

AIR QUALITY MITIGATION FUND
 ROUND 3
 REQUEST FOR PROPOSALS (RFP)

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I. FUNDING OPPORTUNITY ANNOUNCEMENT

A. Background

As part of a settlement associated with the approval of the China Shipping Container Terminal Project (China Shipping) in 2004, the Port of Los Angeles (POLA) set aside funding for air quality mitigation. In 2015, POLA and the Harbor Community Benefit Foundation (HCBF) signed a Memorandum of Agreement (MOA) establishing an Air Quality Mitigation Fund (AQMF) totaling approximately \$5 million of the funds for projects to reduce Port-related air emissions in nearby communities. As a result of the MOA, HCBF, a non-profit organization dedicated to mitigating impacts from POLA on the two neighboring communities of San Pedro and Wilmington, California, administers the fund.

As specified in the MOA, the HCBF, with the approval of the POLA Board of Harbor Commissioners, is empowered to award funding to third parties **"...exclusively for projects that are reasonably calculated to reduce Port-related air emissions.** This includes emissions resulting from the transport and handling of cargo, within, into, out of, to, or from the Port of Los Angeles."

B. Screening

HCBF requests proposals from eligible entities. This solicitation will provide the HCBF Board with applicant information upon which to make funding determinations.

C. Project Objectives

HCBF is soliciting applications from eligible entities, as described in Section II of this announcement, for projects to meet the goals of the [AQMF program](#). AQMF program goals are to implement programs, projects, and approaches that reduce Port-related air emissions. **This AQMF Round 3 is focused specifically on oceangoing vessels.**

Projects funded by the AQMF are expected to demonstrate achievable emissions reduction benefits (1) in San Pedro and Wilmington, or (2) within a 25-mile boundary of the San Pedro Bay, in that prioritized order. Additional derivative benefits may also extend beyond the 25-mile boundary.

Projects shall include demonstration or implementation of one of the following technologies:

- zero-emissions technologies (preferred),
- near-zero-emissions technologies, or
- emission-reduction technologies.

D. Availability of Funds

The available funding for this expedited Round 3 of the Air Quality Mitigation Program is approximately **\$2,000,000**.

E. Number of Awards

HCBF anticipates awarding one or more agreements from this announcement, subject to availability of funds, the quality of applications received, and other applicable considerations.

II. ELIGIBILITY INFORMATION

A. Eligible Applicants

All applicants, any public or private entity, must identify a project demonstration or implementation partner who operates within a 25-mile boundary of the San Pedro Bay in the submittal of the proposal. An example includes an ocean carrier for the demonstration of ship emission-reduction equipment. A letter of support (participation) should include the number of hours for the technology in demonstration.

The partner's contact information will be expected in the actual full proposal submission.

B. Eligible Projects

The eligible projects using Air Quality Mitigation Program funds should be responsive to the following priorities set forth below:

- 1) Demonstration or implementation of emission-reduction technologies that seek to reduce emissions from oceangoing vessels;
- 2) Technologies that, if they were widely deployed, would significantly reduce air emissions and/or air quality related health risks from the largest sources of air pollution from port operations, namely ships;
- 3) The project demonstration must begin within one year from the date of the executed agreement.
- 4) The applicants, in coordination with the project demonstration or implementation partner/s, must determine the number of hours the proposed technology will be operational during the demonstration period (the project duration). These specific hours must serve as the basis for emission reduction and cost effectiveness calculations, and be included in the support (participation) letters. The lack of project-specific calculations of emission reductions and/or cost effectiveness may disqualify the project from consideration.

All projects must be consistent with the conditions prescribed in the City of Los Angeles Tidelands Trust Grant Act, all Federal, State, and local laws, and the China Shipping Amended Stipulated Judgment (described in the Memorandum of Agreement, and available on HCBF's website or by request).

Project types **not** eligible for AQMF funding include:

- Technologies that are not applicable to port-related shipping movement
- Fuel additives
- Technologies in the conceptual or R&D phase

Please read through the Evaluation Criteria for further specifications (**Appendix A**).

C. Eligible Costs and Match Funding

Eligible costs for AQMF funding include: design and engineering, materials, equipment, construction, emissions testing, data tracking and systems integration, and specific demonstration costs.

Costs **not** eligible for AQMF funding include:

- Administrative overhead
- Travel
- Marketing and promotional costs
- Fuel and other consumables
- Labor to operate the equipment not directly associated with the project.

All costs are to be tracked, documented, and made available upon request for HCBF oversight review.

Match funding is not required; however, match funding will be considered as beneficial during the project evaluation phase. If match funding is included, it must be documented, committed, allocated, and readily available for the project.

The project must be cost-effective and result in a high benefit/cost score defined as the amount of reduced lifecycle emissions over the project duration per funding from HCBF. For the purpose of determining cost effectiveness, the project duration refers to the specific number of hours during which the demonstrated technology will be operational based on the agreements with the identified project partners.

D. Violations & Compliance

The applicant shall report to HCBF in writing any and all notices, complaints, determinations, judgments or citations of environmental and/or labor violations pertaining to its operations and those of its partners, consultants, or sub-grantees within the past three years and while the grant contract is in effect. HCBF reserves the right to terminate the contract if the applicant has been found by a state or federal agency or a court to have violated environmental and/or labor laws. The applicant shall include this requirement in all their subcontracts.

310. Exclusions

AQMF grant funding is a grant, not a loan. Proposals shall not include provision for repayment or reimbursement of the grant funds to HCBF. Applicant shall not include as part of their proposal a donation or payment to HCBF of any kind.

III. SUBMITTAL PROCESS

Interested applicants must submit their full proposal using the online form via [Submittable](#).

Information to be provided in response to this RFP will include **all of the following and address components of the evaluation criteria:**

- A detailed description of the technology, including:
 - How does the technology work?
 - What is the stage of development of the technology? Please be specific and note that technologies in the conceptual or R&D phase are not eligible. Demonstration should begin within a year from the agreement execution.
 - Is the technology currently in use? Where?
 - What are other applications for the technology?
 - What are the plans for the technology commercialization, if applicable?

- A detailed description of the proposed demonstration/implementation project. A marketing brochure or description by the firms involved in the project is not considered a project nor technology description. The narrative should include:
 - Project goals and objectives.
 - Specific project requirements, e.g., size of space needed, other equipment necessary for the technology to work.
 - The scope of work including tasks, milestones, and deliverables.
 - The duration of the project and detailed schedule from start to completion.
 - Project partners.
- Available certifications, plans for permits and approvals for verification and certification, as needed. If the necessary certifications or permits are pending, the applicant shall provide a suitable explanation and estimated timeline for securing such certification.
- Description of project benefits demonstrating project emission reductions and other community and economic benefits:
 - A detailed explanation as to how the proposed projects will reduce air toxics (e.g., diesel PM, benzene), criteria pollutants (e.g., NO_x, CO), and greenhouse gas (i.e., CO₂-equivalent) emissions.
 - A description as to if and how the project will leverage AQMF funding to achieve benefits beyond the scope of the proposed project.
 - Calculations of the emission reductions per identified air pollutant, and the timeframe in which those reductions will occur relative to a baseline scenario. The calculations must be based on the specific number of hours during which the demonstrated technology will be operational as agreed with the identified project partners, and included in the support (participation) letters.
- Calculated project cost-effectiveness which is the measure of dollars provided to a project for each ton of covered emissions reduced. The calculations must be based on the specific number of hours during which the demonstrated technology will be operational as agreed with the identified project partners. The Carl Moyer Program Guidelines, available at the California Air Resources Board (CARB) website, describe the Cost-Effectiveness Calculation Methodology and provide reference materials. In addition, Emission Reduction and Cost Effectiveness Calculations guidelines are included in **Appendix B**.
- Budget with detailed total project cost estimate and funding request:
 - Describe project-related costs for equipment, materials, travel, and labor, and any matched funds.
 - A detailed budget of operational costs of the project once deployed, and specification as to who will be responsible for operational costs if not covered in the project.
- Description of the company and the project team:
 - A brief description of the prior relevant experience of the assembled team to accomplish the proposed work effort.
 - Past experience with grant and other funding, including how previously received funds were spent.
 - Key team members with their qualifications and capabilities.

Please review the evaluation criteria for further details (**Appendix A**).

Electronic application submissions must be through [Submittable](#). Materials may be accessed via <https://hcbf.org/aqmf-invitation/>. **Hard-copy submissions will not be accepted.**

Due date: February 24, 2023 by 5 P.M. PST.

Deadline to submit questions: February 10, 2023.

HCBF will host a virtual webinar prior to the due date to provide an overview of the RFP requirements, the application process, and to answer questions. Please join the HCBF mailing list to receive webinar and program related updates.

Please contact Submittable directly for submission issues; HCBF Staff does not have access to draft applications.

HCBF Contacts:

Meghan Reese,
Executive Director
Harbor Community Benefit Foundation
302 West 5th Street, Suite 300
San Pedro CA 90731
meghan@hcbf.org
(310) 997-7116

Tamanna Rahman, PhD, MPH
Program Director (Executive Director effective January 28, 2023)
Harbor Community Benefit Foundation
302 West 5th Street, Suite 300
San Pedro CA 90731
tamanna@hcbf.org
(310) 997-7116

Application-related questions must be addressed solely to the HCBF contacts identified above.

Applicants that contact members of the HCBF Board of Directors, ad-hoc committee, or any other HCBF personnel for any reason after release of this RFP and prior to award (except at the Board meeting at which the grant award will be made) will be subject to disqualification.

Public Information Notice:

All documents submitted to HCBF are considered public records. Proposals are subject to public disclosure once the funding selection process has been completed and HCBF funding selections have been made.

We discourage inclusion of confidential information at this stage of the process, but if you find it necessary to include confidential or proprietary information in your proposal, you should clearly

mark it "CONFIDENTIAL." We will withhold from public disclosure any information that we determine is truly confidential, including financial information, trademarked or patented processes, and the like.

IV. Evaluation Process

A. Project Evaluation Process

HCBF staff is responsible for making a funding recommendation to the HCBF Board of Directors. If the HCBF Board of Directors approves a project (or projects) for funding, the approved projects will then be forwarded to the Board of Harbor Commissioners (BOHC) of the Port of Los Angeles for approval. The BOHC will then have sixty days to review HCBF Recommendations and vote on the approval of the decision. The BOHC's review may take into account only the factors outlined in Paragraph V.f.vii of the Memorandum of Agreement.

HCBF staff will consult with experts as necessary in reviewing the applications and developing recommendations. Staff will convene an ad hoc committee of the HCBF Board of Directors to advise on the recommendation. As set forth in Paragraph V.f.v of the Memorandum of Agreement, "HCBF staff will research whether a proposed project, through information provided in the proposals and any other sources of information that it may in its discretion choose to use, meets the project criteria developed by HCBF, and HCBF staff shall make a recommendation of its findings to the Board of Directors of HCBF."

HCBF anticipates that it will establish a special AQMF review panel, consisting of an HCBF ad hoc board committee, selected stakeholders, and to-be-identified external personnel with demonstrated expertise in evaluation of zero-, near-zero, and emission reduction technologies for freight-movement technologies. The panel will review the received applications and provide feedback to HCBF's ad hoc board committee and staff. HCBF staff, with guidance from its ad hoc board committee and technical consultants, as well as the feedback from the review panel members, will make its recommendations to the HCBF Board.

B. Project Evaluation Criteria

Evaluation criteria for this program have been developed in consultation with the Settlement Petitioners (Natural Resources Defense Council [NRDC], San Pedro and Peninsula Homeowners' Coalition [SPPHC], San Pedro Peninsula Homeowners' United [SPPHU], and the Coalition for Clean Air [CCA]), the City of Los Angeles (as represented by the Port of Los Angeles), and in agreement with the Tidelands Trust and the 2015 MOU.

Evaluation criteria for submitted project applications are presented in **Appendix A**. These categories are not listed in order of preference or priority. Although there is no prioritization implied, **HCBF does emphasize environmental and community benefits within the neighborhoods of Wilmington and San Pedro.**

C. Project Evaluation Limited to Four Corners of the Application

Project applications will be evaluated solely on the basis of the information contained in the submitted application. After the deadline for submittal of applications, HCBF will not accept additional material or information pertaining to the application. Applicants who submit additional information after the deadline for submittal or who propose additional terms to the Board at the meeting at which grant awards will be made may be disqualified from consideration.

V. ADMINISTRATION AND NEXT STEPS

A. AQMF Oversight and Financial Control

Upon approval by both the HCBF Board of Directors and the BOHC, a contract will be executed for the proposal(s) selected for funding. Agreements detailing funding and program oversight of approved projects will be between HCBF and its grantees.

B. Reporting and Invoicing Requirements - Project Evaluation Process

Grantees should anticipate regular written progress reports with HCBF, which includes Monthly Update Reports and Milestone Reports (Interim & Final) (**Appendix C**). Reporting shall describe quantitative and qualitative measures of success such as actual accomplishments, cost status, schedule changes, change in approach, actual and anticipated problems and delays, and their resolution. In addition to the project scope and expenditures status updates, Grantee will provide the following (at the minimum in the milestone and final reports):

- Demonstration results and analysis
- Project performance
- Data collected
- Emission reduction status update (including GHG, criteria pollutants, and other air toxics)
- Project cost effectiveness update
- Lessons learned, including technical, business operations, legal, and regulatory issues and policy implications, customer experience and satisfaction

Grantee shall also submit a final budget report to reconcile the expenditures of Grant Funds, compared to the original budget.

In addition, an annual Grantee meeting will be held to provide an opportunity for Grantees to give an update on project progress and status to the HCBF Board as well as to the China Shipping Petitioners (NRDC, San Pedro and Peninsula Homeowners' Coalition, San Pedro Peninsula Homeowners United, and CCA), City of Los Angeles, and BOHC.

HCBF shall disburse funds to the awarded grantees on a schedule established with each grantee, at its sole discretion, and may include performance benchmarks for a given project, at the discretion of HCBF.

VI. Appendix A: Evaluation Criteria

Evaluation Criteria	
1. Emission Reduction	
<ul style="list-style-type: none"> • The project reduces emissions per project demonstration period, including <ul style="list-style-type: none"> ○ Criteria pollutants ¹ ○ GHG emissions ² ○ VOC or other air toxics pollutant emissions ^{3,4} • Emission reductions and the basis for the projections shall be calculated, not extrapolated to larger scale implementation. • The calculations must be based on the specific number of hours during which the demonstrated technology will be operational as agreed with the identified project partners. • Calculations should include related emissions from auxiliary equipment, if relevant. • The duration of technology in-service during the project and beyond. 	
2. Cost Effectiveness & Budget	
<ul style="list-style-type: none"> • The project results in a high benefit/cost score defined as the amount of reduced lifecycle emissions (weighted emissions)—both criteria pollutants and GHG—over the project duration per dollar of funding from HCBF. • The calculations must be based on the specific number of hours during which the demonstrated technology will be operational as agreed with the identified project partners. • Calculations should be based on the Carl Moyer Program Guidelines, available at the California Air Resources Board (CARB) website. 	
<ul style="list-style-type: none"> • Project should reflect reasonable assumptions of technology in operation, as it impacts the amount of emissions reduced and ultimately the cost effectiveness. • Examples of assumptions include types of ships, sizes of ships, the number of hours the technology will be operational during the demonstration period, time to assemble/disassemble the technology, maintenance needed, etc. The assumptions must be based on agreements with the project partners and included in the support (participation) letters. • All this information is the basis for calculating the project-specific emission reduction and subsequent cost effectiveness. • For example: the equipment is intended to work 5 days, 10 hours a day, totaling 50 hours. The project would reduce emissions during 50 hours of operation. The project cost 	

¹ Six criteria pollutants: Ground-level Ozone, Particulate Matter (PM), Carbon Monoxide (CO), Lead (Pb), Sulfur Dioxide (SO₂), Nitrogen Dioxide (NO₂). <https://www.epa.gov/criteria-air-pollutants>.

² Greenhouse gases (GHGs): CO₂, CH₄, N₂O, and fluorinated gases. Sources: <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>, and <https://ww2.arb.ca.gov/ghg-descriptions-sources>

³ USEPA. Technical Overview of Volatile Organic Compounds. <https://www.epa.gov/indoor-air-quality-iaq/technical-overview-volatile-organic-compounds>

⁴ CARB, 2020d. CARB Identified Toxic Air Contaminants. <https://ww2.arb.ca.gov/resources/documents/carb-identified-toxic-air-contaminants>.

<p>effectiveness would amount to the reduced emissions (weighted emissions) over the project demonstration per dollar of requested funding from HCBF.</p>
<ul style="list-style-type: none"> • The proposed budget addresses the priorities of the AQMF program. • The Applicant demonstrates the need for AQMF funds. • The Applicant demonstrates responsible fund spending based on previous grant funding opportunities, if applicable. • The project continues to drive down previous costs of technology integration, build, procurement, and demonstration. • Matched funds are documented, committed, allocated, and readily available for the project. • Additional resources are leveraged beyond the AQMF grant funds awarded to support the project activities.
<p>3. Potential to Advance Technology, Feasibility, Readiness, and Commercial Availability</p>
<ul style="list-style-type: none"> • The technology is innovative and includes advances of zero emission (ZE), near-zero emission (NZE), and emission reduction technologies (ER), with special consideration given to ZE. Technologies that mitigate pollution from ocean going vessels largely fall into emission-reduction category. • Demonstration or implementation of technologies that seek to demonstrate significant emissions reductions from conventional oceangoing diesel-fueled vehicles and equipment that operate in and around the Port, including ships or harbor craft. • Technology that, if widely deployed, would significantly reduce air emissions and/or air quality related health risks from the largest sources of air pollution from port operations, namely ships and harbor craft.
<ul style="list-style-type: none"> • The targeted market and size for the technology are appropriately matched. • If the project is a demonstration project or small-scale deployment, the scope of the project (including, but not limited to the number of vehicles/equipment units demonstrated, type(s) of vehicles/equipment units demonstrated, length of demonstration, and duty cycles) is appropriate to help lead the technology to commercial adoption. • The project demonstrates that the technology has the potential to be a cost-competitive purchase option that will lead to commercial adoption. • The barriers and challenges to market penetration and commercial adoption for the technology are known, identified, and addressed by the project. • The Applicant presents credible, complete, and viable strategies that will lead the technology to commercial adoption, including existing relationships with major OEMs.
<ul style="list-style-type: none"> • The tasks in the Scope of Work and the proposed project schedule are complete, sequential, and will lead to successful and timely completion of the project. • The fueling/power infrastructure is available and sufficient to support the project. • The proposed project is comprehensive and addresses topics including, but not limited to fuel/power supply, fueling/power practice, costs, fuel/energy consumption, and other appropriate elements to be included in data collection. • The proposed customer and vehicle/equipment support service in the field is appropriate and will contribute to the overall success of the project.
<p>4. Project Partner</p>
<ul style="list-style-type: none"> • The Applicant has secured a project demonstration or implementation partner who operates within a 25-mile boundary of the San Pedro Bay. • The Applicant has secured site access for the proposed project, including site access related to fueling/power infrastructure and the proposed demonstration or implementation. Examples include an ocean carrier for the demonstration of ship emission-reduction equipment.

<ul style="list-style-type: none"> The applicants in coordination with the project partner/s must determine the number of hours the proposed technology will be operational during the demonstration period. These specific hours must serve as the basis for emission reduction and cost effectiveness calculations, and be included in the support (participation) letters.
<p>5. Community, Economic, and Other Benefits</p>
<ul style="list-style-type: none"> The projects funded by the AQMF are expected primarily to benefit the communities of San Pedro and Wilmington.
<ul style="list-style-type: none"> The project will create job opportunities, especially for residents living in the communities of Wilmington and San Pedro. The project will increase economic activity within local, regional, and statewide economies. Project funding (both reimbursable and match share) benefit and are paid to California-based entities. The project will provide cost-effective solutions to the community.
<ul style="list-style-type: none"> The project provides other environmental benefits, including reducing impacts related to water, stormwater, soil, and waste. The project creates by-product synergy (BPS) opportunities. As defined by the United States Business Council for Sustainable Development (US BCSD) and the U.S. Environmental Protection Agency (EPA), BPS represents the synergy among diverse industries, agriculture, and communities resulting in profitable conversion of by-products and wastes to resources promoting sustainability.
<p>6. Certifications, Licenses, Permits, Organizational Capacity and Qualifications</p>
<ul style="list-style-type: none"> The Applicant has secured verifications, certifications, and/or recognitions of the proposed technology's feasibility, reliability, and performance by a known regulatory, academic, or industrial agency or institution. If the necessary certifications or permits are pending, the applicant shall provide a suitable explanation and estimated timeline for securing such certification.
<ul style="list-style-type: none"> The project team's experience and qualifications are well-rounded and suitable to the tasks described in the proposed Scope of Work. The Applicant demonstrates the ability to meet project deadlines and milestones for past and current technology demonstration projects. The Applicant will respond to and mitigate project delays and issues that may arise during the project. The Applicant demonstrates corporate sustainability practices.

VII. Appendix B: Emission Reduction and Cost Effectiveness Calculations Guidelines

A. Emission Reduction Calculations

Use the appropriate formula to determine the annual surplus emission reductions by pollutant. Formula C-4, C-5, C-6, C-7, or C-8 must be completed for each pollutant (including NOx, ROG, and PM) for the baseline technology and the reduced technology. Formula C-4 is the general calculation and can be applied to any project, whereas Formulas C-5, C-6, C-7 and C-8 are specific variations of Formula C-4 for use with mileage, hours of operation, fuel use, and shore power systems, respectively. All five formulas involve multiplying the engine emission factor (found in Appendix D, see the links in the resource section) 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.

Emission factors and deterioration rates in Appendix D can be used to determine the emissions of the baseline engine and reduced engine or zero-emission vehicle; consequently, the engine or motor model year and applicable emission standard will determine the relevant emission factors. Emission reductions for hybrid conversion systems must be based on the projected reduced usage of the baseline engine in the converted vehicle compared to the original vehicle. This can be based on estimated usage reductions for the specific application or vocation type provided by the dealer, installer, or manufacturer. The emission factors and deterioration rates contained in Appendix D are based on CARB mobile source emissions inventory model (EMFAC) values.

Formula C-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

The Moyer Program allows the emission reductions from a project to be calculated using a variety of methods, but mileage and hours of operation are the primary methods. Specific activity factors allowed for each project category may differ and are identified in the source category chapters.

- a. Calculating Annual Emissions Based on Annual Miles Traveled

Calculations based on annual miles traveled are used for on-road projects only. Mileage records must be maintained by the engine owner as described in Chapter 4: On-Road Heavy-Duty Vehicles. Formula C-5 below describes the method for calculating pollutant emissions based on miles traveled, including the method for calculating mile-based deterioration products.

Formula C-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

b. Calculating Annual Emissions Based on Hours of Operation

When hours of equipment operation are the basis for determining emissions, the horsepower rating of the engine and an engine load factor found in Appendix D must be used. The method for calculating emissions based on hours of operation is described in Formula C-6 below, and includes the method for calculating hour based deterioration product.

(b) Total equipment activity for mile-based calculations is limited to 400,000 miles for school buses or 800,000 miles for other on-road vehicles. Used heavy heavy-duty replacement vehicles add 500,000 miles, medium heavy-duty vehicles add 250,000 miles, or light heavy-duty vehicles add 150,000 miles.

Formula C-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

The engine load factor is an indicator of the nominal amount of work done by the engine for a particular application. It is given as a fraction of the rated horsepower of the engine and varies with engine application. Load factors for a variety of equipment types may be found in Appendix D.

c. Calculating Annual Emissions Based on Fuel Consumption

In some cases as outlined in each source category chapter, fuel consumption may be used to calculate annual emissions. In such cases a fuel consumption rate factor must be used to convert emissions given in g/bhp-hr to units of grams of emissions per gallon of fuel used (g/gal). The fuel consumption rate factor is a number that combines the effects of engine efficiency and the energy content of the fuel used in that engine into an approximation of the amount of work output by an engine for each unit of fuel consumed. Formula C-7 below is used to calculate the annual emissions based on annual fuel consumed.

(C) Total equipment activity for hour-based calculations is limited to a maximum of 12,000 hours for diesel engines, 3,500 hours for large-spark ignition (LSI) engines with a model year of 2006 or older, or 5,000 hours for LSI engines with a model year of 2007 or newer.

Formula C-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)*

d. Calculating Annual Emissions for Shore Power Systems

For marine shore power systems, calculate the estimated annual emissions by pollutant as shown in Formula C-8 below.

Formula C-8: Estimated annual emissions for shore power systems (tons/yr)

Annual emissions by pollutant (tons/yr) =
 ship emission factor (g/kW-hr) * power requirements (kW) * berthing time (hrs/visit) * annual
 number of visits (visits/yr) * 0.9 / 907,200 (g/ton)

(2) Calculating Annual Surplus Emission Reductions by Pollutant

Subtract the annual emissions for the reduced technology from the annual emissions for the
 baseline technology as shown in Formula C-9 below, for NO_x, ROG and PM emissions.

Formula C-9: Annual surplus emission reductions (tons/yr)

*Annual surplus emission reductions by pollutant (tons/yr) = annual emissions for the baseline technology
 (tons/yr) – annual emissions for the reduced technology (tons/yr)*

For marine vessels with a wet exhaust system, a wet exhaust factor of 0.80 must be applied;
 calculate the annual surplus emission reductions as shown in Formula C-10 below.

Formula C-10: Annual surplus emission reductions for marine vessels with wet exhaust systems (tons/yr)

*Annual surplus emission reductions by pollutant (tons/yr) =
 0.80 * (annual emissions for the baseline technology (tons/yr) – annual emissions for the reduced
 technology (tons/yr))*

For retrofits, multiply the baseline technology pollutant emissions by the percentage of emission
 reductions that the CARB-verified reduced technology is verified to following Formula C-11 below.

Formula C-11: Annual surplus emission reductions for retrofits (tons/yr)

*Annual surplus emission reductions by pollutant (tons/yr) = annual emissions for the baseline technology
 (tons/yr) * reduced technology verification percentage*

For on-road heavy-duty projects, the baseline will be the newer vehicle emissions.

For marine vessel hybrid systems, calculate the annual surplus emission reductions as shown in
 Formula C-12 below.

Formula C-12: Annual surplus emission reductions for marine vessel hybrid systems (tons/yr)

*Annual surplus emission reductions by pollutant (tons/yr) =
 total annual emissions (all engines on vessel) for the baseline technology (tons/yr) – (total annual
 emissions (all engines on vessel) for the baseline technology (tons/yr) * reduced technology verification
 percentage)*

For marine vessels, calculate the annual surplus emission reductions for each pollutant as shown in Formula C-13 below.

Formula C-13: Total annual surplus emission reductions for marine vessels (tons/yr)

*Total annual surplus emission reductions for marine vessels by pollutant (tons/yr) = (propulsion engine annual surplus emission reductions (tons/yr) * number of propulsion engines) + (auxiliary engine annual surplus emission reductions (tons/yr) * number of auxiliary engines)*

(B) The potential grant amount based on maximum percentage of eligible cost is a measure of the incremental cost as determined by multiplying the cost of the reduced technology by the maximum percentage of eligible cost (from the applicable chapter) as described in Formula C-14 below.

B. Weighted Emission Reductions Calculation

Formula C-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 C-3 is used to complete Formula C-18 to determine the cost-effectiveness of a grant amount.

C. Cost Effectiveness Calculations

The cost-effectiveness of a grant amount is determined by multiplying the CRF (Capital Recovery Factor) as calculated in Formula C-18 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 C-3.

Formula C-18: Cost-effectiveness of weighted surplus emission reductions (\$/tons)

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

Resources

Carl Moyer Program Guidelines <https://ww2.arb.ca.gov/guidelines-carl-moyer>

C-5, Appendix C, Cost-Effectiveness Calculation Methodology, 11/19/2021

https://ww2.arb.ca.gov/sites/default/files/2022-01/FINAL_2017_gl_appendix_c_ADA_2021%20Board%20Approved%20Changes_11.19.21%20v1.2.pdf

Sample Calculations

https://ww2.arb.ca.gov/sites/default/files/classic/msprog/moyer/guidelines/2017/final_sample_calculations_09_18_18_%20%20tables_color_fixed.pdf

Updates to On-Road Example Calculations (Updated 2/24/2022)

<https://ww2.arb.ca.gov/sites/default/files/2022-02/Updated%20OnRoad%20Example%20Calculations%20022422.pdf>

Appendix D <https://ww2.arb.ca.gov/sites/default/files/2022-02/2022vipguidelines.pdf>

Information on EMFAC is available at: <http://www.arb.ca.gov/msei/modeling.htm>

VIII. Appendix C: Reporting Requirements

Monthly Reporting

- Written updates limited to one-page emailed report (within the email, Word doc, or pdf) to the Executive Director.
- Reporting period ends the last business day of each month. Due by the 8th of the following month.
- Update should include status on deliverables within that month, including any completed tasks.

Milestone Reporting Requirements

- Executive Summary
 - Project background (Purpose, location, Project partner(s), project team, challenges, successes, etc.)
 - Technology overview
 - Include challenges on deliverables and tasks to date.
 - Clear communication of project data and analysis
- Provide geographic context for project
- Demonstration results and analysis
- Data collected (emissions, cost effectiveness, environmental benefits, etc.)
 - Installation
 - Operations
 - Comparison to proposed performance
 - Emission reduction status update
 - Cost effective calculations for HCBF's funding
 - Raw data
 - Provide spreadsheet with formulas for all pollutants separate and weighted, including baseline comparison information for original formulas.
- Provide input/feedback from project partner(s).
 - Letter/update from project partner(s) - lessons learned, challenges, & successes
 - Provide information about the project partners, including location of the project, reasons behind their participation, intent following the in-use demonstration, etc. Explain any changes.
- Clarify project timeline, budget, scope of work
 - Updated Timeline, Scope of Work, and Budget and budget narrative.
 - Provide original, revised, and the difference (compare with the budget & budget narrative from the application).
 - For timeline, please use calendar months instead of project month number.
 - Explain any changes to the scope of work.
 - Grantee shall submit final budget report to reconcile the expenditures of grant funds, compared to the original budget.
- Lessons learned, including technical, business operations, legal, and regulatory issues and policy implications, customer experience and satisfaction.