proposal is the responsibility of the Contractor and shall not be chargeable to South Coast AQMD.

Each proposal must be submitted in three separate volumes:

- **Volume I** - Technical Proposal
- **Volume II** - Cost Proposal, including Attachment C
    - Bidder must submit Attachment C for a package containing a minimum of one air filtration unit and a three (3) year supply of associated replacement filters per unit. In addition to the primary submission, a bidder may submit up to five (5) alternate packages (Attachment C) for consideration. All submissions that meet the minimum specification will be evaluated on the same criteria.
- **Volume III** - Certifications and Representations included in Attachment B to this RFP, must be completed and executed by an authorized official of the Contractor.

A separate Table of Contents should be provided for Volumes I and II.

A separate cover letter should accompany the proposal submission. The cover letter should include the following:

a. Name, address and telephone number of the company and must be signed by the person(s) authorized to represent the firm. Also include the name and contact information, including email address of the firm's representative designated as the main contact.
b. *Quote Validity:* Acknowledgement that the pricing for the proposed packages will be valid

through March 31, 2025. Section III Subsection 2 of this RFP details pricing requirements and product specifications.

c. *Delivery Guarantee:* include a guarantee that in-stock products will be delivered within thirty (30) days of the order date. Acknowledge that the vendor will incur a 10 percent (%) late delivery penalty and will reduce the unit price by 10% for each unit arriving after forty-five (45) days past the order date. Also, provide a detailed description of how issues encountered with the delivery of air filtration units and replacement filters to recipients would be resolved, including damaged units, incorrect address, returns, replacements, and other potential issues
d. *Order Cancellations:* Acknowledge that the South Coast AQMD reserves the right to cancel an order at no charge within three business days after it is placed.
e. *Warranty:* South Coast AQMD requires a minimum 2-year manufacturer warranty for air filtration units. Additionally, replacement filters must have a minimum lifespan of six months and be provided directly to the recipients of air filtration units upon delivery. Each proposed package must cover three years of replacement filters per air filtration unit (e.g., for replacement filters with a lifespan of six months, the package must include six replacement filters per air filtration unit). South Coast AQMD does not offer an additional warranty for the air filtration unit or the replacement filters. Also, describe how complaints and issues about defective units will be addressed during the lifetime of the unit warranty.
f. *Additional Data:* Provide other essential data that may assist in the evaluation of the quote (e.g., small business certification, etc.).

VOLUME I - TECHNICAL PROPOSAL

DO NOT INCLUDE ANY COST INFORMATION IN THE TECHNICAL VOLUME

Summary (*Section A*) - State overall approach to meeting the objectives and satisfying the scope of work to be performed, the sequence of activities, and a description of methodology or techniques to be used.

Program Schedule (*Section B*) - Provide projected milestones or benchmarks for completing the project (to include reports) within the total time allowed.

Qualifications (*Section C*) - Describe the technical capabilities of the Firm. Provide references of other similar projects performed during the last five years demonstrating ability to successfully complete the work. Include contact name, title, and telephone number for any references listed. Provide a statement of your Firm's background and related experience in performing similar services for other governmental organizations, if applicable.

Assigned Personnel (*Section D*) - Provide the following information about the staff to be assigned to this project:

1. List all key personnel assigned to the project by level, name and location. Provide a resume or similar statement describing the background, qualifications and experience of the lead person and all persons assigned to the project. Substitution of project manager or lead personnel will not be permitted without prior written approval of South Coast AQMD.

2. Provide a statement indicating whether 90% of the work will be performed within the geographical boundaries of South Coast AQMD.

3. Provide a summary of your Firm’s general qualifications to meet required qualifications and fulfill statement of work, including additional Firm personnel and resources beyond those who may be assigned to the project.

Subcontractors (*Section E*) - This project may require expertise in multiple technical areas. List any subcontractors that will be used, identifying functions to be performed by them, their related qualifications and experience and the total number of hours or percentage of time they will spend on the project.

Conflict of Interest (*Section F*) - Address possible conflicts of interest with other clients affected by actions performed by the Firm on behalf of South Coast AQMD. South Coast AQMD recognizes that prospective Contractors may be performing similar projects for other clients. Include a complete list of such clients for the past three (3) years with the type of work performed and the total number of years performing such tasks for each client. Although the Proposer will not be automatically disqualified by reason of work performed for such clients, South Coast AQMD reserves the right to consider the nature and extent of such work in evaluating the proposal.

Additional Data (*Section G*) - Provide other essential data that may assist in the evaluation of this proposal.

VOLUME II - COST PROPOSAL

Name and Address - The Cost Proposal must list the name and complete address of the Proposer in the upper left-hand corner.

Cost Proposal – South Coast AQMD anticipates awarding a fixed price contract. Cost information must be provided as listed below:

1. **Product Specifications and Pricing** - Complete a separate form, Attachment C, for each proposed package. A package must include a minimum of one air filtration unit and three years of replacement filter(s) for each unit.

    a. *Product Specifications* – Complete *Section A* of Attachment C, with details of the proposed products for each package. A package must include a minimum of one air filtration unit and three years of replacement filter(s) for each unit. Bidder may include a copy of the manufacturer's brochure for the product, if available.

    b. *Product Pricing* - Complete *Section B* of Attachment C with proposed pricing for each package. A package must include a minimum of one air filtration unit and three years of replacement filter(s) per unit. The bidder must offer a discounted price from the retail price for the bulk purchase of the air filtration unit and the replacement filter(s) for this unit. **Each residence will not receive over $1,000 in air filtration units and replacement filters. Submitted packages should be tailored so that air filtration units can adequately cover different square footage rooms to ensure proper air filtration within a residence.** Bidder shall provide quantities at which price breaks will occur. Also, the proposed pricing must include shipping costs (including insurance for lost, stolen, or damaged products), and taxes.

    c. *Product Availability* – Complete *Section C* of Attachment C to demonstrate all air filtration units and replacement filters would be available on demand. Specify the lead time from order placement to delivery for stock and non-stock units.

2. It is the policy of the South Coast AQMD to receive at least as favorable pricing, warranties, conditions, benefits and terms as other customers or clients making similar purchases or receiving similar services. South Coast AQMD will give preference, where appropriate, to

vendors who certify that they will provide “most favored customer” status to the South Coast AQMD. To receive preference points, Proposer shall certify that South Coast AQMD is receiving “most favored customer” pricing in the Business Status Certifications page of Volume III, Attachment B – Certifications and Representations.

VOLUME III - CERTIFICATIONS AND REPRESENTATIONS (see Attachment B to this RFP)

SECTION VIII: PROPOSAL SUBMISSION

All proposals must be submitted according to specifications set forth in the section above, and this section. Failure to adhere to these specifications may be cause for rejection of the proposal.

Signature - All proposals must be signed by an authorized representative of the Proposer.

Due Date - **All proposals are due no later than 2:00pm January 10, 2023, and should be directed to**:

Procurement Unit
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765-4178
(909) 396-3520

Submittal – Submit two (2) complete copies of the proposal along with a USB flash drive containing a digital copy of the proposal in a sealed envelope, plainly marked in the upper left-hand corner with the name and address of the Proposer and the words "Request for Proposals P2023-04."

Late bids/proposals will not be accepted under any circumstances.

Grounds for Rejection - A proposal may be immediately rejected if:

- It is not prepared in the format described, or
- It is signed by an individual not authorized to represent the Firm, or
- An air filtration unit quoted does not use a true high-efficiency particulate air (HEPA) filter rated to remove 99.97% of particles measuring 0.3 micrometers or greater (air filtration units using HEPA-like, HEPA-type or non-HEPA filters are not eligible), or
- Air filtration units quoted are not California Air Resources Board (CARB)-certified air cleaning devices (the list of CARB-certified air cleaning devices is available at: https://ww2.arb.ca.gov/list-carb-certified-air-cleaning-devices), or
- Air filtration units quoted do not have an AHAM-certified CADR value of at least 97 for tobacco smoke (0.09-1.0 µM) or CADR equivalent manufacturer’s rating for air filtration that is appropriate for residences within AB 617 Communities.

Modification or Withdrawal - Once submitted, proposals cannot be altered without the prior written consent of South Coast AQMD. All proposals shall constitute firm offers and may not be withdrawn for a period of ninety (90) days following the last day to accept proposals.

SECTION IX: PROPOSAL EVALUATION/CONTRACTOR SELECTION CRITERIA

A. Each member of the evaluation panel shall be accorded equal weight in his or her rating of proposals. The evaluation panel members shall evaluate the proposals according to the specified criteria and numerical weightings set forth below.

1. (a) Standardized Services:

Criteria	Description	Points
Cost	Total Cost per package including a minimum of one air filtration unit, shipping to residence, and three years' worth of replacement filters per unit	60
CADR-Smoke	The CADR smoke rating of the unit (more points for higher CADR rating)	10
CADR-Dust	The CADR dust rating of the unit (more points for higher CADR rating)	10
Product Specifications	Additional features such as unit operation noise on high (dba rating), size, weight and maneuverability and life expectancy of filters	20
	Total	**100**

(b) Additional Points

Small Business or Small Business Joint Venture	10
DVBE or DVBE Joint Venture	10
Use of DVBE or Small Business Subcontractors	7
Zero or Near-Zero Emission Vehicle Business	5
Local Business (Non-Federally Funded Projects Only)	5
Off-Peak Hours Delivery Business	2
Most Favored Customer	2

The cumulative points awarded for small business, DVBE, use of small business or DVBE subcontractors, Zero or Near-Zero emission vehicle business, local business, and off-peak hours delivery business shall not exceed 15 points. Most Favored Customer status incentive points shall be added, as applicable for a total of 17 points.

Self-Certification for Additional Points

The award of these additional points shall be contingent upon Proposer completing the Self-Certification section of Attachment B – Certifications and Representations and/or inclusion of a statement in the proposal self- certifying that Proposer qualifies for additional points as detailed above.

2. To receive additional points in the evaluation process for the categories of Small Business or Small Business Joint Venture, DVBE or DVBE Joint Venture or Local Business (for non-federally funded projects), the proposer must submit a self-certification at the time of proposal submission certifying that the proposer meets the requirements set forth in Attachments A and B. To receive points for the use of DVBE and/or Small Business subcontractors, at least 25 percent of the total contract value must be subcontracted to DVBEs and/or Small Businesses. To receive points as a Zero or Near-Zero Emission Vehicle Business, the proposer must demonstrate to the Executive Officer, or designee, that supplies and materials delivered to South Coast AQMD are delivered in vehicles that operate on clean-fuels. To receive points as a Local Business, the proposer must affirm that it has an ongoing business within the South Coast AQMD at the time of bid/proposal submittal and that 90% of the work related to the contract will be performed within the South Coast AQMD. Proposals for legislative representation, such as in Sacramento, California or Washington D.C. are not eligible for local business incentive points. Federally funded projects are not eligible for local business incentive points. To receive points as an Off-Peak Hours Delivery Business, the proposer must submit, at proposal submission, certification of its commitment to delivering supplies and materials to South Coast AQMD between the hours of 10:00 a.m. and 3:00 p.m. To receive points for Most Favored Customer status, the proposer must submit, at proposal submission, certification of its commitment to provide most favored customer status to the South Coast AQMD. The cumulative points awarded for Small Business, DVBE, use of Small Business or DVBE Subcontractors, Local Business, Zero or Near- Zero Emission Vehicle Business, Off-Peak Hour Delivery Business and Most Favored Customer shall not exceed 17 points.

3. The lowest cost proposal will be awarded the maximum cost points available and all other cost proposals will receive points on a prorated basis. For example, if the lowest cost proposal is $100 and the maximum points available are 30 points, this proposal would receive the full 30 points. If the next lowest cost proposal is $300 it would receive 27 points reflecting the fact that it is 10% higher than the lowest cost (90% of 30 points = 27 points).

B. During the selection process the evaluation panel may wish to interview some proposers for clarification purposes only. No new material will be permitted at this time. Additional information provided during the bid review process is limited to clarification by the Proposer of information presented in his/her proposal, upon request by South Coast AQMD.

C. The Executive Officer or Governing Board may award the contract to a Proposer other than the Proposer receiving the highest rating in the event the Governing Board determines that another Proposer from among those technically qualified would provide the best value to South Coast AQMD considering cost and technical factors. The determination shall be based solely on the Evaluation Criteria contained in the Request for

Proposal (RFP), on evidence provided in the proposal and on any other evidence provided during the bid review process.

D. Selection will be made based on the above-described criteria and rating factors. The selection will be made by and is subject to Executive Officer or Governing Board approval. Proposers may be notified of the results by letter.

E. The Governing Board has approved a Bid Protest Procedure which provides a process for a Bidder or prospective Bidder to submit a written protest to South Coast AQMD Procurement Manager in recognition of two types of protests: Protest Regarding Solicitation and Protest Regarding Award of a Contract. Copies of the Bid Protest Policy can be secured through a request to South Coast AQMD Procurement Department.

F. The Executive Officer or Governing Board may award contracts to more than one proposer if in (his or their) sole judgment the purposes of the (contract or award) would best be served by selecting multiple proposers.

G. If additional funds become available, the Executive Officer or Governing Board may increase the amount awarded. The Executive Officer or Governing Board may also select additional proposers for a grant or contract if additional funds become available.

H. Disposition of Proposals – Pursuant to South Coast AQMD's Procurement Policy and Procedure, South Coast AQMD reserves the right to reject any or all proposals. All proposals become the property of South Coast AQMD and are subject to the California Public Records Act. One copy of the proposal shall be retained for South Coast AQMD files. Additional copies and materials will be returned only if requested and at the proposer's expense.

I. If proposal submittal is for a Public Works project as defined by State of California Labor Code Section 1720, Proposer is required to include Contractor Registration No. in Attachment B. Proposal submittal will be deemed as non-responsive and Bidder may be disqualified if Contractor Registration No. is not included in Attachment B. **Proposer is alerted to changes to California Prevailing Wage compliance requirements as defined in Senate Bill 854 (Stat. 2014, Chapter 28), and California Labor Code Sections 1770, 1771, 1725, 1777, 1813 and 1815.**

SECTION X: SAMPLE CONTRACT

A sample contract to carry out the work described in this RFP is available on South Coast AQMD's website at http://www.aqmd.gov/grants-bids or upon request from the RFP Contact Person (Section II).

ATTACHMENT A

PARTICIPATION IN THE PROCUREMENT PROCESS

A. It is the policy of South Coast Air Quality Management District (South Coast AQMD) to ensure that all businesses including minority business enterprises, women business enterprises, disabled veteran business enterprises and small businesses have a fair and equitable opportunity to compete for and participate in South Coast AQMD contracts.

B. Definitions:

The definition of minority, women or disadvantaged business enterprises set forth below is included for purposes of determining compliance with the affirmative steps requirement described in Paragraph G below on procurements funded in whole or in part with federal grant funds which involve the use of subcontractors. The definition provided for disabled veteran business enterprise, local business, small business enterprise, Zero or Near-Zero emission vehicle business and off-peak hours delivery business are provided for purposes of determining eligibility for point or cost considerations in the evaluation process.

1. "Women business enterprise" (WBE) as used in this policy means a business enterprise that meets all of the following criteria:

   a. a business that is at least 51 percent owned by one or more women, or in the case of any business whose stock is publicly held, at least 51 percent of the stock is owned by one or more or women.

   b. a business whose management and daily business operations are controlled by one or more women.

   c. a business which is a sole proprietorship, corporation, or partnership with its primary headquarters office located in the United States, which is not a branch or subsidiary of a foreign corporation, foreign firm, or other foreign-based business.

2. "Disabled veteran" as used in this policy is a United States military, naval, or air service veteran with at least 10 percent service-connected disability who is a resident of California.

3. "Disabled veteran business enterprise" (DVBE) as used in this policy means a business enterprise that meets all of the following criteria:

   a. is a sole proprietorship or partnership of which at least 51 percent is owned by one or more disabled veterans or, in the case of a publicly owned business, at least 51 percent of its stock is owned by one or more disabled veterans; a subsidiary which is wholly owned by a parent corporation but only if at least 51 percent of the voting stock of the parent corporation is owned by one or more disabled veterans; or a joint venture in which at least 51 percent of the joint

venture's management and control and earnings are held by one or more disabled veterans.

b. the management and control of the daily business operations are by one or more disabled veterans. The disabled veterans who exercise management and control are not required to be the same disabled veterans as the owners of the business.

c. is a sole proprietorship, corporation, or partnership with its primary headquarters office located in the United States, which is not a branch or subsidiary of a foreign corporation, firm, or other foreign-based business.

4. "Local business" as used in this policy means a company that has an ongoing business within geographical boundaries of South Coast AQMD at the time of bid or proposal submittal and performs 90% of the work related to the contract within the geographical boundaries of South Coast AQMD and satisfies the requirements of subparagraph H below. Proposals for legislative representation, such as in Sacramento, California or Washington D.C. are not eligible for local business incentive points.

5. “Small business” as used in this policy means a business that meets the following criteria:

   a. 1) an independently owned and operated business; 2) not dominant in its field of operation; 3) together with affiliates is either:

      - A service, construction, or non-manufacturer with 100 or fewer employees, and average annual gross receipts of ten million dollars ($10,000,000) or less over the previous three years, or

      - A manufacturer with 100 or fewer employees.

   b. Manufacturer means a business that is both of the following:

      1) Primarily engaged in the chemical or mechanical transformation of raw materials or processed substances into new products.

      2) Classified between Codes 311000 and 339000, inclusive, of the North American Industrial Classification System (NAICS) Manual published by the United States Office of Management and Budget, 2007 edition.

6. "Joint ventures" as defined in this policy pertaining to certification means that one party to the joint venture is a DVBE or small business and owns at least 51 percent of the joint venture.

7. "Zero or Near-Zero Emission Vehicle Business" as used in this policy means a company or contractor that uses Zero or Near-Zero emission vehicles in conducting deliveries to South Coast AQMD. Zero or Near-Zero emission vehicles

include vehicles powered by electric, compressed natural gas (CNG), liquefied natural gas (LNG), liquefied petroleum gas (LPG), ethanol, methanol and hydrogen and are certified to 90% or lower of the existing standard.

8. “Off-Peak Hours Delivery Business” as used in this policy means a company or contractor that commits to conducting deliveries to South Coast AQMD during off-peak traffic hours defined as between 10:00 a.m. and 3:00 p.m.

9. “Benefits Incentive Business” as used in this policy means a company or contractor that provides janitorial, security guard or landscaping services to South Coast AQMD and commits to providing employee health benefits (as defined below in Section VIII.D.2.d) for full time workers with affordable deductible and co-payment terms.

10. “Minority Business Enterprise” as used in this policy means a business that is at least 51 percent owned by one or more minority person(s), or in the case of any business whose stock is publicly held, at least 51 percent of the stock is owned by one or more or minority persons.

    a. a business whose management and daily business operations are controlled by one or more minority persons.

    b. a business which is a sole proprietorship, corporation, or partnership with its primary headquarters office located in the United States, which is not a branch or subsidiary of a foreign corporation, foreign firm, or other foreign-based business.

    c. "Minority person" for purposes of this policy, means a Black American, Hispanic American, Native-American (including American Indian, Eskimo, Aleut, and Native Hawaiian), Asian-Indian (including a person whose origins are from India, Pakistan, and Bangladesh), Asian-Pacific-American (including a person whose origins are from Japan, China, the Philippines, Vietnam, Korea, Samoa, Guam, the United States Trust Territories of the Pacific, Northern Marianas, Laos, Cambodia, and Taiwan).

11. “Most Favored Customer” as used in this policy means that the South Coast AQMD will receive at least as favorable pricing, warranties, conditions, benefits and terms as other customers or clients making similar purchases or receiving similar services.

12. ”Disadvantaged Business Enterprise” as used in this policy means a business that is an entity owned and/or controlled by a socially and economically disadvantaged individual(s) as described by Title X of the Clean Air Act Amendments of 1990 (42 U.S.C. 7601 note) (10% statute), and Public Law 102-389 (42 U.S.C. 4370d)(8% statute), respectively;
    a Small Business Enterprise (SBE);
    a Small Business in a Rural Area (SBRA);
    a Labor Surplus Area Firm (LSAF); or

a Historically Underutilized Business (HUB) Zone Small Business Concern, or a concern under a successor program.

C. Under Request for Quotations (RFQ), DVBEs, DVBE business joint ventures, small businesses, and small business joint ventures shall be granted a preference in an amount equal to 5% of the lowest cost responsive bid. Zero or Near-Zero Emission Vehicle Businesses shall be granted a preference in an amount equal to 5 percent of the lowest cost responsive bid. Off-Peak Hours Delivery Businesses shall be granted a preference in an amount equal to 2 percent of the lowest cost responsive bid. Local businesses (if the procurement is not funded in whole or in part by federal grant funds) shall be granted a preference in an amount equal to 2% of the lowest cost responsive bid. Businesses offering Most Favored Customer status shall be granted a preference in an amount equal to 2 percent of the lowest cost responsive bid.

D. Under Request for Proposals, DVBEs, DVBE joint ventures, small businesses, and small business joint ventures shall be awarded ten (10) points in the evaluation process. A non-DVBE or large business shall receive seven (7) points for subcontracting at least twenty-five (25%) of the total contract value to a DVBE and/or small business. Zero or Near-Zero Emission Vehicle Businesses shall be awarded five (5) points in the evaluation process. On procurements which are not funded in whole or in part by federal grant funds local businesses shall receive five (5) points. Off-Peak Hours Delivery Businesses shall be awarded two (2) points in the evaluation process. Businesses offering Most Favored Customer status shall be awarded two (2) points in the evaluation process.

E. South Coast AQMD will ensure that discrimination in the award and performance of contracts does not occur on the basis of race, color, sex, national origin, marital status, sexual preference, creed, ancestry, medical condition, or retaliation for having filed a discrimination complaint in the performance of South Coast AQMD contractual obligations.

F. South Coast AQMD requires Contractor to be in compliance with all state and federal laws and regulations with respect to its employees throughout the term of any awarded contract, including state minimum wage laws and OSHA requirements.

G. When contracts are funded in whole or in part by federal funds, and if subcontracts are to be let, the Contractor must comply with the following, evidencing a good faith effort to solicit disadvantaged businesses. Contractor shall submit a certification signed by an authorized official affirming its status as a MBE or WBE, as applicable, at the time of contract execution. South Coast AQMD reserves the right to request documentation demonstrating compliance with the following good faith efforts prior to contract execution.

    1. Ensure Disadvantaged Business Enterprises (DBEs) are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities. For Indian Tribal, State and Local Government recipients, this will include placing DBEs on solicitation lists and soliciting them whenever they are potential sources.

    2. Make information on forthcoming opportunities available to DBEs and arrange time frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates

participation by DBEs in the competitive process. This includes, whenever possible, posting solicitations for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.

3. Consider in the contracting process whether firms competing for large contracts could subcontract with DBEs. For Indian Tribal, State and Local Government recipients, this will include dividing total requirements when economically feasible into smaller tasks or quantities to permit maximum participation by DBEs in the competitive process.

4. Encourage contracting with a consortium of DBEs when a contract is too large for one of these firms to handle individually.

5. Using the services and assistance of the Small Business Administration and the Minority Business Development Agency of the Department of Commerce.

6. If the prime contractor awards subcontracts, require the prime contractor to take the above steps.

H. To the extent that any conflict exists between this policy and any requirements imposed by federal and state law relating to participation in a contract by a certified MBE/WBE/DVBE as a condition of receipt of federal or state funds, the federal or state requirements shall prevail.

I. When contracts are not funded in whole or in part by federal grant funds, a local business preference will be awarded. For such contracts that involve the purchase of commercial off-the-shelf products, local business preference will be given to suppliers or distributors of commercial off-the-shelf products who maintain an ongoing business within the geographical boundaries of South Coast AQMD. However, if the subject matter of the RFP or RFQ calls for the fabrication or manufacture of custom products, only companies performing 90% of the manufacturing or fabrication effort within the geographical boundaries of South Coast AQMD shall be entitled to the local business preference. Proposals for legislative representation, such as in Sacramento, California or Washington D.C. are not eligible for local business incentive points.

J. In compliance with federal fair share requirements set forth in 40 CFR Part 33, South Coast AQMD shall establish a fair share goal annually for expenditures with federal funds covered by its procurement policy.

South Coast
Air Quality Management District

21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 • www.aqmd.gov

Business Information Request

Dear South Coast AQMD Contractor/Supplier:

South Coast Air Quality Management District (South Coast AQMD) is committed to ensuring that our contractor/supplier records are current and accurate. If your firm is selected for award of a purchase order or contract, it is imperative that the information requested herein be supplied in a timely manner to facilitate payment of invoices. In order to process your payments, we need the enclosed information regarding your account. **Please review and complete the information identified on the following pages, remember to sign all documents for our files, and return them as soon as possible to the address below:**

Attention: Accounts Payable, Accounting Department
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765-4178

If you do not return this information, we will not be able to establish you as a vendor. This will delay any payments and would still necessitate your submittal of the enclosed information to our Accounting department before payment could be initiated. Completion of this document and enclosed forms would ensure that your payments are processed timely and accurately.

If you have any questions or need assistance in completing this information, please contact Accounting at (909) 396-3777. We appreciate your cooperation in completing this necessary information.

Sincerely,

Sujata Jain
Chief Financial Officer

DH:jn

Enclosures: Business Information Request
Disadvantaged Business Certification
W-9
Form 590 Withholding Exemption Certificate
Federal Contract Debarment Certification
Campaign Contributions Disclosure

REV 6/22

P2023-04

South Coast Air Quality Management District

21865 Copley Drive, Diamond Bar, CA 91765-4178 (909) 396-2000 • www.aqmd.gov

Business Name	
Division of	
Subsidiary of	
Website Address	
Type of Business *Check One:*	⌋ Individual ⌋ DBA, Name_____, County Filed in _____ ⌋ Corporation, ID No. _____ ⌋ LLC/LLP, ID No. _____ ⌋ Other _____

Address			
City/Town			
State/Province		Zip	
Phone	( ) - Ext	Fax	( ) -
Contact		Title	
E-mail Address			
Payment Name if Different			

Attention: Accounts Payable, Accounting Department
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765-4178

BUSINESS STATUS CERTIFICATIONS

Federal guidance for utilization of disadvantaged business enterprises allows a vendor to be deemed a small business enterprise (SBE), minority business enterprise (MBE) or women business enterprise (WBE) if it meets the criteria below.

- is certified by the Small Business Administration or
- is certified by a state or federal agency or
- is an independent MBE(s) or WBE(s) business concern which is at least 51 percent owned and controlled by minority group member(s) who are citizens of the United States.

Statements of certification:

As a prime contractor to South Coast AQMD, (name of business) will engage in good faith efforts to achieve the fair share in accordance with 40 CFR Section 33.301, and will follow the six affirmative steps listed below **for contracts or purchase orders funded in whole or in part by federal grants and contracts.**

1. Place qualified SBEs, MBEs, and WBEs on solicitation lists.
2. Assure that SBEs, MBEs, and WBEs are solicited whenever possible.
3. When economically feasible, divide total requirements into small tasks or quantities to permit greater participation by SBEs, MBEs, and WBEs.
4. Establish delivery schedules, if possible, to encourage participation by SBEs, MBEs, and WBEs.
5. Use services of Small Business Administration, Minority Business Development Agency of the Department of Commerce, and/or any agency authorized as a clearinghouse for SBEs, MBEs, and WBEs.
6. If subcontracts are to be let, take the above affirmative steps.

Self-Certification Verification: Also for use in awarding additional points, as applicable, in accordance with South Coast AQMD Procurement Policy and Procedure:

Check all that apply:

Small Business Enterprise/Small Business Joint Venture
Local business
Minority-owned Business Enterprise
Women-owned Business Enterprise
Disabled Veteran-owned Business Enterprise/DVBE Joint Venture
Most Favored Customer Pricing Certification

Percent of ownership:_____%

Name of Qualifying Owner(s):_____ _____

State of California Public Works Contractor Registration No._____. MUST BE INCLUDED IF BID PROPOSAL IS FOR PUBLIC WORKS PROJECT.

I, the undersigned, hereby declare that to the best of my knowledge the above information is accurate. Upon penalty of perjury, I certify information submitted is factual.

_____ _____
NAME *TITLE*

_____ _____
TELEPHONE NUMBER *DATE*

Definitions

Disabled Veteran-Owned Business Enterprise means a business that meets all of the following criteria:

- is a sole proprietorship or partnership of which is at least 51 percent owned by one or more disabled veterans, or in the case of any business whose stock is publicly held, at least 51 percent of the stock is owned by one or more disabled veterans; a subsidiary which is wholly owned by a parent corporation but only if at least 51 percent of the voting stock of the parent corporation is owned by one or more disabled veterans; or a joint venture in which at least 51 percent of the joint venture's management and control and earnings are held by one or more disabled veterans.
- the management and control of the daily business operations are by one or more disabled veterans. The disabled veterans who exercise management and control are not required to be the same disabled veterans as the owners of the business.
- is a sole proprietorship, corporation, partnership, or joint venture with its primary headquarters office located in the United States and which is not a branch or subsidiary of a foreign corporation, firm, or other foreign-based business.

Joint Venture means that one party to the joint venture is a DVBE and owns at least 51 percent of the joint venture. In the case of a joint venture formed for a single project this means that DVBE will receive at least 51 percent of the project dollars.

Local Business means a business that meets all of the following criteria:

- has an ongoing business within the boundary of South Coast AQMD at the time of bid application.
- performs 90 percent of the work within South Coast AQMD's jurisdiction.

Minority-Owned Business Enterprise means a business that meets all of the following criteria:

- is at least 51 percent owned by one or more minority persons or in the case of any business whose stock is publicly held, at least 51 percent of the stock is owned by one or more minority persons.
- is a business whose management and daily business operations are controlled or owned by one or more minority person.
- is a business which is a sole proprietorship, corporation, partnership, joint venture, an association, or a cooperative with its primary headquarters office located in the United States, which is not a branch or subsidiary of a foreign corporation, foreign firm, or other foreign business.

"Minority" person means a Black American, Hispanic American, Native American (including American Indian, Eskimo, Aleut, and Native Hawaiian), Asian-Indian American (including a person whose origins are from India, Pakistan, or Bangladesh), Asian-Pacific American (including a person whose origins are from Japan, China, the Philippines, Vietnam, Korea, Samoa, Guam, the United States Trust Territories of the Pacific, Northern Marianas, Laos, Cambodia, or Taiwan).

Small Business Enterprise means a business that meets the following criteria:

a. 1) an independently owned and operated business; 2) not dominant in its field of operation; 3) together with affiliates is either:

   - **A service, construction, or non-manufacturer with 100 or fewer employees, and average annual gross receipts of ten million dollars ($10,000,000) or less over the previous three years, or**
   - A manufacturer with 100 or fewer employees.

b. Manufacturer means a business that is both of the following:

   1) Primarily engaged in the chemical or mechanical transformation of raw materials or processed substances into new products.

   2) Classified between Codes 311000 to 339000, inclusive, of the North American Industrial Classification System (NAICS) Manual published by the United States Office of Management and Budget, 2007 edition.

Small Business Joint Venture means that one party to the joint venture is a Small Business and owns at least 51 percent of the joint venture. In the case of a joint venture formed for a single project this means that the Small Business will receive at least 51 percent of the project dollars.

Women-Owned Business Enterprise means a business that meets all of the following criteria:

- is at least 51 percent owned by one or more women or in the case of any business whose stock is publicly held, at least 51 percent of the stock is owned by one or more women.
- is a business whose management and daily business operations are controlled or owned by one or more women.
- is a business which is a sole proprietorship, corporation, partnership, or a joint venture, with its primary headquarters office located in the United States, which is not a branch or subsidiary of a foreign corporation, foreign firm, or other foreign business.

Most Favored Customer as used in this policy means that the South Coast AQMD will receive at least as favorable pricing, warranties, conditions, benefits and terms as other customers or clients making similar purchases or receiving similar services.

Form **W-9**
(Rev. October 2018)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

▶ Go to *www.irs.gov/FormW9* for instructions and the latest information.

Give Form to the requester. Do not send to the IRS.

Print or type. See Specific Instructions on page 3.

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.

2 Business name/disregarded entity name, if different from above

3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only **one** of the following seven boxes.

☐ Individual/sole proprietor or single-member LLC ☐ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate

☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ▶

Note: Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is **not** disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that is disregarded from the owner should check the appropriate box for the tax classification of its owner.

☐ Other (see instructions) ▶

4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):

Exempt payee code (if any)

Exemption from FATCA reporting code (if any)

(Applies to accounts maintained outside the U.S.)

5 Address (number, street, and apt. or suite no.) See instructions.

Requester's name and address (optional)

6 City, state, and ZIP code

7 List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN*, later.

Note: If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Social security number

___ – ___ – ____

or

Employer identification number

__ – _____

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

Sign Here Signature of U.S. person ▶ Date ▶

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to *www.irs.gov/FormW9*.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid)
- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding, *later.*

By signing the filled-out form, you:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),

2. Certify that you are not subject to backup withholding, or

3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and

4. Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See *What is FATCA reporting*, later, for further information.

Note: If you are a U.S. person and a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien;
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States;
- An estate (other than a foreign estate); or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax under section 1446 on any foreign partners' share of effectively connected taxable income from such business. Further, in certain cases where a Form W-9 has not been received, the rules under section 1446 require a partnership to presume that a partner is a foreign person, and pay the section 1446 withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid section 1446 withholding on your share of partnership income.

In the cases below, the following person must give Form W-9 to the partnership for purposes of establishing its U.S. status and avoiding withholding on its allocable share of net income from the partnership conducting a trade or business in the United States.

- In the case of a disregarded entity with a U.S. owner, the U.S. owner of the disregarded entity and not the entity;
- In the case of a grantor trust with a U.S. grantor or other U.S. owner, generally, the U.S. grantor or other U.S. owner of the grantor trust and not the trust; and
- In the case of a U.S. trust (other than a grantor trust), the U.S. trust (other than a grantor trust) and not the beneficiaries of the trust.

Foreign person. If you are a foreign person or the U.S. branch of a foreign bank that has elected to be treated as a U.S. person, do not use Form W-9. Instead, use the appropriate Form W-8 or Form 8233 (see Pub. 515, Withholding of Tax on Nonresident Aliens and Foreign Entities).

Nonresident alien who becomes a resident alien. Generally, only a nonresident alien individual may use the terms of a tax treaty to reduce or eliminate U.S. tax on certain types of income. However, most tax treaties contain a provision known as a "saving clause." Exceptions specified in the saving clause may permit an exemption from tax to continue for certain types of income even after the payee has otherwise become a U.S. resident alien for tax purposes.

If you are a U.S. resident alien who is relying on an exception contained in the saving clause of a tax treaty to claim an exemption from U.S. tax on certain types of income, you must attach a statement to Form W-9 that specifies the following five items.

1. The treaty country. Generally, this must be the same treaty under which you claimed exemption from tax as a nonresident alien.

2. The treaty article addressing the income.

3. The article number (or location) in the tax treaty that contains the saving clause and its exceptions.

4. The type and amount of income that qualifies for the exemption from tax.

5. Sufficient facts to justify the exemption from tax under the terms of the treaty article.

Example. Article 20 of the U.S.-China income tax treaty allows an exemption from tax for scholarship income received by a Chinese student temporarily present in the United States. Under U.S. law, this student will become a resident alien for tax purposes if his or her stay in the United States exceeds 5 calendar years. However, paragraph 2 of the first Protocol to the U.S.-China treaty (dated April 30, 1984) allows the provisions of Article 20 to continue to apply even after the Chinese student becomes a resident alien of the United States. A Chinese student who qualifies for this exception (under paragraph 2 of the first protocol) and is relying on this exception to claim an exemption from tax on his or her scholarship or fellowship income would attach to Form W-9 a statement that includes the information described above to support that exemption.

If you are a nonresident alien or a foreign entity, give the requester the appropriate completed Form W-8 or Form 8233.

Backup Withholding

What is backup withholding? Persons making certain payments to you must under certain conditions withhold and pay to the IRS 24% of such payments. This is called "backup withholding." Payments that may be subject to backup withholding include interest, tax-exempt interest, dividends, broker and barter exchange transactions, rents, royalties, nonemployee pay, payments made in settlement of payment card and third party network transactions, and certain payments from fishing boat operators. Real estate transactions are not subject to backup withholding.

You will not be subject to backup withholding on payments you receive if you give the requester your correct TIN, make the proper certifications, and report all your taxable interest and dividends on your tax return.

Payments you receive will be subject to backup withholding if:

1. You do not furnish your TIN to the requester,

2. You do not certify your TIN when required (see the instructions for Part II for details),

3. The IRS tells the requester that you furnished an incorrect TIN,

4. The IRS tells you that you are subject to backup withholding because you did not report all your interest and dividends on your tax return (for reportable interest and dividends only), or

5. You do not certify to the requester that you are not subject to backup withholding under 4 above (for reportable interest and dividend accounts opened after 1983 only).

Certain payees and payments are exempt from backup withholding. See *Exempt payee code*, later, and the separate Instructions for the Requester of Form W-9 for more information.

Also see *Special rules for partnerships*, earlier.

What is FATCA Reporting?

The Foreign Account Tax Compliance Act (FATCA) requires a participating foreign financial institution to report all United States account holders that are specified United States persons. Certain payees are exempt from FATCA reporting. See *Exemption from FATCA reporting code*, later, and the Instructions for the Requester of Form W-9 for more information.

Updating Your Information

You must provide updated information to any person to whom you claimed to be an exempt payee if you are no longer an exempt payee and anticipate receiving reportable payments in the future from this person. For example, you may need to provide updated information if you are a C corporation that elects to be an S corporation, or if you no longer are tax exempt. In addition, you must furnish a new Form W-9 if the name or TIN changes for the account; for example, if the grantor of a grantor trust dies.

Penalties

Failure to furnish TIN. If you fail to furnish your correct TIN to a requester, you are subject to a penalty of $50 for each such failure unless your failure is due to reasonable cause and not to willful neglect.

Civil penalty for false information with respect to withholding. If you make a false statement with no reasonable basis that results in no backup withholding, you are subject to a $500 penalty.

Criminal penalty for falsifying information. Willfully falsifying certifications or affirmations may subject you to criminal penalties including fines and/or imprisonment.

Misuse of TINs. If the requester discloses or uses TINs in violation of federal law, the requester may be subject to civil and criminal penalties.

Specific Instructions

Line 1

You must enter one of the following on this line; **do not** leave this line blank. The name should match the name on your tax return.

If this Form W-9 is for a joint account (other than an account maintained by a foreign financial institution (FFI)), list first, and then circle, the name of the person or entity whose number you entered in Part I of Form W-9. If you are providing Form W-9 to an FFI to document a joint account, each holder of the account that is a U.S. person must provide a Form W-9.

a. **Individual.** Generally, enter the name shown on your tax return. If you have changed your last name without informing the Social Security Administration (SSA) of the name change, enter your first name, the last name as shown on your social security card, and your new last name.

Note: ITIN applicant: Enter your individual name as it was entered on your Form W-7 application, line 1a. This should also be the same as the name you entered on the Form 1040/1040A/1040EZ you filed with your application.

b. **Sole proprietor or single-member LLC.** Enter your individual name as shown on your 1040/1040A/1040EZ on line 1. You may enter your business, trade, or "doing business as" (DBA) name on line 2.

c. **Partnership, LLC that is not a single-member LLC, C corporation, or S corporation.** Enter the entity's name as shown on the entity's tax return on line 1 and any business, trade, or DBA name on line 2.

d. **Other entities.** Enter your name as shown on required U.S. federal tax documents on line 1. This name should match the name shown on the charter or other legal document creating the entity. You may enter any business, trade, or DBA name on line 2.

e. **Disregarded entity.** For U.S. federal tax purposes, an entity that is disregarded as an entity separate from its owner is treated as a "disregarded entity." See Regulations section 301.7701-2(c)(2)(iii). Enter the owner's name on line 1. The name of the entity entered on line 1 should never be a disregarded entity. The name on line 1 should be the name shown on the income tax return on which the income should be reported. For example, if a foreign LLC that is treated as a disregarded entity for U.S. federal tax purposes has a single owner that is a U.S. person, the U.S. owner's name is required to be provided on line 1. If the direct owner of the entity is also a disregarded entity, enter the first owner that is not disregarded for federal tax purposes. Enter the disregarded entity's name on line 2, "Business name/disregarded entity name." If the owner of the disregarded entity is a foreign person, the owner must complete an appropriate Form W-8 instead of a Form W-9. This is the case even if the foreign person has a U.S. TIN.

Line 2

If you have a business name, trade name, DBA name, or disregarded entity name, you may enter it on line 2.

Line 3

Check the appropriate box on line 3 for the U.S. federal tax classification of the person whose name is entered on line 1. Check only one box on line 3.

IF the entity/person on line 1 is a(n) . . .	THEN check the box for . . .
• Corporation	Corporation
• Individual • Sole proprietorship, or • Single-member limited liability company (LLC) owned by an individual and disregarded for U.S. federal tax purposes.	Individual/sole proprietor or single-member LLC
• LLC treated as a partnership for U.S. federal tax purposes, • LLC that has filed Form 8832 or 2553 to be taxed as a corporation, or • LLC that is disregarded as an entity separate from its owner but the owner is another LLC that is not disregarded for U.S. federal tax purposes.	Limited liability company and enter the appropriate tax classification. (P= Partnership; C= C corporation; or S= S corporation)
• Partnership	Partnership
• Trust/estate	Trust/estate

Line 4, Exemptions

If you are exempt from backup withholding and/or FATCA reporting, enter in the appropriate space on line 4 any code(s) that may apply to you.

Exempt payee code.

- Generally, individuals (including sole proprietors) are not exempt from backup withholding.
- Except as provided below, corporations are exempt from backup withholding for certain payments, including interest and dividends.
- Corporations are not exempt from backup withholding for payments made in settlement of payment card or third party network transactions.
- Corporations are not exempt from backup withholding with respect to attorneys' fees or gross proceeds paid to attorneys, and corporations that provide medical or health care services are not exempt with respect to payments reportable on Form 1099-MISC.

The following codes identify payees that are exempt from backup withholding. Enter the appropriate code in the space in line 4.

1—An organization exempt from tax under section 501(a), any IRA, or a custodial account under section 403(b)(7) if the account satisfies the requirements of section 401(f)(2)

2—The United States or any of its agencies or instrumentalities

3—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities

4—A foreign government or any of its political subdivisions, agencies, or instrumentalities

5—A corporation

6—A dealer in securities or commodities required to register in the United States, the District of Columbia, or a U.S. commonwealth or possession

7—A futures commission merchant registered with the Commodity Futures Trading Commission

8—A real estate investment trust

9—An entity registered at all times during the tax year under the Investment Company Act of 1940

10—A common trust fund operated by a bank under section 584(a)

11—A financial institution

12—A middleman known in the investment community as a nominee or custodian

13—A trust exempt from tax under section 664 or described in section 4947

The following chart shows types of payments that may be exempt from backup withholding. The chart applies to the exempt payees listed above, 1 through 13.

IF the payment is for . . .	THEN the payment is exempt for . . .
Interest and dividend payments	All exempt payees except for 7
Broker transactions	Exempt payees 1 through 4 and 6 through 11 and all C corporations. S corporations must not enter an exempt payee code because they are exempt only for sales of noncovered securities acquired prior to 2012.
Barter exchange transactions and patronage dividends	Exempt payees 1 through 4
Payments over $600 required to be reported and direct sales over $5,000[1]	Generally, exempt payees 1 through 5[2]
Payments made in settlement of payment card or third party network transactions	Exempt payees 1 through 4

[1] See Form 1099-MISC, Miscellaneous Income, and its instructions.

[2] However, the following payments made to a corporation and reportable on Form 1099-MISC are not exempt from backup withholding: medical and health care payments, attorneys' fees, gross proceeds paid to an attorney reportable under section 6045(f), and payments for services paid by a federal executive agency.

Exemption from FATCA reporting code. The following codes identify payees that are exempt from reporting under FATCA. These codes apply to persons submitting this form for accounts maintained outside of the United States by certain foreign financial institutions. Therefore, if you are only submitting this form for an account you hold in the United States, you may leave this field blank. Consult with the person requesting this form if you are uncertain if the financial institution is subject to these requirements. A requester may indicate that a code is not required by providing you with a Form W-9 with "Not Applicable" (or any similar indication) written or printed on the line for a FATCA exemption code.

A—An organization exempt from tax under section 501(a) or any individual retirement plan as defined in section 7701(a)(37)

B—The United States or any of its agencies or instrumentalities

C—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities

D—A corporation the stock of which is regularly traded on one or more established securities markets, as described in Regulations section 1.1472-1(c)(1)(i)

E—A corporation that is a member of the same expanded affiliated group as a corporation described in Regulations section 1.1472-1(c)(1)(i)

F—A dealer in securities, commodities, or derivative financial instruments (including notional principal contracts, futures, forwards, and options) that is registered as such under the laws of the United States or any state

G—A real estate investment trust

H—A regulated investment company as defined in section 851 or an entity registered at all times during the tax year under the Investment Company Act of 1940

I—A common trust fund as defined in section 584(a)

J—A bank as defined in section 581

K—A broker

L—A trust exempt from tax under section 664 or described in section 4947(a)(1)

M—A tax exempt trust under a section 403(b) plan or section 457(g) plan

Note: You may wish to consult with the financial institution requesting this form to determine whether the FATCA code and/or exempt payee code should be completed.

Line 5

Enter your address (number, street, and apartment or suite number). This is where the requester of this Form W-9 will mail your information returns. If this address differs from the one the requester already has on file, write NEW at the top. If a new address is provided, there is still a chance the old address will be used until the payor changes your address in their records.

Line 6

Enter your city, state, and ZIP code.

Part I. Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. If you are a resident alien and you do not have and are not eligible to get an SSN, your TIN is your IRS individual taxpayer identification number (ITIN). Enter it in the social security number box. If you do not have an ITIN, see *How to get a TIN* below.

If you are a sole proprietor and you have an EIN, you may enter either your SSN or EIN.

If you are a single-member LLC that is disregarded as an entity separate from its owner, enter the owner's SSN (or EIN, if the owner has one). Do not enter the disregarded entity's EIN. If the LLC is classified as a corporation or partnership, enter the entity's EIN.

Note: See *What Name and Number To Give the Requester*, later, for further clarification of name and TIN combinations.

How to get a TIN. If you do not have a TIN, apply for one immediately. To apply for an SSN, get Form SS-5, Application for a Social Security Card, from your local SSA office or get this form online at *www.SSA.gov*. You may also get this form by calling 1-800-772-1213. Use Form W-7, Application for IRS Individual Taxpayer Identification Number, to apply for an ITIN, or Form SS-4, Application for Employer Identification Number, to apply for an EIN. You can apply for an EIN online by accessing the IRS website at *www.irs.gov/Businesses* and clicking on Employer Identification Number (EIN) under Starting a Business. Go to *www.irs.gov/Forms* to view, download, or print Form W-7 and/or Form SS-4. Or, you can go to *www.irs.gov/OrderForms* to place an order and have Form W-7 and/or SS-4 mailed to you within 10 business days.

If you are asked to complete Form W-9 but do not have a TIN, apply for a TIN and write "Applied For" in the space for the TIN, sign and date the form, and give it to the requester. For interest and dividend payments, and certain payments made with respect to readily tradable instruments, generally you will have 60 days to get a TIN and give it to the requester before you are subject to backup withholding on payments. The 60-day rule does not apply to other types of payments. You will be subject to backup withholding on all such payments until you provide your TIN to the requester.

Note: Entering "Applied For" means that you have already applied for a TIN or that you intend to apply for one soon.

Caution: A disregarded U.S. entity that has a foreign owner must use the appropriate Form W-8.

Part II. Certification

To establish to the withholding agent that you are a U.S. person, or resident alien, sign Form W-9. You may be requested to sign by the withholding agent even if item 1, 4, or 5 below indicates otherwise.

For a joint account, only the person whose TIN is shown in Part I should sign (when required). In the case of a disregarded entity, the person identified on line 1 must sign. Exempt payees, see *Exempt payee code*, earlier.

Signature requirements. Complete the certification as indicated in items 1 through 5 below.

1. Interest, dividend, and barter exchange accounts opened before 1984 and broker accounts considered active during 1983. You must give your correct TIN, but you do not have to sign the certification.

2. Interest, dividend, broker, and barter exchange accounts opened after 1983 and broker accounts considered inactive during 1983. You must sign the certification or backup withholding will apply. If you are subject to backup withholding and you are merely providing your correct TIN to the requester, you must cross out item 2 in the certification before signing the form.

3. Real estate transactions. You must sign the certification. You may cross out item 2 of the certification.

4. Other payments. You must give your correct TIN, but you do not have to sign the certification unless you have been notified that you have previously given an incorrect TIN. "Other payments" include payments made in the course of the requester's trade or business for rents, royalties, goods (other than bills for merchandise), medical and health care services (including payments to corporations), payments to a nonemployee for services, payments made in settlement of payment card and third party network transactions, payments to certain fishing boat crew members and fishermen, and gross proceeds paid to attorneys (including payments to corporations).

5. Mortgage interest paid by you, acquisition or abandonment of secured property, cancellation of debt, qualified tuition program payments (under section 529), ABLE accounts (under section 529A), IRA, Coverdell ESA, Archer MSA or HSA contributions or distributions, and pension distributions. You must give your correct TIN, but you do not have to sign the certification.

What Name and Number To Give the Requester

For this type of account:	Give name and SSN of:
1. Individual	The individual
2. Two or more individuals (joint account) other than an account maintained by an FFI	The actual owner of the account or, if combined funds, the first individual on the account[1]
3. Two or more U.S. persons (joint account maintained by an FFI)	Each holder of the account
4. Custodial account of a minor (Uniform Gift to Minors Act)	The minor[2]
5. a. The usual revocable savings trust (grantor is also trustee)	The grantor-trustee[1]
b. So-called trust account that is not a legal or valid trust under state law	The actual owner[1]
6. Sole proprietorship or disregarded entity owned by an individual	The owner[3]
7. Grantor trust filing under Optional Form 1099 Filing Method 1 (see Regulations section 1.671-4(b)(2)(i)(A))	The grantor*
For this type of account:	**Give name and EIN of:**
8. Disregarded entity not owned by an individual	The owner
9. A valid trust, estate, or pension trust	Legal entity[4]
10. Corporation or LLC electing corporate status on Form 8832 or Form 2553	The corporation
11. Association, club, religious, charitable, educational, or other tax-exempt organization	The organization
12. Partnership or multi-member LLC	The partnership
13. A broker or registered nominee	The broker or nominee
14. Account with the Department of Agriculture in the name of a public entity (such as a state or local government, school district, or prison) that receives agricultural program payments	The public entity
15. Grantor trust filing under the Form 1041 Filing Method or the Optional Form 1099 Filing Method 2 (see Regulations section 1.671-4(b)(2)(i)(B))	The trust

[1] List first and circle the name of the person whose number you furnish. If only one person on a joint account has an SSN, that person's number must be furnished.

[2] Circle the minor's name and furnish the minor's SSN.

[3] You must show your individual name and you may also enter your business or DBA name on the "Business name/disregarded entity" name line. You may use either your SSN or EIN (if you have one), but the IRS encourages you to use your SSN.

[4] List first and circle the name of the trust, estate, or pension trust. (Do not furnish the TIN of the personal representative or trustee unless the legal entity itself is not designated in the account title.) Also see *Special rules for partnerships*, earlier.

*__Note:__ The grantor also must provide a Form W-9 to trustee of trust.

Note: If no name is circled when more than one name is listed, the number will be considered to be that of the first name listed.

Secure Your Tax Records From Identity Theft

Identity theft occurs when someone uses your personal information such as your name, SSN, or other identifying information, without your permission, to commit fraud or other crimes. An identity thief may use your SSN to get a job or may file a tax return using your SSN to receive a refund.

To reduce your risk:

- Protect your SSN,
- Ensure your employer is protecting your SSN, and
- Be careful when choosing a tax preparer.

If your tax records are affected by identity theft and you receive a notice from the IRS, respond right away to the name and phone number printed on the IRS notice or letter.

If your tax records are not currently affected by identity theft but you think you are at risk due to a lost or stolen purse or wallet, questionable credit card activity or credit report, contact the IRS Identity Theft Hotline at 1-800-908-4490 or submit Form 14039.

For more information, see Pub. 5027, Identity Theft Information for Taxpayers.

Victims of identity theft who are experiencing economic harm or a systemic problem, or are seeking help in resolving tax problems that have not been resolved through normal channels, may be eligible for Taxpayer Advocate Service (TAS) assistance. You can reach TAS by calling the TAS toll-free case intake line at 1-877-777-4778 or TTY/TDD 1-800-829-4059.

Protect yourself from suspicious emails or phishing schemes. Phishing is the creation and use of email and websites designed to mimic legitimate business emails and websites. The most common act is sending an email to a user falsely claiming to be an established legitimate enterprise in an attempt to scam the user into surrendering private information that will be used for identity theft.

The IRS does not initiate contacts with taxpayers via emails. Also, the IRS does not request personal detailed information through email or ask taxpayers for the PIN numbers, passwords, or similar secret access information for their credit card, bank, or other financial accounts.

If you receive an unsolicited email claiming to be from the IRS, forward this message to *phishing@irs.gov*. You may also report misuse of the IRS name, logo, or other IRS property to the Treasury Inspector General for Tax Administration (TIGTA) at 1-800-366-4484. You can forward suspicious emails to the Federal Trade Commission at *spam@uce.gov* or report them at *www.ftc.gov/complaint*. You can contact the FTC at *www.ftc.gov/idtheft* or 877-IDTHEFT (877-438-4338). If you have been the victim of identity theft, see *www.IdentityTheft.gov* and Pub. 5027.

Visit *www.irs.gov/IdentityTheft* to learn more about identity theft and how to reduce your risk.

Privacy Act Notice

Section 6109 of the Internal Revenue Code requires you to provide your correct TIN to persons (including federal agencies) who are required to file information returns with the IRS to report interest, dividends, or certain other income paid to you; mortgage interest you paid; the acquisition or abandonment of secured property; the cancellation of debt; or contributions you made to an IRA, Archer MSA, or HSA. The person collecting this form uses the information on the form to file information returns with the IRS, reporting the above information. Routine uses of this information include giving it to the Department of Justice for civil and criminal litigation and to cities, states, the District of Columbia, and U.S. commonwealths and possessions for use in administering their laws. The information also may be disclosed to other countries under a treaty, to federal and state agencies to enforce civil and criminal laws, or to federal law enforcement and intelligence agencies to combat terrorism. You must provide your TIN whether or not you are required to file a tax return. Under section 3406, payers must generally withhold a percentage of taxable interest, dividend, and certain other payments to a payee who does not give a TIN to the payer. Certain penalties may also apply for providing false or fraudulent information.

TAXABLE YEAR [redacted] CALIFORNIA FORM

2021 Withholding Exemption Certificate 590

The payee completes this form and submits it to the withholding agent. The withholding agent keeps this form with their records.

Withholding Agent Information

Name

Payee Information

Name | ☐ SSN or ITIN ☐ FEIN ☐ CA Corp no. ☐ CA SOS file no.

Address (apt./ste., room, PO box, or PMB no.)

City (If you have a foreign address, see instructions.) | State | ZIP code

Exemption Reason

Check only one box.

By checking the appropriate box below, the payee certifies the reason for the exemption from the California income tax withholding requirements on payment(s) made to the entity or individual.

☐ **Individuals — Certification of Residency:**
I am a resident of California and I reside at the address shown above. If I become a nonresident at any time, I will promptly notify the withholding agent. See instructions for General Information D, Definitions.

☐ **Corporations:**
The corporation has a permanent place of business in California at the address shown above or is qualified through the California Secretary of State (SOS) to do business in California. The corporation will file a California tax return. If this corporation ceases to have a permanent place of business in California or ceases to do any of the above, I will promptly notify the withholding agent. See instructions for General Information D, Definitions.

☐ **Partnerships or Limited Liability Companies (LLCs):**
The partnership or LLC has a permanent place of business in California at the address shown above or is registered with the California SOS, and is subject to the laws of California. The partnership or LLC will file a California tax return. If the partnership or LLC ceases to do any of the above, I will promptly inform the withholding agent. For withholding purposes, a limited liability partnership (LLP) is treated like any other partnership.

☐ **Tax-Exempt Entities:**
The entity is exempt from tax under California Revenue and Taxation Code (R&TC) Section 23701 _____ (insert letter) or Internal Revenue Code Section 501(c) _____ (insert number). If this entity ceases to be exempt from tax, I will promptly notify the withholding agent. Individuals cannot be tax-exempt entities.

☐ **Insurance Companies, Individual Retirement Arrangements (IRAs), or Qualified Pension/Profit-Sharing Plans:**
The entity is an insurance company, IRA, or a federally qualified pension or profit-sharing plan.

☐ **California Trusts:**
At least one trustee and one noncontingent beneficiary of the above-named trust is a California resident. The trust will file a California fiduciary tax return. If the trustee or noncontingent beneficiary becomes a nonresident at any time, I will promptly notify the withholding agent.

☐ **Estates — Certification of Residency of Deceased Person:**
I am the executor of the above-named person's estate or trust. The decedent was a California resident at the time of death. The estate will file a California fiduciary tax return.

☐ **Nonmilitary Spouse of a Military Servicemember:**
I am a nonmilitary spouse of a military servicemember and I meet the Military Spouse Residency Relief Act (MSRRA) requirements. See instructions for General Information E, MSRRA.

CERTIFICATE OF PAYEE: Payee must complete and sign below.

To learn about your privacy rights, how we may use your information, and the consequences for not providing the requested information, go to **ftb.ca.gov/forms** and search for **1131**. To request this notice by mail, call 800.852.5711.

Under penalties of perjury, I declare that I have examined the information on this form, including accompanying schedules and statements, and to the best of my knowledge and belief, it is true, correct, and complete. I further declare under penalties of perjury that if the facts upon which this form are based change, I will promptly notify the withholding agent.

Type or print payee's name and title _____ Telephone _____

Payee's signature ▶ _____ Date _____

2021 Instructions for Form 590

Withholding Exemption Certificate

References in these instructions are to the California Revenue and Taxation Code (R&TC).

General Information

California Revenue and Taxation Code (R&TC) Section 18662 requires withholding of income or franchise tax on payments of California source income made to nonresidents of California. For more information, See General Information B, Income Subject to Withholding.

Registered Domestic Partners (RDPs) – For purposes of California income tax, references to a spouse, husband, or wife also refer to a California RDP unless otherwise specified. For more information on RDPs, get FTB Pub. 737, Tax Information for Registered Domestic Partners.

A Purpose

Use Form 590, Withholding Exemption Certificate, to certify an exemption from nonresident withholding.

Form 590 does not apply to payments of backup withholding. For more information, go to **ftb.ca.gov** and search for **backup withholding**.

Form 590 does not apply to payments for wages to employees. Wage withholding is administered by the California Employment Development Department (EDD). For more information, go to **edd.ca.gov** or call **888**.745.3886.

Do not use Form 590 to certify an exemption from withholding if you are a **seller of California real estate**. Sellers of California real estate use Form 593, Real Estate Withholding Statement, to claim an exemption from the real estate withholding requirement.

The following are excluded from withholding and completing this form:

- The United States and any of its agencies or instrumentalities.
- A state, a possession of the United States, the District of Columbia, or any of its political subdivisions or instrumentalities.
- A foreign government or any of its political subdivisions, agencies, or instrumentalities.

B Income Subject to Withholding

Withholding is required on the following, but is not limited to:

- Payments to nonresidents for services rendered in California.
- Distributions of California source income made to domestic nonresident partners, members, and S corporation shareholders and allocations of California source income made to foreign partners and members.
- Payments to nonresidents for rents if the payments are made in the course of the withholding agent's business.
- Payments to nonresidents for royalties from activities sourced to California.
- Distributions of California source income to nonresident beneficiaries from an estate or trust.
- Endorsement payments received for services performed in California.
- Prizes and winnings received by nonresidents for contests in California.

However, withholding is optional if the total payments of California source income are $1,500 or less during the calendar year.

For more information on withholding, get FTB Pub. 1017, Resident and Nonresident Withholding Guidelines. To get a withholding publication, see Additional Information.

C Who Certifies this Form

Form 590 is certified (completed and signed) by the payee. California residents or entities exempt from the withholding requirement should complete Form 590 and submit it to the withholding agent before payment is made. The withholding agent is then relieved of the withholding requirements if the agent relies in good faith on a completed and signed Form 590 unless notified by the Franchise Tax Board (FTB) that the form should not be relied upon.

An incomplete certificate is invalid and the withholding agent should not accept it. If the withholding agent receives an incomplete certificate, the withholding agent is required to withhold tax on payments made to the payee until a valid certificate is received. In lieu of a completed exemption certificate, the withholding agent may accept a letter from the payee as a substitute explaining why they are not subject to withholding. The letter must contain all the information required on the certificate in similar language, including the under penalty of perjury statement and the payee's taxpayer identification number (TIN).

The certification does not need to be renewed annually. The certification on Form 590 remains valid until the payee's status changes. The withholding agent must retain a copy of the certification or substitute for at least five years after the last payment to which the certification applies. The agent must provide it to the FTB upon request.

If an entertainer (or the entertainer's business entity) is paid for a performance, the entertainer's information must be provided. **Do not** submit the entertainer's agent or promoter information.

The grantor of a grantor trust shall be treated as the payee for withholding purposes. Therefore, if the payee is a grantor trust and one or more of the grantors is a nonresident, withholding is required. If all of the grantors on the trust are residents, no withholding is required. Resident grantors can check the box on Form 590 labeled "Individuals — Certification of Residency."

D Definitions

For California nonwage withholding purposes:

- Nonresident includes all of the following:
  - Individuals who are not residents of California.
  - Corporations not qualified through the California Secretary of State (CA SOS) to do business in California or having no permanent place of business in California.
  - Partnerships or limited liability companies (LLCs) with no permanent place of business in California.
  - Any trust without a resident grantor, beneficiary, or trustee, or estates where the decedent was not a California resident.
- Foreign refers to non-U.S.

For more information about determining resident status, get FTB Pub. 1031, Guidelines for Determining Resident Status. Military servicemembers have special rules for residency. For more information see General Information E, Military Spouse Residency Relief Act (MSRRA), and FTB Pub. 1032, Tax Information for Military Personnel.

Permanent Place of Business:
A corporation has a permanent place of business in California if it is organized and existing under the laws of California or it has qualified through the CA SOS to transact intrastate business. A corporation that has not qualified to transact intrastate business (e.g., a corporation engaged exclusively in interstate commerce) will be considered as having a permanent place of business in California only if it maintains a permanent office in California that is permanently staffed by its employees.

E Military Spouse Residency Relief Act (MSRRA)

Generally, for tax purposes you are considered to maintain your existing residence or domicile. If a military servicemember and nonmilitary spouse have the same state of domicile, the MSRRA provides:

- A spouse shall not be deemed to have lost a residence or domicile in any state solely by reason of being absent to be with the servicemember serving in compliance with military orders.
- A spouse shall not be deemed to have acquired a residence or domicile in any other state solely by reason of being there to be with the servicemember serving in compliance with military orders.

Domicile is defined as the one place:

- Where you maintain a true, fixed, and permanent home.
- To which you intend to return whenever you are absent.

A military servicemember's nonmilitary spouse is considered a nonresident for tax purposes if the servicemember and spouse have the same domicile outside of California and the spouse is in California solely to be with the servicemember who is serving in compliance with Permanent Change of Station orders.

California may require nonmilitary spouses of military servicemembers to provide proof that they meet the criteria for California personal income tax exemption as set forth in the MSRRA.

Income of a military servicemember's nonmilitary spouse for services performed in California is not California source income subject to state tax if the spouse is in California to be with the servicemember serving in compliance with military orders, and the servicemember and spouse have the same domicile in a state other than California.

For additional information or assistance in determining whether the applicant meets the MSRRA requirements, get FTB Pub. 1032.

Specific Instructions

Payee Instructions

Enter the withholding agent's name.

Enter the payee's information, including the TIN and check the appropriate TIN box.

You must provide a valid TIN as requested on this form. The following are acceptable TINs: social security number (SSN); individual taxpayer identification number (ITIN); federal employer identification number (FEIN); California corporation number (CA Corp no.); or CA SOS file number.

Private Mail Box (PMB) – Include the PMB in the address field. Write "PMB" first, then the box number. Example: 111 Main Street PMB 123.

Foreign Address – Follow the country's practice for entering the city, county, province, state, country, and postal code, as applicable, in the appropriate boxes. Do not abbreviate the country name.

Exemption Reason – Check the box that reflects the reason why the payee is exempt from the California income tax withholding requirement.

Withholding Agent Instructions

Do not send this form to the FTB. The certification on Form 590 remains valid until the payee's status changes. The withholding agent must retain a copy of the certificate or substitute for at least five years after the last payment to which the certificate applies. The agent must provide it to the FTB upon request.

The payee must notify the withholding agent if any of the following situations occur:

- The individual payee becomes a nonresident.
- The corporation ceases to have a permanent place of business in California or ceases to be qualified to do business in California.
- The partnership ceases to have a permanent place of business in California.
- The LLC ceases to have a permanent place of business in California.
- The tax-exempt entity loses its tax-exempt status.

If any of these situations occur, then withholding may be required. For more information, get Form 592, Resident and Nonresident Withholding Statement, Form 592-B, Resident and Nonresident Withholding Tax Statement, Form 592-PTE, Pass-Through Entity Annual Withholding Return, Form 592-Q, Payment Voucher for Pass-Through Entity Withholding, and Form 592-V, Payment Voucher for Resident or Nonresident Withholding.

Additional Information

Website: For more information, go to **ftb.ca.gov** and search for **nonwage**.

MyFTB offers secure online tax account information and services. For more information, go to **ftb.ca.gov** and login or register for MyFTB.

Telephone: 888.792.4900 or 916.845.4900, Withholding Services and Compliance phone service

Fax: 916.845.9512

Mail: WITHHOLDING SERVICES AND COMPLIANCE MS F182
FRANCHISE TAX BOARD
PO BOX 942867
SACRAMENTO CA 94267-0651

For questions unrelated to withholding, or to download, view, and print California tax forms and publications, or to access the TTY/TDD numbers, see the Internet and Telephone Assistance section.

Internet and Telephone Assistance

Website: **ftb.ca.gov**

Telephone: 800.852.5711 from within the United States
916.845.6500 from outside the United States

TTY/TDD: 800.822.6268 for persons with hearing or speech disability
711 or 800.735.2929 California relay service

Asistencia Por Internet y Teléfono

Sitio web: **ftb.ca.gov**

Teléfono: 800.852.5711 dentro de los Estados Unidos
916.845.6500 fuera de los Estados Unidos

TTY/TDD: 800.822.6268 para personas con discapacidades auditivas o del habla
711 ó 800.735.2929 servicio de relevo de California

Certification Regarding
Debarment, Suspension, and Other Responsibility Matters

The prospective participant certifies to the best of its knowledge and belief that it and the principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

(b) Have not within a three year period preceding this proposal been convicted of or had a civil judgement rendered against them or commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction: violation of Federal or State antitrust statute or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property:

(c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (b) of this certification; and

(d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

I understand that a false statement on this certification may be grounds for rejection of this proposal or termination of the award. In addition, under 18 USC Sec. 1001, a false statement may result in a fine of up to $10,000 or imprisonment for up to 5 years, or both.

Typed Name & Title of Authorized Representative

Signature of Authorized Representative Date

❑ I am unable to certify to the above statements. My explanation is attached.

CAMPAIGN CONTRIBUTIONS DISCLOSURE

In accordance with California law, bidders and contracting parties are required to disclose, at the time the application is filed, information relating to any campaign contributions made to South Coast Air Quality Management District (SCAQMD) Board Members or members/alternates of the MSRC, including: the name of the party making the contribution (which includes any parent, subsidiary or otherwise related business entity, as defined below), the amount of the contribution, and the date the contribution was made. 2 C.C.R. §18438.8(b). Where a proposed rule or proposed amended rule impacts three or fewer facilities, those facilities will be treated in much the same manner as contracting parties and so must also complete this form, disclosing information relating to any campaign contributions made to any SCAQMD Board Members. See Quadri Advice Letter (2002) A-02.096.1 In the event that a qualifying campaign contribution is made, the Board Member to whom it was made may be disqualified from participating in the actions involving that donor.

California law prohibits a party, or an agent, from making campaign contributions to SCAQMD Governing Board Members or members/alternates of the Mobile Source Air Pollution Reduction Review Committee (MSRC) of more than $250 while their contract or permit is pending before the SCAQMD; and further prohibits a campaign contribution from being made for three (3) months following the date of the final decision by the Governing Board or the MSRC on a donor's contract or permit. Gov't Code §84308(d). For purposes of reaching the $250 limit, the campaign contributions of the bidder or contractor plus contributions by its parents, affiliates, and related companies of the contractor or bidder are added together. 2 C.C.R. §18438.5.

In addition, SCAQMD Board Members or members/alternates of the MSRC must abstain from voting on a contract or permit if they have received a campaign contribution from a party or participant to the proceeding, or agent, totaling more than $250 in the 12-month period prior to the consideration of the item by the Governing Board or the MSRC. Gov't Code §84308(c).

The list of current SCAQMD Governing Board Members can be found at the SCAQMD website (www.aqmd.gov). The list of current MSRC members/alternates can be found at the MSRC website (http://www.cleantransportationfunding.org).

SECTION I.

Contractor (Legal Name): _____

DBA, Name_____, County Filed in_____

Corporation, ID No._____

LLC/LLP, ID No. _____

List any parent, subsidiaries, or otherwise affiliated business entities of Contractor:
(See definition below).

SECTION II.

Has Contractor and/or any parent, subsidiary, or affiliated company, or agent thereof, made a campaign contribution(s) totaling $250 or more in the aggregate to a current member of the South Coast Air Quality Management Governing Board or member/alternate of the MSRC in the 12 months preceding the date of execution of this disclosure?

☐ Yes ☐ No **If YES, complete Section II below and then sign and date the form. If NO, sign and date below. Include this form with your submittal.**

Campaign Contributions Disclosure, *continued:*

Name of Contributor _____

Governing Board Member or MSRC Member/Alternate	Amount of Contribution	Date of Contribution

Name of Contributor _____

Governing Board Member or MSRC Member/Alternate	Amount of Contribution	Date of Contribution

Name of Contributor _____

Governing Board Member or MSRC Member/Alternate	Amount of Contribution	Date of Contribution

Name of Contributor _____

Governing Board Member or MSRC Member/Alternate	Amount of Contribution	Date of Contribution

I declare the foregoing disclosures to be true and correct.

By:_____

Title:_____

Date:_____

DEFINITIONS

Parent, Subsidiary, or Otherwise Related Business Entity (2 Cal. Code of Regs., §18703.1(d).)

(1) Parent subsidiary. A parent subsidiary relationship exists when one corporation directly or indirectly owns shares possessing more than 50 percent of the voting power of another corporation.

(2) Otherwise related business entity. Business entities, including corporations, partnerships, joint ventures and any other organizations and enterprises operated for profit, which do not have a parent subsidiary relationship are otherwise related if any one of the following three tests is met:

(A) One business entity has a controlling ownership interest in the other business entity.

(B) There is shared management and control between the entities. In determining whether there is shared management and control, consideration should be given to the following factors:

(i) The same person or substantially the same person owns and manages the two entities;
(ii) There are common or commingled funds or assets;
(iii) The business entities share the use of the same offices or employees, or otherwise share activities, resources or personnel on a regular basis;
(iv) There is otherwise a regular and close working relationship between the entities; or

(C) A controlling owner (50% or greater interest as a shareholder or as a general partner) in one entity also is a controlling owner in the other entity.

REQUEST FOR PROPOSAL (RFP) FOR RESIDENTIALAIR FILTRATION UNIT AND THREE (3) YEAR SUPPLY OF FILTERS

P2023-04- ATTACHMENT C: Product Specifications and Pricing

January 10, 2023

SECTION A: PRODUCT FEATURES AND SPECIFICATIONS		
Manufacturer		
Brand Name		
Model Number		
CARB Certification Executive Order Number		
ENERGY STAR Unique ID Number		
AHAM-Verified CADR Value for Smoke		
AHAM-Verified CADR Value for Dust		
Recommended room size or area filtered (sq.ft.)		
Filters Included with Unit:		
Filter description (e.g., all 3 filter types combined into 1 filter)		
Certified HEPA filter (REQUIRED)		Model #:
Carbon filter (if applicable)		Model #:
Pre-filter (if applicable)		Model #:
Recommended Frequency of Filter Changeout with Normal/Daily Use:		
HEPA filter		
Carbon filter (if applicable)	☐ Yes ☐ No	
Pre-filter (if applicable)		
Product Specifications:		
Operating Noise on high (dB)		
Wheels/Casters?	☐ Yes ☐ No	
Filter Changeout Indicator?	☐ Yes ☐ No	
Dimensions (in.) of unit		
Dimensions (in.) of box		
Weight of unit (lbs.)		
Other (e.g., UV-C)		
Retail Price ($) of:		
Air filtration unit		
HEPA replacement filter		
Carbon replacement filter (if applicable)		
Pre-filter replacement (if applicable)		

SECTION B: PRODUCT PRICING				
Quantity Price Breaks (up to 1000 units)	**Cost ($) –** Not to Exceed $1,000	**Shipping and Delivery Fees** (if not free)*	**Other Fees** (if any)**	**Description for Other Fees****
1. Air Filtration Unit and Three Years of Replacement Filters Per Unit				
1 - 50 units				
51 - 150 units				
151 - 200 units				
> 201 units				
If price-break categories other than above, specify:				

Notes:
*Orders may be shipped to Los Angeles and Riverside Counties.
**Any additional fees (excluding sales tax) and a description (i.e., stocking, processing, or handling fees)
Sales tax will be added and calculated based on current tax rate of the ship-to location.

SECTION C: PRODUCT AVAILABILITY***

Notes:
***Indicate the quantity of air filtration unit and replacement filter(s) in stock. Specify the lead time from order placement to delivery for both stock and non-stock units once an order is placed.

Back to Agenda

Agenda Item #1

Issue Request for Proposal (RFP), Execute Contracts, and Program Announcement (PA) for the Residential Air Filtration Program within East Los Angeles, Boyle Heights, West Commerce and Eastern Coachella Valley AB 617 Communities

Frances Maes

Background

- East Los Angeles, Boyle Heights, West Commerce (ELABWC) and Eastern Coachella Valley (ECV) identified residential air filtration as an air quality priority in their Community Emission Reduction Plan under the AB 617 Program
- In 2021, the AB 617 ELABHWC and ECV communities allocated $2.8 million of Community Air Protection (CAP) Funds for air filtration systems
  - $1.8 million – ELABHWC
  - $1 million – ECV
- In June 2022, CARB approved the AB 617 Residential Air Filtration Project Plan allowing the use of CAP funds for residential air filtration systems

Overview of Staff Proposal

- Release RFP #P2023-04 to develop a list of eligible manufacturers to supply portable air filtration systems and replacement filters to residents
- Conduct outreach to prioritized areas of the ELABHWC and ECV communities
- Issue PA #2023-03 within the first half of 2023
  - Applicants must be ELABHWC or ECV residents
  - Funding limit of $1,000 per address
  - Application period open until funds are exhausted

Portable Air Filtration Unit

RFP and PA Schedule

Date	Event
November 4, 2022	Release RFP #P2023-04
January 10, 2023	Proposals Due
April 2023	Contract Execution with Bidders
Quarter 2, 2023	Open PA #2023-03

Recommended Actions

- Issue RFP #P2023-04 to establish a list of eligible filtration units and replacement filters and authorize the Executive Officer to execute subsequent contracts
- Issue PA #2023-03 in an amount up to $2,625,000 from the Community Air Protection AB 134 Fund (77) to solicit applications for the Residential Air Filtration Program
  - ELABHWC in an amount not to exceed $1,687,500, and
  - ECV in an amount not to exceed $937,500

Recommended Actions

- Reimburse the General Fund for administrative costs of up to $167,000 from Community Air Protection AB 134 Fund (77)
- Transfer and appropriate up to $8,000 from the administrative portion of Community Air Protection AB 134 Fund (77) into Technology Advancement's FYs 2022-23 and/or 2023-24 Budgets, Services and Supplies Major Object, Public Notice and Advertisement account for administrative costs to implement the Residential Air Filtration Program

BOARD MEETING DATE: November 4, 2022 AGENDA NO.

PROPOSAL: Recognize Revenue and Amend Contract Awards for Cleaner Freight California Projects

SYNOPSIS: In May 2022, the Board recognized a $2,349,995 award from U.S. EPA to replace diesel cargo handling equipment with innovative zero-emission electric alternatives for the Cleaner Freight California Projects. In August 2022, U.S. EPA awarded additional funding of $219,938 to South Coast AQMD's Cleaner Freight California Projects for a total of $2,569,933. These additional funds would be distributed to contracts with Albertsons Companies, McLane Company, and Long Beach Container Terminal. These actions are to: 1) recognize revenue, upon receipt, of up to $219,938 from the U.S. EPA National Clean Diesel Program into the Advanced Technology, Outreach and Education Fund (17), and 2) execute contracts with Albertsons Companies, McLane Company, and Long Beach Container Terminal in amounts not to exceed $1,396,386, $775,770, and $273,150, respectively from the Advanced Technology, Outreach and Education Fund (17).

COMMITTEE: Technology, October 21, 2022; Recommended for Approval

RECOMMENDED ACTIONS:

1. Recognize revenue, upon receipt, of up to $219,938 from the U.S. EPA Diesel Emissions Reduction Act Funding into the Advanced Technology, Outreach and Education Fund (17) for electrification of cargo handling equipment; and
2. Authorize the Executive Officer to execute contracts from the Advanced Technology, Outreach and Education Fund (17) as follows:
   a. Albertsons Companies to replace up to nine diesel yard hostlers with zero-emission, all-electric hostlers in an amount not to exceed $1,396,386;
   b. McLane Company to replace up to five diesel yard hostlers with zero-emission, all-electric yard hostlers in an amount not to exceed $775,770; and

c. Long Beach Container Terminal to replace up to five intermodal box connector carts with zero-emission electric intermodal box connector carts in an amount not to exceed $273,150.

Wayne Nastri
Executive Officer

AK:MW:PSK:SH

Background
In 2021, staff submitted a proposal to U.S. EPA for the Diesel Emission Reduction Act (DERA) grants for electrification of cargo handling equipment at facilities in Southern California. Staff was notified by U.S. EPA that South Coast AQMD had been awarded $2,349,995 in partial funding for the Cleaner Freight California Projects.

In August 2022, U.S. EPA awarded additional funding of $219,938 for the Cleaner Freight California Projects to the South Coast AQMD, amending the total award amount to up to $2,569,933.

Proposal
U.S. EPA awarded additional funding of $219,938 to South Coast AQMD's Cleaner Freight California Projects for a total of $2,569,933. This additional funding will be distributed to Albertsons, McLane, and Long Beach Container Terminal (LBCT) in the amounts of $81,507, $45,281, and $93,150, respectively. Due to the increased retail price of vehicles, U.S. EPA funding will be used to offset costs of vehicle purchases.

Albertsons, McLane, and LBCT currently own and operate the respective diesel-powered units proposed for scrappage and replacement with new zero-emission electric variants. New electric units will be supported with chargers and pedestals funded under this project.

Zero-Emission Yard Hostlers at Albertsons' Distribution Center
Albertsons will replace up to nine diesel yard hostlers with all-electric hostlers at three distribution centers in Irvine, Brea, and Tracy, California.

Zero-Emission Yard Hostlers at McLane's Distribution Center
McLane will scrap and replace up to five eligible diesel yard tractors with new, eligible, zero-emission electric hostlers.

Zero-Emission Intermodal Box Connector Carts (IBC carts) at Port of Long Beach
LBCT will scrap and replace up to five eligible IBC carts with new, eligible, zero-emission electric IBC carts at LBCT.

Sole Source Justification
Section VIII.B.3. of the Procurement Policy and Procedure identifies four major provisions under which a sole source award may be justified for federally funded procurement. The request for sole source awards for the Albertsons, McLane, and LBCT contracts are made under Section VIII.B.3.c, which states the awarding federal agency or pass-through entity expressly authorizes non-competitive proposals in response to a written request from the non-federal entity.

Benefits to South Coast AQMD
The South Coast Air Basin is classified as an "extreme" nonattainment area for ozone under the federal Clean Air Act. The success of this project will contribute to the attainment of national ambient air quality standards in the South Coast Air Basin by helping to eliminate PM and NOx emissions as a result of replacing the diesel cargo handling equipment. The project supports the *Technology Advancement Office Clean Fuels Program 2023 Plan Update* under the categories of "Electric/Hybrid Technologies" and "Zero Emission Infrastructure".

Resource Impacts
U.S. EPA FY21 DERA Grant award of $2,569,933 towards the electrification of cargo handling equipment in Southern California. Projects include $2,445,306 for project costs and $124,627 for South Coast AQMD staff administrative costs.

U.S. EPA FY21 DERA Fund	Funding Amount
Albertsons	$1,396,386
McLane	$775,770
LBCT	$273,150
Total	$2,445,306

Sufficient funds will be available to execute contracts from the Advanced Technology, Outreach and Education Fund (17) once U.S. EPA 2021 DERA funds are recognized.

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Agenda Item #2

Recognize Revenue and Amend Contract Awards for Cleaner Freight California Projects

Seungbum Ha

Background

- In May 2022, U.S. EPA awarded South Coast AQMD partial funding for Diesel Emission Reduction Act (DERA) grant ($2,349,995) for Cleaner Freight California Projects
- In August 2022, U.S. EPA later awarded additional funding of $219,938 for total of $2,569,933

Proposal

- Additional funding will be distributed to Albertsons, McLane, and Long Beach Container Terminal (LBCT)
- Due to increased retail vehicle prices, EPA funding will be utilized to offset vehicle purchase costs

Proposed Project Costs

U.S. EPA FY 21 DERA Fund	Vehicle	Funding Amount*
Albertsons	9 Zero-emission Yard Tractors	$1,396,386
McLane	5 Zero-emission Yard Tractors	$775,770
LBCT	5 Zero-emission IBC Carts	$273,150
Total	19 Zero-emission Off-road vehicles	$2,445,306**

* Additional funding to Albertsons, McLane, and LBCT for $81,507, $45,281, and $93,150, respectively

** U.S. EPA FY 21 DERA Grant award of $2,569,933 includes $2,445,306 for project costs and $124,627 for South Coast AQMD administrative costs

Recommended Actions

Recognize revenue, upon receipt, of up to $219,938 from U.S. EPA Diesel Emissions Reduction Act Funding into Advanced Technology, Outreach and Education Fund (17) for electrification of cargo handling equipment; and

Recommended Actions

Authorize Executive Officer to execute contracts from Advanced Technology, Outreach and Education Fund (17) as follows:

- Albertsons Companies to replace diesel yard hostlers with zero-emission, all-electric hostlers in an amount not to exceed $1,396,386;
- McLane Company to replace diesel yard hostlers with zero-emission, all-electric yard hostlers in an amount not to exceed $775,770; and
- Long Beach Container Terminal to replace intermodal cargo handling equipment with zero-emission, all-electric equipment in an amount not to exceed $273,150

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DRAFT

Technology Committee Agenda #3

PROPOSAL: Clean Fuels Program Draft 2023 Plan Update
[Written Report Only]

SYNOPSIS: The Clean Fuels Plan Update is submitted every year with the Clean Fuels Annual Report as required by legislation. As part of that process, staff provides the Clean Fuels Program Draft Plan Update to the Technology Committee to solicit input on the proposed priority technology areas and potential projects for the upcoming year before requesting final Board approval for the Plan Update in early spring. Staff proposes continued support for a wide portfolio of technologies with particular emphasis on zero emission technologies for vehicles, off-road equipment, and supporting infrastructure for goods movement applications.

Background

Each calendar year, as required by legislation, the Clean Fuels Program Plan Update is revised to reflect technical priorities and proposed project areas for the upcoming year. As part of this process, staff provides the Clean Fuels Program Draft Plan Update (Draft Plan Update) before the Technology Committee as a separate item to solicit input on the proposed allocation of potential project funds before requesting final approval each year in early spring. This has provided an opportunity for the Technology Committee to provide input prior to Board consideration and approval of the final Plan Update (concurrent with approval of the Clean Fuels Annual Report).

For Calendar Year 2023, staff has prepared a 2023 Draft Plan Update which proposes continued support for a wide portfolio of technologies. This Draft Plan Update continues to emphasize zero emission technologies for vehicles, off-road cargo handling equipment, and supporting infrastructure for goods movement applications to create a pathway towards achieving attainment of the National Ambient Air Quality Standards for ozone by 2037. This aligns with South Coast AQMD's FY 2022-23 Goals and Priority Objectives and assists in achieving goals outlined in the Draft 2022 Air Quality Management Plan (2022 AQMP), which calls for a significant reduction in NOx emissions by 2037. The portfolio is also designed to leverage funds from other state and federal programs such as the CARB Greenhouse Gas Reduction Fund Program, CEC Clean Transportation Program, and the U.S. EPA Diesel Emissions Reduction Act and Targeted Airshed Grants.

Proposal
The attached Draft Plan Update identifies potential projects to be considered for funding during 2023. The proposed projects reflect promising near-zero and zero emission technologies and applications that are emerging in the hydrogen/mobile fuel cell and electric/hybrid technology source categories, some of which will be funded in the current fiscal year. Some of the proposed projects for 2023 include but are not limited to: large deployment projects of medium-duty (MD) and heavy-duty (HD) zero emission trucks and infrastructure, microgrid demonstrations to support HD truck charging and hydrogen fueling, high-power charging to reduce dwell time of battery electric trucks, and development and demonstration of long range Class 8 fuel cell electric trucks and equipment and green hydrogen production pathways. Projects not funded in 2023 may be considered for funding in subsequent years.

In addition to identifying proposed projects to be considered for funding, the Draft Plan Update confirms ten key high priority technical areas. Zero Emission Infrastructure was formerly included within the Hydrogen/Mobile Fuel Cell Technologies and Electric/Hybrid Technologies categories but given its increasing importance it is now being presented as a separate category. Funding for Renewable Natural Gas (RNG) infrastructure and engine systems/technologies has been significantly reduced as funding is increasingly shifted to zero emission technologies and infrastructure for future planned projects in 2023. These high priority areas are listed below based on the proposed funding distribution shown in Figure 1:

- Hydrogen/Mobile Fuel Cell Technologies
- Electric/Hybrid Vehicle Technologies
- Zero Emission Infrastructure
- Engine Systems/Technologies (particularly in the HD vehicle sector)
- RNG Infrastructure (Renewable Natural Gas/Renewable Fuels)
- Stationary Clean Fuel Technologies (including renewables)
- Fuel and Emissions Studies
- Emission Control Technologies
- Health Impacts Studies
- Technology Transfer and Outreach

It should be noted that these priorities represent the areas where South Coast AQMD funding is thought to have the greatest impact. In keeping with the diverse and flexible "technology portfolio" approach, these priorities may shift during the year to capture opportunities such as cost-sharing by state government, federal government, or other entities, or address specific technology issues which affect residents within the South Coast AQMD's jurisdiction.

Figure 1 graphically depicts potential distribution of South Coast AQMD's Clean Fuels funds, based on projected program costs of $19.8 million for the ten project areas discussed previously. The expected actual project expenditures for 2023 will be less than the total projected program cost since not all projects will be implemented. Target allocations are based on balancing technology priorities, addressing technical challenges and opportunities, and achieving near-term versus long-term benefits with the constraints on available South Coast AQMD funding. Specific contract awards throughout 2023 will be based on this proposed allocation, quality of proposals received and evaluation of projects against standardized criteria, and ultimately, Board approval.

The principal revenue source is the Clean Fuels Program, which under H&SC Section 40448.5 and Vehicle Code Section 9250.11 which establishes mechanisms to collect revenues from mobile and stationary sources to support the program's objectives. Grants and cost-sharing revenue contracts from various government agencies, such as CARB, CEC, National Renewable Energy Laboratory, U.S. EPA and U.S. DOE, also support technology advancement efforts and may be approached for cost-sharing.

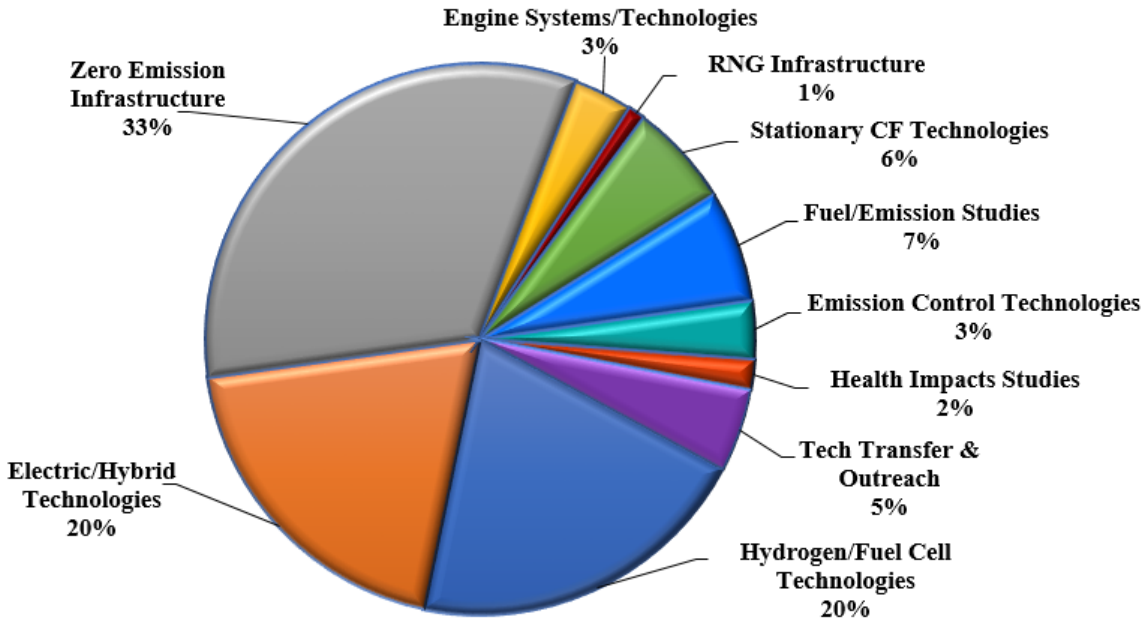

Figure 1: Projected Funding Distribution for Potential Projects in 2023 ($19.8M)

This proposed update is the result of a historical as well as current comprehensive planning and review process, which will continue over the next few months as the Draft Plan Update is further refined before the Board considers adoption in early spring. This process includes consideration of the Draft 2022 AQMP, Draft 2022 Scoping Plan Update – Achieving Carbon Neutrality by 2045, San Pedro Bay Ports' Clean Air Action Plan, California Sustainable Freight Strategy, CARB's 2022-2023 Funding Plan, and

proposed regulations, such as the Advanced Clean Trucks and Fleets regulations, as well as Proposed Indirect Source Rules for the ports and new railyards. The proposed update also incorporates coordination activities involving outside organizations including consideration of federal, state and local activities, and proposed integrated solutions ranging from the Governor's Executive Orders and goals for MD and HD vehicles and beyond to CARB's climate strategies. The Governor's Executive Order issued in January 2018 setting a target of 200 hydrogen stations by 2025 (which doubled the original 2023 target) and 5 million ZEVs by 2030 is a good example of state and local alignment. As part of the Clean Fuels Program, staff hosted two advisory group meetings in February and September 2022 to solicit input from the Clean Fuels Advisory Group, Technology Advancement Advisory Group, and other technical experts. During these advisory meetings, participants reviewed current and proposed Technology Advancement projects as well as the proposed funding distribution for the 2023 Draft Plan Update and discussed near-term and long-term technologies as potential projects.

Discussions from the review process and advisory meetings, where appropriate, have been and will continue to be fashioned into project areas and included in this year's Plan Update as it is finalized. Additionally, staff regularly interacts with CARB, CEC, DOE, U.S. EPA, Hydrogen Fuel Cell Partnership, research universities, and other entities to solicit and incorporate technical areas for potential leveraged funding. Overall, the Draft Plan Update attempts to maintain flexibility to address dynamically evolving technologies and incorporate new research and data.

The major areas of focus are proposed in the following areas:

- Large deployments of MD and HD zero emission drayage trucks;
- HD zero emission infrastructure development, demonstration, deployment, and planning;
- Onboard sensor development for emissions monitoring and improved efficiency;
- Microgrid demonstrations to support zero emission infrastructure;
- Battery and fuel cell electric transit and school bus fleet charging/fueling infrastructure;
- HD diesel truck replacements with zero emission trucks through incentive programs; and
- Fuel and emissions studies, such as conducting airborne measurements and analysis of NOx emissions and assessing emission impacts of hydrogen-natural gas fuel blends on near-zero emission HD natural gas engines.

Changes in Funding Allocation

The relative changes in funding allocation are a result of recent and anticipated opportunities to partner with other agencies on projects and studies. For example, the

2023 Draft Plan Update increased the allocation for hydrogen/mobile fuel cell technologies, electric/hybrid technologies, and zero emission infrastructure, which is in line with the $27 million Greenhouse Gas Reduction Fund and Clean Transportation Fund grants that South Coast AQMD and its partners were awarded by CARB and CEC for the Joint Electric Truck Scaling Initiative Project. As shown in Figure 2, the 2023 Draft Plan Update has a particular focus on zero emission infrastructure for large-scale charging and fueling stations necessary to support MD and HD battery electric and fuel cell vehicles. There remains an urgent need to develop, demonstrate, and deploy zero emission technologies for HD vehicles and equipment, especially for goods movement applications, including supporting infrastructure. The emphasis on zero emission technologies for goods movement applications continues to pave a technological pathway towards achieving the 2037 federal attainment goals.

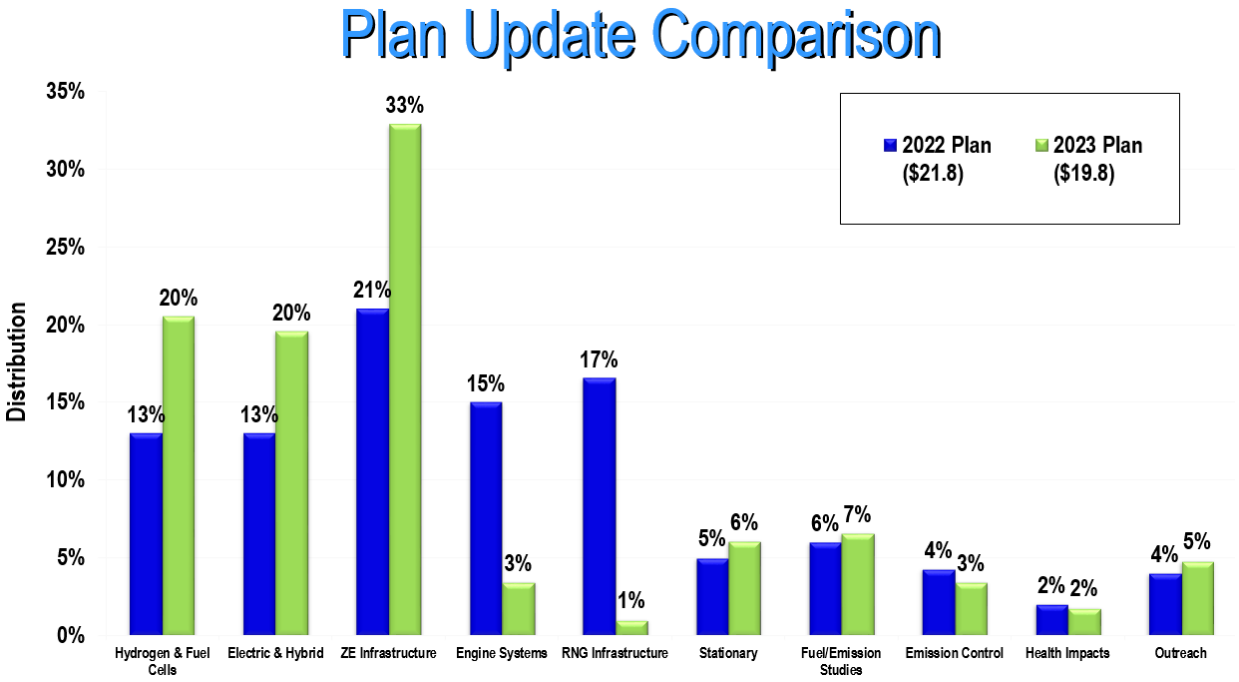

Figure 2: Plan Update Comparison

Based on communications with organizations specified in H&SC Section 40448.5.1 and review of their programs, the projects proposed in this update do not appear to duplicate any past or present projects. As each individual project is recommended to the Board for funding, staff will continue to coordinate with these organizations to ensure that duplication is avoided and ensure optimal expenditure of Clean Fuels Program funds.

Attachment
Clean Fuels Program 2023 Draft Plan Update

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TECHNOLOGY ADVANCEMENT OFFICE
DRAFT 2023 PLAN UPDATE

South Coast Air Quality Management District
October 2022

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EXECUTIVE SUMMARY

Introduction

The South Coast Air Quality Management District (South Coast AQMD) is the air pollution control agency for all of Orange County and the urban portions of Los Angeles, Riverside and San Bernardino counties. This region, which encompasses the South Coast Air Basin (Basin) as well as small portions of the Mojave Desert and Salton Sea Air Basins, historically experiences the worst air quality in the nation due to the natural geographic and atmospheric conditions of the region, coupled with the high population density and associated mobile and stationary source emissions.

In 1988, SB 2297 (Rosenthal) was signed into law (Chapter 1546). It initially established a "five-year program to increase the use of clean fuels," but subsequent legislation extended and eventually removed the sunset clause for the Program. That legislation also reaffirmed the existence of the Technology Advancement Office (TAO) to administer the Clean Fuels Program. The TAO Clean Fuels Program is an integral part of the South Coast AQMD's effort to achieve the significant nitrogen oxides (NOx) emission reductions called for in the Draft 2022 Air Quality Management Plan (AQMP) because it affords South Coast AQMD the ability to fund research, development, demonstration and accelerated deployment of clean fuels and transformative transportation technologies.

Using funding received through a $1 motor vehicle registration fee, the Clean Fuels Program encourages, fosters and supports clean fuels and transportation technologies, such as hydrogen powered fuel cells, advanced natural gas technologies, alternative fuel engines, battery electric vehicles, plug-in hybrid electric vehicles and related fueling infrastructure including renewable fuels. A key strategy of the Program is its public-private partnerships with private industry, technology developers, academic institutions, research institutions and government agencies. Since 1988, the Clean Fuels Program leveraged nearly $250 million into over $1.6 billion in projects. Leveraging of the Clean Fuels Fund is based on executed contracts and total project costs from the prior year's Clean Fuels Annual Report and Plan Update.

As technologies move towards commercialization, such as battery and fuel cell electric trucks, the Clean Fuels Program has been able to partner with large original equipment manufacturers (OEMs), such as Daimler, Volvo, Hyundai and Peterbilt to deploy these vehicles in larger numbers. These OEM partnerships allow the Program to leverage their research, product development, customer relationships, and financial resources needed to move advanced technologies from the laboratories to the field and into customers' hands. The OEMs have the resources and capabilities to design, engineer, test, manufacture, market, distribute and service quality products under brand names that are trusted. This is the type of scale needed to achieve emission reductions needed to attain national ambient air quality standards (NAAQS).

While South Coast AQMD aggressively seeks to leverage funds, it plays a leadership role in technology development and commercialization, along with its partners, to accelerate the reduction of criteria pollutants. The TAO Clean Fuels Program has traditionally supported a portfolio of technologies at different technology readiness levels. This helps with the development of new technologies across many different mobile sectors in need of new technologies that provide emission reductions and health benefits. This approach enhances the region's chances of achieving the NAAQS.

California Health and Safety Code (H&SC) 40448.5(e) calls for the Clean Fuels Program to consider factors such as: current and projected economic costs and availability of fuels; cost-effectiveness of emission reductions associated with clean fuels compared with other pollution control alternatives; use of new pollution control technologies in conjunction with traditional fuels as an alternative means of reducing emissions; potential effects on public health, ambient air quality, visibility within the region; and other

factors determined to be relevant by the South Coast AQMD. The Legislature recognized the need for flexibility, allowing focus on a broad range of technology areas, including cleaner fuels, vehicles and infrastructure, which helps the South Coast AQMD continue to make progress toward achieving its clean air goals.

California H&SC 40448.5.1 requires the South Coast AQMD to prepare and submit to the Legislative Analyst each year by March 31, a Clean Fuels Annual Report and Plan Update. The Clean Fuels Annual Report looks at Program accomplishments in the prior calendar year (CY) and the Clean Fuels Plan Update looks ahead at proposed projects for the next CY, re-calibrating the technical emphasis of the Program.

Setting the Stage

The overall strategy of TAO's Clean Fuels Program is largely based on emission reduction technology needs identified in the AQMP and the South Coast AQMD Board directives to protect the health of almost 18 million residents (nearly half the population of California) in the Basin. The Draft 2022 AQMP, which was released in May 2022 and is expected to be adopted in December 2022, is the long-term regional "blueprint" that identifies the fair-share emission reductions from all jurisdictional levels (e.g., federal, state and local). The Draft 2022 AQMP is composed of stationary and mobile source emission reductions from traditional regulatory control measures, incentive-based programs, projected co-benefits from climate change programs, mobile source strategies and other innovative approaches, including indirect source measures and incentive programs, to reduce emissions from federally regulated sources (e.g., aircraft, locomotives and ocean-going vessels). South Coast AQMD developed the Plan in collaboration with the California Air Resources Board (CARB) and Southern California Association of Governments (SCAG). CARB's Proposed 2022 State SIP Strategy included a revised mobile source strategy required for the Basin to meet the 2015 8-hour ozone standard by 2037.

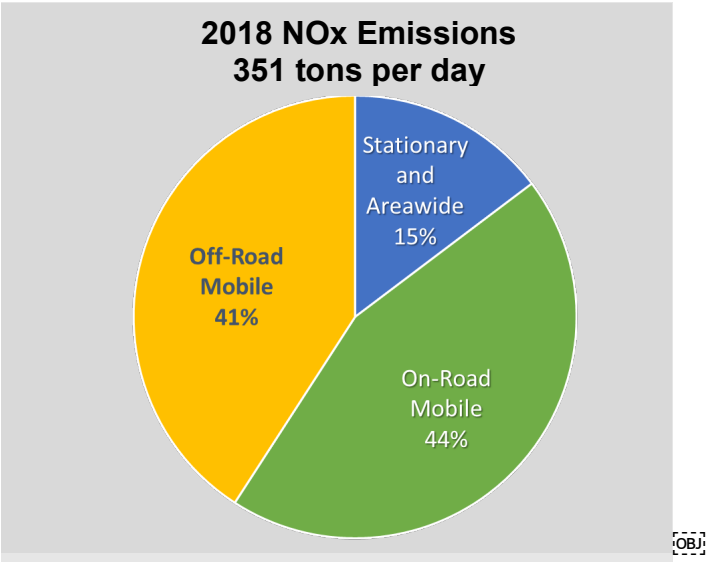

Figure 1: NOx Emissions by Source Category

Ground level ozone (a key component of photochemical smog) is formed by a chemical reaction between NOx and volatile organic compound (VOC) emissions in the presence of sunlight. NOx emission reduction is the key to improve ozone air quality and attain the ozone National Ambient Air Quality Standard (NAAQS) in the Basin. Approximately 85 percent of NOx emissions are from mobile sources in 2018, as shown in Figure 1. Furthermore, NOx emissions, along with VOC emissions, also lead to the secondary

formation of PM2.5 [particulate matter measuring 2.5 microns or less in size, expressed as micrograms per cubic meter (µg/m3)].

The emission reductions and control measures in the Draft 2022 AQMP rely on a mix of currently available technologies as well as the expedited development and commercialization of clean fuel mobile and stationary advanced technologies to achieve health-based air quality standards. The Draft 2022 AQMP identifies that 83 percent NOx emission reductions from the 2018 level and 67 percent additional reductions in 2037 beyond already adopted regulations and programs are necessary to meet the 2015 8-hour ozone standard by 2037, the attainment due date set by the USEPA. Figure 2 illustrates these needed NOx reductions in the Basin. The majority of NOx reductions must come from mobile sources, both on-road and off-road. Notably, the South Coast AQMD is currently only one of two regions in the nation designated as an extreme nonattainment area of the 2015 8-hour ozone NAAQS (the other region is California's San Joaquin (Central Valley).

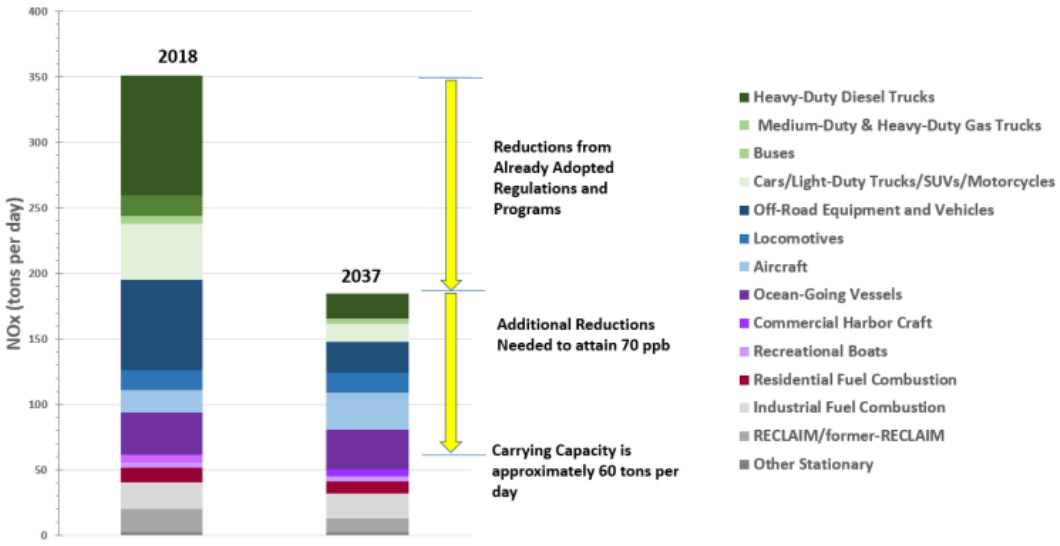

Figure 2: NOx Emissions and Reductions Required to Attain 70 ppb 2037 Standard

The Draft 2022 AQMP proposes economy-wide transition to zero emission technologies when cost-effective and feasible, and low NOx technologies in other applications. This strategy requires a significantly lower state and national heavy-duty (HD) truck engine emissions standard with the earliest implementation date, significant additional financial resources, and accelerated fleet turnover on a massive scale.

Current state and federal efforts in developing regulations for on- and off-road vehicles and equipment are expected to significantly reduce NOx emissions, but are insufficient to achieve the 2023, 2031, and 2037 ozone attainment deadlines.

Clean Fuels Program

The Clean Fuels Program, established in California H&SC 40448.5, is an important mechanism to encourage and accelerate the advancement and commercialization of clean fuels in both stationary and mobile source technologies.

Figure 3 provides a conceptual design of the wide scope of the Clean Fuels Program and the relationship with incentive programs. Various stages of technology projects are funded not only to provide a portfolio of technology choices but to achieve near-term and long-term emission reduction benefits. South Coast

AQMD's Clean Fuels Program typically funds projects in the Technology Readiness Level (TRL) ranging between 3-8.

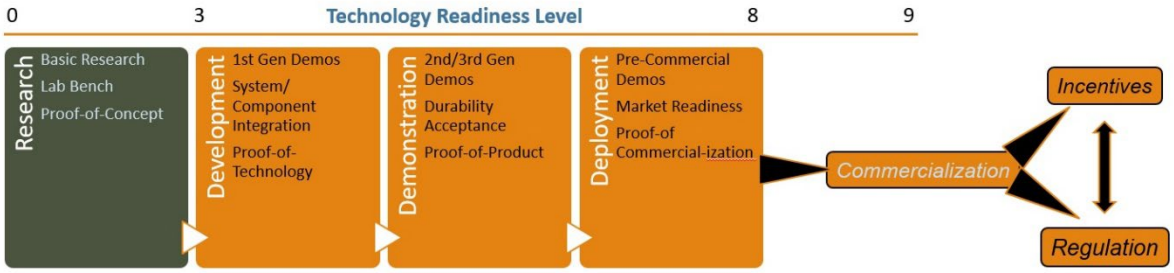

Figure 3: Stages of Clean Fuels Program Funding [is this meant to be Figure 3, for the figure below?]

Below is a summary of the 2022 Clean Fuels Annual Report and Draft 2023 Plan Update. Every Annual Report and Plan Update is reviewed by two advisory groups--the Clean Fuels Advisory Group, legislatively mandated by SB 98 (chaptered, 1999), and the Technology Advancement Advisory Group, created by the South Coast AQMD Board in 1990. These stakeholder groups review and assess the overall direction of the Program. The two groups meet approximately every six months to provide expert analysis and feedback on potential projects and areas of focus. Key technical experts working in the fields of the Program's core technologies also typically attend and provide feedback. Preliminary review and comment are also provided by South Coast AQMD's Board and other interested parties and stakeholders, as deemed appropriate.

Draft 2023 Plan Update

The Clean Fuels Program is re-evaluated annually to develop the annual Plan Update based on a reassessment of the technology progress and direction for the agency. The Program continually seeks to support the development and deployment of cost-effective clean fuel technologies with increased collaboration with OEMs to achieve large scale deployment. The design and implementation of the Clean Fuels Program Plan must balance the needs in the various technology sectors with technology readiness on the path to commercialization, emission reduction potential and co-funding opportunities. For several years, the state has focused a great deal of attention on climate change and petroleum reduction goals, but the South Coast AQMD has remained committed to developing, demonstrating and commercializing technologies that reduce criteria pollutants, specifically NOx and toxic air contaminants (TACs). Most of these technologies address the Basin's need for NOx and TAC reductions and garner reductions in greenhouse gases (GHG) and petroleum use. Due to these co-benefits, South Coast AQMD has been successful in partnering with the state and public/private partnerships to leverage its Clean Fuels funding.

To identify technology and project opportunities where funding can make a significant difference in deploying cleaner technologies in the Basin, South Coast AQMD engages in outreach and networking efforts. These activities range from close involvement with state and federal collaboratives, partnerships and industrial coalitions, to the issuance of Program Opportunity Notices (PONs) to solicit project ideas and concepts and Requests for Information (RFIs) to determine the current state of various technologies and their development and commercialization challenges. Additionally, unsolicited proposals from OEMs and other clean fuel technology developers are regularly received and reviewed. Potential development, demonstration and certification projects resulting from these outreach and networking efforts are included conceptually within the Draft 2023 Clean Fuels Plan Update.

Assembly Bill (AB) 617[1] requires reduced exposure to communities most impacted by air pollution; TAO conducted additional outreach to AB 617 communities regarding available zero and near-zero emission technologies and incentives to accelerate the deployment of cleaner technologies. Cleaner technologies such as near-zero and zero emission HD trucks are now included in the Community Emission Reduction Plans (CERPs) for these AB 617 communities, and an RFP for a zero emission HD truck program will be released in 2022.

Since 2020, CARB has adopted several critical milestone regulations for reducing emissions from on-road HD mobile sources. These regulations include: 1) the Advanced Clean Truck (ACT) regulation which mandates an increasingly higher percentage of zero emission truck sales starting in 2024, 2) CARB's Omnibus Low NOx regulation which requires lower exhaust NOx standards on HD engines starting in 2024, and 3) the HD Vehicle Inspection and Maintenance Program looking at removing high emitters from legacy trucks. CARB is also taking the Advanced Clean Fleets regulation as well as the 2022 State Implementation Plan (SIP) Strategy for Board consideration in 2022.

On the federal level, USEPA aims to adopt a national low NOx truck rule by the end of 2022.

Regionally, South Coast AQMD adopted the WAIRE program to reduce NOx and DPM emissions from indirect sources such as warehouse facilities. The San Pedro Bay Ports implemented the Clean Truck Fund (CTF) to generate funds for achieving the goal of zero-emission drayage trucks by 2035. Despite these major efforts, NOx emission reductions in the South Coast AQMD are still expected to fall short of the levels necessary to meet ozone attainment target deadlines.

The Plan Update includes projects to develop, demonstrate and commercialize a variety of technologies, from near-term to long-term commercialization, that are intended to provide significant emission reductions over the next five to ten years. Areas of focus include:

- developing and demonstrating technologies to reduce emissions from goods movement and Port-related activities, including zero emission drayage trucks and infrastructure;
- developing and demonstrating ultra-low NOx, gaseous and liquid alternative/renewable fueled, large displacement/high efficiency engines and HD zero emission engine technologies;
- mitigating criteria pollutant emissions from the production of renewable fuels, such as renewable natural gas, diesel and hydrogen as well as other renewable, low/zero carbon fuels and waste streams;
- producing transportation fuels and energy from renewable and waste stream sources;
- developing and demonstrating electric-drive (fuel cell, battery, plug-in hybrid and non-plug-in hybrid) technologies across light (LD), medium (MD) and HD platforms;
- establishing large-scale hydrogen fueling and electric vehicle (EV) charging infrastructure to support LD, MD and HD zero emission vehicles;
- ultra-fast higher power charging for HD battery electric vehicles; and
- developing and demonstrating zero emission microgrids that utilize battery energy storage systems and onsite clean power generation to support transportation electrification demands associated with goods movement and freight handling activities.

Table 1 (page 28) lists potential projects across ten core technologies by funding priority:

1. Hydrogen/Mobile Fuel Cell Technologies;

[1] https://ww2.arb.ca.gov/capp

2. Electric/Hybrid Technologies (battery electric and hybrid electric trucks and container transport technologies with zero emission operations);
3. Zero Emission Infrastructure (especially large-scale fueling and production facilities) and stations that support MD and HD vehicles);
4. Engine Systems/Technologies (alternative and renewable fuels for truck and rail applications);
5. RNG Infrastructure (renewable natural gas and renewable fuels);
6. Stationary Clean Fuel Technologies (microgrids that support EV and Hydrogen infrastructure and renewables);
7. Fuel and Emission Studies;
8. Emission Control Technologies;
9. Health Impact Studies within disadvantaged communities; and
10. Technology Transfer and Outreach.

These potential projects for 2023 total $19.8 million of Clean Fuels funding, with the anticipation of total project costs of $118.7 million, leveraging $6 for every $1 of Clean Fuel funds spent. Some proposed projects may also be funded by other funding sources, such as state and federal grants for clean fuel technologies, incentive programs such as AB 617 Community Air Protection Program (CAPP) funding, Volkswagen Mitigation and Carl Moyer volatile organic compound (VOC), and NOx mitigation funds.

CLEAN FUELS PROGRAM

Draft 2023 Plan Update

In 1988, SB 2297 (Rosenthal) was signed into law (Chapter 1546) establishing South Coast AQMD's Clean Fuels Program and reaffirming the existence of the TAO to administer the Clean Fuels Program. The funding source for the Clean Fuels Program is a $1 motor vehicle registration surcharge that was originally approved for a limited five-year period, but legislation eventually extended both the Program and surcharge indefinitely. The Clean Fuels Program has evolved over the years but continues to fund a broad array of technologies spanning near- and long-term implementation. Similarly, planning will remain an ongoing activity for the Clean Fuels Program, which must remain flexible to address evolving technologies as well capitalize on the latest progress in technologies, research areas and data.

Every year, South Coast AQMD re-evaluates the Clean Fuels Program to develop a Plan Update based on reassessment of clean fuel technologies and direction of the South Coast AQMD Board. This Plan Update for CY 2023 targets several projects to achieve near-term emission reductions needed for the South Coast to meet health-based NAAQS.

Overall Strategy

The overall strategy of TAO's Clean Fuels Program is based on emission reduction technology needs identified through the AQMP process and South Coast AQMD Board directives to protect the health of the approximately 18 million residents (nearly half the population of California) in the Basin. The Draft 2022 AQMP, which was released in May 2022 and expected to be adopted in December 2022, is the long-term regional "blueprint" that relies on fair-share emission reductions from all jurisdictional levels (e.g., federal, state and local). The Draft 2022 AQMP is composed of stationary and mobile source emission reductions from traditional regulatory control measures, incentive-based programs, projected co-benefits from climate change programs, mobile source strategies and reductions from federally regulated sources (e.g., aircraft, locomotives and ocean-going vessels). South Coast AQMD developed the last AQMP in collaboration with CARB and SCAG. CARB's latest Proposed 2022 State SIP Strategy included revised mobile source strategy required for the Basin to meet the 2015 8-hour ozone standard by 2037.

The emission reductions and control measures in the Draft 2022 AQMP rely on commercial adoption of a mix of currently available technologies as well as the expedited development and commercialization of clean fuel mobile and stationary advanced technologies in the Basin to achieve air quality standards. The Draft 2022 AQMP identifies that 83 percent NOx emission reductions from the 2018 level and 67 percent additional reductions in 2037 beyond already adopted regulations and programs are necessary to meet the 2015 8-hour ozone standard by 2037, the attainment due date set by EPA. The majority of NOx reductions must come from mobile sources, including both on- and off-road sources. Notably, South Coast AQMD is currently only one of two regions in the nation designated as an extreme nonattainment area of the 2015 8-hour ozone NAAQS (the other region is California's San Joaquin Valley).

The Draft 2022 AQMP proposes economy-wide transition to zero emission and advanced technologies as necessary where feasible, while low NOx emission technologies are still needed to improve air quality in the near future.

Current state efforts in developing regulations for on- and off-road vehicles and stationary equipment are expected to significantly reduce NOx emissions, but are insufficient to achieve the 2023, 2031, and 2037 ozone attainment deadlines. To support fleet turnover the Clean Fuels Program continues to emphasize commercialization and deployment of HD low NOx engines with alternative fuel sources and large scale

deployment of zero emission HD trucks like the Joint Electric Truck Scaling Initiative (JETSI) Pilot Project.[2]

While zero emission technologies, battery and fuel cell electric vehicles are making progress or becoming commercialized, the number of zero emission trucks needed to be deployed in time to meet the 2031 and 2037 ozone standards will be difficult to achieve. The impacts and challenges of large deployments of zero emission vehicles are not yet fully understood or addressed and declines in prices from scale production has not yet been realized. Vehicle, infrastructure and operating costs, fleet adoption, impacts to the electrical grid, OEM supply chain and re-tooling of assembly plants and support networks for vehicle maintenance and service, development and standardization of ultra-fast high power charging and fleet integration of limited range battery electric vehicles into their logistics and business models are some of the challenges that must be dealt with before widespread deployments of battery electric trucks become a reality. Efforts to address these challenges are being undertaken by projects like the JETSI 100 truck deployment and EPRI's Research Hub for Electric Technologies in Truck Applications (RHETTA) Electric Truck Research and Utilization Center (eTRUC) project for development of ultra-fast high power charging are the first trials to address the complex challenges of integrating large fleets of zero emission vehicles. Findings and results will need to be disseminated to further scale up these technologies.

Based on the projected limited deployment of zero emission battery electric vehicles and infrastructure in the near-term and the development and commercialization of fuel cell electric vehicles and infrastructure in the mid-term, our strategy is to continue development and deployment of near-zero low NOx engines to meet the NAAQS. On June 3, 2016, South Coast AQMD petitioned USEPA to initiate rulemaking for a lower national NOx standard for on-road HD engines to achieve additional mobile source emission reductions. A national NOx standard (as opposed to a California standard) for on-road HD vehicles is estimated to result in 70 to 90 percent NOx emission reductions from this source category in 14 to 25 years, respectively. CARB estimates that 60 percent of total on-road HD vehicle miles traveled in the Basin are from vehicles purchased outside of California, which points to the need for a more stringent federal as well as state standard for on-road HD vehicles.

USEPA has acknowledged the need for additional NOx reductions through a harmonized and comprehensive national NOx reduction program for HD on-highway engines and vehicles. On November 13, 2018, USEPA announced the Cleaner Truck Initiative, and on January 6, 2020, they issued an Advance Notice of Proposed Rule to reduce NOx emissions from on-road HD trucks. After some delay, in March 2022, USEPA issued the Notice of Proposed Rule Making (NPRM) with a target to finalize the rule by end of 2022. Numerous organizations, including South Coast AQMD, submitted comments to USEPA urging the adoption of the most stringent rule as fast as feasible. South Coast AQMD comments suggested that USEPA should align with the already adopted CARB Omnibus regulation. The CARB regulation imposes two-phase NOx standards starting in model year 2024 with the ultimate standard of 0.02 g/bhp-hr in 2027, 90% below today's NOx standard, while the USEPA proposal considers three NOx options of 0.05, 0.035 and 0.02 g/bhp-hr.o in 2027 Despite these efforts, the implementation and effectiveness of USEPA and CARB regulations are unable to help South Coast AQMD meet its 2023 federal ozone attainment deadline. Hence commercialization and deployment of cost-effective low NOx near-zero engines are still needed to meet near and mid-term goals. Given that the Basin must attain the 70-ppb ozone NAAQS by 2037, a new on-road HD engine NOx emission standard is critical given the time needed for OEMs to develop and produce compliant vehicles, and for national fleet turnover to occur.

2 The project, known as Joint Electric Truck Scaling Initiative, or JETSI, will be the largest commercial deployment of battery-electric trucks in North America to date, helping to significantly increase the number of zero-emission HD trucks available for goods movement while achieving necessary emission reductions. This is the first battery-electric truck project jointly financed by CARB and the CEC, and the largest investment of its kind.

Figure 4 shows the difference in NOx reductions in the Basin from on-road HD trucks under three scenarios: baseline (no change in the NOx standard) in blue, a 0.02 g/bhp-hr NOx standard adopted only in California in yellow, and lastly, a federal 0.02 g/bhp-hr NOx standard in orange. Although a single 0.02 g/bhp-hr standard no longer reflects the current adopted and proposed options of NOx standards, Figure 4 is still relevant because it shows the significant contribution by federally regulated trucks' to the Basin's NOx inventory as well as the relatively long turnover time from when the regulation is first adopted. (e.g. 10 years for 50% NOx reduction and 20 years for 80% NOx reduction). These two facts support the urgency for the Basin to have a more stringent nationwide NOx regulation as soon as feasible.

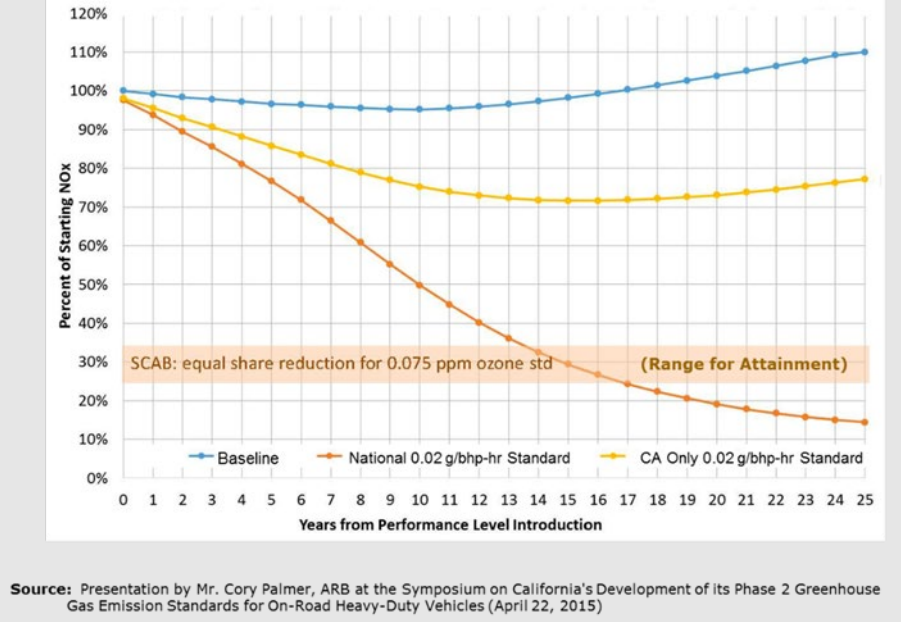

Figure 4: NOx Reduction Comparison:
No New Regulations vs Low NOx Standard in California only vs National Standard

South Coast AQMD completed MATES V in August 2021 to update the emissions inventory of toxic air contaminants, as well as modeling to characterize risks, including measurements and analysis of ultrafine particle concentrations typically emitted or subsequently formed from vehicle exhaust. Findings from the MATES V report showed that air toxics cancer risk based on modeling data has decreased by over 50% since MATES IV, with an average multi-pathway air toxics cancer risk at 454-in-a-million. The highest risk locations are at LAX and the Ports along goods movement and transportation corridors. Diesel PM continues to be the major contributor accounting for over 60% of the overall air toxics cancer risk. For the first time, chronic non-cancer risk was estimated with a chronic hazard index of 5.9 across the 10 stations in the MATES V study. USEPA approved the use of the CARB EMFAC 2017 model for on-road vehicles for use in the State Implementation Plan and transportation conformity analyses, which assesses emissions from on-road vehicles including cars, trucks and buses. The off-road model, which assesses emissions from off-road equipment such as yard tractors, top handlers, and rubber tire gantry cranes, is being replaced by category-specific methods and inventory models developed for specific regulatory support projects.

A key strategy of the Clean Fuels Program, which allows significant leveraging of Clean Fuels funding (historically $4 to every $1 of Clean Fuels funds), is its public-private partnerships with private industry, technology developers, academic institutions, research institutions and government agencies. Since 1988,

the Clean Fuels Program provided more than $250 million toward projects exceeding $1.6 billion. Leveraging of the Clean Fuels Fund is based on actual executed contracts and total project costs from the prior year's Clean Fuels Annual Report and Plan Update. In 1998, South Coast AQMD's Carl Moyer Program was launched. The two programs produce a unique synergy, with the Carl Moyer Program (and other subsequent incentive programs) providing the necessary funding to push market penetration of technologies developed and demonstrated by the Clean Fuels Program. This synergy enables South Coast AQMD to act as a leader in technology development and commercialization efforts targeting reduction of criteria pollutants. Since the Carl Moyer Program began, South Coast AQMD has implemented other incentive programs (i.e., Volkswagen Mitigation, Proposition 1B-Goods Movement, and Community Air Protection Program), with cumulative funding of $250 million annually. There is $15.6 million in Year 3 AB 617 Community Air Protection Program (CAPP) incentive funding reserved for zero emission trucks in the East Los Angeles/Boyle Heights/West Commerce, Southeast Los Angeles, San Bernardino/Muscoy, and Wilmington/Carson/West Long Beach AB 617 communities, all of which identified zero emission trucks as a funding priority in their CERPs. The Draft 2022 AQMP also included control measures to develop indirect source regulations and strengthen fleet rules to take advantage of incentives to further accelerate emission reductions.

Despite several current California incentive programs to deploy cleaner technologies and offset the higher procurement costs of cleaner technologies, significant additional resources are still needed for the scale necessary to achieve the NAAQS for this region. Meanwhile, South Coast AQMD is seeking to commercialize alternative low-NOx technologies that do not rely on incentives by providing customer fuel savings with shorter payback periods and lower total cost of ownership (TCO). There are several emerging key technologies that are discussed in detail later that will provide NOx and GHG co-benefits while requiring less vehicle purchase incentives.

As technologies move towards commercialization, such as HD battery electric trucks, the Clean Fuels Program has partnered with large OEMs, such as Daimler and Volvo to deploy these vehicles in large numbers. These OEM partnerships allow the Clean Fuels Program to leverage their research, design, engineering, manufacturing, sales and service, and financial resources to move advanced technologies from the laboratories to the field and into customers' hands. The OEMs have the resources to develop advanced technology vehicles such as battery electric and fuel cell powertrains, manufacture in large quantities, and utilize their distribution networks to support sales across the state. To obtain the emission reductions needed to meet the NAAQS, large numbers of advanced technology vehicles must be deployed across our region and state.

Figure 5 outlines a developmental progression for technology demonstration and deployment projects funded by the Clean Fuels Program and the relationship incentive programs administered by TAO play in that progression. The Clean Fuels Program funds various stages of technology projects, typically ranging from Technology Readiness Levels 3-8, to provide a portfolio of technology choices and to achieve near-term and long-term emission reduction benefits.

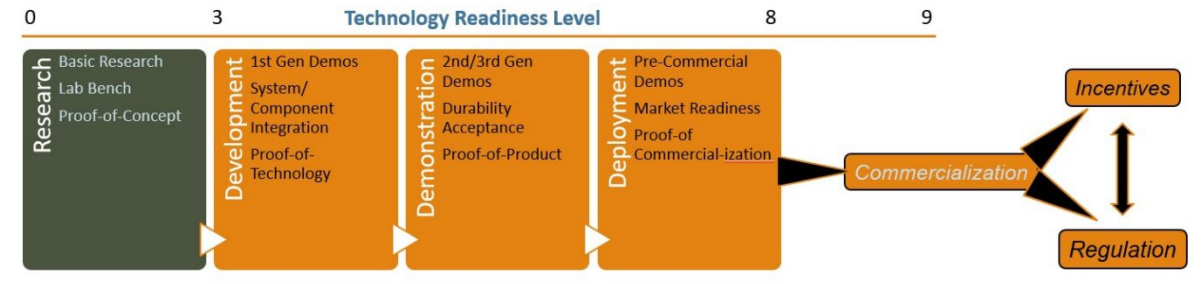

Figure 5: Stages of Clean Fuels Program Funding

Many technologies that address the Basin's needed NOx reductions align with the state's GHG reduction efforts. USEPA (2022)[3] noted that the transportation sector contributed 36 percent of overall GHG emissions. Due to these co-benefits, South Coast AQMD has been successful in partnering with the state and public/private partnerships to leverage its Clean Fuels funding extensively.

Program and Funding Scope

This Draft 2023 Plan Update includes projects to research, develop, demonstrate and advance deployment a variety of technologies, from near-term to long-term, that are intended to address the following challenges:

1) implementation of new and changing federal requirements, such as the more stringent federal 8-hour ozone standard of 70 ppb promulgated by USEPA in late 2015;
2) implementation of new technology measures including accelerated development of technologies nearing commercialization and deployment of commercially ready technologies; and
3) continued development of near-term cost-effective approaches and long-term technology development.

The overall scope of projects in the Draft 2023 Plan Update remains sufficiently flexible to address new technologies and control measures identified in the Draft 2022 AQMP, dynamically evolving technologies, and new research and data. The latter includes findings from MATES V and revised emission inventories from EMFAC 2017.

Within the core technology areas defined later in this section, project objectives range from near term to long term. The Clean Fuels Program concentrates on supporting development, demonstration and technology commercialization and deployment efforts rather than fundamental research. The nature and typical time-to-product for Clean Fuels Program projects are described below, from near term to long term.

- *Deployment* or technology *commercialization* efforts focus on increasing utilization of clean technologies in conventional applications, promising immediate and growing emission reduction benefits. These are expected to result in commercially available products as early as 2022, including obtaining required certifications from CARB and EPA. It is often difficult to transition users to non-traditional technologies or fuels due to higher incremental costs or required changes to user behavior, even if these technologies or fuels offer significant benefits. In addition to the government's role to reduce risk by funding technology development and testing, it is also necessary to offset incremental costs through incentives to accelerate the use of cleaner technologies. The increased use of these clean fuel technologies also depends on efforts to increase stakeholder confidence that these technologies are viable and cost-effective in the long term.
- Technologies ready to begin field *demonstration* in 2023 are expected to result in commercially available products in the 2024-2027 timeframe, and technologies being demonstrated generally are in the process of being verified or certified by CARB and EPA. Field demonstrations provide a controlled environment for manufacturers to gain real-world experience and address end-user issues that arise prior to the commercial introduction of technologies. Field demonstrations provide real-world evidence of performance to allay any concerns by early adopters as well as preliminary emissions reduction potential.
- Finally, successful technology *development* projects are expected to begin during 2023 with durations of two or more years. Additionally, field demonstrations to gain long term verification of performance may also be needed prior to commercialization. Certification and commercialization

[3] *U.S. Greenhouse Gas Emissions and Sinks 1990-2020*. 2022. https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions

would be expected to follow. Development projects identified in this plan may result in technologies ready for commercial introduction as soon as 2024-2027. Projects may involve the development of emerging technologies that are considered long-term and higher risk, but with significant emission reductions potential. Commercial introduction of such long-term technologies would not be expected until 2028 or later.

Core Technologies

The following technologies have been identified as having the greatest potential to enable the emission reductions needed to achieve the NAAQS and thus form the core of the Clean Fuels Program.

The goal is to fund viable projects in all categories. However, not all project categories will be funded in 2023 due to funding limitations, and the focus will remain on control measures identified in the Draft 2022 AQMP, with consideration for availability of suitable projects. The project categories identified below are appropriate within the context of the current air quality challenges and opportunities for technology advancement.

Within these areas, there is significant opportunity for South Coast AQMD to leverage its funds with other funding partners to expedite the demonstration and deployment of clean technologies in the Basin. A concerted effort is continually made to form public private partnerships to maximize leveraging of Clean Fuels funds.

Several of the core technologies discussed below are synergistic. For example, a HD vehicle such as a transit bus or drayage truck, may utilize a hybrid electric drive train with a fuel cell operating on hydrogen fuel or an internal combustion engine (ICE) operating on an alternative fuel as a range extender. Elements of the core hybrid electric system may overlap. Similarly, a hydrogen powered engine may utilize a natural gas HD vehicle that also combusts gaseous fuel and requires a compressed tank storage system; elements of the similar combustion and fuel storage may overlap.

Priorities may shift during the year in keeping with the diverse and flexible technology portfolio approach or to leverage opportunities such as cost-sharing by the state or federal government or other entities. Priorities may also shift to address specific technology issues which affect residents within the South Coast AQMD's jurisdiction. For example, AB 617, signed by the Governor in 2017, implements actions and provides incentive funding for priorities designated in CERPs by six AB 617 communities within the South Coast region, and additional flexibility will be needed to develop new strategies and technologies for those disadvantaged communities.

The following ten core technology areas are listed by current South Coast AQMD priorities based on the goals for 2023.

Hydrogen/Mobile Fuel Cell Technologies

South Coast AQMD supports hydrogen fuel cell technologies as one option in the technology portfolio; the agency is dedicated to assisting federal and state government programs to deploy LD, medium, and HD fuel cell electric vehicles (FCV).

Calendar Years 2015-2019 were a critical timeframe for the introduction of LD hydrogen FCVs. In 2014, Hyundai introduced the Tucson FCV for lease. In 2015, Toyota commercialized the Mirai, the first FCV available to consumers for purchase. In December 2016, Honda started commercial lease of its 2017 Honda Clarity FCV. The 2019 Hyundai Nexo was the second FCV offered for sale and lease in California. In the

past, Clean Fuels funding has gone towards leases for LD FCVs as part of its technology outreach efforts for conferences and events in disadvantaged communities.

Fuel cells can play a role in MD and HD applications where battery recharge time and vehicle range, although improving, is insufficient to meet fleet operational requirements. The California Fuel Cell Partnership's (CaFCP's) *2030 Vision*[4] released in July 2018 provides a broader framework for the earlier *MD and HD Fuel Cell Electric Truck Action Plan* completed in October 2016, which focused on Class 4 parcel delivery trucks and Class 8 drayage trucks with infrastructure development and established metrics for measuring progress. The CaFCP's *HD Vision* released in July 2021 describes 70,000 fuel cell electric trucks supported by 200 HD hydrogen stations operating in California and beyond.

Another player in the HD fuel cell truck space is Cummins (CWI) who recently purchased Hydrogenics and Efficient Drivetrains, Inc. (EDI) to develop fuel cell power trains. CWI is currently working on the ZECT 2 and a CEC/South Coast AQMD project to develop and demonstrate fuel cell drayage trucks with next generation fuel cell module - easy to package system design and other innovative integration strategies. In 2022, Volvo and Daimler also announced a joint venture to develop fuel cell powered trucks. South Coast AQMD has created many alliances with large OEMs and will continue to fund projects with these OEMs over the next year to develop HD fuel cell trucks. In June 2021, South Coast AQMD recognized $500k from USEPA to demonstrate two Hyundai Class 8 fuel cell trucks with a range of up to 500 miles for regional and long-haul operations.

The CaFCP *Fuel Cell Electric Bus Road Map* released in September 2019 supports implementation of CARB's Innovative Clean Transit and Zero Emission Airport Shuttle regulations. As part of the $46 million Fuel Cell Electric Bus Commercialization Consortium project, for which the Clean Fuels Fund contributed $1 million, Center for Transportation and the Environment (CTE), in partnership with New Flyer, Trillium, and OCTA, wrapped up its deployment of ten 40-foot New Flyer XHE40 fuel cell transit buses and installed a liquid storage hydrogen station capable of fueling up to 50 fuel cell transit buses at OCTA in February 2021. This project also deployed 10 fuel cell transit buses and a hydrogen station upgrade at Alameda-Contra Costa Transit District (AC Transit). The ten fuel cell buses at OCTA accumulated almost 300,000 miles of revenue service during the demonstration with an overall uptime of 67%.

SunLine Transit Agency (SunLine) received a USEPA Targeted Airshed grant in June 2020 to deploy five fuel cell transit buses, in addition to their existing fleet of 26 fuel cell and four battery electric transit buses as well as a recently upgraded 900 kg/day hydrogen station capable of supporting up to 30 fuel cell transit buses. SunLine has accepted and commissioned one of the buses into its fleet. In August 2021, the Clean Fuels Program committed $531,166 to a $2 million project to develop and demonstrate two MD fuel cell transit buses at SunLine. Additional outlets for hydrogen fueling infrastructure for these buses will also be developed.

In March 2021, Frontier Energy was awarded $25,000 to perform a high-flow bus fueling protocol development project as a part of the DOE H2@Scale program with partners including SoCalGas, Shell, and NREL. NREL was also awarded $25,000 for California HD Infrastructure Research, and UC Davis was awarded $50,000 for California Hydrogen Systems Analysis. These projects aim to fill in the gaps between LD and HD hydrogen fueling infrastructure to encourage the expansion of hydrogen fueling infrastructure as more state and federal policies are developed or passed. In addition, as more fuel cell MHDVs are commercialized, this research becomes more pivotal to ensuring sufficient hydrogen fueling stations are available.

[4] CaFCP's *The California Fuel Cell Revolution, A Vision For Advancing Economic, Social, and Environmental Priorities* (Vision 2030), September 4, 2018.

The Draft 2023 Plan Update identifies key opportunities while clearly leading the way for pre-commercial demonstrations of OEM FCVs. Future projects may include the following:

- development and demonstration of cross-cutting fuel cell applications (e.g. scalable and cost-effective fuel cell powertrain components);
- development and demonstration of fuel cells in off-road, locomotive and commercial harbor craft applications such as port cargo handling equipment, switcher locomotives and tugs;
- demonstration of FCVs in controlled fleet applications in the Basin;
- coordination with FCV OEMs to develop an understanding of their progress in overcoming barriers to economically competitive FCVs and develop realistic scenarios for large scale introduction;
- development and implementation of strategies with government and industry to build increasing scale and renewable content in the hydrogen market including certification and testing of hydrogen as a commercial fuel to create a business case for investments as well as critical assessments of market risks to guide and protect these investments; and
- repurposing fuel cells and hydrogen tanks for other secondary energy production and storage uses, as well as reusing fuel cells and hydrogen tanks, and approaches to recycle catalysts and other metals.

Electric/Hybrid Technologies

To meet the NAAQS, a primary focus continues to be on zero and near-zero emission technologies. A key strategy to achieve these goals is wide-scale transportation electrification. South Coast AQMD supports projects to address concerns regarding cost, battery life, all-electric range, and OEM commitment. Integrated transportation systems can encourage further emission reductions by matching EVs to typical consumer and fleet duty cycles and demands including drayage, short regional haul, and last mile delivery. Class 8 battery electric trucks from Daimler and Volvo are now CARB and USEPA certified, commercially available, and eligible for incentives from Hybrid and Zero Emission Truck and Bus Voucher Incentive Project (HVIP), Carl Moyer, Prop 1B, VW Settlement, Voucher Incentive Program, and CAPP funds.

Development and deployment of zero emission goods movement and freight handling technologies remains one of the top priorities for the South Coast AQMD to support balanced and sustainable growth at the San Pedro Bay Ports as well as freight/logistics facilities throughout the Basin. The South Coast AQMD continues to work with our regional partners, including the San Pedro Bay Ports, Southern California Association of Governments (SCAG) and Los Angeles County Metropolitan Transportation Authority (Metro) to demonstrate and deploy technologies that are technically feasible, cost-effective with the assistance of incentives and/or grant funding, and beneficial to all stakeholders. Specific technologies include zero emission trucks/freight handling equipment (battery and/or fuel cell), or plug-in hybrid powertrains, locomotives with hydrogen fuel cells, hybrid and battery electric technologies, and linear synchronous motors for locomotives and trucks. Additionally, the California Sustainable Freight Action Plan outlines a blueprint to transition the state's freight system to an environmentally cleaner, more efficient and economical system, including a call for a zero and near-zero emission vehicle pilot project in Southern California. The City of Los Angeles *Zero Emission 2028 Roadmap 2.0* in preparation for the 2028 Olympics corroborates this effort, calling for an additional 25% each in GHG and criteria pollutant reductions. The San Pedro Bay Ports *Clean Air Action Plan* Update (2022) calls for zero emissions cargo handling equipment by 2030 and zero emission drayage trucks by 2035, respectively.

HD hybrid vehicles have historically been optimized for fuel economy, new generation hybrid powertrains that use a systems approach for co-optimizing both criteria emissions and fuel economy could provide another technology pathway to meet the air quality goals of the Basin. These hybrid systems in both plug-in and non-plug-in configurations, focus on electrifying key engine subsystems and energy recovery to

provide engine assistance during transient operations. Furthermore, the availability of additional electrical power such as 48-volt systems could allow for electric aftertreatment heaters for better transient control through thermo-management and therefore better NOx control at a reduced cost compared to traditional aftertreatment systems. South Coast AQMD views these next generation hybrid powertrains as capable of being deployed without the need for incentives, by providing fuel economy benefits which could provide another potential cost-effective pathway for near term NOx emission reductions. Furthermore, CARB's Advanced Clean Trucks (passed June 2020) and Advanced Clean Fleets (Board consideration October 2022) regulations allow sales of plug-in hybrid vehicles capable of zero-emission operation as a compliance pathway for meeting the manufacturer and fleet zero emission vehicle mandate.

New, ongoing, and recently completed zero emission battery electric technology projects include: 1) Joint Electric Truck Scaling Initiative (JETSI) Pilot Project with deployment of 100 Daimler and Volvo Class 8 battery electric trucks for drayage and regional haul at NFI and Schneider funded by $16 million from CARB, $11 million from CEC, $8 million from Mobile Source Air Pollution Reduction Review Committee (MSRC), $5.5 million from the Clean Fuels Fund, $5 million from SCE, and $3 million from the San Pedro Bay Ports; 2) Switch-On Project with deployment of 70 Volvo Class 8 battery electric drayage/freight trucks at eight fleets funded with $20 million from the USEPA Targeted Airshed grant; 3) deployment of two additional Class 8 battery electric drayage trucks as part of the CARB Volvo LIGHTS project through a $500,000 USEPA Clean Air Technology Initiative grant; 4) deployment of two Volvo Class 8 battery electric trucks at Producers Dairy in Fresno as part of the CARB Greenhouse Gas Reduction Fund Zero Emission Drayage Truck Project; 5) Daimler Customer Experience project to demonstrate eight Class 6 and 8 battery electric trucks and fast charging infrastructure funded with $1 million by the Clean Fuels Fund; and 6) commercial deployment of 35 Daimler Class 6 and Class 8 battery electric trucks funded by $4 million from the USEPA Targeted Airshed grant.

Opportunities to develop and demonstrate technologies that could enable expedited widespread use of pre-commercial and commercial battery electric and hybrid-electric vehicles in the Basin include the following:

- demonstration of battery electric and fuel cell electric technologies for cargo handling and container transport operations, e.g., HD battery electric or plug-in electric drayage trucks with all electric range;
- large scale deployments of commercial battery electric vehicles (i.e. 50 or more vehicles) to prove feasibility and development of fleet tools to assist in successful operation for drayage and short regional haul operations;
- demonstration of MD battery electric and fuel cell electric vehicles in package delivery or last mile operations, e.g., battery electric walk-in vans with fuel cell or plug-in hybrid range extender;
- development and demonstration of battery and fuel cell electric off-road equipment; e.g. battery electric off-road construction equipment, yard tractors, or top-handler with wireless charger;
- development and demonstration of hybrid and plug-in hybrid vehicle technology;
- development of hybrid vehicles and technologies for off-road equipment;
- demonstration of niche application battery and fuel cell electric MD and HD vehicles, including school and transit buses and refuse trucks with short-distance fixed service routes;
- demonstration of integrated programs that make best use of electric drive vehicles through interconnectivity between fleets of shared electric vehicles and mass transit, and rideshare services that cater to multiple users and residents in disadvantaged communities;
- development of eco-friendly intelligent transportation system (ITS), geofencing, and Eco-Drive strategies to maximize emission reductions and energy consumption by operating in zero emission

mode when driving in disadvantaged communities; demonstrations that encourage electric drive vehicle deployment in autonomous applications; optimized load-balancing strategies and improved characterization of in-duty drayage cycles and modeling/simulations for cargo freight and market analysis for zero emission HD trucks;

- development of higher density battery technologies for use in HD vehicles;
- repurposing EV batteries for other or second life energy storage uses, as well as reusing battery packs and approaches to recycle lithium, cobalt and other metals; and
- development of a methodology to increase capability to accept fast-charging and resultant life cycle and demonstration of effects of fast-charging on battery life and vehicle performance.

Zero Emission Infrastructure

Significant demonstration and commercialization efforts for zero emission infrastructure are funded by the Clean Fuels Program as well as other local, state and federal programs. Zero emission infrastructure has become an increasing focus of the Clean Fuels Program in order to support large scale demonstration and deployment of hydrogen fuel cell and battery electric vehicles and equipment. This category is being presented separately from Hydrogen/Fuel Cell and Electric/Hybrid Technologies for the first time in the Draft 2023 Plan Update.

Hydrogen Infrastructure

With lead times on retail level hydrogen fueling stations requiring 18-36 months for permitting, construction and commissioning, plans for future stations need to be implemented. While coordination with the California Division of Measurement Standards (DMS) to establish standardized measurements for hydrogen fueling started in 2014, additional efforts to offer hydrogen for sale in higher volumes are still needed specifically with upcoming ZE vehicle and infrastructure policy deadlines on a national and state level. Moreover, CARB's Low Carbon Fuel Standard (LCFS) regulation provides incentives for producing and dispensing the low carbon intensity (CI) hydrogen for FCVs, enabling station operators to remain solvent and cover part of their operational cost and consequently reducing the dollar per kilogram cost of hydrogen for consumers. Lastly, a deliberate and coordinated effort is necessary to ensure that hydrogen stations are developed with design flexibility to address specific location limitations, robust hydrogen supply, and fueling reliability matching those of existing gasoline and diesel fueling stations. The current network of hydrogen fueling stations to support the current number of LD FCVs on the road and future MHD FCVs is insufficient, and supply of hydrogen and additional hydrogen production, specifically the carbon-neutral hydrogen, continue to be challenges that need to be addressed.

In 2019, the Clean Fuels Program awarded $1.2 million to Equilon (Shell) as part of the H2Freight project for a new 1,000 kg/day HD hydrogen fueling station using hydrogen produced by a new tri-generation fuel cell on POLB property leased by Toyota. The station was commissioned in 2021 and continues its soft open operation with ongoing data collection and analysis. As part of the $83 million Shore-to-Store project led by the POLA, for which the Clean Fuels Program committed $1 million, Toyota and Kenworth deployed 10 Class 8 fuel cell trucks and Equilon (Shell) built two large capacity hydrogen fueling stations in Wilmington and Ontario. Kenworth leveraged the development on the fuel cell truck demonstrated in South Coast AQMD's ZECT 2 project and integrated Toyota's fuel cells into the Kenworth trucks. These fuel cell trucks are deployed at fleets including UPS, Total Transportation Services, Southern Counties Express, and Toyota Logistics Services at the Ports of Los Angeles and Port Hueneme, as well as other fleets in Riverside County. Most of the fuel cell trucks completed the demonstration phase. Also, the Ontario and Wilmington stations are commissioned and NREL continues to collect and analyze the data.

New, ongoing, and recently completed hydrogen infrastructure projects include: 1) POLA Shore to Store project with deployment of two 400 kg/day hydrogen fueling stations in Wilmington and Ontario for HD fuel cell trucks and 2) retrofit of existing hydrogen infrastructure stations to accommodate HD fuel cell trucks by First Element to demonstration Hyundai Class 8 fuel cell trucks.

Electric Charging Infrastructure

The challenges of installing charging infrastructure include costs, permitting, UL certification of equipment, utility interconnection requirements and the ability of utilities to upgrade power to specific fleet sites, all of which need to be better understood.

Continued technology advancements in LD infrastructure have facilitated development of corresponding codes and standards for MD and HD infrastructure including UL certification of the CCS2 connector for the Volvo LIGHTS battery electric truck demonstration project. Additionally, SCE's Charge Ready Transport Program and Los Angeles Department of Water and Power's (LADWP) Commercial EV Charging Station Rebate Program includes funding for MD and HD vehicles and infrastructure.

LD EV charging infrastructure is commercially available and MD and HD charging infrastructure is becoming commercially available. The CCS1 connector continues to be the standard connector for MD and HD charging up to 350 kW direct current (DC). Charging Interface Initiative (CharIN) released a Megawatt Charging System (MCS) connector in June 2022 for Class 6 -8 EVs designed for a maximum current of 3,000 A at up to 1,250V for charging up to 3.75 MW DC. Currently there are no MD or HD EVs capable of accepting charging above 350 kW DC. There is also an agreed upon SAE J3068 connector standard for single-phase and three-phase AC charging. Challenges and costs of installing MD and HD charging infrastructure increase exponentially compared to LD infrastructure. Each year there are more commercially available options for MD and HD charging infrastructure.

South Coast AQMD is seeking DOE funding to lead a regional collaborative to create a MD/HD charging and hydrogen fueling infrastructure plan for the South Coast Air Basin. This will supplement SCAG's existing effort to create a six county regional MD/HD charging and hydrogen fueling infrastructure plan as part of a CEC RHETTA eTRUC project to develop and demonstrate high power DC fast charging for HD battery electric trucks. A detailed plan for the San Pedro Bay Ports and the I-710 corridor will be created using advanced modeling and additional data sources. In a related effort, Metro has committed $50 million of its funding to deploy charging for HD battery electric trucks between the San Pedro Bay Ports and along the I-710 south corridor.

New, ongoing, and recently completed electric charging infrastructure projects include: 1) Joint Electric Truck Scaling Initiative (JETSI) Pilot Project with installation of 350 kW DC fast chargers to support 100 Daimler and Volvo Class 8 battery electric trucks at NFI and Schneider; 2) Switch-On Project with installation of multiple DC fast chargers to support 70 Volvo Class 8 battery electric drayage/freight trucks at eight fleets; and 3) deployment of two 150 kW DC fast chargers at Producers Dairy in Fresno as part of the CARB Greenhouse Gas Reduction Fund Zero Emission Drayage Truck Project.

The Draft 2023 Plan Update identifies key opportunities while clearly leading the way for demonstration and deployment of hydrogen fueling and charging infrastructure. Future projects may include the following:

- continued development and demonstration of distributed hydrogen production and fueling stations from multiple providers, including energy stations with electricity and renewable hydrogen co-production and higher pressure (10,000 psi) hydrogen dispensing and scalable/higher throughput;
- development of additional sources of hydrogen production and local generation of hydrogen for fueling stations far from local production sources to better meet demand of FCVs;

- development of carbon-natural (or low carbon intensity) hydrogen production, distribution, and infrastructure network through a partnership with regional hydrogen hub projects;
- large scale deployments of commercial large fleet and public charging infrastructure to meet needs for owner operators/small fleets/large fleets for various segments (drayage, last mile delivery, short regional haul);
- development of fleet tools to assist in successful operation for drayage, last mile delivery, and short regional haul operations;
- demonstration and installation of infrastructure to support battery electric and fuel cell electric LD, MD and HD fleets, and ways to reduce cost and incentivize incremental costs over conventionally fueled vehicles, meet fleet operational needs, improve reliability, and integrate with battery energy storage, renewable energy and energy management strategies (e.g., vehicle-to-grid or vehicle-to-building functionality, demand response, load management);
- creation of MD/HD charging and hydrogen fueling regional infrastructure planning efforts; and
- deployment of infrastructure corresponding to codes and standards specific to LD, MD and HD vehicles, including standardized connectors, fuel quality, communication protocols, and open standards and demand response protocols for EV chargers to communicate across charging networks.

Engine Systems/Technologies

To achieve the emission reductions required for the Basin, ICEs used in the HD sector will require emissions that are 90 percent lower than the 2010 standards as outlined in CARB's recently adopted HD On-Road "Omnibus" Low NOx regulation and EPA's proposed Cleaner Trucks Initiative (CTI).

In 2016, CWI achieved a new ultra-low NOx threshold by commercializing the first on-road HD engine to be certified to CARB's optional low NOx standard of 0.02g NOx/bhp-hr. The 8.9 liter (8.9L) ISL-G natural gas engine demonstrated that an ICE could achieve NOx exhaust emission levels 90 percent cleaner than the existing federal standard. Powering these vehicles with low Carbon Intensity renewable fuels or biomethane, to help address GHG objectives, became a game changer for the HD transportation sector. The 8.9L engine works well in refuse and other vocational trucks as well as transit and school buses.

In 2017, CWI, with South Coast AQMD and other project partners, achieved certification of the 12L natural gas engine. The 12L engine in Class 8 drayage trucks and 60-foot articulated transit buses expanded the scope of this near-zero technology. Both CARB and USEPA certified the 12L engine at 0.02 g/bhp-hr for NOx. New for 2020, CWI certified its 6.7L natural gas engine to 0.02 g/bhp-hr NOx for the first time, further ensuring the viability of near-zero engine options for all market segments.

Although no near-zero emission diesel technology is commercially available today, development and demonstration efforts have proven low NOx diesel technology is viable. South Coast AQMD has been working closely with CARB, USEPA and others on defining low NOx diesel technology pathways via several projects, including the Ultra-Low Emissions Diesel Engine Program at Southwest Research Institute (SwRI), opposed piston engine development with Achates Power Inc., and Thermal Management using Cylinder Deactivation (CDA) with West Virginia University.

More recently, CWI announced a hydrogen powered ICE with near –zero NOx capabilities ready for implementation in the 2027 timeframe. As a result, the Draft 2023 Plan Update includes on-road truck demonstrations using hydrogen as a fuel for internal combustion. These demonstration efforts are considered key milestones in driving up the TRL level toward full commercialization as a bridge and complementary technology toward zero emission technology, especially for high horsepower and long-haul applications where zero emission technologies and supporting infrastructure will take longer to become commercially available.

The Draft 2023 Plan Update continues to incorporate pursuit of cleaner engines and hybrid powertrains for the HD sector but is starting to transition to large scale pre-commercial demonstration and deployment efforts as current near-zero NOx ICE technologies are becoming readily available. Future projects will continue to support the development, demonstration and emissions verification/certification of engines and powertrains that can achieve needed near-term emission reductions. At the same time, aggressive GHG emission reduction targets set forth by both CARB and USEPA have invigorated interest in revisiting low- and zero carbon alternative fuels for those high power/torque applications. While the GHG benefit is relatively easy to assess by fuel source, it is also important to understand the criteria emissions impact under real-world conditions and over its useful lifetime to ensure reduction of both criteria and GHGs are fully realized.

The Draft 2023 Plan Update includes potential projects that the South Coast AQMD might participate with federal, state, and other private companies towards these efforts. Specifically, these projects are expected to target the following:

- development of ultra-low emissions and improved higher efficiency gaseous and liquid fuel powered engines for HD vehicles and high horsepower applications projects that move these technologies to a higher technology readiness level and commercialization;
- development and demonstration of gaseous and liquid fuel powered engines to support hybrid and plug-in hybrid vehicle technology;
- development and demonstration of alternative fuel engines for on- and off-road applications;
- development and demonstration of engine systems that employ advanced engine design features, CDA, improved exhaust or recirculation systems, and aftertreatment devices; and
- further development of robust aftertreatment systems which can maintain certified emissions levels under a wide variety of duty-cycles and throughout the vehicle's useful life.

EPA's recent proposal to create a new national low NOx standard for on-highway HD engines starting in 2027 will further motivate manufacturers to develop lower-NOx emitting technologies expected to result in greater NOx emission reductions than a "California only" low NOx standard for on-road HD engines. Low- and zero carbon alternative fuels for new low emitting engines will continue to emerge as timelines for GHG reductions approach.

RNG Infrastructure (RNG and Renewable Fuels)

Significant demonstration and commercialization efforts funded by the Clean Fuels Program as well as other local, state and federal agencies are underway to: 1) support the upgrade and buildup of public and private infrastructure projects, 2) expand the network of public-access and fleet fueling stations based on the population of existing and anticipated vehicles, 3) put in place infrastructure that will ultimately be needed to accommodate transportation fuels with very low gaseous and GHG emissions, and 4) support local production of clean, low carbon intensity, renewable transportation fuels.

Hydrogen fueling stations continue to be positioned to support both public and private fleet applications. Funding has been applied to provide fueling at key points for all classes of vehicles, with an emphasis on HD vehicle users travelling on major goods movement corridors, including local ports, and along I-15 and The Greater Interstate Clean Transportation Corridor (ICTC) Network. Upgrades and expansions are also needed on RNG stations to refurbish or increase capacity for some of the stations installed five or more years ago as well as standardize fueling station design, especially to ensure growth of alternative fuels throughout the Basin and beyond. There is also a continuing and growing interest for complete transition to renewable fuels, particularly natural gas delivered through existing natural gas pipelines. Future funding will be needed to support local production and use of renewable natural gas to produce green hydrogen for

light and HD vehicles. The growing interest in low carbon, renewable transportation fuels that also power ultra-low to zero emission vehicles will expand the scope of this category to provide support of local production and distribution of such fuels and help accelerate fleet turnover. SB 350 (De León) further established a target to double the energy efficiency in electricity and renewable natural gas end uses by 2030.

Projects expected to be developed and co-funded for infrastructure development are:

- development and demonstration of low carbon intensity renewable transportation fuels including renewable natural gas, renewable hydrogen, and renewable electricity from zero emission sources and from renewable feedstocks, such as biomass and biowaste;
- development and demonstration of advanced, cost-effective methods for manufacturing synthesis gas for conversion to renewable natural gas and renewable (biomass-based) hydrogen;
- enhancement of safety and emission reductions from existing natural gas fueling equipment;
- expansion of fueling infrastructure, fueling stations, and equipment, with an emphasis on renewable energy sources; and
- expansion of infrastructure connected with existing fleets, public transit, and transportation corridors, including demonstration and deployment of closed loop systems for dispensing and storage.

Stationary Clean Fuel Technologies

Although stationary source NOx emissions are small compared to mobile sources in the Basin, there are applications where cleaner fuel technologies or processes can be applied to reduce NOx, VOC and PM emissions. A demonstration project funded in part by the South Coast AQMD at a local sanitation district consisted of retrofitting an existing biogas engine with a digester gas cleanup system and catalytic exhaust emission control. The retrofit system resulted in significant reductions in NOx, VOC and CO emissions. This project demonstrated that cleaner, more robust renewable distributed generation technologies exist that not only improve air quality but enhance power quality and reduce electricity distribution congestion.

SCR has been used as aftertreatment for combustion equipment for NOx reduction. SCR requires the injection of ammonia or urea that is reacted over a catalyst bed to reduce the NOx formation during the combustion process. Challenges arise if ammonia distribution within the flue gas or operating temperature is not optimal resulting in ammonia emissions leaving the SCR in a process referred to as "ammonia slip." The ammonia slip may also lead to the formation of particulate matter in the form of ammonium sulfates. An ongoing demonstration project funded in part by the South Coast AQMD consists of retrofitting a Low NOx ceramic burner on an oil heater without the use of reagents such as ammonia nor urea which is anticipated to achieve SCR NOx emissions or lower. Based on the successful deployment of this project, further emission reductions may be achieved by other combustion sources such as boilers by the continued development of specialized low NOx burners without the use of reagents. As discussed in engine systems, the use of low and zero carbon fuels could also be used in stationary applications; it is easier to develop optimized engine systems and stationary sources typically operate in steady-state modes.

Additionally, alternative energy storage could be achieved through vehicle-to-grid or vehicle-to-building technologies, as well as power-to-gas that could allow potentially stranded renewable electricity to be stored as hydrogen fuel. Microgrid demonstration and deployment projects to support large scale deployment of zero emission vehicles and equipment could also be incorporated into new or existing deployment projects to facilitate installation of infrastructure. UCR's Sustainable Integrated Grid Initiative and UCI's Advanced Energy and Power Program, funded in part by the South Coast AQMD, for example, could assist in evaluation of these technologies.

Projects conducted under this category may include:

- development and demonstration of reliable, low emission stationary technologies and fuels (e.g., new innovative low NOx burners and fuel cells);
- exploration of renewables, waste gas and produced gas sources for cleaner stationary technologies;
- evaluation, development and demonstration of advanced control technologies for stationary sources;
- vehicle-to-grid, vehicle-to-building, or other stationary energy demonstration projects to develop sustainable, low emission energy storage alternatives and reduce total cost of ownership (TCO); and
- development and demonstration of microgrids with photovoltaic/fuel cell/battery storage/EV chargers and energy management to support large scale deployment of zero emission vehicles and equipment.

The development, demonstration, deployment and commercialization of advanced stationary clean fuel technologies will support control measures in the Draft 2022 AQMP that reduce emissions of NOx and VOCs from traditional combustion sources by replacement or retrofits with zero and near-zero emission technologies.

Fuel and Emissions Studies

Monitoring of pollutants in the Basin is extremely important, especially when linked to a particular sector of the emissions inventory. This information highlights the need for further emission studies to identify emissions from high polluting sectors resulting from these technologies.

Over the past few years, the South Coast AQMD has funded emission studies to evaluate the impact of tailpipe emissions of biodiesel, renewable diesel, and ethanol fueled vehicles mainly focusing on criteria pollutants and GHG emissions. These studies showed that biofuels, especially biodiesel in some applications and duty cycles, can contribute to higher NOx emissions while reducing other criteria pollutant emissions. South Coast AQMD has participated in several renewable diesel and ethanol-blend gasoline studies led by CARB to approve these renewable fuels in California.

In addition, as the market share for gasoline direct injection (GDI) vehicles has rapidly increased from 4 percent of all vehicle sales in the U.S. to an estimated 60 percent between 2009 and 2016, it is important to understand air quality impacts from these vehicles. South Coast AQMD has funded studies to investigate both physical and chemical composition of tailpipe emissions, focusing on PM from GDI vehicles as well as secondary organic aerosol formation formed by the reaction of gaseous and particulate emissions from natural gas and diesel HD vehicles. The results from these studies suggest the addition of a particulate filter for controlling particulate emissions from GDI vehicles.

In 2017, South Coast AQMD initiated a basin wide in-use real-world emissions study, including fuel usage profile characterization and an assessment of the impacts of current technology and alternative fuels. Preliminary results suggest real-world emissions vary greatly between applications and fuel types; but alternative fueled technologies such as natural gas fueled vehicles, especially ones certified to near-zero emission levels, are significantly lower in emissions compared to diesel baseline. The results of the study also contributed to the new EMFAC 2021 emissions model.

In 2020, CARB adopted the Omnibus regulation to the next lower level NOx standard, particularly highlighting the need to address the gap between certification values and in-use emissions. The new regulation included a new low-load cycle, new in-use emissions testing metric based on 3-Bin Moving

Average Windows (3B-MAW), as well as a new concept to assess NOx across the entire vehicle population via onboard emission sensors. The 3B-MAW will be a game changer for future combustion technologies, as it addresses the shortfalls of previous in-use testing methods and should address the gap between in-use emissions and the certification standard, an issue commonly seen in the Basin where low-speed, low load operations are more common. It is important to continue conducting real-world emissions studies on existing and new technologies to help stakeholders better understand the impacts of emissions in real time to a specific geographic area, as well as ensuring emissions are low throughout the useful life of the vehicle.

To assess issues with legacy fleets, SB 210 was signed into law in 2019 and directs CARB to develop and implement a new comprehensive HD inspection and maintenance (HD I/M) program to support higher emitter issues due to mal-maintenance/deterioration to ensure trucks maintain their emissions for their intended useful life. The HD I/M program includes an emissions measurement campaign from a large population of a current fleet of trucks which is critical for the success of this program. Mass screening methods such as remote sensing technology, which can be setup near roadsides and on freeway overpasses has gained the spotlight for enabling a new suite of technology for assessing emissions in-use when compared to traditional measurements. In August 2021, CARB staff shared findings and recommendations from the pilot program. CARB suggested that on-board diagnostics (OBD) and Roadside Emissions Monitoring Device (REMD) testing would likely be the best combination of technologies for a future statewide vehicle compliance and enforcement program. Together with Automated License Plate Recognition (ALPR) camera technologies that are able to capture 80% of license plates, this can be another tool to assist in any enforcement efforts. A statewide vehicle compliance program would likely be phased in with vehicle screening starting in January 2023, enforcement of compliance certificate requirements starting in July 2023, and periodic testing and certified devices for OBD submissions in 2024. The newly adopted HD I/M rule should address the concerns of high emitters in the legacy fleets which are expected to remain in service well into the 2030s, further reducing emissions in our region. South Coast AQMD also recognizes HD I/M is one of the few regulations that can provide much needed immediate emission reductions.

In recent years, there has also been an increased interest at the state and federal level in the use of alternative fuels to reduce petroleum oil dependency, GHG emissions and air pollution. To sustain and increase biofuel utilization, it is essential to identify feedstocks that can be processed in a more efficient, cost-effective and sustainable manner. More recently, various low and zero carbon initiatives have stirred up a new round of interest in alternative fuel combinations such as ethanol, hydrogen and other engineered bio/renewable fuels. In 2019, South Coast AQMD, SoCalGas, and UCR/CE-CERT launched a study to assess emission impacts of hydrogen-natural gas blends on near-zero emission natural gas engines. Test results will be available in late 2022. Similar emissions work is being considered to support the use of zero-carbon fuels. Based on higher average summer temperatures over the past few years, there is interest on how higher temperatures impact ozone formation. A project was launched in 2019 to evaluate meteorological factors and trends contributing to recent poor air quality in the Basin. These types of studies may be beneficial to support the CERPs developed under AB 617, as well as other programs targeting benefits to residents in disadvantaged communities.

Some areas of focus include:

- demonstration of remote sensing technologies to target different high emission applications and sources;
- studies to identify health risks associated with ultrafine and ambient particulate matter to characterize toxicity and determine specific combustion sources;
- in-use emission studies using biofuels, including renewable diesel and other alternative fuels:

- in-use emission studies to determine impact of new technologies, in particular new near-zero emission engine technologies and hybrids on local air quality as well as the benefit of telematics on emission reduction strategies;
- lifecycle energy and emissions analyses to evaluate conventional and alternative fuels;
- analysis of fleet composition and its associated impacts on criteria pollutants;
- evaluation of emissions impact of low- and zero-carbon fuels/blends on the latest technology engines; and
- evaluation of impact of higher ambient temperatures on emissions of primary and secondary air pollutants.

Emission Control Technologies

Although engine technology and engine systems research are required to reduce emissions at the combustion source, dual fuel technologies and post-combustion cleanup methods are also needed to address on-road and off-road equipment emissions. Existing diesel emissions can be greatly reduced with introduction of RNG, hydrogen, biofuels, synthetic and low carbon fuels into the engine but also via aftertreatment controls such as close coupled catalysts, advanced SCR and DPF catalysts coupled with electrically heated diesel exhaust fluid (DEF) dosers as well as advanced control strategies using cylinder deactivation, which have proven to lower emissions to near-zero and increase efficiency. Gas to Liquid (GTL) fuels formed from natural gas or other hydrocarbons rather than petroleum feedstock and emulsified diesel, provide low emission fuels for use in diesel engines. As emissions from engines become lower, lubricant contributions to VOC and PM emissions become increasingly important. Recently, particulate matter (PM and PN) emissions from GDI fueled LD vehicles, natural gas fueled MD and HD vehicles have gathered attention due to the lack of particulate filters. While relative PM levels are low and below the applicable standard, concerns on ultra-fine emissions needs to be assessed. South Coast AQMD will continue to fund studies to help mitigate emissions concerns for gasoline and natural gas fueled engines. Onboard emissions sensors have been identified by CARB and other agencies as a reliable method for assessing in-use emissions compliance. At the same time, researchers have proposed to use sensors, coupled with GPS, cellular connection, weather, traffic, and other online air quality models together to enable advanced concepts like Geofencing, Eco-routing, and more. Similar strategy have been presented in CARB's latest 2022 SIP Strategy. The most promising of these technologies will be considered for funding, specifically:

- evaluation and demonstration of new emerging liquid fuels, including alternative and renewable diesel and other GTL fuels;
- development and demonstration of renewable-diesel engines and advanced aftertreatment technologies for mobile applications (including heated dosing technologies, close coupled catalysts, electronically heated catalysts and other advanced selective catalytic reduction systems) as well as non-thermal regen technology;
- development and demonstration of low-VOC and PM lubricants for diesel and natural gas engines;
- develop, evaluate, and demonstrate onboard sensor-based emissions monitoring methodology; and
- develop, evaluate, and demonstrate cloud-based emissions and energy management system.

Health Impacts Studies

Assessment of potential health risks linked to exposure to pollution is extremely important. Studies indicate that ultrafine particulate matter (PM) can produce irreversible damage to children's lungs, which highlights the need for further studies to identify health effects resulting from these technologies.

Previous studies of ambient levels of toxic air contaminants, such as the MATES studies, have found that diesel exhaust is the major contributor to health risk from air toxics. South Coast AQMD completed MATES V in August 2021 to update the emissions inventory of toxic air contaminants, as well as modeling to characterize risks, including measurements and analysis of ultrafine particle concentrations typically emitted or subsequently formed from vehicle exhaust. Findings from the MATES V report showed that air toxics cancer risk based on modeling data has decreased over 50% since MATES IV, with average multi-pathway air toxics cancer risk at 454-in-a-million. The highest risk locations are at LAX and the Ports along goods movement and transportation corridors. Diesel PM continues to be the major contributor accounting for over 60% of the overall air toxics cancer risk. For the first time, chronic non-cancer risk was estimated with a chronic hazard index of 5.9 across the 10 stations in the MATES V study.

Furthermore, despite recent advancements in toxicological research related to air pollution, the relationship between particle chemical composition and health effects is still not completely understood, especially for biofuels, natural gas and other alternative fuels. In 2015, South Coast AQMD funded chamber studies as part of the 200 Vehicle Study to further investigate the toxicological potential of emissions from MD and HD vehicles, such as ultrafine particles and vapor phase substances, and to determine whether substances such as volatile or semi-volatile organic compounds are being emitted in lower mass emissions that could pose harmful health effects, the results are due to be finalized by end of 2022.

Technology Transfer and Outreach

Since the Clean Fuels Program depends on the deployment and adoption of demonstrated technologies, technology transfer and outreach efforts are essential to its success. This core area encompasses assessment of advanced technologies, including retaining outside technical assistance to expedite implementation of low emission and clean fuel technologies, coordinating activities with other organizations and educating end users of these technologies. Technology transfer efforts include supporting various incentive programs that encourage the purchase of cleaner technologies, cosponsoring technology-related conferences, workshops, and other events, and disseminating information on advanced technologies to various audiences (i.e., residents in AB 617 or disadvantaged communities, local governments, funding agencies, technical audiences). South Coast AQMD's AB 617[5] program is designed to reduce emissions in communities disproportionately impacted by air pollution. TAO conducted additional outreach to AB 617 communities regarding available zero and near-zero emission technologies and incentives to accelerate the adoption of cleaner technologies. Incentivizing deployment of zero emission HD trucks has been included in the CERPs and an RFP for zero emission HD truck incentive funding will be released in 2022 for these AB 617 communities.

Target Allocations to Core Technology Areas

Figure 6 below presents the potential allocation of available funding, based on South Coast AQMD projected program costs of $19.8 million for all potential projects. The actual project expenditures for 2023 will be less than the total South Coast AQMD projected program costs since not all projects will materialize. Target allocations are based on balancing technology priorities, technical challenges and opportunities discussed previously, and near term versus long term benefits with the constraints on available South Coast

[5] http://www.aqmd.gov/nav/about/initiatives/environmental-justice/ab617-134

AQMD funding. Specific contract awards throughout 2023 will be based on this proposed allocation, quality of proposals received, and evaluation of projects against standardized criteria and ultimately South Coast AQMD Board approval.

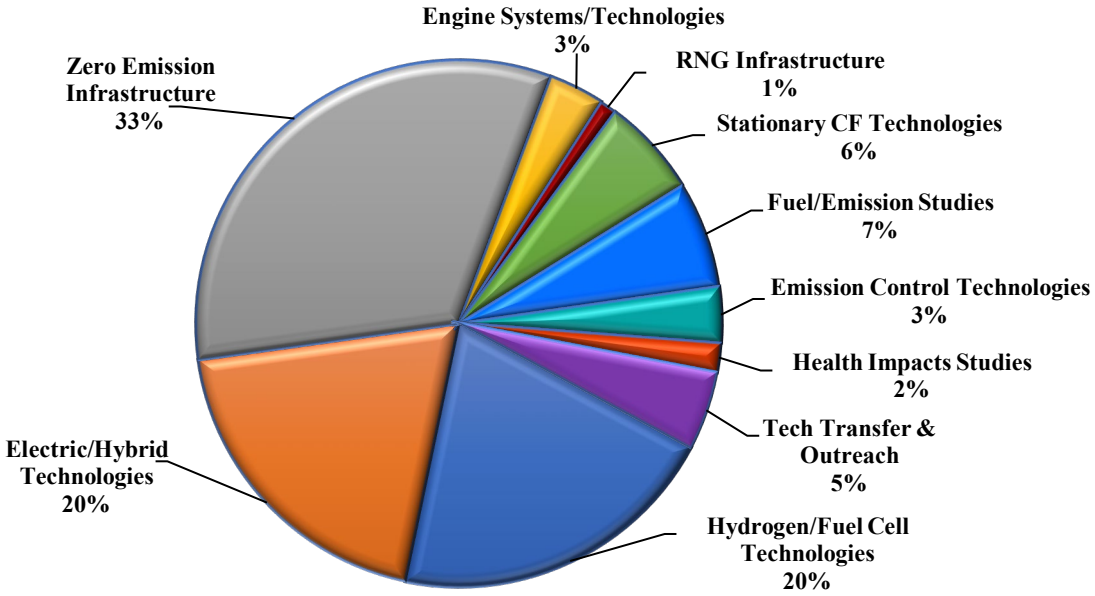

Figure 6: Projected Cost Distribution for Potential South Coast AQMD Projects in 2023 ($19.8M)

CLEAN FUELS PROGRAM

Program Plan Update for 2023

This section presents the Clean Fuels Program Plan Update for 2023. The proposed projects are organized by program areas and described in further detail, consistent with the South Coast AQMD budget, priorities and the best available information on the state-of-the-technology. Although not required, this Plan also includes proposed projects that may also be funded by revenue sources other than the Clean Fuels Program, through state and federal grants for clean fuel technologies, incentive programs such as AB 617 Community Air Protection Program (CAPP) funding, Volkswagen Mitigation and Carl Moyer, and VOC and NOx mitigation.

Table 1 summarizes potential projects for 2023 as well as the distribution of South Coast AQMD costs in some areas as compared to 2022. The funding allocation continues the focus on development and demonstration of zero and near-zero emission technologies including infrastructure to support vehicles and off-road equipment. For the 2023 Draft Plan Update, there is a continuing focus on zero emission technologies including funding for hydrogen/fuel cell technologies, electric/hybrid technologies, and zero emission infrastructure. Zero emission infrastructure was formerly included within hydrogen/fuel cell and electric/hybrid technologies, but given its increasing importance it is now being presented as a separate category. There are significant decreases in funding for RNG infrastructure and engine systems/ technologies as near-zero engine development has been significantly reduced as funding is increasingly shifted to zero emission technologies and infrastructure for future planned projects in 2023, including:

- HD zero emission battery electric and fuel cell trucks;
- HD zero emission infrastructure development, demonstration, deployment and planning;
- Onboard sensor development for emissions monitoring and improved efficiency;
- Microgrid demonstrations to support zero emission infrastructure;
- Battery and fuel cell electric transit and school bus fleet charging/fueling infrastructure;
- HD diesel truck replacements with zero emission trucks; and
- Fuel and emissions studies, such as conducting airborne measurements and analysis of NOx emissions and assessing emission impacts of hydrogen-natural gas fuel blends on near-zero emission HD natural gas engines.

As in prior years, funding allocations again align well with the South Coast AQMD's FY 2022-23 Goals and Priority Objectives, which includes supporting development of cleaner advanced technologies. Overall, the Clean Fuels Program is designed to ensure a broad portfolio of technologies, complement state and federal efforts, and maximize opportunities to leverage technologies in a synergistic manner.

Each of the proposed projects described in this Plan, once fully developed, will be presented to the South Coast AQMD Governing Board for approval prior to contract initiation. This Plan Update reflects the maturity of the proposed technology and identifies contractors to implement projects, participating host sites and fleets, and securing sufficient cost-sharing to complete projects, and other necessary factors. Recommendations to the South Coast AQMD Governing Board will include descriptions of technologies to be demonstrated or deployed, their applications, proposed scope of work, and capabilities of selected contractor(s) and project teams, in addition to the expected costs and project benefits as required by H&SC 40448.5.1.(a)(1). Based on communications with all organizations specified in H&SC 40448.5.1.(a)(2) and review of their programs, projects proposed in this Plan do not appear to duplicate any past or present projects.

Funding Summary of Potential Projects

The remainder of this section contains the following information for each of the potential projects summarized in Table 1.

Proposed Project: Descriptive title and a designation for future reference.

Expected South Coast AQMD Cost: Estimated proposed South Coast AQMD cost-share as required by H&SC 40448.5.1.(a)(1).

Expected Total Cost: Estimated total project cost including South Coast AQMD cost-share and cost-share of outside organizations expected to be required to complete the proposed project. This is an indication of how much South Coast AQMD public funds are leveraged through its cooperative efforts.

Description of Technology and Application: Brief summary of proposed technology to be developed and demonstrated, including expected vehicles, equipment, fuels, or processes that could benefit.

Potential Air Quality Benefits: Brief discussion of expected benefits of proposed project, including expected contribution towards meeting the goals of the Draft 2022 AQMP, as required by H&SC 40448.5.1.(a)(1). In general, the most important benefits of any technology research, development and demonstration program are not necessarily realized in the near-term. Demonstration projects are generally intended to be proof-of-concept for an advanced technology in a real-world application. While emission benefits, for example, will be achieved from the demonstration, true benefits will be seen over a longer term, as a successfully demonstrated technology is eventually commercialized and implemented on a wide scale.

Table 1: Summary of Potential Projects for 2023

Proposed Project	Expected SCAQMD Cost $	Expected Total Cost $
Hydrogen/Mobile Fuel Cell Technologies		
Develop and Demonstrate Hydrogen Research to Support Innovative Technology Solutions for Fueling Fuel Cell Vehicles	50,000	800,000
Develop and Demonstrate MD and HD Fuel Cell Vehicles	4,000,000	15,000,000
Subtotal	$4,050,000	$15,800,000
Electric/Hybrid Technologies		
Develop and Demonstrate MD and HD On-Road and Off-Road Battery Electric and Hybrid Vehicles and Equipment	3,400,000	26,800,000
Demonstrate Alternative Energy Storage	300,000	1,000,000
Demonstrate Light-Duty Battery Electric Vehicles and Plug-In Hybrid Vehicles	160,000	160,000
Subtotal	$3,860,000	$27,960,000
Zero Emission Infrastructure		
Develop and Demonstrate Hydrogen Production and Fueling Stations	2,000,000	6,500,000
Develop and Demonstrate Electric Charging Infrastructure	4,500,000	47,361,774
Subtotal	$6,500,000	$53,861,774
Engine Systems/Technologies		
Develop and Demonstrate Advanced Gaseous- and Liquid-Fueled MD and HD Engines & Vehicle Technologies to Achieve Ultra-Low Emissions	500,000	2,000,000
Develop and Demonstrate Alternative Fuel and Clean Conventional Fueled Light-Duty Vehicles	0	0
Develop and Demonstrate Low Emission Locomotive Technologies and After Treatment Systems	176,300	1,000,000
Subtotal	$676,300	$3,000,000
RNG Infrastructure (Renewable Natural Gas/Renewable Fuels)		
Demonstrate Near-Zero Emission Hybrid and Hydrogen ICE Vehicles in Various Applications	0	0
Develop, Maintain and Expand Renewable Fuel Infrastructure	200,000	2,100,000
Demonstrate Renewable Transportation Fuel Manufacturing and Distribution Technologies	0	0
Subtotal	$200,000	$2,100,000
Stationary Clean Fuel Technologies		
Develop and Demonstrate Microgrids with Photovoltaic/Fuel Cell/Battery Storage/EV Chargers and Energy Management	1,000,000	4,000,000
Develop and Demonstrate Zero or Near-Zero Emission Energy Generation Alternatives	200,000	1,000,000
Subtotal	$1,200,000	$5,000,000

Table 1: Summary of Potential Projects for 2023 (cont'd)

Proposed Project	Expected SCAQMD Cost $	Expected Total Cost $
Fuel and Emissions Studies		
Conduct In-Use Emission Studies for Advanced Technology Vehicle Demonstrations	500,000	2,000,000
Conduct Emission Studies on Biofuels, Alternative Fuels and Other Related Environmental Impacts	400,000	1,500,000
Identify and Demonstrate In-Use Fleet Emission Reduction Technologies and Opportunities	400,000	1,500,000
Subtotal	$1,300,000	$5,000,000
Emission Control Technologies		
Develop and Demonstrate Advanced Aftertreatment Technologies On-Highway	250,000	1,000,000
Develop Methodology and Evaluate and Demonstrate Onboard Sensors for On-Road HD Vehicles	250,000	1,000,000
Demonstrate On-Road Technologies in Off-Road and Retrofit Applications	176,300	800,000
Subtotal	$676,300	$2,800,000
Health Impacts Studies		
Evaluate Ultrafine Particle Health Effects	88,150	1,000,000
Conduct Monitoring to Assess Environmental Impacts	132,225	500,000
Assess Sources and Health Impacts of Particulate Matter	132,225	300,000
Subtotal	$352,600	$1,800,000
Technology Transfer and Outreach		
Assess and Support Advanced Technologies and Disseminate Information	600,000	1,000,000
Support Implementation of Various Clean Fuels Incentive Programs	350,000	400,000
Subtotal	950,000	$1,400,000
TOTALS FOR POTENTIAL PROJECTS	$19,765,200	$118,721,774

Technical Summaries of Potential Projects

Hydrogen/Mobile Fuel Cell Technologies

Proposed Project: Develop and Demonstrate Hydrogen Research to Support Innovative Technology Solutions for Fueling Fuel Cell Vehicles

Expected South Coast AQMD Cost: $50,000

Expected Total Cost: $800,000

Description of Technology and Application:

California regulations require automakers to place increasing numbers of ZEVs into service every year. By 2050, CARB projects that 87% of LD vehicles on the road will be zero emission battery and FCVs.

Many stakeholders are working on hydrogen and fuel cell products, markets, requirements, mandates and policies. California has been leading the way for hydrogen infrastructure and FCV deployment. This leadership has advanced a hydrogen network that is not duplicated anywhere in the U.S. and is unique in the world for its focus on providing a retail fueling experience. In addition, the advancements have identified many lessons learned for hydrogen infrastructure development, deployment and operation. Other interested states and countries are using California's experience as a model case, making success in California paramount to enabling market acceleration and uptake in the U.S. U.S. leadership for hydrogen technologies is rooted in California, a location for implementing many DOE H2@Scale pathways, such as reducing curtailment and stranded resources, reducing petroleum use and emissions, and developing and creating jobs. The technical research capability of the national laboratories can be used to assist California in decisions and evaluations, as well as to verify solutions to problems impacting the industry. Because these challenges cannot be addressed by one agency or one laboratory, in 2018, a hydrogen research consortium was organized to combine and collaborate. Moreover, in 2022 California announced its intention to develop a renewable hydrogen hub as a part of the DOE announcement for an $8B funding opportunity to establish up to ten regional hydrogen hubs to build self-sustaining hydrogen economies of producers and infrastructure in the nation. The Governor's Office of Business and Economic Development (GO-Biz) established Alliance for Renewable Clean Hydrogen Energy Systems (ARCHES) to unite critical public and private stakeholders to build the framework for a California renewable, clean hydrogen hub as such additional hydrogen research studies and projects are foreseen in 2023.

The California Hydrogen Infrastructure Research Consortium focuses on top research needs and priorities to address near-term problems to support California's continued leadership in innovative hydrogen technology solutions needed for fueling FCVs. These tasks also provide significant contributions to the DOE H2@Scale Initiative. For instance, advances in fueling methods and components can support the development of supply chains and deployments. Tasks completed include data collection from operational stations, component failure fix verification (i.e., nozzle freeze lock), reporting about new fueling methods for MD and HD applications and HD tasks to develop HD reference station design, model HD station capacity with high flowrates and provide near-real-time verification of fuel quality with on-site hydrogen contaminant detectors (HCDs) for use at both LD and HD stations. The tasks are supported by leading researchers at NREL and coordinating national labs and managed in detail (e.g., schedule, budget, roles, milestones, tasks, reporting requirements) in a hydrogen research consortium project management plan. The UC Davis Institute of Transportation study on hydrogen systems analysis in 2021 is intended to evaluate the current hydrogen polices and their impact on a carbon neutral transportation by 2050 with data analysis and modeling support of the current hydrogen resources.

These efforts are complemented by projects undertaken and supported by the HFCP and its members over the last few years such as the *H2 Fuel Cell Electric Trucks, A Vision for Freight Movement in California – and Beyond* document released in July 2021 establishing a vision for 70,000 Class 8 FC trucks supported by 200 hydrogen fueling stations by 2035, including barriers that need to be overcome, CARB's Advanced Clean Truck Regulation adopted in June 2020, and anticipated adoption of the Advanced Clean Fleets Regulation in 2022.

This project area would enable co-funding support for additional or follow on mutually agreed technical tasks with the California Hydrogen Infrastructure Research Consortium members, the HFCP, UC Davis as well as other collaborative efforts that may be undertaken to advance hydrogen infrastructure technologies including the upcoming hydrogen hubs efforts.

Potential Air Quality Benefits:

The Draft 2022 AQMP identifies the use of alternative fuels and zero emission transportation technologies as necessary to lower NOx and VOC emissions to meet federal air quality standards. One of the major advantages of FCVs is the fact that they use hydrogen, a fuel that can be domestically produced from a variety of resources such as natural gas (including biogas), electricity (stationary turbine technology, solar or wind), and biomass. The technology and means to produce hydrogen fuel to support FCVs are available but require optimization to achieve broad market scale. The deployment of large numbers of FCVs, which is one strategy to attain air quality goals, requires a well-planned and robust hydrogen fueling infrastructure network. These South Coast AQMD projects, with significant additional funding from other governmental and private entities, will work towards providing the necessary hydrogen production and fueling infrastructure network for our region.

Proposed Project: Develop and Demonstrate MD and HD Fuel Cell Vehicles

Expected South Coast AQMD Cost: $4,000,000

Expected Total Cost: $15,000,000

Description of Technology and Application:

This proposed project would support evaluation, including demonstrating promising fuel cell technologies for applications using direct hydrogen with proton exchange membrane (PEM) fuel cell technology. Battery dominant fuel cell hybrids are another potential technology to reduce costs and potentially enhance the performance of FCVs.

The California *ZEV Action Plan* specifies actions to help deploy an increasing number of ZEVs, including MD and HD ZEVs. CARB's Advanced Clean Truck and Fleet and Innovative Clean Transit Bus Regulations will also increase deployment of MD and HD FCVs. Fleets are useful demonstration sites because economies of scale exist in central fueling, training skilled personnel to operate and maintain FCVs, monitoring and collecting data on vehicle performance, and OEM technical and customer support. In some cases, MD and HD FCVs could leverage the growing network of hydrogen stations and provide an early base load of fuel consumption until the number of LD FCVs grows. These vehicles could include hybrid-electric vehicles powered by fuel cells and equipped with batteries capable of being charged from the grid and even supplying power to the grid.

In 2012, the DOE awarded South Coast AQMD funds to demonstrate Zero Emission Container Transport (ZECT) technologies. In 2015, the DOE awarded South Coast AQMD additional funds to develop and demonstrate additional fuel cell truck platforms and vehicles under ZECT II. Both ZECT I and ZECT II enabled the largest strides in Technology Readiness Level (TRL) of hybrid, battery electric and fuel cell HD trucks on the overall vehicle design and architecture. Especially, the fuel cell drayage truck's TRL prior to this project was at a strong Level 4 with several proof-of-concept vehicles constructed and it has advanced the TRL to a Level 7 with ZECT II. The Clean Fuels Program cost-shared the demonstration of transit buses at OCTA which was completed in September 2021. In 2020, the USEPA Targeted Airshed Grant Program awarded South Coast AQMD five fuel cell transit buses to be deployed at SunLine Transit which was also cost-shared by the Clean Fuels Program.

This category may include projects in the following applications:

On-Road:	**Off-Road:**
• Transit Buses • Shuttle Buses • MD & HD Trucks	• Vehicle Auxiliary Power Units • Construction Equipment • Lawn and Garden Equipment • Cargo Handling Equipment

Potential Air Quality Benefits:

The Draft 2022 AQMP identifies the need to implement ZEVs. South Coast AQMD adopted fleet regulations require public and some private fleets within the Basin to acquire alternatively fueled vehicles when making new purchases. CARB is revising the Advanced Clean Fleets for adoption in 2022 to impose 100% zero emission vehicle fleet targets for last mile delivery, drayage and public fleets in 2035. In the future, such vehicles could be powered by zero emission fuel cells operating on hydrogen fuel. The proposed projects have the potential to accelerate the commercial viability of FCVs. Expected immediate benefits include the establishment of zero and near-zero emission proof-of-concept vehicles in numerous applications. Over the longer term, the proposed projects could help foster wide-scale implementation of

FCVs in the Basin. The proposed projects could also lead to significant fuel economy improvements, manufacturing innovations and the creation of high-tech jobs in Southern California, besides realizing the air quality benefits projected in the AQMP as well as GHG reductions. Currently, the range of the trucks in the ZECT II project have a targeted range of 150 miles. Future projects would include extending the range of the FCVs up to 400 miles and demonstrate improvements in reliability and durability of powertrain systems and hydrogen storage systems. For fuel cell transit buses, projects are being proposed that reduce the cost of the fuel cell bus to less than $1 million through advanced technologies for the fuel cell stack, higher density and lower cost batteries, and increased production volumes.

Electric/Hybrid Technologies

Proposed Project: Develop and Demonstrate MD and HD On-Road and Off-Road Battery Electric and Hybrid Vehicles and Equipment

Expected South Coast AQMD Cost: $3,400,000

Expected Total Cost: $26,800,000

Description of Technology and Application:

The significance of transportation in overall carbon emissions is increasing as energy utilities move toward cleaner and more sustainable ways to generate electricity. USEPA (2022)[6] estimated that transportation was responsible for 27 percent of the nation's carbon emissions, while the electricity sector emissions accounted for 25 percent.

The South Coast AQMD has long been a leader in promoting early demonstrations of next generation LD vehicle propulsion technologies (and fuels). However, given the commercial availability of LD EVs, priorities have shifted. South Coast AQMD will continue to evaluate market offerings and proposed technologies in LD vehicles to determine if any future support is required.

Meanwhile, MD and HD vehicles make up 5[7] percent of vehicles in the U.S. and drive 11[8] percent of all vehicle miles traveled each year yet are responsible for more than 25[9] percent of all the fuel burned annually. Moreover, the Draft 2022 AQMP identified MD and HD vehicles as the largest source of NOx emissions in the Basin. Electric and hybrid technologies have gained momentum in the LD sector with commercial offerings by most of the automobile manufacturers. Unfortunately, significant emission reductions are needed for MD and HD vehicles and off-road equipment, exacerbated by low turnover of these vehicles by fleets and high incremental costs for battery electric vehicles and equipment compared to conventional-fueled vehicles and equipment.

The South Coast AQMD has investigated the use of electric and hybrid technologies to achieve similar performance as conventional-fueled counterparts while achieving emission reductions and improved fuel economy. Multiple natural gas and diesel hybrid vehicles have been developed and demonstrated under the DOE funded Zero Emissions Cargo Transport (ZECT), CARB Greenhouse Gas Reduction Fund (GGRF) and NREL's Natural Gas Vehicle Consortium. These hybrid trucks all share plug-in capability and ability to operate in zero emission mode, and some leveraging advanced concepts such as geofencing and EcoDrive to maximize emission reductions in disadvantaged communities. CARB's ACT and ACF regulation further provided additional compliance flexibility for plug-in hybrids. Vehicle based hybrid systems continue to progress for additional emission reductions and efficiency improvements. Engine powertrain based hybrid systems began to emerge since the introduction of optional hybrid powertrain test procedures.

Vehicle categories to be considered for potential or future demonstration and deployment projects include drayage/freight/regional haul trucks, utility trucks, last mile delivery vans, shuttle buses, transit buses, waste haulers, construction equipment, cranes and other off-road equipment such as yard tractors, forklifts, top handlers, and RTG cranes. Innovations that may be considered for demonstration and deployment include

[6] *U.S. Greenhouse Gas Emissions and Sinks 1990-2020*. 2022. https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions

[7] https://www.bts.gov/content/number-us-aircraft-vehicles-vessels-and-other-conveyances

[8] https://www.bts.gov/content/us-vehicle-miles

[9] https://www.bts.gov/content/fuel-consumption-mode-transportation

advancements in the auxiliary power unit, either ICE or other heat engine; and battery-dominant plug-in hybrid systems utilizing off-peak charging, with advanced battery technologies including alternative chemistries, design, and management systems. Alternative fuels are preferred in these projects, e.g., natural gas, especially from renewable sources, LPG, hydrogen, gas-to-liquid (GTL) and hydrogen-natural gas blends, but conventional fuels such as gasoline, renewable diesel, or even modified biodiesel may be considered if emission benefits can be demonstrated as equivalent or superior to alternative fuels. Both new designs and retrofit technologies and related charging infrastructure will be considered.

Both on-road vehicles and off-road equipment are transitioning increasingly towards zero emission technologies. Off-road equipment includes cargo handling equipment as well as construction equipment. The Volvo LIGHTS project included certification of Volvo's Class 8 battery electric truck, and the demonstration of a zero-emission freight handling system including 30 Class 8 battery electric trucks, 29 battery electric yard tractors and forklifts, 56 chargers and solar/energy storage at fleets DHE and NFI. Volvo Construction Equipment just recently finished demonstrating a small battery electric compact excavator and wheel loader in California that was commercially released in late 2021. Several other manufacturers have released battery electric and hybrid equipment, and more are becoming commercially available. CARB has introduced the Clean Off-Road Equipment Voucher Incentive Project (CORE) which have been seeing great success in deploying zero-emission cargo handling equipment and switch locomotives. The most recent round of funding in 2022 included off-road construction equipment. Since the applications are more diverse in this sector, continued development and incentives are needed to accelerate progress in this sector, especially for large mobile off-road equipment where infrastructure solutions are more difficult.

This project category will develop and demonstrate:

- various electric vehicles and equipment;
- anticipated costs for electric vehicles and equipment;
- customer interest and preferences for these alternatives;
- integration of technologies into prototype vehicles and fleets;
- battery electric and hybrid-electric MD and HD vehicles (e.g., drayage/freight/regional haul trucks, utility trucks, delivery vans, shuttle buses, transit buses, waste haulers);
- development and demonstration of battery electric off-road equipment, (e.g., battery electric off-road cargo handling such as yard tractors, forklifts and top-handlers, and construction equipment;
- development and demonstration of hybrid and plug-in hybrid vehicle technology; and

Potential Air Quality Benefits:

The Draft 2022 AQMP identifies zero or near-zero emission vehicles as a key attainment strategy. Plug-in hybrid electric technologies have the potential to achieve near-zero emission while retaining the range capabilities of conventional-fueled vehicles, a key factor expected to enhance broader consumer acceptance. Given the variety of EV systems under development, it is critical to determine actual emission reductions and performance metrics compared to conventional-fueled vehicles. Successful demonstration of optimized prototypes would promise to enhance the deployment of zero and near-zero emission technologies.

Expected benefits include the establishment of criteria for emission evaluations, performance requirements, and customer acceptability of the technology. This will help both regulatory agencies and OEMs to expedite introduction of zero and near-zero emission vehicles in the Basin, which is a high priority of the Draft 2022 AQMP.

Proposed Project: Demonstrate Alternative Energy Storage

Expected South Coast AQMD Cost: $300,000

Expected Total Cost: $1,000,000

Description of Technology and Application:

The South Coast AQMD has been involved in the development and demonstration of energy storage systems for electric and hybrid-electric vehicles, mainly lithium ion chemistry battery packs. Over the past few years, new technologies, especially lithium-ion batteries have shown robust performance. Other technology manufacturers have also developed energy storage devices including beyond lithium-ion batteries, flywheels, hydraulic systems and ultracapacitors. Energy storage systems optimized to combine the advantages of ultracapacitors and high-energy but low-power advanced batteries could yield benefits. Beyond lithium-ion batteries (e.g., lithium-sulfur, lithium-oxygen, sodium-ion, flow, and solid-state batteries) also have opportunities to achieve higher energy density, longer cycle life, and lower cost.

This project category is to apply these advanced storage technologies in vehicle platforms to identify best fit applications, demonstrate their viability (reliability, maintenance and durability), gauge market preparedness, evaluate costs relative to current lithium-ion batteries and provide a pathway to commercialization. The use of alternative energy storage and generation (i.e. solar) could also be in combination with a large scale deployment of 50 or more battery electric trucks and charging infrastructure at a single fleet location for energy storage optimization for grid reliability and offset electricity demand charges.

The long-term objective of this project is to decrease fuel consumption and resulting emissions without any changes in performance compared to conventional-fueled vehicles. This effort will support several projects for development and demonstration of battery electric and hybrid electric vehicles using advanced energy storage strategies and conventional or alternative fuels. The overall net emissions and fuel consumption of these types of vehicles are expected to be much lower than traditional engine systems. Both new and retrofit technologies will be considered.

Additionally, this project will also assess potential for second life uses of electric vehicle batteries for storage as well as the longer term more cost-effective recycling approaches currently in a nascent “pilot” stage, especially for metals such as lithium and cobalt.

Potential Air Quality Benefits:

Certification of battery electric and hybrid electric vehicles and engines and their integration into the Basin’s transportation sector is a high priority under the Draft 2022 AQMP. This project is expected to further efforts to develop alternative energy storage technologies that could be implemented in MD and HD trucks, buses, off-road equipment, and other applications. Benefits will include proof of concept for new technologies, diversification of transportation fuels and lower emissions of criteria, toxic pollutants and greenhouse gases.

Proposed Project: Demonstrate Light-Duty Battery Electric Vehicles and Plug-In Hybrid Vehicles

Expected South Coast AQMD Cost: $160,000

Expected Total Cost: $160,000

Description of Technology and Application:

This proposed project would support the demonstration of limited production and early commercial LD BEVs and PHEVs using advanced technology, mainly through showcasing this technology. Recent designs of LD BEVs and PHEVs provide increased electric range, improved efficiency and recharge times, and other advanced safety, energy, autonomous and performance features in new platforms and applications that can accelerate EV adoption.

South Coast AQMD has included BEVs and PHEVs as part of its demonstration fleet since the development of early conversion vehicles. South Coast AQMD installed 92 Level 2 EV charging ports in 2017 and a DC fast charger with CHAdeMO and CCS1 connectors in 2018 to support public and workplace charging as a means of education outreach regarding BEV and PHEV technology. Thirty networked Level 2 fleet chargers were added through the Southern California Edison Charge Ready Fleet program in 2020, which will help South Coast AQMD acquire 8,500 GVW and over ZEVs like LD trucks and vans to comply with the upcoming CARB Advanced Clean Fleet regulation.

LD BEVs and PHEVs are available from most established OEMs and several new OEMs. Current legislation extends solo carpool lane access only for MY 2019 and later vehicles, with all Clean Air Vehicle decals expiring between 2023 - 2025, unless legislation is adopted to continue.

Potential Air Quality Benefits:

The Draft 2022 AQMP identifies the need to implement LD EVs. South Coast AQMD adopted fleet regulations require public and some private fleets within the Basin to acquire alternatively fueled vehicles when making new purchases. In the future, such vehicles could be powered by BEVs. The proposed projects have the potential to accelerate commercial viability of BEVs and PHEVs. Expected immediate benefits include the deployment of ZEVs in South Coast AQMD's demonstration fleet. Over the longer term, the proposed projects could help foster wide-scale implementation of ZEVs in the Basin. The proposed projects could also lead to significant fuel economy improvements, manufacturing innovations and the creation of high-tech jobs in Southern California, besides realizing the air quality benefits projected in the Draft 2022 AQMP.

Zero Emission Infrastructure

Proposed Project: Develop and Demonstrate Hydrogen Production and Fueling Stations

Expected South Coast AQMD Cost: $2,000,000

Expected Total Cost: $6,500,000

Description of Technology and Application:

Alternative fuels, such as hydrogen and the use of advanced technologies, such as FCVs, are necessary to meet future clean air standards. A key element in the widespread acceptance and resulting increased use of alternative fuel vehicles is the development of a reliable and robust infrastructure to support the fueling of vehicles, cost-effective production and distribution and clean utilization of these new fuels.

A challenge to the entry and acceptance of direct-hydrogen FCVs is the limited number and scale of hydrogen fueling and production sites. This project would support the development and demonstration of hydrogen fueling technologies with a focus on MD/HD fueling infrastructure. Proposed projects would address:

Fleet and Commercial Fueling Stations: Further expansion of the hydrogen fueling network based on retail models, providing renewable generation, adoption of standardized measurements for hydrogen fueling, other strategic fueling locations, dispensing pressures that support zero emission vehicle deployment and compatibility with existing CNG stations may be considered.

Energy Stations: Multiple-use energy stations that can produce hydrogen for FCVs or stationary power generation are considered an enabling technology and potentially cost-competitive with large-scale reforming. System efficiency, emissions, hydrogen throughput, hydrogen purity and system economics will be monitored to optimize strategies for hydrogen fueling infrastructure deployment and to produce power and hydrogen from renewable feedstocks (e.g., biomass, digester gas) and store hydrogen in larger scale.

Innovative Fueling Appliances: Home or small scale fueling/charging is an attractive advancement for alternative clean fuels for potential applications. This project would evaluate an innovative hydrogen refueler for cost, compactness, performance, durability, emission characteristics, ease of assembly and disassembly, maintenance and operations. Other issues such as setbacks, building permits, building code compliance and UL ratings for safety would also be evaluated.

- CARB projections for on-road FCVs counts are now 30,800 in 2024 and 61,000 in 2027 in California[10] and the majority of these do not include MD and HD vehicles deployed in the Basin. To meet demand, the number of hydrogen fueling infrastructures needs to be significantly increased and become more reliable in terms of uptime and supply. South Coast AQMD will seek additional funding from CEC and CARB to construct and operate hydrogen fueling stations and take advantage of funding opportunities that may arise soon with the California hydrogen hub application and others such as anticipated adoption of the Advanced Clean Fleets Regulation.

Potential Air Quality Benefits:

The Draft 2022 AQMP identifies the use of alternative clean fuels in mobile sources as a key attainment strategy. Pursuant to AQMP goals, the South Coast AQMD has several fleet rules in effect that require

[10] California Air Resources Board. *2021 Annual Evaluation of Fuel Cell Vehicle Deployment & Hydrogen Fuel Station Network Development* (AB 8 Report). September 2021.

public and certain private fleets to purchase clean-burning alternative-fueled vehicles when adding or replacing vehicles to their vehicle fleets. The Warehouse Indirect Source Rule (ISR) also requires certain warehouse owners and operators to comply with the rule by operating clean fuel vehicle technologies. FCVs constitute some of the cleanest alternative-fuel vehicles today. Since hydrogen is a key fuel for FCVs, this project would address some of the barriers faced by hydrogen as a fuel with the focus on MD/HD infrastructure and thus assist in accelerating its acceptance and ultimate commercialization. In addition to supporting the immediate deployment of the demonstration fleet, expanding the hydrogen fuel infrastructure should contribute to the market acceptance of fuel cell technologies in the long run, leading to substantial reductions in NOx, VOC, CO, PM and toxic compound emissions from vehicles.

Proposed Project: Develop and Demonstrate Electric Charging Infrastructure

Expected South Coast AQMD Cost: $4,500,000

Expected Total Cost: $47,361,774

Description of Technology and Application:

There is a critical need to address gaps in EV charging infrastructure availability. Thirty nine percent of the 2,826,923[11] EVs sold in the U.S. since 2010 were in California, and of those sales in California, almost half (46 percent) of CVRP[12] rebates issued as of April 2021 were for vehicles in the South Coast AQMD. In addition, the California *ZEV Action Plan*, which was updated in 2018, calls for 5 million ZEVs and supporting infrastructure by 2030.

There are separate challenges associated with infrastructure for LD EVs vs. MD and HD EVs, which are on opposite ends of the commercialization spectrum. LD EVs and charging infrastructure have long been commercially available with an SAE J1772 connector standard for Level 1 and Level 2 charging. Availability of public fast charging and workplace charging continues to increase and is needed particularly for residents in multi-unit dwellings without easy access to home charging. Availability and costs to deploy infrastructure are the main challenges for LD EVs.

MD and HD EVs are becoming more commercially available, with Daimler and Volvo obtaining CARB certification of their Class 6 and/or 8 battery electric trucks in 2020. Standards for charging infrastructure to support MD and HD EVs has generally been with the CCS1 connector in North America. Although Volvo and ABB obtained UL certification of the CCS2 connector in 2020, which is a connector standard predominantly used in Europe and other parts of the world, the CCS1 connector continues to be the standard connector for charging up to 350 kW DC. A Megawatt Charging System connector is under development by the Charging Interface Initiative (CharIN) for Class 6 -8 EVs for charging up to 4.5 MW DC, although there are no EVs which are currently capable of accepting charging above 350 kW DC. There is also an agreed upon SAE J3068 connector standard for single-phase and three-phase AC charging. The challenges and costs of installing MD and HD charging infrastructure are exponentially increased compared to LD infrastructure. Each year there are more commercially available options for MD and HD on-road EVs and off-road equipment, charging infrastructure to HD EVs, equipment, and infrastructure. As the deployment of MD and HD EVs and off-road equipment has increased, there is an increasing reliance on the use of standardized charging connectors that are UL or Nationally Recognized Testing Laboratory (NRTL) certified charging infrastructure, as opposed to proprietary charging infrastructure and connectors which can only be used with EVs and equipment manufactured by that OEM or equipment manufacturer. Further, for off-road mobile applications where a fixed charging solution is not feasible, innovative solutions must be explored and demonstrated.

The South Coast AQMD is actively pursuing development of intelligent transportation systems, such as Volvo's EcoDrive 2.0 software platform being utilized for the GGRF Zero Emission Drayage Truck (ZEDT) and Volvo LIGHTS projects, to improve traffic efficiency of battery electric and fuel cell electric drayage/freight trucks. This system provides truck drivers real-time vehicle operation feedback based on changing traffic and road conditions where trucks can dynamically change their speed to better flow through intersections. EcoDrive also uses geofencing capabilities to operate in zero emissions mode while traveling through disadvantaged communities. A truck eco-routing system can provide the eco-friendliest travel route based on truck engine/emission control characteristics, loaded weight, road grade and real-time traffic

[11] https://www.veloz.org/ev-market-report/. Q2 2022 data uploaded on 8/23/22.

[12] https://cleanvehiclerebate.org/eng/rebate-statistics

conditions. Integrated programs can interconnect fleets of electric drive vehicles with mass transit via web-based reservation systems that allow multiple users. These integrated programs can match the features of EVs (zero emissions, zero start-up emissions, short range) to typical consumer demands for mobility in a way that significantly reduces emissions of pollutants and greenhouse gases. As part of the demonstration of the Volvo diesel plug-in hybrid electric truck for the ZEDT project, this truck will be demonstrated in California for six months starting in November 2020 and data will be collected on the performance of EcoDrive 2.0 through the connector vehicle corridor in Carson that was set up as part of the CEC funded Eco FRATIS[13] freight transportation connected truck project.

This project category is one of South Coast AQMD's continued efforts to:

- deploy a network of DC fast charging infrastructure (350kW or more) and rapidly expand the existing network of public EV charging stations including energy storage systems;
- deploy DC fast charging infrastructure (500 kW or more) in conjunction with energy storage and/or solar to support large scale deployments of 50 or more battery electric trucks at a single fleet location;
- charging infrastructure and innovative systems (i.e. solar or battery swap) to support MD and HD vehicle and off-road equipment demonstration and deployment projects;
- regional planning for MD/HD charging;
- support investigation of fast charging impacts on battery life;
- develop intelligent transportation system strategies for cargo containers; and
- develop freight load-balancing strategies as well as to conduct market analysis for zero emission HD trucks in goods movement.

Potential Air Quality Benefits:

The Draft 2022 AQMP identifies zero emission vehicles as a key attainment strategy. This proposed project category will reduce PM pollution along major roadways through the expansion of the public EV charging infrastructure network by allowing drivers to shift away from conventional-fueled vehicles to battery and fuel cell EVs. In addition, this project will assist in achieving improved fuel economy and lower tailpipe emissions, further helping the region to achieve NAAQS and protect public health. Expected benefits include the establishment of criteria for emission evaluations, performance requirements and customer acceptability of the technology. This will help both regulatory agencies and OEMs to expedite introduction of ZEVs in the Basin, which is a high priority of the Draft 2022 AQMP.

[13] https://www.aapa-ports.org/files/PDFs/ITS%20POLA%204.24.2019.pdf

Engine Systems/Technologies

Proposed Project: Develop and Demonstrate Advanced Gaseous- and Liquid-Fueled MD and HD Engines and Vehicles Technologies to Achieve Ultra-Low Emissions

Expected South Coast AQMD Cost: $500,000

Expected Total Cost: $2,000,000

Description of Technology and Application:

The objective of this proposed project would be to support development and certification of near-commercial prototype low emission MD and HD gaseous- and liquid-fueled engine technologies, as well as integration and demonstration of these technologies in on-road vehicles. The NOx emissions target for this project area is 0.02 g/bhp-hr or lower and the PM emissions target is below 0.01 g/bhp-hr. The recent development of low-NOx diesel or natural gas engine hybrid/plug-in hybrid powertrain has also shown the potential for achieving lower NOx as a combined system. To achieve these targets, an effective emissions control strategy must employ advanced fuel system and engine design features such as CDA, aggressive engine calibration and improved thermal management, improved exhaust gas recirculation (EGR) systems, and aftertreatment devices that are optimized using a system approach. This effort is expected to result in several projects, including:

- development and demonstration of advanced engines in MD and HD vehicles and high horsepower (HP) applications;
- development of durable and reliable retrofit technologies to significantly reduce NOx emissions;
- field demonstrations of advanced technologies in various fleets operating with different classes of vehicles;
- development and demonstration of CNG, propane and diesel hybrid powertrain technology; and
- development and demonstration of optimized engine systems for use with low- and zero carbon alternative fuels such as hydrogen

Anticipated fuels for these projects include but are not limited to alternative fuels (fossil fuel-based and renewable natural gas, propane, hydrogen blends, ethanol, electric and hybrid), conventional and alternative diesel fuels, ultra-low sulfur diesel, renewable diesel, dimethyl ether and gas-to-liquid fuels. There has been significantly more interest as well as a mandate requiring the use of renewable fuels across all sectors due to CARB's Low Carbon Fuel Standard (LCFS). Projects listed under Fuel/Emissions Studies will assess the emissions impact of renewable fuels on past and future optimized combustion technologies. Several key diesel engine development projects that have demonstrated the ability to achieve 0.02 g/bhp-hr NOx under laboratory conditions are near the on-road truck demonstration stage. Truck integration and packaging are another critical step towards commercialization. Prototype trucks are typically placed in revenue service to collect real-world performance data as well as end user feedback for production engines. Furthermore, with the new in-use and low-load emissions requirements within the CARB Omnibus and the USEPA CTI regulations, we expect these new generation of low-emission engines to comply with the low emissions standard for their full useful life.

The use of alternative fuel in HD trucking applications has been demonstrated in certain local fleets within the Basin. These vehicles typically require 200-400 HP engines. Higher HP alternative fuel engines for long-haul applications are beginning to be introduced. However, vehicle range, lack or limited accessible public infrastructure, lack of experience with alternative fuel engine technologies, limited selection of appropriate alternative fuel engine products, and high initial cost have made it difficult for more fleets to

adopt and deploy larger quantity of alternative fuel vehicles. For example, in recent years, several large trucking fleets have expressed interest in using alternative fuels but requires higher horsepower engines that able to fulfill the full range of needs. However, at this time the choice of engines over 400 HP or more was not available. Continued development of cleaner dedicated alternative gaseous- or diesel-fueled engines over 400 HP with low NOx emissions, would increase availability to end-users and provide additional emission reductions for long-haul applications. The applications that require high power/torque levels such as long haul are also the applications where zero emission technologies and supporting infrastructures will take longer to become commercially available. South Coast has been supporting effort for developing high power natural gas engines that address that gap.

Moreover, as incentive funding shifts away as clean combustion technologies reach full commercial readiness, development of cost-effective technologies that do not rely on incentives are key to drive additional market penetration and emissions reduction. South Coast AQMD has investigated the emergence of cost-effective hybrid and plug-in hybrid powertrain technologies to achieve targeted lower-NOx emission standard while with improved fuel economy. Cost-effective hybrid technologies that offer reasonable payback period could potentially offer a faster commercialization pathway for reducing both NOx and GHG in the near term by strategically utilizing the existing ICEs and electric components together to assists engine operation and maintain aftertreatment temperature and efficiency. Manufacturers of Emission Controls Association's (MECA) 2019 low NOx white paper analysis shows that these newly integrated hybrid powertrains could potentially achieve the CARB 2024-2026 NOx standard of 0.05 g/bhp-hr while maintaining reasonable costs and offering a feasible pathway to 0.02 g/bhp-hr. Due to the slow fleet turn over, the legacy 2010+ diesel fleet will remain in service well into the 2030s and beyond, especially for the high powered applications. Thus, continued development of cost-effective low emission engine technologies is key to reduce the impact of legacy fleets in our region.

Potential Air Quality Benefits:

This project is intended to expedite the commercialization of near-zero emission gaseous- and liquid-fueled MD and HD engine technology both in the Basin and in intrastate operation. The emissions reduction benefits of replacing one 4.0 g/bhp-hr HD engine with a 0.02 g/bhp-hr engine in a vehicle that consumes 10,000 gallons of fuel per year is about 1,400 lb/yr of NOx. MD and HD engines between 6L to 12L using natural gas and propane achieving NOx emissions of 0.02 g/bhp-hr have been certified and commercialized, with larger displacement and advanced technology (e.g., opposed piston) engines still undergoing development. Further, renewable or blended alternative fuels can also reduce HD engine particulate emissions by over 90 percent compared to current diesel technology. The key to future engine system project success are emissions, cost-effectiveness and availability of future incentives. This project is expected to lead to increased availability of low emission alternative fuel HD engines. Fleets can use the engines and vehicles emerging from this project to comply with South Coast AQMD fleet regulations and towards compliance of the Draft 2022 AQMP control measures as well as future CARB and USEPA low NOx regulations.

Proposed Project: Develop and Demonstrate Alternative Fuel and Clean Conventional Fueled Light-Duty Vehicles

Expected South Coast AQMD Cost: $0

Expected Total Cost: **$**0

Description of Technology and Application:

Although new conventionally fueled vehicles are much cleaner than their predecessors, not all match the lowest emissions standards often achieved by alternative fuel vehicles. This project would assist in the development, demonstration and certification of both alternative-fueled and conventional-fueled vehicles to meet the strictest emissions requirements by the state, e.g., SULEV for light-duty vehicles. The candidate fuels include CNG, LPG, ethanol, GTL, renewable diesel and hydrogen, and other novel technologies including electric hybrids. The potential vehicle projects may include:

- certification of CNG light-duty sedans and pickup trucks used in fleet services;
- assessment of "clean diesel" vehicles, including hybrids and their ability to attain SULEV standards;
- assessment of other clean technologies; and
- other fuel and technology combinations may also be considered under this category.

Potential Air Quality Benefits:

The Draft 2022 AQMP identifies the use of alternative clean fuels in mobile sources as a key attainment strategy. Pursuant to AQMP goals, South Coast AQMD has in effect several fleet rules that require public and certain private fleets to purchase clean-burning alternative-fueled vehicles when adding or replacing vehicles to their vehicle fleets. This project is expected to lead to increased availability of low emission alternative-and conventional-fueled vehicles for fleets as well as consumer purchase.

Proposed Project: Develop and Demonstrate Low Emission Locomotive Technologies and After Treatment Systems

Expected South Coast AQMD Cost: $176,300

Expected Total Cost: $1,000,000

Description of Technology and Application:

This project aims to support the development and demonstration of gaseous and liquid-fueled locomotive engines. With the upcoming revision of locomotive regulations and the plan to establish Tier 5 or cleaner locomotive emission standards, railroads are exploring the possibility of transitioning from diesel to cleaner fuels or installing aftertreatments to the existing locomotives. The railroad is also considering alternative fuels for its potential economic benefit as compared with diesel fuel. The requirements of locomotive engines as primary generators of electricity to power the locomotive poses serious challenges. From an operational standpoint, there is a significant difference between natural gas and diesel energy density, a fuel tender would need to provide sufficient fuel for an acceptable range. Locomotives operate at a specific duty cycle different than conventional on-road engines. The engines often run at low speed and have extended periods of idle time. The durability requirements also surpass other forms of transportation.

Large displacement gaseous fueled engines are still in early stages of commercialization in the U.S., especially in the marine sector. The development of engines and systems to fill this need is currently on-going in the locomotive sector. Engine emissions are expected to be below the current 0.2g/bhp-hr NOx standard. Adaptation of alternative fueled locomotives ,in coordination with required infrastructure improvements by leading manufacturers in the industry, shows great potential for further research and cost savings with fewer maintenance costs and better reliability. Depending on the type of combustion strategy, aftertreatments are likely needed to achieve Tier 4 or cleaner emission standards. Urea-based selective catalytic reduction (SCR) or exhaust gas recirculation (EGR) can be used to reduce NOx emissions and methane slip. Similar low and zero carbon fueled engines could migrate as a retrofit option.

Potential Air Quality Benefits:

The Draft 2022 AQMP identifies the use of low emissions technologies for locomotives where zero emission technologies are not yet commercially available. This project is expected to reduce emissions of around 97 tons per year of NOx per locomotive. The reduction of PM and GHG emissions also show great potential mitigation in environmental justice communities.

RNG Fueling Infrastructure (Renewable Natural Gas/Renewable Fuels)

Proposed Project: Demonstrate Near-Zero Emission Hybrid and Hydrogen ICE Vehicles in Various Applications

Expected South Coast AQMD Cost: $0

Expected Total Cost: $0

Description of Technology and Application:

Natural gas vehicles (NGVs) have been very successful in reducing emissions in the Basin due to the deployment by fleet owners and operators of HD vehicles utilizing this fuel. Currently, an increasing number of on-road HD natural gas engines are being certified to CARB's optional low-NOx standards which are significantly lower in NOx emissions than the current on-road HD standard. This technology category seeks to support the expansion of OEMs producing engines or systems certified to the lowest optional NOx standard or near-zero emission and useable in a wide variety of MD and HD applications, including Class 6 vehicles such as school buses and in passenger and goods delivery vans, Class 7 vehicles such as transit buses, waste haulers, street sweepers, sewer-vector trucks, dump trucks, concrete mixers, commercial box trucks, Class 8 tractors used in goods movement and drayage operations, and off-road equipment such as construction vehicles and yard hostlers. This category can also include advancing engine technologies to improve engine efficiencies that will help attract HD vehicle consumers to NGVs. Under Engine Systems, South Coast AQMD supports efforts for development of high-powered NGVs to support long-haul applications. Increasing natural gas engine availability for the full range of applications would increase NGV deployment in long-haul applications where diesel engines have been the only feasible option.

Potential Air Quality Benefits:

NGVs have inherently lower engine criteria pollutant emissions relative to conventionally fueled vehicles, especially older diesel-powered vehicles. Recently, on-road HD engines have been certified to near-zero emission levels that are 90% lower in NOx than the current on-road HDV standard. California's On-Road Truck and Bus Regulation requires all on-road HDVs to meet the current standard by January 1, 2023. The deployment of near-zero emission vehicles would significantly further emission reductions relative to the state's current regulatory requirements. Incentivizing the development and demonstration of near-zero emission NGVs in private and public fleets, goods movement applications, and transit buses will help reduce local emissions and emissions exposure to nearby residents. NGVs can also have lower GHG emissions and increase energy diversity, help address national energy security objectives, and reduce biomass waste produced from such feedstocks. Deployment of additional NGVs is consistent with the Draft 2022 AQMP goal to reduce criteria pollutants. When fueled by RNG, it supports California's objectives of reducing GHGs and carbon intensity of the state's transportation fuel supply, as well as the federal government's objective of increasing domestically produced alternative transportation fuels.

Proposed Project: Develop, Maintain & Expand Renewable Fuel Infrastructure

Expected South Coast AQMD Cost: $200,000

Expected Total Cost: $2,100,000

Description of Technology and Application:

This project supports the development, maintenance and expansion of natural gas fueling infrastructure in strategic locations throughout the Basin, including the Ports, and advancing technologies and station design to improve fueling and fueling efficiencies of HD NGVs. This category supports broader deployment of near-zero emission HD vehicles and implementation of South Coast AQMD's fleet rules. In addition, as natural gas fueling infrastructure begins to age or has been placed in demanding usage, components will deteriorate. This project offers facilities the opportunity to replace worn-out equipment or to upgrade existing fueling and/or garage and maintenance equipment to provide increased fueling capacity to public agencies, private fleets and school districts.

Potential Air Quality Benefits:

The Draft 2022 AQMP identifies the use of alternative clean fuels in mobile sources as a key attainment strategy. HD NGVs have significantly lower emissions than their diesel counterparts and represent one of the cleanest ICE-powered vehicles available today. The project has the potential to significantly reduce the installation and operating costs of NGV fueling infrastructure and improve vehicle fueling times through improved fueling system designs and high-flow nozzles. New or improved NGV infrastructure helps facilitate near-zero emission NGVs in private and public fleets. It is expected that the lower fuel cost of natural gas relative to diesel and added financial incentives of RNG under the state's Low Carbon Fuel Standard (LCFS) program attract fleets and consumers to this technology. Increased exposure and fleet and consumer acceptance of NGVs will lead to significant and direct reductions in NOx, VOC, CO, PM and toxic compound mobile source emissions. Such increased penetration of NGVs will provide direct emission reductions of NOx, VOC, CO, PM and air toxic compounds throughout the Basin.

Proposed Project: Demonstrate Renewable Transportation Fuel Manufacturing and Distribution Technologies

Expected South Coast AQMD Cost: $0

Expected Total Cost: $0

Description of Technology and Application:

The transportation sector represents a significant source of criteria pollution in the Basin. Clean, alternative fuel-powered transportation is a necessary component for this region to meet NAAQS. Alternative fuels produced from renewable sources such as waste biomass help further efforts associated with landfill and waste diversion, GHG reduction, energy diversity and petroleum dependency. Locally produced renewable fuels further reduce concerns associated with out-of-state production and transmission of fuel and help support the local economy. Renewable fuels recognized as a transportation fuel under the state's LCFS program and the federal government's Renewable Fuel Standard program can provide financial incentives, including reduced fuel price and operational costs, which act as incentives to purchase and deploy alternative or renewable energy powered vehicles.

This project category will consider development and demonstration of technologies for the production and use of renewable transportation fuels such as RNG, renewable diesel (RD), and renewable hydrogen (RH). These renewable fuels can be converted from various waste biomass feed stocks, including municipal solid wastes, green waste, and biosolids produced at wastewater treatment facilities generated from anaerobic digestion, gasification, and pyrolysis.

The main objectives of this project are to investigate, develop and demonstrate:

- commercially viable methods for converting renewable feed stocks into CNG, LNG, hydrogen or diesel (e.g., production from biomass);
- economic small-scale natural gas liquefaction technologies;
- utilization of various gaseous feed stocks locally available;
- commercialize incentives for fleets to site, install and use RNG refueling facilities; and
- pipeline interconnection in the local gas grid to supply users.

Potential Air Quality Benefits:

The Draft 2022 AQMP relies on a significant increase in the penetration of zero and near-zero emission vehicles in the Basin to attain the NAAQS by 2037. This project would help develop renewable transportation fuel production and distribution facilities to improve local production and use of renewable fuels to help reduce transportation costs and losses as well as reduce total operating costs of zero and near-zero emission vehicles to be competitive with comparable diesel fueled vehicles. Such advances in production and use are expected to lead to greater infrastructure development. Additionally, this project could support the state's goal of redirecting biomass waste for local fuel production and reduce GHGs associated with these waste biomass feedstocks.

Stationary Clean Fuel Technologies

Proposed Project: Develop and Demonstrate Microgrids with Photovoltaic/Fuel Cell/Battery Storage/EV Chargers and Energy Management

Expected South Coast AQMD Cost: $1,000,000

Expected Total Cost: $4,000,000

Description of Technology and Application:

CARB has proposed the Advanced Clean Truck Regulation which is part of a holistic approach to accelerate a large-scale transition of zero emission MD and HD vehicles from Class 2B to Class 8. Manufacturers who certify Class 2B-8 chassis or complete vehicles with combustion engines would be required to sell zero emission trucks as an increasing percentage of their annual California sales from 2024 to 2030. By 2030, zero emission truck/chassis sales would need to be 50% of Class 4–8 straight trucks sales and 15% of all other truck sales.

The commercialization of zero emission HD trucks is currently under way with two of the largest manufacturers offering commercial products in California. Both Daimler and Volvo obtained CARB certification of their Class 6 and/or 8 battery electric trucks in 2020, with these trucks eligible for HVIP and other incentives and commercially available for sale. South Coast AQMD also received $16M in CARB and $11M in CEC funding, as well as $34M in co-funding from project partners for the deployment of 100 Daimler and Volvo Class 8 battery electric trucks, solar, and energy storage for the JETSI Pilot Project for drayage and regional haul applications. Ever larger deployments of zero emission trucks will be needed for the technology to have an impact on air quality.

Large deployments of zero emission Class 8 battery electric trucks (BETs) each carrying 300+ kWh of battery-stored energy or fuel cell trucks (FCTs) carrying 30-50 kg of hydrogen will require costly infrastructure that creates a barrier for some fleets to adopt zero emission technologies. Many fleet operators lease their facilities making the capital expenditure of EV or hydrogen infrastructure impossible to recoup in a short period of time. In order to comply with existing and upcoming regulatory requirements, fleets are having to navigate challenges in installing and maintaining charging and/or fueling infrastructure. Microgrids can be instrumental in meeting the challenge of providing large amounts of energy cost-effectively for EV charging or hydrogen generation to support zero emission vehicle charging and fueling. Additionally, if the microgrid equipment is owned by a third party and energy is sold to the fleet through a power purchase agreement, the financial challenge of large capital investment can be avoided by the fleets.

A microgrid is a group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid. A microgrid can connect and disconnect from the grid to enable it to operate in both grid-connected and island-mode. Microgrids can work synergistically with the utility grid to provide power for zero emission vehicle fueling by managing when energy from the grid is used–during off-peak hours when it is the least expensive. Then during peak demand periods, the microgrid would use energy from battery storage or onsite generation. Most technologies that make up microgrids include photovoltaic, fuel cells, battery storage, along with hardware and software for the energy management system (EMS). When grid service is interrupted, the microgrid can disconnect from and continue to operate as an energy island independent from the grid. Having assurance of an uninterrupted power source is an important consideration for fleets. If the microgrid is connected to the fleet's logistics and telematics systems, additional benefits in terms of infrastructure cost and battery life for BETs can be realized. If the EMS is fed information on the route a truck is planning to travel, it can charge the vehicle with enough energy for the trip so the truck will operate within the desired 20-80% state of charge (SOC) of the battery having the least amount of impact to battery life. Additionally,

if the EMS is connected to the logistics system, it can plan charging schedules with 150 kW or lower power chargers which will have less impact on battery life than 350+ kW chargers and lower charging costs.

Electricity demand of electric and fuel cell HD trucks is substantial. For a 100-vehicle fleet of BETs with 300 kWh batteries, this would require 30 MW hours/day of energy. For a 100-vehicle fleet of FCTs the hydrogen requirement is 2,000 kg/day. Microgrids can provide energy for EV and hydrogen infrastructure to enable large zero emission vehicle deployments and make charging and fueling economical and reliable. Staff has demonstrated several microgrid projects with University of California Irvine and has toured the microgrid at University of California San Diego. Currently, several pilot projects are being discussed with microgrid developers and fleets that involve various configurations of microgrid technologies and different business models. Proposed projects would include development and demonstration of microgrids utilizing various types of renewable and zero emitting onsite generation (fuel cell tri-generation, power to gas, photovoltaic, wind), energy storage, connectivity to logistics systems, vehicle-to-grid and vehicle-to-building technologies. Projects that demonstrate different business models will be considered, such as projects involving a separate entity owning some or all the microgrid equipment and engaging in a power purchase agreement to provide energy to fleets transitioning to zero emission trucks. Proposed projects would partner with truck OEMs and their major customers, such as large- and medium-sized fleets looking at microgrid solutions for their operations in the Basin.

Potential Air Quality Benefits:

Microgrids can provide grid resilience and potentially support large deployments of zero emission MD and HD trucks that are necessary to meet the AQMP target of 83 percent NOx emission reductions from the 2018 level and 67 percent additional reductions in 2037 beyond already adopted regulations and programs by 2037. Both renewable and zero emitting power generation technologies that make up a microgrid can provide a well-to-wheel zero emission pathway for transporting goods. Projects could potentially reduce a significant class of NOx and CO emissions in excess of the assumptions in the Draft 2022 AQMP and further enhance South Coast AQMD's ability to enforce full-time compliance.

Proposed Project: Develop and Demonstrate Zero or Near-Zero Emission Energy Generation Alternatives

Expected South Coast AQMD Cost: $200,000

Expected Total Cost: $1,000,000

Description of Technology and Application:

The objective of this project is to support development and demonstration of clean energy, renewable alternatives in stationary applications. The technologies to be considered include thermal, photovoltaic and other solar energy technologies; wind energy systems; energy storage potentially including vehicle to grid or vehicle to building functionalities for alternative energy storage; biomass conversion; and other renewable energy and recycling technologies. Innovative solar technologies, such as solar thermal air conditioning and photovoltaic-integrated roof shingles, are of particular interest. Also, in the agricultural sections of the Basin, wind technologies could potentially be applied to drive large electric motor-driven pumps to replace highly polluting diesel pumps. Besides renewable technologies, electrolyzer technology could be used to generate hydrogen as a clean fuel. Hydrogen, when used in ICEs, can potentially reduce tail-pipe emissions of NOx, while in fuel cells emissions are reduced to zero.

This project is expected to result in pilot-scale production demonstrations, scale-up process design and cost analysis, overall environmental impact analysis and projections for ultimate clean fuel costs and availability. This project is expected to result in several projects addressing technological advancements in these technologies that may improve performance and efficiency, potentially reduce capital and operating costs, enhance the quality of natural gas generated from renewable sources for injection into natural gas pipelines, improve reliability and identify markets that could expedite implementation of successful technologies.

Potential Air Quality Benefits:

The Draft 2022 AQMP identifies that the development and implementation of non-polluting power generation could gain maximum air quality benefits. Polluting fossil fuel-fired electric power generation needs to be replaced with clean, renewable energy resources or other advanced zero emission technologies, such as hydrogen fuel cells, particularly in a distributed generation context to help provide grid resiliency as the transportation sector becomes more reliant on electricity.

This project is expected to accelerate implementation of advanced zero emission energy sources. Expected benefits include directly reducing emissions by displacement of fossil generation; proof-of-concept and potential viability for zero emission power generation systems; increased exposure and user acceptance of the new technology; reduced fossil fuel usage; and potential for increased use, once successfully demonstrated, with resulting emission benefits, through expedited implementation. These technologies would also have a substantial influence in reducing GHG emissions.

Fuel and Emissions Studies

Proposed Project: Conduct In-Use Emission Studies for Advanced Technology Vehicle Demonstrations

Expected South Coast AQMD Cost: $500,000

Expected Total Cost: $2,000,000

Description of Technology and Application:

Hybrid electric, hybrid hydraulic, plug-in electric hybrid and battery-electric and fuel cell electric vehicles will all play a role in the future of transportation. Each of these transportation technologies has attributes that could provide unique benefits to different transportation sectors. Identifying optimal placement of each transportation technology will provide the co-benefits of maximizing environmental benefit and return on investment.

South Coast AQMD has been supporting rapid deployment of near-zero emission natural gas technologies since the first HD engine became commercially available in 2015. As more near-zero emission natural gas, propane and other alternative fuel technologies penetrate different segments, in-use assessment of real-world benefit is needed especially as CARB and USEPA have introduced a new in-use testing metric.

The CARB EMFAC 2017 model that the Draft 2022 AQMP is based on uses emissions data from in-use emissions studies for calculating emission factors for HD trucks rather than certification data which has a relatively limited data set for alternative fuel vehicles. For the recently released EMFAC 2021, more complete natural gas engine modules have been included for the first time with emissions data gathered from the currently funded South Coast AQMD in-use emissions characterization effort. CARB and USEPA low-NOx regulations focus on addressing the gap of in-use and certification values by introducing a new methodology that includes emissions from all operations. While staff expects the in-use emissions from new engines to perform closer to certification values, there is still a significant population of the MY 2010+ legacy fleet expected to remain in service well into the 2030s. There is always a need to better assess real world truck emissions, fuel economy, and activity from engines, hybrid powertrain and zero emission technologies for continued technology improvements and verification of emission reductions.

Environmental benefits for each technology class are duty-cycle and application specific. Identifying attributes of a specific application or drive cycle that would take best advantage of a specific transportation technology would speed adoption and make optimal use of financial resources in the demonstration and deployment of a technology. Adoption rates would be accelerated since intelligent deployment of a certain technology would ensure that a high percentage of demonstration vehicles showed positive results, which would spur adoption of this technology in similar applications, as opposed to negative results derailing further development or deployment of a certain technology.

This project would review and potentially coordinate application specific drive cycles for specific applications. Potential emission reductions and fossil fuel displacement for each technology in a specific application would be quantified on a full-cycle basis. This information could be used to develop a theoretical database of potential environmental benefits of different transportation technologies when deployed in specific applications. This duty-cycle requirement, often based on traditional vehicles, is used for planning purposes for building MD and HD public fueling stations. Furthermore, some of the standardized test cycles, like the chassis dyno based cycle, can be used to evaluate efficiency of zero-emissions vehicles and direct comparisons with diesel and natural gas vehicles.

Another project would be characterization of intermediate volatility organic compound (IVOC) emissions, which is critical in assessing ozone and secondary organic aerosol (SOA) precursor production rates. Diesel

vehicle exhaust and unburned diesel fuel are major sources and contribute to formation of urban ozone and SOA, which is an important component of PM2.5. NGVs are also a concern due to lack of particulate filters, however the actual impact based on current and projected vehicle populations needs to be further studied.

While early developments in autonomous and vehicle-to-vehicle controls are focused on LD vehicles, early application of this technology to HD, drayage and container transport technologies is more likely. Impacts on efficiency and emissions could be substantial. A project to examine this technology to assess its effect on goods movement and emissions associated with goods movement could be beneficial at this time.

Potential Air Quality Benefits:

Development of an emissions reduction database for various application specific transportation technologies would assist in targeted deployment of new transportation technologies. This database coupled with application specific vehicle miles traveled and population data would assist in intelligently deploying advanced technology vehicles to attain the maximum environmental benefit. These two data streams would allow vehicle technologies to be matched to an application that is best suited to the specific technology, as well as selecting applications that are substantial enough to provide significant environmental benefits. Demonstration of a quantifiable reduction in operating cost through intelligent deployment of vehicles will also accelerate commercial adoption of various technologies. Accelerated adoption of lower emitting vehicles will further assist goals in the Draft 2022 AQMP.

Proposed Project: Conduct Emission Studies on Biofuels, Alternative Fuels and Other Related Environmental Impacts

Expected South Coast AQMD Cost: $400,000

Expected Total Cost: $1,500,000

Description of Technology and Application:

The use of renewable fuels such as biofuels can be an important strategy to reduce petroleum dependency, air pollution and greenhouse gas emissions and help with California's aggressive GHG reduction goals. Biofuels are receiving increased attention due to national support and state activities resulting from SB 32, AB 1007 and the Low-Carbon Fuel Standard. With an anticipated increase in renewable fuel use, it is the objective of this project to further analyze these fuels to better understand their benefits and impacts not only on GHGs but also air pollution and associated health effects.

In various diesel engine studies, replacement of petroleum diesel fuel with renewable fuel has demonstrated reduced PM, CO and air toxics emissions. Renewable fuel also has the potential to reduce GHG emissions if made from renewable feedstocks such as soy and canola. However, certain blends of biodiesel can increase NOx emissions for some engines and duty cycles, which exacerbates ozone and PM2.5 challenges faced in the Basin. In addition, despite recent advancements in toxicological research in the air pollution field, the relationship between biodiesel particle composition and associated health effects is still not completely understood.

Ethanol is another biofuel that is gaining increased national media and state regulatory attention. CARB's reformulated gasoline regulation increases ethanol content to 10% as a means to increase the amount of renewable fuels in the state. As in the case of biodiesel, ethanol has demonstrated in various emission studies to reduce PM, CO and toxic emissions. However, the relationship between particle composition and associated health effects from the combustion of ethanol is not well understood either. In 2019, USEPA approved 15% ethanol (E15) blends for year-round use and CARB, along with South Coast AQMD and other agencies, launched an emissions study of E15 to assess the emissions impact of the current fleet of California light duty vehicles. South Coast AQMD also has been monitoring efforts in using ethanol as a primary fuel for MD and HD applications in optimized engine systems that allows both criteria and GHG reductions which could be another pathway for reducing emissions due to abundance of ethanol from the light duty sector.

CARB recently proposed a regulation on commercialization of alternative diesel fuels, including biodiesel and renewable diesel, while noting that biodiesel in older HD vehicles can increase NOx. The need for emerging alternative diesel fuels for HD trucks and transit buses is also being studied. Researchers have proposed evaluating the emissions impact of RNG and other natural gas blends such as renewable hydrogen or pure hydrogen.

To address these concerns on potential health effects associated with biofuels, namely biodiesel and ethanol blends, this project will investigate physical and chemical composition and associated health effects of tailpipe PM emissions from LD to HD vehicles burning biofuels to ensure public health is not adversely impacted by broader use of these fuels. This project also supports future studies to identify mitigation measures to reduce NOx emissions from biofuels. Additionally, a study of well-to-wheel emissions from for the extraction and use of shale gas might be considered.

The Power-to-Gas concept has renewed interest in hydrogen-fossil fuel blends, and its emissions impact on the latest ICE technologies needs to be reassessed. Hydrogen fueled ICEs were studied heavily in the early 2000s and results have shown significant possible criteria emission reductions with optimized engine

calibration. Since then, ICE technologies have been fitted with advanced aftertreatment technologies to allow engines to be certified to today's lower NOx standards. Therefore, emissions impact assessment is needed on the latest ICE technologies.

In an effort to evaluate contribution of meteorological factors to high ozone and PM2.5 episodes occurring in the Basin, mainly as a result of higher summer temperatures and increased air stagnation following droughts, a comprehensive study is necessary to evaluate trends of meteorological factors that may adversely impact air quality in the Basin. The study will assist in better understanding potential impact of recent weather trends on criteria pollutant emissions and developing more effective strategies for improving air quality in the future.

Potential Air Quality Benefits:

If renewable diesel, biodiesel and biodiesel blends can be demonstrated to reduce air pollutant emissions with the ability to mitigate NOx impacts, this technology will become a viable strategy in meeting air pollutant standards as well as the goals of SB 32 and the Low-Carbon Fuel Standard. The use of biodiesel is an important effort for a sustainable energy future. Emission studies are critical to understanding emission benefits and any tradeoffs (NOx impacts) that may result from using this alternative fuel. With reliable information on the emissions from using biodiesel and biodiesel blends, this can ensure the use of biodiesel without creating additional NOx emissions. Additionally, understanding meteorological factors on criteria pollutant emissions may help identify mitigation strategies, possibly through targeted advanced transportation deployment.

Proposed Project: Identify and Demonstrate In-Use Fleet Emission Reduction Technologies and Opportunities

Expected South Coast AQMD Cost: $400,000

Expected Total Cost: $1,500,000

Description of Technology and Application:

New technologies, such as alternative fueled HD engines, are extremely effective at reducing emissions because they are designed to meet the most stringent emissions standards while maintaining vehicle performance. In addition, many new vehicles are now equipped with telematics enabling motorists to obtain transportation information such as road conditions to avoid excessive idling and track information about vehicle maintenance needs, repair history, tire pressure and fuel economy. Telematics have been shown to reduce emissions from new vehicles through various vehicle usage optimization strategies. Unfortunately, many in-use fleets lack telematic systems, particularly HD engines in trucks, buses, construction equipment, locomotives, commercial harbor craft and cargo handling equipment, and have fairly long working lifetimes (up to 20 years due to remanufacturing in some cases). Even LD vehicles routinely have lifetimes exceeding 200,000 miles and 10 years. The in-use fleet, especially the oldest vehicles, are responsible for the majority of emissions. In the last few years, real-time emissions and fuel economy data reporting along with telematics has been demonstrated with large fleets as fleet management tools to identify high emitters and increase operational efficiency. Similar efforts have already been proposed by CARB as part of the HD I/M regulation. Moreover, the same telematic systems are being installed on zero emission trucks where fleet and charging management are important. Cloud based fleet management concepts are being proposed by researchers to maximize range and air quality benefits of zero emission trucks.

This project category is to investigate near-term emission control technologies that can be cost-effectively applied to reduce emissions from the in-use fleet. The first part of the project is to identify and conduct proof-of-concept demonstrations of feasible candidate technologies, such as:

- remote sensing for HD vehicles including license plate recognition systems;
- annual testing for high mileage vehicles (>100,000 miles);
- replace or upgrade emission control systems at 100,000-mile intervals;
- on-board emission diagnostics with remote notification;
- low-cost test equipment for monitoring and identifying high emitters;
- test cycle development for different class vehicles (e.g. four-wheel drive SUVs);
- electrical auxiliary power unit replacements;
- development, deployment and demonstration of smart vehicle telematic systems;
- fleet and charger management concepts; and
- low cost NOx sensor development.

Potential Air Quality Benefits:

Many of the technologies identified can be applied to LD and HD vehicles to identify and subsequently remedy high-emitting vehicles in the current fleet inventory. Estimates suggest that 5 percent of existing fleets account for up to 80 percent of the emissions. Identification of higher emitting vehicles would assist with demand-side strategies, where higher emitting vehicles have correspondingly higher registration charges. Identification and replacement of high-emitting vehicles has been identified in the Community

Emission Reduction Plans (CERPs) from multiple AB 617 communities as a high priority for residents living in these communities, particularly as HD trucks frequently travel on residential streets to bypass traffic on freeways surrounding these disadvantaged communities.

Emission Control Technologies

Proposed Project: Develop and Demonstrate Advanced Aftertreatment Technologies for On-Highway

Expected South Coast AQMD Cost: $250,000

Expected Total Cost: $1,000,000

Description of Technology and Application:

There are several aftertreatment technologies which have shown substantial emission reductions in diesel engines. These technologies include zoned catalyst soot filters, early light -off catalysts, dual SCR systems, pre-NOx absorbers, and ammonia slip catalysts. Additional heating technologies enabled by availability of a 48 volt battery system or plug-in hybrid system can be used to keep desired catalyst temperatures using heated dosing and heated catalysts which are part of the complete aftertreatment system design for near-zero emission NOx engines. This project category is to develop and demonstrate these aftertreatment technologies alone or in tandem with an alternative fuel to produce the lowest possible PM, ultrafine PM, nanoparticles, NOx, CO, carbonyl and hydrocarbon emissions in retrofit and new applications. With increasing focus on zero and near-zero emission goods movement technologies, this category should examine idle reduction concepts and technologies that can be employed at Ports and airports. The proposed Clean Truck Initiative by USEPA as well as the adopted CARB Omnibus Regulation will require aftertreatment systems to maintain certification levels to a much longer useful life via new in-use testing performance metrics. Technology durability and in-use performance will need to be further studied.

Possible projects include advancing technologies for on-road truck demonstrations beyond lab based testing, retrofit applications such as HD line-haul and other large displacement diesel engines, street sweepers, and waste haulers. Applications for off-road may include construction equipment, yard hostlers, gantry cranes, locomotives, commercial harbor craft, ground support equipment and other similar industrial applications. Potential fuels to be considered in tandem are low-sulfur diesel, emulsified diesel, biodiesel, gas-to-liquids, hydrogen and natural gas. This project category will also explore performance, economic feasibility, viability (reliability, maintainability and durability) and ease-of-use to ensure a pathway to commercialization.

Potential Air Quality Benefits:

Transfer of mature emission control technologies, such as DPFs and oxidation catalysts, to the off-road sector is a potentially low-risk endeavor that can have immediate emission reductions. Further development and demonstration of other technologies, such as early light –off SCR and heated dosing, could also have NOx reductions of up to 90%.

Proposed Project: Develop Methodology and Evaluate and Demonstrate Onboard Sensors for On-Road HD Vehicles

Expected South Coast AQMD Cost: $250,000

Expected Total Cost: $1,000,000

Description of Technology and Application:

New HD on-road vehicles represent one of the largest categories in the NOx emissions inventory in the Basin. The Draft 2022 AQMP identifies that 83 percent NOx emission reductions from the 2018 level and 67 percent additional reductions beyond already adopted regulations and programs are necessary to meet the 2015 8-hour ozone standard by 2037. Previous in-use emission studies, including studies funded by the South Coast AQMD, have shown significantly higher NOx emissions from on-road HD vehicles than the certification limit under certain in-use operations, such as low power duty cycles. In CARB's adopted HD On-Road "Omnibus" Low NOx regulation, in addition to the lower certification values, there is a low load test cycle and revisions to the not-to-exceed compliance tests. NOx sensor data reporting is also introduced where the vehicle computer is required to store a past period of emissions data to ensure real-world emission reductions are realized over various duty cycles, especially those low power duty cycles in urban areas. An alternative proposed new methodology is to continuously measure real-time emissions from trucks with onboard sensors. Both industry, government and regulators are looking to use sensors to better monitor emissions compliance and leverage the real-time data from sensors to enable advances concepts such as geofencing. CARB's newly adopted HD I/M rules addresses in-use emissions from the older legacy fleets and also has onboard sensors as one of the emission testing methods.

This project category is to investigate near term and long-term benefits from onboard sensors to understand in-use emissions better and reduce emissions from the advanced management concept. The first part of the project is to identify and conduct proof-of-concept demonstrations of feasible candidate technologies, such as:

- laboratory evaluation/verification of new and baseline sensors;
- development and evaluation of next generation sensors;
- development of algorithms to extract sensor information into mass-based metric;
- demonstrate feasibility to monitor emissions compliance using sensors;
- identify low cost option for cost and benefit analysis;
- demonstrate sensors on natural gas and other mobile sources such as LD, off-highway and commercial harbor craft; and
- development, deployment and demonstration of smart energy/emissions management systems.

Potential Air Quality Benefits:

The proposed research projects will assist the trucking industry to monitor emissions, using sensors as one of the design platform options and identify freight routes which result in lower emissions. Reduction of NOx and PM emissions from mobile sources is imperative for the Basin to achieve NAAQS and protect public health.

Proposed Project: Demonstrate On-Road Technologies in Off-Road and Retrofit Applications

Expected South Coast AQMD Cost: $176,300

Expected Total Cost: $800,000

Description of Technology and Application:

On-road HD engines have demonstrated progress in meeting increasingly stringent federal and state requirements. New HD engines have progressed from 2 g/bhp-hr NOx in 2004 to 0.2 g/bhp-hr NOx in 2010, which is an order of magnitude decrease in just six years. Off-road engines, however, have considerably higher emissions limits depending on engine size. For example, Tier 3 standards for HD engines require only 3 g/bhp-hr NOx. There are apparent opportunities to implement cleaner on-road technologies in off-road applications. There is also an opportunity to replace existing engines in both on-road and off-road applications with the cleanest available technology. Current regulations don't usually require repowering (engine replacement) or remanufacturing to meet cleaner emission standards as engines are retired. Unfortunately, this does not take advantage of recently developed clean technologies.

Exhaust gas cleanup strategies, such as EGR, SCR, DPF, electrostatic precipitators, baghouses and scrubbers, have been used successfully for many years on stationary sources. The exhaust from the combustion source is routed to the cleaning technology, which typically requires a large footprint for implementation. This large footprint has made installation of such technologies on some mobile sources prohibitive. However, in cases where the mobile source is required to idle for long periods of time, it may be more effective to route emissions from the mobile source to a stationary device to clean the exhaust stream.

Projects in this category will include utilizing proven clean technologies in novel applications, such as:

- demonstrating certified LNG and CNG on-road engines as well as other clean alternative fuels in off-road applications including yard hostlers, locomotives, commercial harbor craft, gantry cranes, waste haulers and construction equipment;
- implementing lower emission engines requirement in repower applications for both on-road and off-road applications; and
- applying stationary best available control technologies, such as EGR, SCR, scrubbers, DPF, baghouses and electrostatic precipitators, to appropriate on- and off-road applications, such as idling locomotives, commercial harbor craft at dock and HD line-haul trucks at weigh stations.

Potential Air Quality Benefits:

Transfer of mature emission control technologies, such as certified engines and SCR, to the off-road and retrofit sectors offers high potential for immediate emission reductions. Further development and demonstration of these technologies will assist in regulatory efforts which could require such technologies and retrofits.

Health Impacts Studies

Proposed Project: Evaluate Ultrafine Particle Health Effects

Expected South Coast AQMD Cost: $88,150

Expected Total Cost: $1,000,000

Description of Technology and Application:

Reducing diesel exhaust from vehicles has become a high priority in the Basin since CARB identified the particulate phase of diesel exhaust as a surrogate for all toxic air contaminants emitted from diesel exhaust. Additionally, health studies indicate that ultrafine particulate matter (UPM) may be more toxic on a per-mass basis than other fractions. Several control technologies have been introduced and others are under development. Recent studies have shown that control technologies applied to mobile sources have been effective in reducing the mass of particulates emitted. However, there is also evidence that UPM on and near roadways has increased, even while the mass of particulates has decreased. To have a better understanding of changes in ultrafine particulate emissions from the application of new technologies and health effects of these emissions, an evaluation and comparison of UPM and potential impacts on community exposure, particularly in disadvantaged communities, is needed.

In this project, measurements and chemical composition of UPM will be done, as well as studies conducted from HD vehicles to measure, evaluate and compare UPM, PAH and other relevant toxic emissions from different types of fuels such as gasoline, CNG, low-sulfur diesel, biofuels and others. This project needs to be closely coordinated with development of technologies for alternative fuels, aftertreatment technologies, and new engine development to determine health benefits of such technologies.

Furthermore, gasoline direct injection (GDI) vehicles are known for higher efficiency and power output but the PM emissions profile is not well understood especially on secondary organic aerosol (SOA) formation potential. As manufacturers introduce more GDI models in the market to meet new fuel economy standards, it is important to understand SOA potential from these vehicles as it could further impact ambient PM concentration in our region. In 2015 a project with UCR CE-CERT to investigate the physical and chemical composition of aerosols from GDI vehicles using a mobile environmental chamber was designed and constructed to characterize secondary emissions. Based on initial results indicating an increase in particle numbers, follow-up in-use studies to assess PM emissions including with and without particle filters will be beneficial. Similar studies should also be conducted on natural gas MD and HD vehicles to understand potential emissions impacts are being considered.

Potential Air Quality Benefits:

The Draft 2022 AQMP for the Basin relies on significant penetration of low emission vehicles to attain federal clean air standards. Reduction of PM emissions from combustion of diesel and other fuels is a major priority in achieving these standards. This project would help to better understand the nature and number of UPM generated by different types of fuels and advanced control technologies as well as provide information on potential health effects of UPM. Such an understanding is important to assess the emission reduction potentials and health benefits of these technologies. In turn, this will have a direct effect on the policy and regulatory actions for commercial implementation of alternative fuel vehicles in the Basin.

Proposed Project: Conduct Monitoring to Assess Environmental Impacts

Expected South Coast AQMD Cost: $132,225

Expected Total Cost: $500,000

Description of Technology and Application:

Facilities, buildings, structures, or highways which attract mobile sources of pollution are considered "indirect" sources. Ambient and saturation air monitoring near sources such as ports, airports, rail yards, freight/logistics distribution centers and freeways is important to identify emissions exposure to surrounding communities and provide data to assess health impacts. This could include the study of indirect sources such as warehouses which are impacted by South Coast AQMD's Indirect Source Regulations. This project category would identify areas of interest and conduct ambient air monitoring, emissions monitoring, analyze data and assess potential health impacts from mobile sources. These projects would need to be at least one year in duration in order to properly assess air quality impacts in surrounding communities.

Potential Air Quality Benefits:

The proposed project will assist in evaluation of adverse public health impacts associated with mobile sources. The information will be useful in (a) determining whether indirect sources have a relatively higher impact on residents living in close proximity, particularly in disadvantaged communities; and (b) providing guidance to develop some area-specific control strategies in the future should it be necessary.

Proposed Project: Assess Sources and Health Impacts of Particulate Matter

Expected South Coast AQMD Cost: $132,225

Expected Total Cost: $300,000

Description of Technology and Application:

Previous studies of ambient levels of toxic air contaminants, such as the MATES studies, have found that diesel exhaust is the major contributor to health risk from air toxics. Analyses of diesel particulate matter (DPM) in ambient samples have been based on measurements of elemental carbon. While the bulk of particulate elemental carbon in the Basin is thought to be from combustion of diesel fuels, it is not a unique tracer for diesel exhaust.

The MATES III study collected particulate samples at ten locations in the Basin. Analysis of particulate bound organic compounds was utilized as tracers to estimate levels of ambient DPM as well as estimate levels of PM from other major sources. Other major sources that were taken into consideration include automobile exhaust, meat charbroiling, road dust, wood smoke and fuel oil combustion. Analyzing for organic compounds and metals in conjunction with elemental carbon upon collected particulate samples was used to determine contributing sources.

MATES IV, completed in 2015, included an air monitoring program and updated emissions inventory of toxic air contaminants. MATES IV also measured UPM concentrations and black carbon at monitoring sites as well as near sources such as airports, freeways, rail yards, busy intersections and freight/logistics warehouse operations.

South Coast AQMD completed MATES V in August 2021 to update the emissions inventory of toxic air contaminants, as well as modeling to characterize risks, including measurements and analysis of ultrafine particle concentrations typically emitted or subsequently formed from vehicle exhaust. Findings from the MATES V report showed that air toxics cancer risk based on modeling data has decreased by about 50% since MATES IV, with average multi-pathway air toxics cancer risk at 454-in-a-million. The highest risk locations are at LAX and the Ports along goods movement and transportation corridors. Diesel PM continues to be the major contributor accounting for over 60% of the overall air toxics cancer risk. For the first time, chronic non-cancer risk was estimated with a chronic hazard index of 5.9 across the 10 stations in the MATES V study.

This project category would include other related factors, such as toxicity assessment based on age, source (HD, LD engines) and composition (semi-volatile or non-volatile fractions) to better understand health effects and potential community exposure, particularly in disadvantaged communities. Additionally, early identification of new health issues could be of considerable value and could be undertaken in this project category.

Potential Air Quality Benefits:

Results of this work will provide a more robust, scientifically sound estimate of ambient levels of DPM as well as levels of PM from other significant combustion sources, including gasoline and diesel generated VOCs. This will allow a better estimation of potential exposure and health effects from toxic air contaminants from diesel exhaust in the Basin. This information in turn can be used to determine health benefits of promoting clean fuel technologies.

Technology Transfer and Outreach

Proposed Project: Assess and Support Advanced Technologies and Disseminate Information

Expected South Coast AQMD Cost: $600,000

Expected Total Cost: $1,000,000

Description of Project:

This project supports assessment of clean fuels and advanced technologies, progress towards commercialization and dissemination of information on demonstrated technologies. The objective of this project is to expedite transfer of technology developed from Technology Advancement Office projects to the public domain, industry, regulatory agencies and the scientific community. This project is a fundamental element in South Coast AQMD's outreach efforts by coordinating activities with other organizations to expedite implementation of advanced engines and clean fuels technologies.

This project may include the following:

- technical review and assessment of technologies, projects and proposals;
- support for alternative and zero emission charging and fueling infrastructure;
- advanced technology curriculum development, mentoring and outreach to local schools;
- emission studies and assessments of near-zero and zero emission alternatives;
- preparation of reports, presentations at conferences, improving public relations and public communications of successful clean technology demonstration projects;
- participation in and coordination of workshops and various meetings;
- support for training programs related to fleet operation, maintenance and fueling of alternative fuel vehicles and equipment;
- publication of technical papers as well as reports and bulletins; and
- dissemination of information, including websites development and updates.

These objectives will be achieved by consulting with industry, scientific, health, medical and regulatory experts and co-sponsoring related conferences and organizations, resulting in multiple contracts. In addition, an ongoing outreach campaign will be conducted to encourage decision-makers to voluntarily switch to alternatively fueled vehicles and train operators to purchase, operate and maintain these vehicles/equipment and associated infrastructure.

Potential Air Quality Benefits:

As the Clean Fuels Program transitions increasingly to zero emission vehicle, equipment and infrastructure technologies, there will continue to be challenges in assisting fleets and others to successfully make this transition. The benefits of highlighting challenges, lessons learned, and success stories in the use of zero emission and near-zero emission vehicles, equipment and infrastructure can expedite acceptance and commercialization of these technologies. The emission reduction benefits will contribute to the goals of the Draft 2022 AQMP.

Proposed Project: Support Implementation of Various Clean Fuels Incentive Programs

Expected South Coast AQMD Cost: $350,000

Expected Total Cost: $400,000

Description of Project:

This project supports implementation of incentive programs, including state and federal grant programs, Carl Moyer, Prop 1B, VW, VIP, CAPP, lower emission school bus, Replace Your Ride, and South Coast AQMD residential EV charger rebate program. Implementation support includes application review, funds allocation, equipment owner reports collection, documentation to CARB, verification of vehicle operation, and other support as needed. Information dissemination is critical to successfully implementing coordinated and comprehensive incentive programs. Outreach will be directed to vehicle OEMs, dealers, individuals and fleets.

Potential Air Quality Benefits:

South Coast AQMD will provide matching funds to implement several key incentive programs to reduce emissions in the Basin. The benefit of highlighting zero emission vehicle, equipment and infrastructure incentives is to expedite acceptance and commercialization of advanced technologies. Future emission reduction benefits will contribute to the goals of the Draft 2022 AQMP. Carl Moyer, Prop 1B, VW, VIP, CAPP, and lower emission school bus incentive programs can reduce large amounts of NOx and PM emissions, and toxic air contaminants in the Basin.

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2023 Plan Update

Back to Agenda

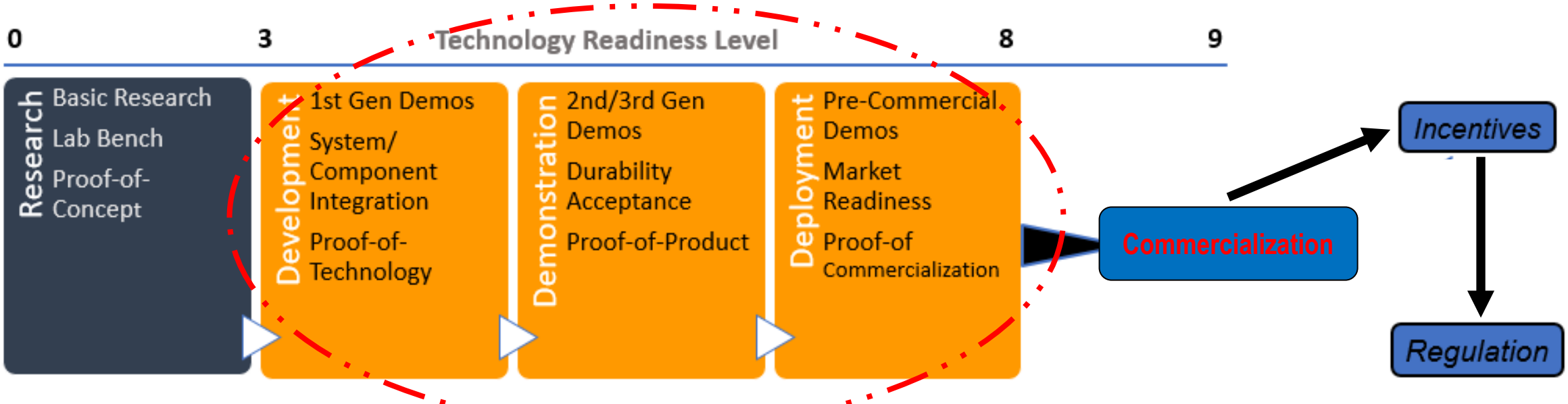
Technology Committee Meeting

October 21, 2022

Sam Cao
Program Supervisor

Clean Fuels Fund Program

- Established in 1988
- $1 fee on DMV registrations ($~12M/year)
- Stationary source fee (~$400k/year)
- Research, develop, demonstrate, and deploy clean technologies
- Revised to reflect technical priorities and proposed project areas

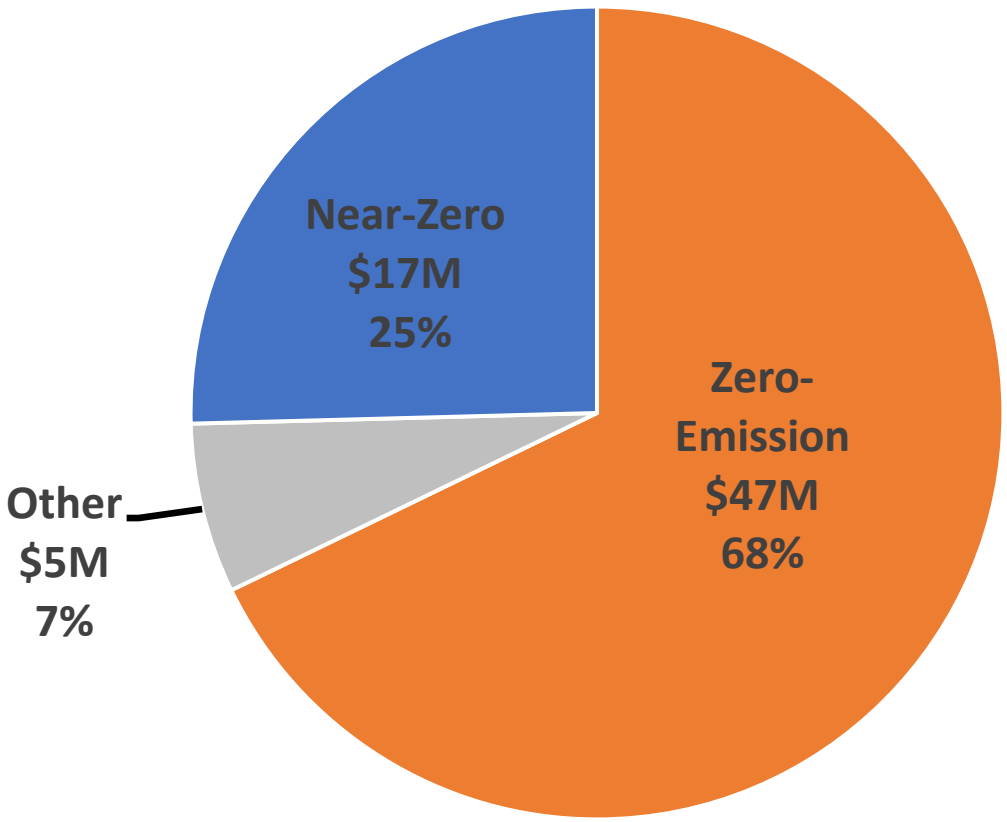


NOx Reductions Needed

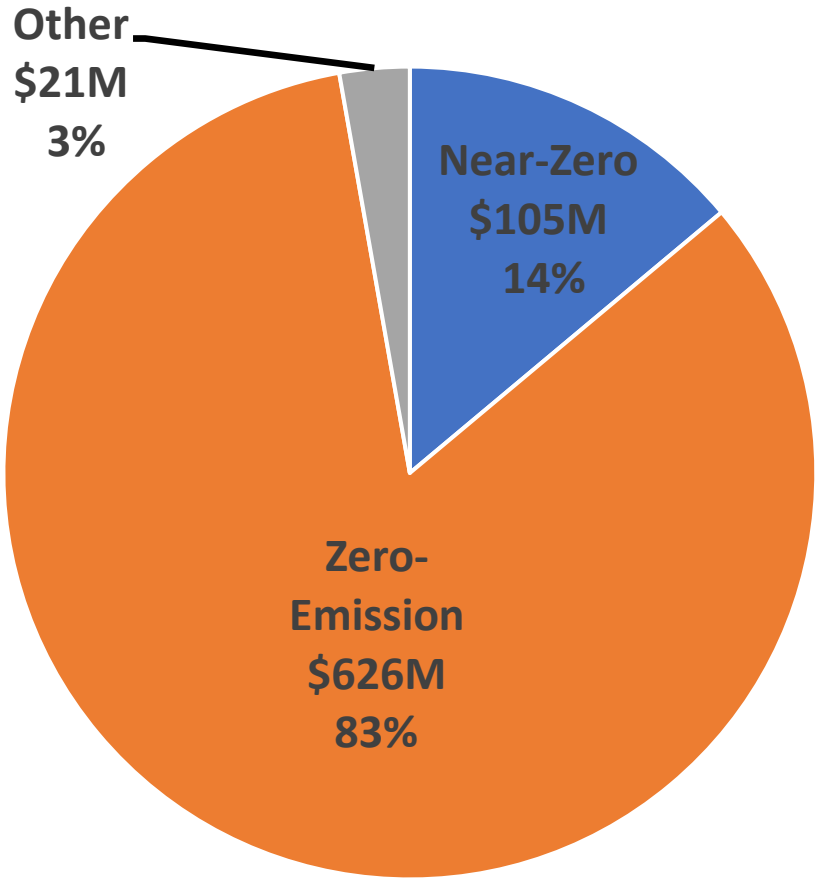
83%

Technology Demonstration Projects Since 2017

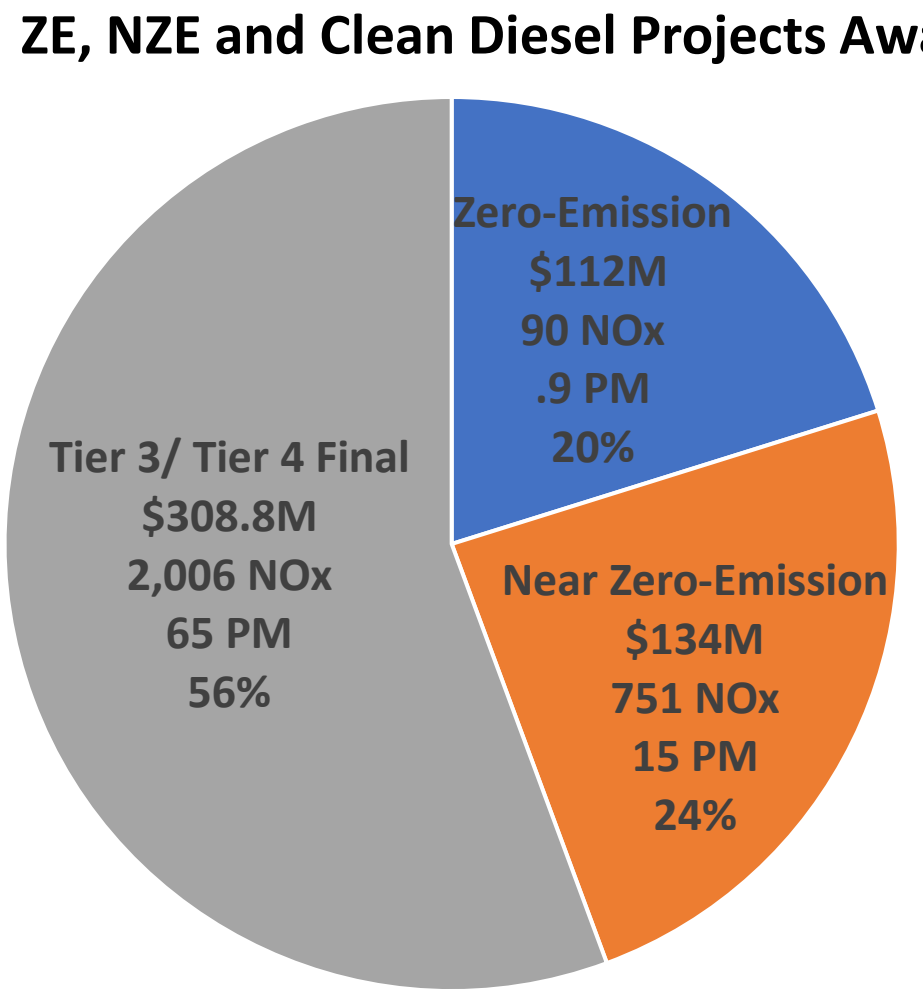
Clean Fuels Funding



Total Project Funding
(including State and Federal Grants)



Zero-Emission, Near Zero-Emission and Clean Diesel Incentive Projects Funded Since 2017



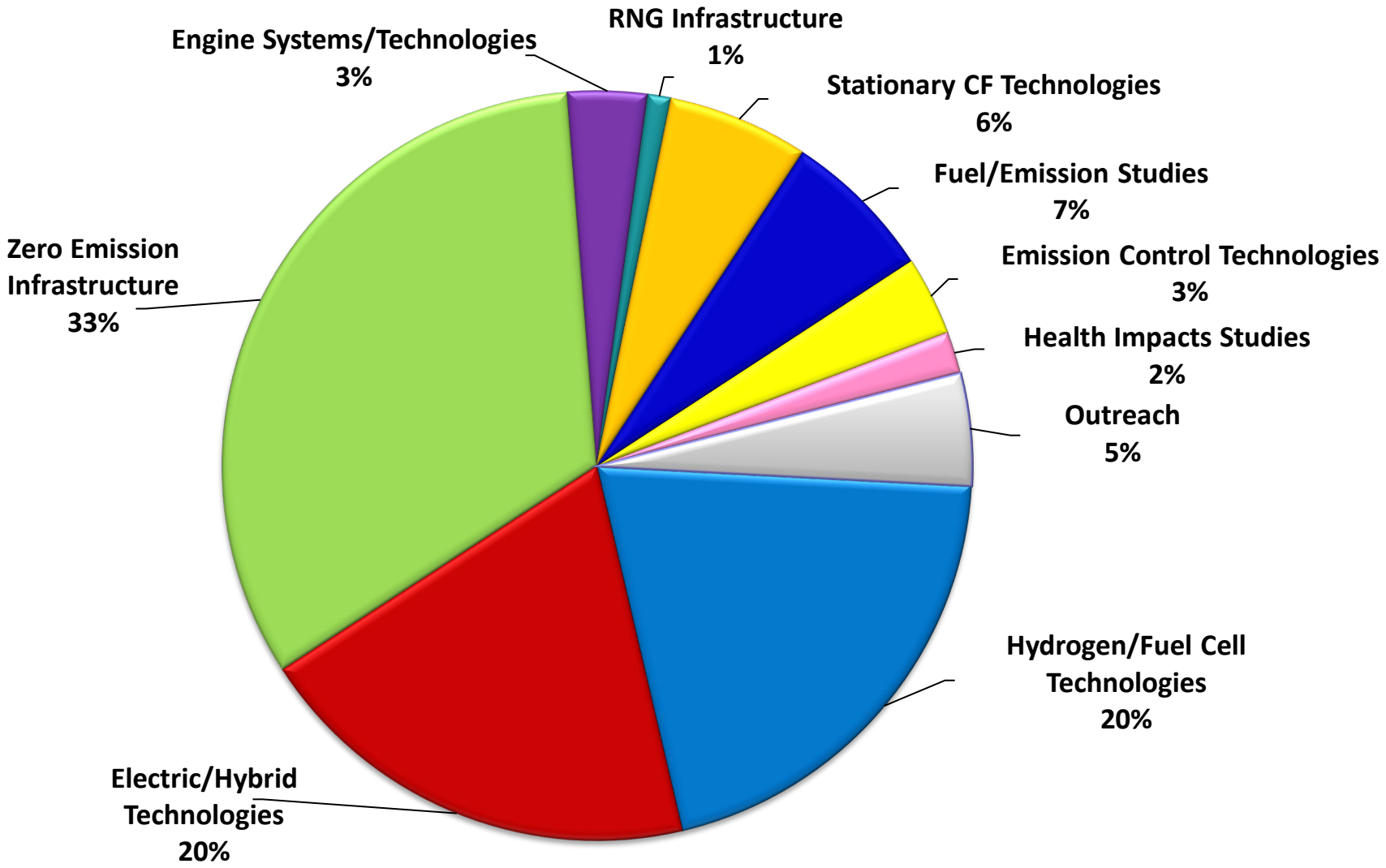
Draft 2023 Plan Update (Key Technical Areas)

- Zero emission medium and heavy-duty trucks and equipment
- Challenges and solutions to deploy zero emission infrastructure
- Zero emission microgrids
- Ultra-low NOx and heavy-duty zero emission engine technologies
- Emission studies on renewable fuels and other sources
- Maintain other areas of emphasis

Draft 2023 Plan Update
Proposed Projects

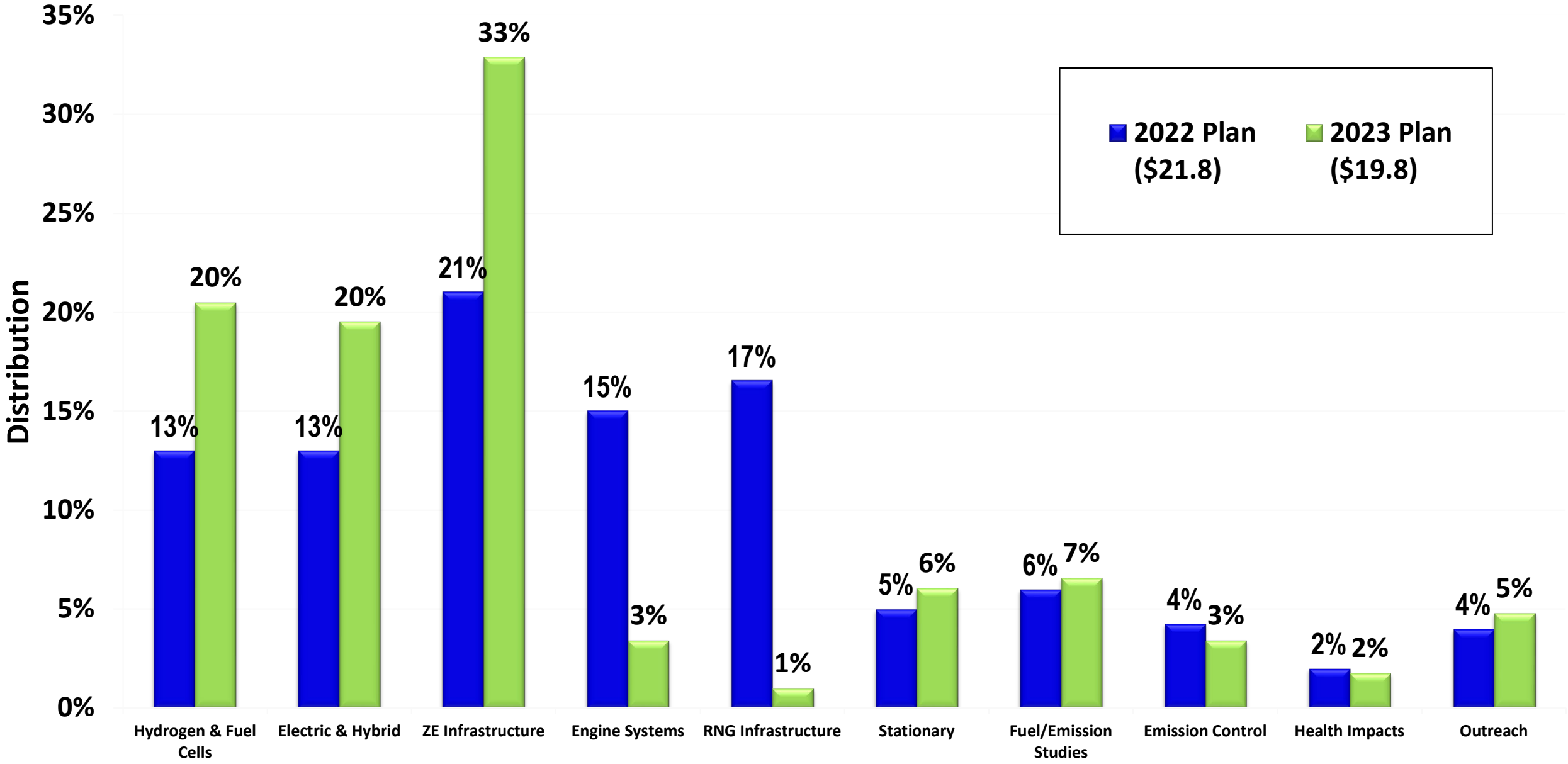
- Large deployments of medium and heavy zero emission trucks and infrastructure
- Microgrid demonstrations to support heavy-duty truck charging and hydrogen fueling
- High-power charging to decrease dwell time of battery electric trucks
- Develop and demonstrate fuel cell electric trucks and equipment
- Develop and demonstrate green hydrogen production pathways

Proposed 2023 Plan Distribution



$19.8M

Plan Update Comparison



Proposed Distribution

	2022 Plan	Draft 2023 Plan
Hydrogen/Fuel Cell Technologies	13%	20%
Electric/Hybrid Technologies	13%	20%
Zero Emission Infrastructure	21%	33%
Engine Systems/Technologies	15%	3%
RNG Infrastructure	17%	1%
Stationary Technologies	5%	6%
Fuel/Emission Studies	6%	7%
Emission Control Technologies	4%	3%
Health Impacts Studies	2%	2%
Outreach	4%	5%
	100%	100%

Next Steps

- Relative changes in funding allocation due to recent and anticipated opportunities with other agencies
- Urgent need to develop, demonstrate and deploy zero emission technologies for HD vehicles and equipment, and infrastructure
- Zero emission for goods movement creates technology pathway for achieving 2037 attainment goals