San Joaquin Valley Air Pollution Control District
AB 617 Community Emission Reduction Program

Zero Emission Yard Truck Replacement Program Plan
South Central Fresno Community
Shafter Community

1. Project Identification

Project Identification: *HD.2: INCENTIVE PROGRAM FOR THE DEPLOYMENT OF CLEAN YARD TRUCKS, TRANSPORT REFRIGERATION UNITS, AND RELATED INFRASTRUCTURE*

This is a Community Identified Project included and prioritized in the California Air Resources Board (CARB) and District adopted South Central Fresno and Shafter Community Emission Reduction Programs (CERP).

This measure will reduce emissions from diesel powered yard trucks and transport refrigeration units operating at warehouses, distribution centers or other facilities within the community by replacing them with zero emission technology.

2. Community Support

This measure received support from both the South Central Fresno and Shafter Community Steering Committees and was included in the adopted Community Emission Reduction Program.

(1) **Name(s) of the community group(s):**
    a. South Central Fresno Steering Committee Map
    b. Shafter Steering Committee Map
(2) **Purpose of community group(s)**
    a. AB617 Community Engagement and Public Input
(3) **Total number of members in the community group(s)**
    a. South Central Fresno – 34 members
    b. Shafter – 27 members
(4) **Date(s) of formation/establishment**
    a. South Central Fresno – December 2018
    b. Shafter – December 2018
(5) **A description of the decision-making process must be included.**
    a. South Central Fresno Steering Committee Charter
    b. Shafter Steering Committee Charter
(6) **Community Support Demonstration**
    a. South Central Fresno CERP
    b. Shafter CERP

This measure will be discussed at Community Steering Committee meetings in addition to outreach activities to inform residents of the program and requirements for participation.

3. Participant Requirements

(A) Yard Truck Program Eligibility

The Heavy-Duty Yard Truck Replacement Program guidelines are attached to this program plan as Exhibit A. In implementing this CERP measure, the District will follow existing program guidelines and eligibility criteria. Existing trucks must meet the following eligibility requirements based on engine certification: On-Road and Off-Road.

(1) On-Road: On-Road certified / manufactured trucks must meet the following eligibility requirements:
   i. Have an engine model year of 2009 or older.
   ii. Have a Gross Vehicle Weight Rating (GVWR) of 26,001 or more pounds (Class 7 – Class 8).
   iii. Be owned by the participant for the past 24 months.
   iv. Be registered with the CARB Truck Regulations Upload and Compliance Reporting System (TRUCRS).
   v. Operated one hundred percent (100%) of the time within South Central Fresno or Shafter AB 617 community boundary for the past 24 months prior to the application submission date.
   vi. Be in operating condition at the time of application submission. Operating condition will be determined through an inspection process conducted by Dealership staff or District staff prior to issuing a contract. Trucks found to be non-operational during the inspection process will be deemed ineligible for the Program.

(2) Off-Road: Off-Road certified / manufactured trucks must meet the following eligibility requirements:
   i. Have an engine tier that is Uncontrolled (Tier 0), Tier 1, Tier 2, or Tier 3 certified.
   ii. Be owned by the participant for at least the past 24 months.
   iii. If used in agricultural operations, be registered with the CARB Truck Regulations Upload and Compliance Reporting System (TRUCRS).
   iv. If used in non-agricultural operations, be registered with the CARB Diesel Off-Road, Online Reporting System (DOORS).
   v. Operate one hundred percent (100%) of the time within South Central Fresno or Shafter Communities for the past 24 months prior to the application submission date.

vi. Be in operating condition at the time of application submission. Operating condition will be determined through an inspection process conducted by Dealership staff or District staff prior to issuing a contract. Trucks found to be non-operational during the inspection process will be deemed ineligible for the Program.

(B) Participant Requirements

The Heavy-Duty Yard Truck Replacement Program application is attached to this program plan as Exhibit B. A certification section is included in the application and details participant requirements. Participants must submit an application and obtain a signed executed agreement (contract) from the District prior to purchasing their new truck. Participants must have owned the old truck for, at a minimum, the past 24 months prior to applying and remain the owner of the replacement truck throughout the five (5) year life of the project.

Participation in the program occurs in three phases: Application Approval, Contract Execution and Reimbursement (Claim for Payment).

(1) Application Approval: A participant must submit an application along with additional documentation that shows proof of ownership and usage for the old truck. An inspection of the current truck is required to complete review of the application. Upon receipt of a complete application, District staff will assign the project for a pre-inspection, which includes a visual inspection of the operational condition of the truck along with photographs of the truck, VIN number, Gross Vehicle Weight Rating (GVWR) and engine information that will be reviewed for eligibility.

(2) Contract Execution: District staff will review submitted applications and issue a draft contract if the application is deemed eligible. Participants will then sign the draft contract and return to the District for final signatures and contract execution. Funds are not guaranteed until a contract has been issued and executed. The participant will then have a specified amount of time to purchase/take delivery of the new truck and surrender the old truck to an approved program dismantler.

(3) Reimbursement (Claim for Payment): Once a Participant has purchased and taken delivery of their new truck they may submit a claim packet. A complete claim packet is required as part of the reimbursement process and must include a completed and signed claim form, copies of any invoices for the purchase, proof of insurance and registration and a completed Old Truck Status Form which identifies the program dismantler for the old truck. Funding is awarded at 45% of the total eligible cost of the replacement truck as a reimbursement. The eligible cost is calculated based on the invoiced price prior to any grants, incentives, or non-manufacturer discount applied, minus any ineligible

items. The submission of a complete claim packet initiates the scheduling of the post-inspections, which must be completed before incentive funds can be paid. The post-inspection of the old diesel truck will verify that the vehicle was rendered permanently inoperable by the dismantler as per the dismantler requirements and the post-inspection of the new truck will verify the new equipment. District staff will review submitted claim packets and post-inspections and reimburse for eligible costs, up to the contracted amount.

(C) Dismantler Requirements

The Program requires the current truck to be permanently destroyed. Destruction of the current truck's chassis and engine permanently removes the old, high-emitting truck from operation. This requirement has been established to ensure that emission reductions are real. It prevents the current truck from being moved into another locale to continue emitting high levels of pollutants. A list of participating dismantlers can be found at www.valleyair/grants/truck-replacement.htm that current trucks can be delivered to for destruction.

(D) Annual Report

Projects that are awarded a contract will be subject to a project life up to five (5) years commencing on the day the replacement truck is purchased, as indicated on the dealership's final sales invoice. Applicants will be required to submit annual reports to the District for the life of the project. Annual reports will be provided by the District and mailed to applicants annually approximately one year from the date of the final sales invoice.

4. Funding Amounts

The approved CERP's provide incentive funding for operators to replace their diesel powered yard trucks with zero emission technology. This funding includes $1,500,000 for the Shafter community and $3,500,000 for the South Central Fresno community. This will provide for the replacement of up to 10 yard trucks in Shafter and 25 yard trucks in South Central Fresno.

(A) Funding is awarded at 45% of the total eligible cost of the replacement truck as a reimbursement.

1. The eligible cost is calculated based on the invoiced price prior to any grants, incentives or non-manufacture discounts being applied

2. Eligible items include standard and optional equipment, taxes, licensing and delivery costs associated with the purchase of the vehicle.

3. Ineligible items include off-board charging cabinet, extended warranty, and custom paint

(B) Funding will be decreased at time of reimbursement if the final invoice is less than the quoted amount to insure the award is no more than 45% of the final eligible cost. However, funding will not be increased if the final invoice is greater than the quoted amount.

(C) A project life of 5 years will be used when calculating emission reductions. This project life is based on the estimated life expectancy for properly maintained battery powered, zero emission yard trucks.

5. Project Selection and Reporting

Projects will be approved on a first come, first served basis determined by the submittal of a complete program application.

The District will report program information in accordance with Community Air Protection program guidelines found at:
https://ww3.arb.ca.gov/msprog/cap/docs/cap_incentives_2019_guidelines.pdf.

6. Emission Reduction Targets

Emission reductions associated with the community of Shafter would achieve an estimated 0.03 tons of PM2.5 consisting of diesel particulate matter and 1.8 tons of NOx. For the community of South Central Fresno, emission reductions would achieve 0.8 tons of PM2.5 in the form of diesel particulate matter and 4.5 tons of NOx. These types of equipment are in near constant operation at impacted facilities, therefore local communities and equipment operators can be exposed to PM2.5 (consisting of diesel particulate matter, a toxic air contaminant) and NOx emissions.

The District will utilize an established Carl Moyer Program emission reduction calculation methodology to calculate the emission reductions achieved from each completed project.

The necessary formulas to calculate the emission reductions and cost-effectiveness for a project are provided below.

Optional Advanced Technology Limit: For advanced technology projects that are zero-emission, or alternatively meet the cleanest optional standard level certified, the cost-effectiveness limit is up to $100,000 per weighted ton for the emissions reductions beyond those achieved by the required standard. The higher cost-effectiveness limit is applied only to the incremental emission reductions beyond what the conventional project would achieve. The base cost-effectiveness limit for costs associated with getting engines to the cleanest required standard is applied first, and then the advanced technology limit to the additional costs of getting emissions down to or below the cleanest optional standard.

Formula A-1: Potential grant amount at the cost-effectiveness limit ($)

*Potential grant amount ($) = cost-effectiveness limit ($/ton) * estimated annual emission reductions (weighted tons/yr) / CRF*

The CRF is based on a discount rate. The CRF uses an interest rate and project life to determine the rate at which earnings could reasonably be expected to accrue if the same funds were invested over that length of time. The CRF may be calculated using Formula A-2 below, or you may refer to Tables 4and 5 below for CRFs at various project lives.

Formula A-2: Capital recovery factor

*Capital recovery factor = (1 + discount rate(a)) ^ project life * discount rate /((1 + discount rate) ^ project life - 1)*

Annual weighted surplus emission reductions are calculated using Formula A-3 below. Note that particulate matter (PM) is weighted by a factor of 20.

Formula A-3: Annual weighted surplus emission reductions (weighted tons/yr)

*Weighted emission reductions (weighted tons/yr) = NOx reductions (tons/yr) + ROG reductions (tons/yr) + (20 * PM reductions (tons/yr))*

The result of Formula A-3 is used to complete Formula A-1 to determine the potential grant amount at the cost-effectiveness limit. In order to determine the annual surplus emission reductions by pollutant, Formula A-4, A-5, A-6, or A-7, below must be completed for each pollutant (NOx, ROG, and PM), for the baseline technology and the reduced technology. Formula A-4 is the general calculation and can be applied to any project, whereas Formulas A-5, A-6, or A-7 are specific variations of Formula A-4 for use with mileage, hours of operation, and fuel use respectively. All four formulas involve multiplying the engine emission factor by the annual activity level and by other adjustment factors (such as load factor in the case of off-road equipment calculations) as specified for the calculation methodologies presented. Emission factors are also adjusted to account for in-use deterioration where applicable.

Formula A-4: Estimated annual emissions (tons/yr)

*Annual emissions by pollutant (tons/yr) = (emission factor + deterioration product (if applicable)) * annual activity * adjustment factor(s) (if applicable) * percentage operation in California / 907,200 (g/ton)*

*Deterioration product = deterioration rate * total equipment activity*

*Total equipment activity = annual activity * deterioration life (yrs)*

Deterioration life (baseline equipment) (yrs) = expected first year of operation – baseline engine model year + (project life / 2)

Deterioration life (reduced equipment) (yrs) = project life / 2

Formula A-5: Estimated annual emissions based on mileage (tons/yr)

*Annual emissions by pollutant (tons/yr) = (emission factor (g/mi) + deterioration product (g/mi) (if applicable)) * annual activity (mi/yr) * percentage operation in California / 907,200 (g/ton)*

*Mile-based deterioration product(g/mi) = deterioration rate (g/mi-10,000 mi) * total equipment activity (mi)*

*Total equipment activity(b) (mi) = annual activity (mi/yr) * deterioration life (yrs)*

Deterioration life (baseline equipment) (yrs) = expected first year of operation – baseline engine model year + (project life / 2) Deterioration life (reduced equipment) (yrs) = project life / 2

Formula A-6: Estimated annual emissions based on hours of operation (tons/yr)

*Annual emissions by pollutant (tons/yr) = (emission factor (g/bhp-hr) + deterioration product (g/bhp-hr) (if applicable)) * horsepower (hp) * load factor * annual activity (hrs/yr) *percentage operation in California / 907,200 (g/ton)*

*Hour-based deterioration product (g/bhp-hr) = deterioration rate (g/bhp-hr-hr) * total equipment activity (hrs)*

*Total equipment activity(c) (hrs) = annual activity (hrs/yr) * deterioration life (yrs)*

Deterioration life (baseline equipment) (yrs) = expected first year of operation – baseline engine model year + (project life / 2)

Deterioration life (reduced equipment) (yrs) = project life / 2

Formula A-7: Estimated annual emissions based on fuel consumption (tons/yr)

*Annual emissions by pollutant (tons/yr) = emission factor (g/bhp-hr) * fuel consumption rate factor (bhp-hr/gal) * annual activity (gal/yr) * percentage operation in California / 907,200 (g/ton)*

Calculating Split Project Life Projects:

Split Project Life Projects must use a separate project life for the two baseline technology scenarios. First, Formulas A-4, A-5, A-6, or A-7 must be used to calculate emission reduction by pollutant for the two baseline scenarios:

   A. Baseline technology to phase 1 reduced technology
   B. Phase 1 reduced technology to phase 2 reduced technology

Formula A-3 is used to calculate the annual emission reductions for each baseline technology. Next, a fraction of the project life must be applied to the annual emission reductions for each of the baseline scenarios, as outlined below in Formula A-8.

Formula A-8: Split project life

Total annual weighted surplus emission reductions (tons/yr) = (fraction project life (yrs) * annual weighted surplus emissions from transaction 1 (tons/yr) / total project life (yrs)) + (fraction project life (yrs) * annual weighted surplus emissions from transaction 2 (tons/yr) / total project life (yrs))

$$\text{Total annual weighted surplus emission reductions (tons/yr)} = (n_1 * a_1 / t) + (n_2 * a_2 / t)$$
where:
n_1 = *fraction project life from transaction 1 (yrs)*
n_2 = *fraction project life from transaction 2 (yrs)*
a_1 = *annual weighted surplus emissions from transaction 1 (tons/yr)*
a_2= *annual weighted surplus emissions from transaction 2 (tons/yr) t = total project life (yrs)*

Calculating the Cost-Effectiveness of a Grant Amount:
The cost-effectiveness of a grant amount is determined by multiplying the CRF as calculated in Formula A-9 by the grant amount, and dividing that by the annual weighted surplus emission reductions that will be achieved by the project as calculated in Formula A-3.

Formula A-9: Cost-effectiveness of weighted surplus emission reductions ($/tons)

Cost-effectiveness ($/tons) = grant amount ($) * CRF / annual weighted surplus emission reductions (weighted tons/yr)

The following tables summarize the data needed to calculate emission reductions for Yard Truck Program projects.

Table 1: On-Road Diesel Vehicle NOx, ROG & PM Emission Factors

Diesel Medium HD Vehicles 14,001-33,000 lbs GVWR (g/mile)						
MODEL YEAR	NOx	DR	ROG	DR	PM	DR
Pre-1987	14.52	0.031	0.89	0.051	0.713	0.0283

1987-1990	14.31	0.041	0.70	0.060	0.774	0.0252
1991-1993	10.70	0.054	0.37	0.031	0.425	0.0193
1994-1997	10.51	0.063	0.27	0.036	0.241	0.0129
1998-2002	10.33	0.072	0.28	0.036	0.266	0.0116
2003-2006	6.84	0.071	0.23	0.021	0.175	0.0067
2007-2009	3.99	0.090	0.18	0.007	0.014	0.0008
2007+ (0.21-0.50 Nox FEL)	1.27	0.079	0.06	0.002	0.002	0.0001
2010-2012 (0.20 NOx Std)	1.03	0.079	0.06	0.002	0.002	0.0001
2013+ (0.20 NOx Std)	1.03	0.045	0.06	0.001	0.002	0.0001
2016+ (0.10 NOx Std)	0.52	0.023	0.06	0.001	0.002	0.0001
2016+ (0.05 NOx Std)	0.26	0.011	0.06	0.001	0.002	0.0001
2016+ (0.02 NOx Std)	0.10	0.005	0.06	0.001	0.002	0.0001

Table 1: Continued

Diesel Heavy HD Vehicles 33,000+ lbs GVWR (g/mile)						
MODEL YEAR	NOx	DR	ROG	DR	PM	DR
Pre-1987	21.37	0.018	1.38	0.031	1.260	0.0200
1987-1990	21.07	0.024	1.08	0.037	1.369	0.0178
1991-1993	18.24	0.037	0.78	0.027	0.574	0.0104
1994-1997	17.92	0.043	0.58	0.031	0.377	0.0080
1998-2002	17.61	0.049	0.60	0.031	0.415	0.0073
2003-2006	11.66	0.049	0.49	0.018	0.267	0.0041
2007-2009	6.80	0.077	0.39	0.007	0.022	0.0006
2007+ (0.21-0.50 Nox FEL)	2.17	0.068	0.13	0.002	0.004	0.0001
2010-2012 (0.20 NOx Std)	1.76	0.068	0.13	0.002	0.004	0.0001
2013+ (0.20 NOx Std)	1.76	0.039	0.13	0.001	0.004	0.0001
2016+ (0.10 NOx Std)	0.88	0.019	0.13	0.001	0.004	0.0001
2016+ (0.05 NOx Std)	0.44	0.010	0.13	0.001	0.004	0.0001
2016+ (0.02 NOx Std)	0.18	0.004	0.13	0.001	0.004	0.0001

Table 2: Off-Road Diesel Engine Default Load Factor

Cargo Handling	Yard Truck	0.39

Table 3: Moyer 2011 NOx, ROG & PM Emission Factors – Off-Road Diesel Engines (g/bhp-hr)

UNCONTROLLED							
HORSEPOWER	MODEL YEAR	NOx	DR	ROG	DR	PM	DR

25-49	Pre-1988	6.51	0.000098	1.68	0.000210	0.547	0.0000424
	1988+	6.42	0.000097	1.64	0.000210	0.547	0.0000424
50-119	Pre-1988	12.09	0.000280	1.31	0.000061	0.605	0.0000440
	1988+	8.14	0.000190	0.90	0.000042	0.497	0.0000361
120+	Pre-1970	13.02	0.000300	1.20	0.000056	0.554	0.0000403
	1970-1979	11.16	0.000260	0.91	0.000042	0.396	0.0000288
	1980-1987	10.23	0.000240	0.80	0.000037	0.396	0.0000288
	1988+	7.60	0.000180	0.62	0.000029	0.274	0.0000199

CONTROLLED							
HORSEPOWER	TIER LEVEL	NOx	DR	ROG	DR	PM	DR
25-49	Tier 1	5.26	0.000098	1.32	0.000170	0.480	0.0000372
50-74		6.54	0.000150	0.90	0.000042	0.552	0.0000402
75-99		6.54	0.000150	0.90	0.000042	0.552	0.0000402
100-174		6.54	0.000150	0.62	0.000029	0.304	0.0000221
175-299		5.93	0.000140	0.29	0.000013	0.120	0.0000064
300-750		5.93	0.000099	0.29	0.000010	0.120	0.0000064
751+		5.93	0.000099	0.29	0.000010	0.120	0.0000064
25-49	Tier 2	4.63	0.000093	0.22	0.000050	0.280	0.0000218
50-74		4.75	0.000071	0.17	0.000025	0.192	0.0000141
75-99		4.75	0.000071	0.17	0.000025	0.192	0.0000141
100-174		4.15	0.000060	0.15	0.000023	0.128	0.0000094
175-299		4.15	0.000060	0.11	0.000022	0.088	0.0000046
300-750		3.79	0.000050	0.09	0.000023	0.088	0.0000044
751+		3.79	0.000050	0.09	0.000023	0.088	0.0000044
50-74	Tier 3	2.74	0.000036	0.09	0.000023	0.192	0.0000141
75-99		2.74	0.000036	0.09	0.000023	0.112	0.0000080
100-174		2.32	0.000030	0.09	0.000030	0.112	0.0000080
175-299		2.32	0.000030	0.09	0.000023	0.088	0.0000046
300-750		2.32	0.000030	0.09	0.000023	0.088	0.0000044
25-49	Tier 4I	4.55	0.000095	0.09	0.000036	0.128	0.0000096
50-74		2.74	0.000036	0.09	0.000023	0.112	0.0000080
751+		2.24	0.000028	0.06	0.000017	0.051	0.0000021
75-99	Tier 4 Phase Out	2.74	0.000036	0.09	0.000030	0.009	0.0000009
100-174		2.32	0.000030	0.09	0.000030	0.009	0.0000004
175-299		2.32	0.000030	0.09	0.000023	0.009	0.0000003
300-750		2.32	0.000030	0.09	0.000023	0.009	0.0000003
75-99	Tier 4 Alt NOx	2.15	0.000027	0.08	0.000021	0.009	0.0000009

100-174		2.15	0.000027	0.08	0.000020	0.009	0.0000004
175-299		1.29	0.000017	0.06	0.000017	0.009	0.0000003
300-750		1.29	0.000017	0.06	0.000017	0.009	0.0000003
25-49	**Tier 4 Final**	2.75	0.000057	0.09	0.000036	0.009	0.0000010
50-74		2.74	0.000036	0.09	0.000023	0.009	0.0000009
75-99		0.26	0.000004	0.05	0.000015	0.009	0.0000009
100-174		0.26	0.000004	0.05	0.000011	0.009	0.0000004
175-299		0.26	0.000004	0.05	0.000011	0.009	0.0000003
300-750		0.26	0.000004	0.05	0.000011	0.009	0.0000003
750+		2.24	0.000028	0.05	0.000011	0.017	0.0000009

Table 4: Capital Recovery Factor (CRF) for Various Project Lives at a 1% Discount Rate

Project Life	CRF
1	1.010
2	0.508
3	0.340
4	0.256
5	0.206
6	0.173
7	0.149
8	0.131
9	0.117
10	0.106
11	0.096
12	0.089
13	0.082
14	0.077
15	0.072
16	0.068
17	0.064
18	0.061
19	0.058
20	0.055

Table 5: Capital Recovery Factor (CRF) for Various Project Lives at a 2% Discount Rate

Project Life	CRF
1	1.020
2	0.515
3	0.347
4	0.263
5	0.212
6	0.179
7	0.155
8	0.137
9	0.123
10	0.111
11	0.102
12	0.095
13	0.088
14	0.083
15	0.078
16	0.074
17	0.070
18	0.067
19	0.064
20	0.061

Upon CARB approval of the 2017 Moyer Program Guidelines, the discount rate is one percent. Per statute, CARB reviews and may update discount rates annually, using the average rates of return for U.S. Treasury securities and the California Consumer Price Index data available at the time of publication.

The Discount Rate varies from year to year, and may increase beyond 2 percent. The formula used to calculate the CRF based on the Discount Rate can be found in Formula A-2.