



Clean Vehicles Program Guidelines

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Clean Vehicles Program
Houston-Galveston Area Council
PO Box 22777
Houston TX 77227-2777

713-993-2488 *phone*
713-993-4508 *fax*

<http://www.mysolutionis.com/fleet-resources/clean-vehicles-program/>

Clean Vehicles Program Guidelines

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Clean Vehicles Program Guidelines

1.0 General Information

1.1 Definitions

Terminology used throughout this document includes the following:

Alternative Fuels: Technologies and fuels such as natural gas, ethanol blends (higher than E10), biodiesel blends (B5 or higher blends), electricity, fuel cells, and hybrids (with a fuel economy improvement of at least 25% over the baseline nonhybrid model)

Application: The total packet of information required for an organization’s funding request to be considered by the Clean Vehicles Program.

Bi-Fuel: Any auto or piece of equipment which can take in two or more different external fuel sources. This includes plug-in vehicles/equipment that retain an internal combustion engine for extended range, but excludes non-plug-in hybrid vehicles/equipment which use closed battery systems to improve the fuel economy of an auto or piece of equipment.

CARB: The California Air Resources Board, the state agency in California with jurisdiction over outdoor air quality issues.

Category: A particular subset of the Clean Vehicles Program, such as the “Clean Machines” category, based on project type

Category Focus Area (CFA): A particular subset of a Clean Vehicles Program category, based on auto/equipment characteristics

Cost-Effectiveness Factor: How efficient a project is at reducing a given pollutant; given in units of dollars/ton of pollutant reduced

Clean Fleet Policy: Any enforceable measure voluntarily instituted by an organization that is specifically designed to minimize auto/equipment emissions

Conformity: Governmental process whereby it is assured that transportation plans do not undermine air quality goals.

CVP: Umbrella effort called the “Clean Vehicles Program” which encompasses all categories and focus areas.

Diesel-Based Project: Project in which the baseline auto/equipment under consideration for retrofit or replacement is powered by diesel.

EPA: United States Environmental Protection Agency, the federal agency with jurisdiction over outdoor air quality issues

Funding Source: Granting organization from which monies for the Clean Vehicles Program are received.

Funding Type: Monies received from a grantor, which may be allocated to CFA(s) according to grantor preferences and/or by preset allotment schedules; may or may not carry eligibility/evaluation criteria beyond the basic program criteria listed in this document.

Gasoline-Based Project: Project in which the baseline auto/equipment under consideration for retrofit or replacement is powered by gasoline

HGB: “Houston-Galveston-Brazoria” region, which includes Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller counties, as well as any additional counties the EPA may designate as part of the region’s ozone nonattainment area in the future

Innovative Project: Project in which new technologies/fuels are introduced, such as hybrids, natural gas, biofuels, or hydrogen fuel cells

NOx: Nitrogen oxide pollutants, precursors of ozone

On-Road: Road-legal mobile vehicles such as busses, trucks, cars, etc.

Off-Road: Mobile vehicles and equipment which are generally used on unpaved surfaces, such as construction equipment, lawn mowers, etc.

Ozone: Ground-level pollutant (O₃) that is formed in the atmosphere through a photochemical reaction between NOx and VOCs

Ozone Nonattainment Area: Area that does not comply with the National Ambient Air Quality Standard for ozone

PM: Particulate matter (soot) pollutants which are small in size and may be harmful to human health

SIP: Texas State Implementation Plan; describes how the region will come into attainment for ozone

TCEQ: Texas Commission on Environmental Quality, a state agency with jurisdiction over outdoor air quality issues

Traditional Project: Project in which gasoline or diesel fuel will continue to be used after the project is completed, with no advanced fuel saving technologies introduced

VOCs: Volatile Organic Compound pollutants; precursors of ozone.

1.2 Regional Air Quality

Presently, the HGB region is in “severe” nonattainment of the federal ground-level ozone standard. This means that our air contains unhealthy levels of ozone pollution multiple times throughout the year. According to the EPA, “Numerous scientific studies have linked ground-level ozone exposure to a variety of problems, including:

- Lung irritation that can cause inflammation much like a sunburn;
- Wheezing, coughing, pain when taking a deep breath, and breathing difficulties during exercise or outdoor activities;
- Permanent lung damage to those with repeated exposure to ozone pollution; and
- Aggravated asthma, reduced lung capacity, and increased susceptibility to respiratory illnesses like pneumonia and bronchitis.”¹

Ozone is produced through a photochemical (sunlight enhanced) reaction between NOx and VOCs in warm temperatures. Both NOx and VOCs are emitted from vehicles and equipment. NOx is emitted in higher quantities from diesel-powered engines, while VOCs are emitted in higher quantities from gasoline-powered engines.

In accordance with the Federal Clean Air Act, the TCEQ has submitted a legally-binding SIP describing how our region (and other nonattainment regions in Texas) will reduce ozone pollution to safer levels. Currently, our deadline to demonstrate attainment is 2019. If we do not reach this goal, then the region may be penalized for its failure to comply with federal requirements. These penalties may include restrictions on transportation funding and stricter controls on industrial facilities.

Additionally, the Clean Air Act mandates that regional transportation plans must demonstrate “conformity” in the nonattainment areas. Conformity is a process designed to ensure that transportation projects do not undermine air quality

¹ <http://www.epa.gov/oar/ozonepollution/health.html>

goals by inadvertently promoting strategies that will result in increasing auto emissions. Transportation projects cannot be approved, funded, or implemented without a conforming transportation plan.

Finally, it is important to note that ozone is not the region's only air quality problem. Recently, concerns have been raised regarding the levels of PM and air toxics (compounds such as benzene, 1,3-butadiene, trichloroethylene, and hydrochloric acid) in our region, which have been measured at unhealthy concentrations in localized areas. PM and air toxics can cause serious health problems, including cancer, and both types of pollution are emitted by on-road vehicles and off-road equipment. Excess greenhouse gas emissions can cause the climate to destabilize and change rapidly relative to typical natural cycles, with potentially negative impacts to both human societies and species in ecosystems throughout the world.

1.3 The Clean Vehicles-Clean Cities Partnership

Also housed at H-GAC is the Houston-Galveston Clean Cities Coalition (HGCCC). The HGCCC is a chapter of the U.S. Department of Energy's national Clean Cities program, and its mission is to reduce petroleum consumption through the promotion of alternative fuels, technologies and fuel conservation measures. The HGCCC works closely with the CVP to solicit funding, raise awareness, and provide consultative and technical support for Clean Vehicles project evaluation and implementation as needed. In exchange, the program may provide fleet data and applicant contact information to HGCCC staff if requested for outreach or information purposes.

The HGCCC consists of supporters and stakeholders with diverse backgrounds and interests, and is always looking for more participants. For more information about HGCCC or becoming a member, please visit <http://www.mysolutionis.com/fleet-management/clean-cities-coalition/default.aspx> or email the Clean Cities coordinator at cleancities@h-gac.com for more information.

1.4 Other Funding Opportunities

The Clean Vehicles Program is not the only source for information and funding. H-GAC staff encourages interested individuals and organizations to explore other opportunities, including the following.

Special Grant Projects: On occasion, H-GAC becomes aware of special grant opportunities through requests for proposal (RFPs) announced by federal and state agencies as well as other private and public organizations. RFPs vary widely in scope, funding availability, and evaluation criteria. Often, applications for these grant opportunities are enhanced through the collaboration of public and private entities. For those interested in partnering with H-GAC on a special grant project, please email cleancities@h-gac.com. Please provide details on the nature of the organization, who the appropriate contact person is, and what the specific interests and/or constraints are in working on a special project with H-GAC. H-GAC staff will retain this information for future reference, and as appropriate opportunities arise, may make contact to explore a potential collaboration. Depending on the type of the special grant opportunity and the restrictions listed therein, individuals and/or organizations may also be able to apply for and receive a CVP grant to provide additional support to the project. More information is available online at <http://www.mysolutionis.com/fleet-management/clean-cities-coalition/default.aspx>.

Federal and State Tax Incentives and Credits: A number of tax incentives and credits exist for projects involving the research and/or deployment of alternative fuels and advanced auto technologies. The U.S. Department of Energy maintains a comprehensive and up-to-date listing of available credits and incentives, as well as any applicable laws, through the Alternative Fuels Data Center at http://www.afdc.energy.gov/afdc/incentives_laws.html.

Texas Emission Reduction Program (TERP): The State of Texas regularly allocates funding to the Texas Emission Reduction Plan program, which is designed to reduce emissions in nonattainment areas such as the Houston-Galveston-Brazoria region. The TCEQ is the primary administrator of these funds, and their main program website is located here: <http://www.tceq.state.tx.us/implementation/air/terp/index.html>. Smaller portions of TERP funds are sometimes set aside for special focus areas, and are administered by the Railroad Commission of Texas (<http://www.propane.tx.gov/>) and H-GAC (<http://www.mysolutionis.com/fleet-management/texas-emission-reduction-plan/default.aspx>).

Drayage Loan Program: The Houston-Galveston Area Council also administers a revolving loan fund for fleets that do business with the Ports of Houston, Galveston, Texas City, and Freeport. The revolving loan program provides affordable interest rates to owners and operators who may not qualify for loans through the private sector, but wish to upgrade their trucks to cleaner technologies. For more information, please visit the program's website at: <http://www.mysolutionis.com/fleet-management/drayage-loan-program/default.aspx>.

Business Loans and Assistance: Frequently, H-GAC staff receives questions about starting or relocating an alternative fuels or clean air technologies business in the greater Houston area. Qualifying businesses may be eligible to receive a small business loan through a separate H-GAC economic development program. More information about this program is available at <http://www.h-gac.com/community/community/h-galadc/default.aspx>. Also, resources and information are available through the Greater Houston Partnership's Business Resources online portal at <http://www.houston.org/business/>.

Drive a Clean Machine: For individuals looking to repair their older personal vehicles, vouchers may be available through the Drive A Clean Machine program. This program is overseen by the Texas Commission on Environmental Quality, but is administered in this region by H-GAC. For more information about funding availability, eligibility, and application guidelines, please visit <http://www.h-gac.com/human-services/airchecktexas/default.aspx>.

2.0 Overview of the Clean Vehicles Program

2.1 Program Purpose

The CVP is an auto and equipment grant program designed to:

1. Help improve HGB's regional air quality and fulfill regional SIP and conformity requirements
2. Help reduce petroleum consumption and enhance energy independence and diversity
3. Help stimulate the local economy

It achieves these objectives by providing grants to qualifying fleets and fuel providers interested in deploying cleaner technologies. The program is open to any private, public, or nonprofit organizational entity with a base of operations in the HGB region. Individuals may not apply for or receive funding.

Applicants may receive a grant package to cover *up to 75%* of the total eligible project costs. Grant funds may come from a variety of funding sources and be of a variety of types.

The CVP is intended to achieve its objectives through technological, rather than operational changes in fleets. It is not intended to accommodate changes in auto/equipment usage (miles traveled or hours operated) by expanding or reducing fleet size. Rather, its focus is to accelerate the deployment of solutions such that given the same level of usage, existing operations will occur more cleanly.

2.2 Basic Program Requirements

Actions that may generally be considered for funding under the CVP are:

- Auto/equipment retrofit (includes on-board anti-idling devices)
- Conversion of engines to operate on alternative fuels
- Engine repowers
- Auto/equipment replacement
- Installation of alternative fuel and anti-idling infrastructure
- Deployment of noncertified or noncommercialized vehicles/equipment for field testing and demonstration

Regardless of the project type or funding source, ALL projects must fulfill the following **Basic Program Requirements** to be eligible for a grant:

Vehicles/Equipment Eligibility

- Vehicles/Equipment which are included in the application must be in good working order and in current use
- Both current and future vehicles/equipment must be based within H-GAC's thirteen-county region (Austin, Brazoria, Chambers, Colorado, Fort Bend, Galveston, Harris, Liberty, Matagorda, Montgomery, Walker, Waller, and Wharton Counties).
- Both current and future vehicles/equipment must be operated within H-GAC's eight-county nonattainment area for some fraction of their overall usage. Higher usage levels within the nonattainment area will result in higher grant awards.
- Current vehicles/equipment must have been owned/operated by the applicant for at least the past twelve months.
- Vehicles/Equipment intended for replacement must represent accelerated turnover rather than normal turnover. Accelerated turnover is defined to be the replacement of an auto which could have remained in operation at least as long as the length of the proposed project life, given the expected useful life of its engine and its current rate of usage. Alternate definitions of accelerated turnover will be considered by staff on a case-by-case basis as requested.
- Bi-fueled vehicles/equipment are eligible for funding. However, applicants will be required to select one of five future fuel usage scenarios (Fuel 1/Fuel 2: 100%/0%, 75%/25%, 50%/50%, 25%/75%, 0%/100%) prior to the grant award that best meets their needs for business operations and project compliance purposes. This usage commitment will then become contractually binding to ensure the projected emission reductions are achieved.
- Vehicles/Equipment fleets must have an anti-idling policy in place
- Vehicles/Equipment to be purchased as replacements for current vehicles/equipment, must be new, with no previous owners other than the original manufacturer/dealer.
- Vehicles/Equipment funded under the CVP cannot be used to generate credit in any emissions banking and trading program or otherwise credited in the SIP.

- Except for vehicles/equipment submitted for consideration under the Demonstrations and Pilot Projects CFA, ALL retrofits, conversions, and engines must be EPA- or CARB-certified, verified, or otherwise approved.

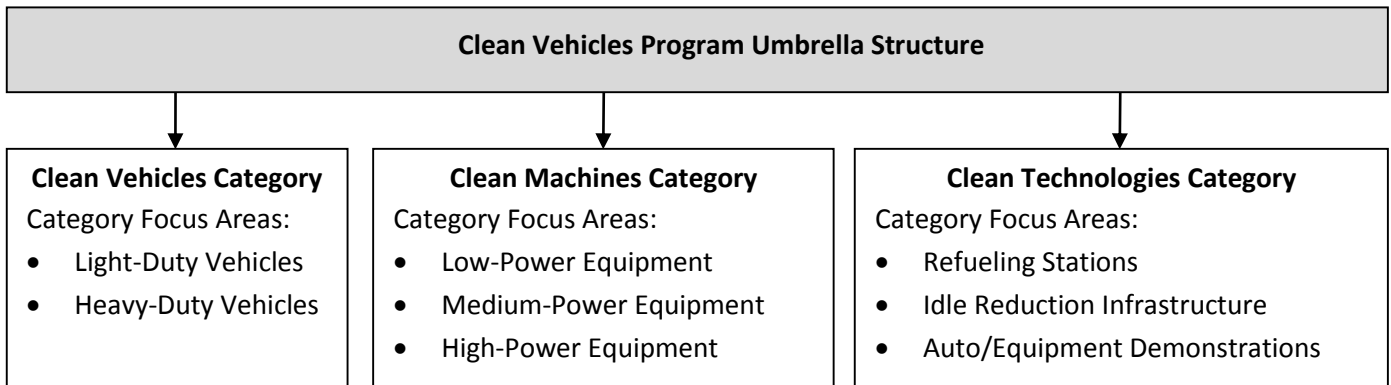
Infrastructure Eligibility

- Infrastructure included in the application must be located within the HGB ozone nonattainment area
- Infrastructure funded under the CVP cannot be used to generate credit in any emissions banking and trading program or otherwise credited in the SIP.

Depending on the funding source and funding type, additional restrictions and/or eligibility criteria may apply. See Section 3.4 for additional information.

2.3 Program Structure

The CVP is an umbrella effort that encompasses three categories: Clean Vehicles (on-road), Clean Machines (off-road), and Clean Technologies (auto/equipment support). Within each category, particular focus areas represent different types of vehicles, equipment, and support. A structural diagram of the Clean Vehicles Program along with brief descriptions defining the scope of each Category Focus Area (CFA) is provided below:



The **Clean Vehicles Category** is designed to assist fleets in upgrading cars, trucks, buses, and motorcycles. Based on the auto weight and type, actions may be classified under either of the following two category focus areas:

- **Light Duty Vehicles CFA:** Includes any passenger car, pick-up truck, SUV, or motorcycle with a gross vehicle weight rating of 8,500 lbs or less
- **Heavy-Duty Vehicles CFA:** Includes any passenger or cargo-carrying on-road truck with a gross vehicle weight rating of 8,501 lbs or more; also includes all transit and school buses

The **Clean Machines Category** is designed to assist fleets in upgrading commercial and industrial equipment primarily utilized off of highways, arterial streets, and other local roads. Equipment sectors included are construction, agriculture, facilities maintenance, port equipment (air, sea, or railyard), marine vessels, and locomotives. Equipment sectors excluded are aircraft, stationary generators, and recreational equipment. Category focus areas are divided according to the size of the engine.

- **Low-Power Equipment CFA:** Includes equipment powered by engines with less than 100 horsepower (<75 kW).
- **Medium-Power Equipment CFA:** Includes equipment powered by engines between 101-750 horsepower (75-560 kW).

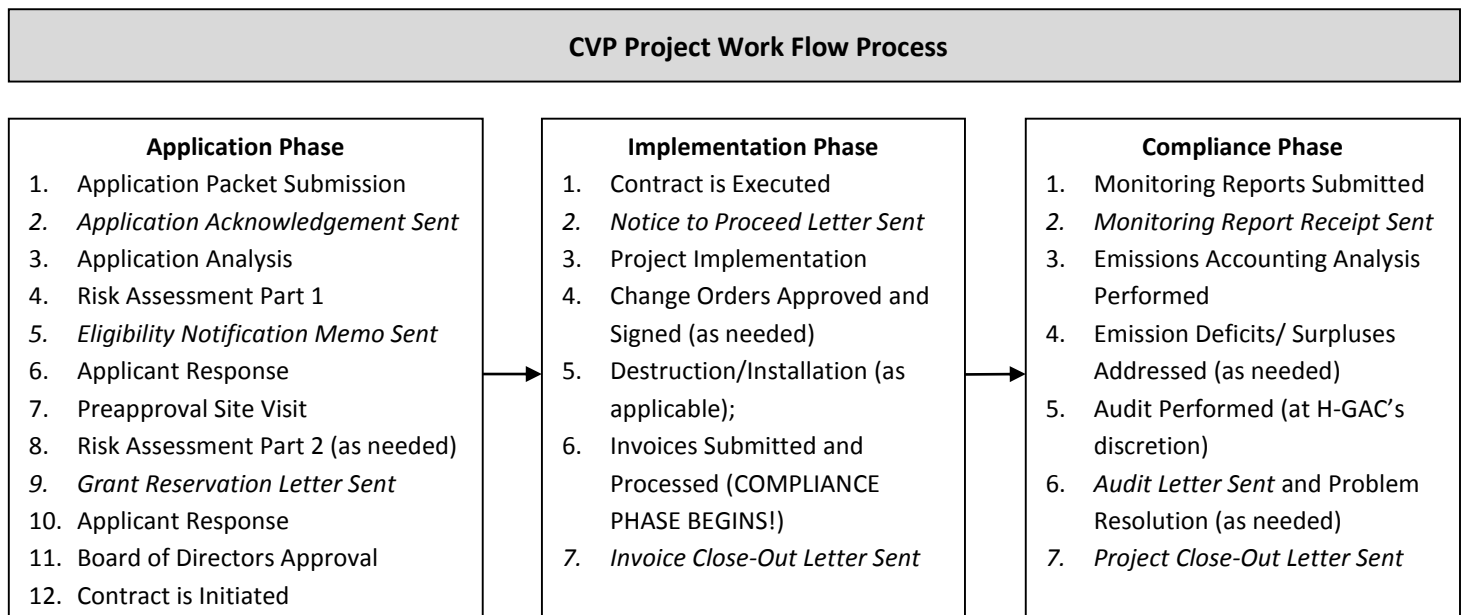
- **High-Power Equipment CFA:** Includes equipment powered by engines with more than 751 horsepower (>560 kW).

The **Clean Technologies Category** is designed to assist applicants in fostering a market environment that promotes the adoption of advanced vehicle designs and cleaner fuels use. It is not intended to fund full-scale research programs or support other upstream activities removed from the immediate operational aspects of fleet management and utilization.

- **Refueling Stations CFA:** Eligible actions are those involving the installation of specialized alternative fuel tanks, pumps, and other equipment at any new or existing stations.
- **Auto/Equipment Demonstration CFA:** Eligible actions are those involving the deployment of noncertified/noncommercialized vehicles or equipment. Infrastructure demonstration projects should apply under the Refueling Stations CFA or the Idle Reduction Infrastructure CFA, whichever is applicable.
- **Idle Reduction Infrastructure CFA:** Eligible actions are those involving the new construction or expansion of off-board infrastructure designed to reduce idling, such as truck stop electrification and marine shore-power.

2.4 Project Work Flow and Key Contacts

Each project in the Clean Vehicles Program is processed through three stages: application phase, implementation phase, and compliance phase. These stages are detailed in the diagram shown below.



Throughout each phase, project managers should expect to receive a formal communication from H-GAC staff at certain milestones within the process. These milestones are shown in italics above. For additional details on each phase, see Sections 3-5.

CVP participants will coordinate with two primary contacts within H-GAC throughout the course of project: the program coordinator and a project specialist. The **program coordinator** represents the CVP to the general public and works with individuals both internally and externally to ensure all projects are handled effectively and efficiently. The program coordinator will assign a project specialist to each project that will be responsible for working with the participant to move each project through the CVP work flow process. The **project specialist** will handle all of the day-to-day tasks and questions related to the project.

3.0 Application Phase

3.1 Application Packet and Submission

Potential applicants are encouraged to contact staff prior to submitting an application with any questions they may have regarding program requirements and/or to receive a qualitative assessment of their prospects for receiving funding under the CVP. H-GAC is not responsible for ensuring the compatibility and/or proper installation of technologies that are included in the application. H-GAC strongly encourages participants to discuss any questions relating to the operation and/or compatibility of equipment with the product vendor and other qualified personnel prior to including it in the application.

There are no application deadlines and so organizations may submit their application at any time. Awards will be granted on a first-come, first-serve basis until funds are exhausted. Only one application is necessary per organization.

Application packets should include the following information:

Checklist	Application Form	Description	Notes
	A	Basic Information Form	Required
	B1	On-Road Vehicle Data	Required for all on-road projects
	B2	Off-Road Equipment Data	Required for all off-road projects
	B3	Uneven Ratio Analysis Request	Optional (See Section 3.2.1.)
	B4	Tiered Analysis Request	Optional (See Section 3.2.1.)
	C	Infrastructure Narrative Cover Page	Required for all infrastructure projects
	D	Signature Form	Required

Applications should be submitted both electronically and in hard copy.

- Electronic copies may be provided either by inclusion of a CD with the mailed hard copy application packet, or by emailing all completed forms to cleanvehicles@h-gac.com.
- Submit the hard-copy application packet to H-GAC at the following mailing address:

Clean Vehicles Program
 Houston-Galveston Area Council
 PO Box 22777
 Houston TX 77227-2777

Street Address:
 3555 Timmons, Suite 120
 Houston TX 77027

Organizations may withdraw an application at any time by notifying staff in writing.

3.2 Application Analysis

3.2.1 ANALYSIS TYPES

Once it is established that the application is complete and that the project meets the Basic Program Requirements (per Section 2.2), an analysis is performed to determine the projected emission reductions and how cost-effective the project is relative to the air pollution benefits that would be achieved by its implementation. There are three types of analyses which may be performed for vehicles, and two types that may be performed for infrastructure.

Traditional (Vehicles): Vehicles or equipment that are to be replaced, retrofit, or converted in a 1-for-1 ratio and which will be used at least as much as the original auto or equipment may be analyzed through a direct comparison of the baseline and future cases. Unless applicants specify otherwise, this is the “default” type of analysis that will be utilized for all vehicle projects. An example of a traditional analysis set-up is shown below:

Traditional Analysis (Example)			
Baseline Unit	Baseline Usage	Future Unit	Future Usage
Unit A	25,000 miles/year	Replacement of Unit A	25,000 miles/year
Unit B	20,000 miles/year	Replacement of Unit B	20,000 miles/year
Unit C	15,000 miles/year	Replacement of Unit C	15,000 miles/year
Unit D	10,000 miles/year	Replacement of Unit D	10,000 miles/year
Unit E	5,000 miles/year	Replacement of Unit E	5,000 miles/year
Unit F	1,000 miles/year	Replacement of Unit F	1,000 miles/year

Uneven Ratios (Vehicles): At the applicant’s request, H-GAC can consider replacement projects occurring in uneven ratios. Due to analysis complexity, replacement ratios are limited to only the following options: 2-for-1, 3-for-1, 4-for-1, and 5-for-1. Where considered, usage levels must remain consistent between the baseline and future cases such that the emission reductions are claimed on the basis of technological rather than operational changes. An example of an uneven ratio analysis set-up is shown below:

Uneven Ratio Analysis (Example)			
Baseline Unit	Baseline Usage	Future Unit	Future Usage
Unit A	25,000 miles/year	Replacement of Units A and B	45,000 miles/year
Unit B	20,000 miles/year		
Unit C	15,000 miles/year	Replacement of Units C and D	25,000 miles/year
Unit D	10,000 miles/year		
Unit E	5,000 miles/year	Replacement of Units E and F	6,000 miles/year
Unit F	1,000 miles/year		

Tiered Analysis (Vehicles): The tiered analysis is designed for vehicles or equipment that are to be replaced, retrofit, or converted in a 1-for-1 ratio, but for which a cascading effect of shifting vehicles from one usage “tier” to another will result in both direct and indirect emission benefits. By capturing these additional benefits, an applicant can qualify for a greater grant award. However, all vehicles/equipment included in the tiered analysis will be subject to CVP contract and compliance requirements, even those not directly funded. Any number of vehicles may be included in the tiered analysis, so long as their connection to the project can be mapped, and so long as each of the vehicles/equipment

included for retrofit, conversion, or replacement represent accelerated turnover. The usage patterns between the baseline case and the future case should not significantly change. An example of a tiered analysis set-up is shown below:

Tiered Analysis (Example)			
Baseline Unit	Baseline Usage	Future Unit	Future Usage
Unit A	25,000 miles/year	Replacement of Unit F	25,000 miles/year
Unit B	20,000 miles/year	Unit A	20,000 miles/year
Unit C	15,000 miles/year	Unit B	15,000 miles/year
Unit D	10,000 miles/year	Unit C	10,000 miles/year
Unit E	5,000 miles/year	Unit D	5,000 miles/year
Unit F	1,000 miles/year	Unit E	1,000 miles/year

Quantitative (Infrastructure): Infrastructure projects depending solely on an anchor fleet(s) will be evaluated quantitatively, assigning a specific emissions benefit to the project. Emission calculations will be based on the vehicles that the infrastructure is serving, and cost-effectiveness calculations will jointly reflect both the applicable vehicle and infrastructure costs. Because of the close linkage between the specific vehicles and the infrastructure in this type of analysis, H-GAC’s contract will be with the primary vehicle fleet, and the primary vehicle fleet will be solely responsible for invoicing and compliance obligations as they relate to both the vehicles and the infrastructure included in the project. As a consequence of this being a quantitative, rather than qualitative analysis, it should be noted that other vehicles served by the infrastructure site, which are not included in the original analysis, are not eligible to receive Clean Vehicles grant funding due to emission credit double counting restrictions.

Qualitative (Infrastructure): Infrastructure projects providing public access, which are not primarily or entirely dependent on an anchor fleet(s), will be evaluated qualitatively. To be considered for a qualitative analysis, infrastructure projects must satisfy three criteria:

1. Inability to generate a technically sound, quantitative emission benefit²
2. Contributes to the attainment of a federal Clean Air Act standard³
3. has the potential to influence travel behavior⁴. Infrastructure projects meeting these criteria will be evaluated instead using a scoring rubric that assesses potential fuel volume through-put, accessibility enhancement, the qualifications/experience of the applicant, and the business plan presented.

Funding eligibility is then determined based on the applicant’s score instead of a cost-effectiveness factor. Because specific vehicles and infrastructure are not linked in this type of analysis, H-GAC’s contract will be with the owner/operator of the infrastructure site, and the owner/operator will be solely responsible for invoicing and compliance obligations independent of any fleet(s) that may frequent the site. As a consequence of this being a qualitative, rather than quantitative analysis, it should be noted that fleets interested in using these infrastructure sites are eligible to receive

² This is understood as being satisfied by including a significant public access component, which is difficult to quantify upfront and even more difficult to verify after deployment.

³ This is understood as being satisfied by supporting the deployment of innovative vehicle technologies otherwise eligible for funding under the Clean Vehicles Program.

⁴ This is understood as being satisfied by demonstrating, through traffic counts on adjacent roadways, that the project will be visible within the community, raising awareness and making the new fuel/technology a practical option for fleets and drivers.

Clean Vehicles grant funding for qualifying vehicles, and will not be disqualified due to emission credit double counting restrictions.

3.2.2 EMISSION REDUCTION CALCULATIONS

Emission reductions for CVP projects will be calculated based on information provided in the application and use of the most appropriate, up-to-date EPA or CARB approved emissions modeling programs (such as MOVES 2016) and/or applicable guidance documents and certifications. The analyst will also incorporate as many current local parameters and corrections as possible, in accordance with current SIP and conformity modeling protocols.

A more detailed discussion of calculation methodology is included in Appendix B. In its most simple form, calculations are performed as follows:

$$\begin{aligned} &(\text{Emissions Rate}) \times (\text{Usage Rate}) = (\text{Emissions}) \\ &(\text{Current Emissions}) - (\text{Future Emissions}) = (\text{Projected Emission Reductions}) \end{aligned}$$

Reductions in all pollutant types are desirable, but not required. Increases in any pollutant are not desirable, but except for NO_x, will not result in a de-facto rejection.

3.2.3 COST-EFFECTIVENESS CALCULATIONS

After a projected emission reduction is calculated, a cost-effectiveness (CE) analysis is performed. A CE factor is a measure of how efficient a project is at reducing a given pollutant over the course of the project's life. There are two types of CE factors. The first is an "actual" CE factor, which describes the efficiency of a project if it were to be fully funded as proposed in the application. The second is a "target" CE factor, which is defined by the CVP evaluation criteria and acts to ensure that the program as a whole maintains a minimum level of efficiency. During the CE analysis, the actual CE factor is compared to the target CE factor to determine if the project is efficient enough to be fully funded, or if a project is only eligible for partial funding.

A more detailed discussion of calculation methodology is included in Appendix C. In its most simple form, calculations are performed as follows:

$$\begin{aligned} &\text{Eligible Project Costs} \times \text{Capital Recovery Factor} = \text{Annualized Project Costs} \\ &\text{Annualized Project Costs} / \text{Projected Annual Emission Reductions} = \text{Cost-Effectiveness} \end{aligned}$$

Generally, the greater the emission reduction achieved, the more efficient it is for CVP to fund a project, and the more money that project may be eligible to receive. However, it should be noted that actual grant awards are subject to the availability of funds and any applicable match requirements. Being eligible for a certain level of funding does not guarantee that that level of funding will actually be awarded.

Since emission reductions are a component of the CE factor, they will necessarily be different if calculated on the basis of one pollutant versus another pollutant. Therefore, for any cost-effectiveness factor, it is necessary to specify what pollutant(s) is being addressed. Typically, a NO_x cost-effectiveness factor will be used for diesel-based projects and a VOCs cost-effectiveness factor will be used for gasoline-based projects. However, this may vary according to funding type.

3.3 Part 1 Risk Assessment

Concurrent with the evaluation of emission reductions and cost-effectiveness, a Part 1 Risk Assessment is conducted for all private and nonprofit applicants. This assessment is performed in order to gauge the reliability of the applicant in fulfilling their contractual commitments and their ability to remain operational throughout the long-term monitoring period. (See Section 5.1 for more information.) The Part 1 Risk Assessment is based on the following factors:

- Number of years in business/operation
- Third party credit score
- Prior history with any H-GAC air quality grant programs
- Professional experience of the prospective contract signatory
- Size of the business/organization

Depending on the risk level that these factors show for each applicant, H-GAC staff will determine if the project should be deemed ineligible due to high-risk or if it may move forward. Projects moving forward that are deemed “low risk” can advance without undergoing a Part 2 Risk Assessment, while those deemed “moderate risk” will require the performance of the Part 2 Risk Assessment. (See Section 3.6 for more information.)

3.4 Grant Package Development

Having determined the anticipated benefits of the project, a grant package will be developed. The amount and type of grant funds included in this package will vary depending on a number of factors including the availability of funding and the specific criteria associated with each funding type.

The specific criteria associated with each funding type consist of a number of “attributes” such as project life, what constitutes an “eligible cost”, what county(ies) the funding is designated for, matching requirements, etc. These will vary according to the specific preferences of the funding source and consequently, not every project will be eligible for every funding type. So, for example, a project may be eligible for SEP funding, but ineligible for CMAQ funding. Attributes for each funding type are compiled into a “Funding Attribute Matrix”, which are a series of tables that list the applicable criteria. Attribute matrices for regularly available funding types such as Congestion Mitigation/Air Quality (CMAQ) funds are available from program staff.

Beyond the funding attributes used in the grant determination process, several other factors are taken into consideration. These include:

- If the applicant has been awarded grants or assistance through other funding opportunities for the vehicles/equipment included in this project (See Section 1.4.)
- How the applicant performed in the Part 1 Risk Assessment (See Section 3.3.)
- If the applicant’s future vehicles will be subject to an open-ended lease agreement (See Section 4.3.)
- If the applicant may qualify for grant monies through the Good Citizen’s Incentive (See Appendix A.)

After considering these factors, the application analyst will assemble the best grant package available and provide an Eligibility Notification Memo (by email or letter) to the applicant, and discuss with them any questions they may have. The applicant will respond in writing about how they wish to proceed, choosing one of three options:

1. Move forward for grant approval for all of the vehicles/equipment submitted in the application
2. Move forward for grant approval with selected vehicles/equipment, withdrawing others from the application
3. Withdraw the entire application

Vehicles/equipment that are withdrawn from the process may be resubmitted for consideration under a new application at a later time.

Please note that in order to ensure the most efficient use of the program’s administrative funding and staff time, projects qualifying for less than \$1,000 in total grant funding will not be accepted into the program.

3.5 Preapproval Site Visit

Following notification by the applicant that they wish to proceed in response to the eligibility notification memo, H-GAC staff will conduct a preapproval site visit (vehicle projects) or a preapproval consultation meeting (infrastructure projects). The purpose of the visit/meeting will be to verify the accuracy of the information contained in the application, and to ensure that several operational features are in place.

Specifically, H-GAC staff will review and/or collect copies of the following documentation as appropriate:

Description	Vehicles	Pre-Existing Infrastructure (to be expanded/modified)	New Infrastructure
Usage logs (miles/hours, fuel)	X		
Maintenance Logs	X	X	
Good working order check	X	X	
Operating/Training Procedures	X	X	X
Workplace Drug Policy	X	X	X
Anti-Idling Policy	X		
Proof of current insurance/liability protection	X	X	X
Proof of current ownership	X	X	
Current financial/bank statement (If needed for Part 2 Risk Assessment)	X	X	X
Three years of personal/corporate tax returns (If needed for Part 2 Risk Assessment)	X	X	X
Current personal budget (If needed for Part 2 Risk Assessment)	X	X	X
Proof of time in operation (not required for public entities)	X	X	X
Building, Business, and Environmental Permits		X	

Portions of the preapproval site visit may be waived at the discretion of H-GAC staff for any previous grant recipients who have a good history with the program. Also, if applicants do not already have the required policies/procedures in place (for example, Drug Policy), H-GAC can provide sample documents upon request to assist the applicant in drafting and implementing any policies/procedures that are lacking.

3.6 Part 2 Risk Assessment

For projects deemed “moderate risk” during the Part 1 Risk Assessment, a Part 2 Risk Assessment will be performed. Factors considered in the Part 2 Risk Assessment include:

- Financial trends
- Liquidity
- Profitability
- Best Management Practices

Part 2 Risk Assessments are conducted during the preapproval site visit through the collection of additional documentation and through staff observations of the applicants’ facilities, equipment, and practices. More specifically, staff will need to review three years of financial statements and tax returns for the applicant if the business is structured as a corporation or limited liability entity. For businesses which are structured as general partnerships or sole proprietorships three years of personal tax returns as well as a detailed current budget and bank statements are needed for review. All financial information collected during this process will be stored in a secure area that is only accessible to authorized personnel.

Depending on the risk level that these factors show for each applicant, H-GAC staff will determine if the project should be deemed ineligible due to high-risk or if it may move forward. Projects moving forward that are deemed “low risk” can advance with standard requirements, while those still deemed “moderate risk” will advance only with the use of supplemental requirements. (See Section 5.3 for more information.)

3.7 Final Approval

Following the preapproval site visit and the Part 2 Risk Assessment (if applicable), H-GAC staff will send the applicant a Grant Reservation Letter (by email or U.S. mail) signifying that grant funds have been reserved for the applicant and describing the final determination of eligibility. The applicant will respond in writing about how they wish to proceed, choosing one of two options: 1) move forward for grant approval for all of the remaining vehicles/equipment included in the application or 2) withdraw the entire application. Vehicles/equipment that are withdrawn from the process may be resubmitted for consideration under a new application at a later time.

For projects still moving forward, staff will then submit the applicant’s grant information to the H-GAC Board for approval. Upon approval of the grant from the H-GAC Board, H-GAC staff will internally initiate the contract process by developing Project Specifications reflective of the amount of the grant funds awarded and the specific work that will be performed under the contract. Participants will also be sent an optional program survey requesting feedback about the efficiency and effectiveness of the application phase of the CVP work flow process.

4.0 Implementation Phase

4.1 Contract Execution

Once a contract has been initiated and drafted, signatures will be collected for the contract's execution. Three copies of the draft contract will be mailed to the applicant. The applicant should sign all three copies and return them to H-GAC staff using the address listed in Section 3.1. Upon receipt of the signed copies, H-GAC staff will circulate the contract internally for signature, and will ensure that a fully executed copy of the contract is returned to the applicant along with a Notice to Proceed letter. The other two copies of the contract will be retained by the H-GAC Finance Department and by the CVP.

The full contract will include the following components:

- General Provisions (specific to whether the participant is a public, private or nonprofit entity)
- Special Provisions
- Assignment of Proceeds (If applicable, see Section 4.3.)
- Alternative Reimbursement Schedule (If applicable, see Section 4.3.)
- Project Scope of Work (one Funding Attributes Matrix for each type of funding included in the grant)
- Project Specifications
- Supplemental Requirements Form (If applicable, see Section 5.3.)
- Sample Invoice Billing Form

Should the applicant have any questions or proposed changes to the draft contract, they should contact program staff to discuss the matter. All substantive changes in the contract language will need to be referred to H-GAC's upper management and/or attorneys for review. A complete set of shell contract documents and sample forms are available from program staff.

Under NO circumstance should the participant begin ordering or purchasing new vehicles/equipment, or destroying old engines, prior to their receipt of a fully executed contract and a Notice to Proceed letter, or the express written consent of H-GAC program staff. Failure to follow this instruction may result in a loss of grant funds.

4.2 Project Implementation

Project implementation may begin as soon as the participant receives a fully executed copy of the contract and a Notice to Proceed letter. Retrofit, engine, and infrastructure installation must be performed by qualified personnel (for example, the vendor, certified mechanics, etc.). H-GAC is not responsible for reimbursing the costs associated with improper installation, the inadvertent installation of equipment that is incompatible with existing equipment, and/or equipment which has manufacturer defects. H-GAC strongly encourages participants to exercise due diligence in assessing and selecting the right products, vendors, and installation personnel for their needs.

Retrofit and infrastructure installation must be documented by the participant photographically, showing major milestones before, during, and after project implementation. Important information, such as engine serial numbers, should be included in the photographs as applicable. Though there is no set list of photographs required at this time for

retrofit and infrastructure projects, photographic documentation should be sufficient for invoice reviewers to clearly see that the project was implemented as outlined in the contract and that the specific request for reimbursement is justified.

For replacement projects, the third-party administered destruction of the old engine and/or chassis will be required. Engine/chassis destruction is necessary to ensure that the engine/chassis will not be resold such that it could continue producing air pollution, thus cancelling the air quality benefits of engine/chassis replacement. Engines/chassis that are to be replaced must remain in use with current registration/inspection stickers until at least 90 days prior to their destruction, and must be destroyed by a certified destruction vendor no later than 90 days following receipt of the new engine/chassis. Noncompliance may result in the loss of grant funds. Complete destruction guidelines are available from program staff.

A list of H-GAC currently approved destruction vendors may be obtained from program staff. The participant and/or their vendor may request that H-GAC add a destruction vendor to the approved list – prospective vendors must review the Destruction Vendor Guidelines, submit an application form, enable program staff to conduct a site visit, and then sign a Vendor Performance Agreement with H-GAC prior to their being approved. H-GAC also encourages program participants to establish their own Performance Agreements with vendors outlining the specifics of their transaction. Upon request, program staff will provide a sample agreement for participants' use. Engines/chassis rendered useless by the destruction process may be sold as scrap. However, monies received for the scrap value will be deducted from the grant award.

On a case-by-case basis, H-GAC staff will consider requests to resell the engine/chassis outside of the United States. In such cases, staff will weigh the potential benefits of resale to other nations which have significantly less stringent engine standards and/or an older average fleet. If approved, the grant recipient will be fully responsible for ensuring the proper and legal export and resale of engines outside of the United States. If H-GAC staff grants a request to resell the engine(s)/chassis outside of the United States, export and resale documentation must be provided in lieu of destruction documentation. The remainder of the auto body may be resold and/or scrapped at the participant's discretion.

4.3 Financing Arrangements and Invoicing Procedures

Participants financing their future vehicles through a lender, or leasing rather than purchasing their future vehicles, will need to submit an Assignment of Proceeds agreement or an Alternative Reimbursement Schedule agreement prior to invoicing, ideally during the contract execution process. (See Section 4.1.)

The Assignment of Proceeds agreement may only be used for a project involving a lender, and requires the agreement of both the contractor and the lending institution. The agreement delineates the lender's responsibilities to H-GAC in case of contractor default, and enables H-GAC to send the grant reimbursement directly to the lending firm.

The Alternative Reimbursement Schedule agreement may be used for projects involving either a lending or a leasing institution, and requires only the agreement of the contractor. This agreement provides for an annual invoicing process over a maximum period of three years, with reimbursements made directly to the contractor rather than the lending or leasing institution. Reimbursements are based on actual payments made to the third party institution. Participants choosing this option should note that if the full grant amount is not invoiced by the end of this three-year period, they will forfeit the remaining available grant funds. Participants leasing vehicles through an open-ended rather than lease-to-own agreement should also be aware that the project life for those vehicles will be capped at three years, which may result in a lower grant award.

Following engine/chassis destruction and/or the actual installation of retrofit or infrastructure equipment, the participant may begin invoicing H-GAC for reimbursement. Complete invoicing guidelines are available from program staff. Invoicing must be completed within one year of the contract start date unless a change order is approved to extend the invoicing period. (See Section 4.4.) When submitting an invoice, the participant should include:

- Original invoices from the vendor
- Implementation documentation/photos (For replacement projects, implementation documentation/photos will be submitted directly to H-GAC staff by the destruction vendor.)
- Completed Invoice Billing Form
- Proof of payment to the vendor(s)
- Proof of current ownership (for new infrastructure sites)
- Proof of building, business, and environmental permits (as applicable, for new infrastructure sites)

All invoices submitted must present the appropriate level of match at the time of billing, in accordance with the proportions specified in the contract. For example, if the contract specifies that 40% of the project is to be funded through CVP, and 60% of the project will be funded by the participant, each invoice submitted must maintain this 40%/60% ratio. Future payments to a lender or other party that have not been actualized at the time of the invoice, do not count as match towards the billing.

Allowable costs may vary by funding types included in the grant package, so please review each applicable Funding Attributes Matrix for more information on what are considered eligible costs. Invoices should be submitted to the address listed in Section 3.1 or by email to cleanvehicles@h-gac.com. Participants should allow approximately 2 months for processing and reimbursement, depending on the type(s) of funding received in the grant award package. At the conclusion of the invoicing period, participants will have 60 days to submit a final invoice, after which H-GAC will send the participant a formal, written notification that the invoicing period is closed. Participants will also be sent an optional program survey requesting feedback about the efficiency and effectiveness of the implementation phase of the CVP work flow process.

4.4 Change of Scope

Participants may request a change of scope to their contract at any time by communicating to program staff in writing the changes requested, and the reason(s) for requesting the changes. These changes may include, but are not limited to:

- Changes to the type of auto/equipment purchased/utilized
- Changes in the usage patterns of the auto/equipment
- An extension of the invoicing period
- Changes to the fuel type utilized
- Changes to the contract amount
- Change in organizational status (for example, mergers, name change, etc.)

If the changes relate to the usage patterns, engine type, or fuel type of any vehicles, equipment, or infrastructure, a reanalysis of the project may be needed, and the approved funding amount may change as a result.

Upon agreement by H-GAC staff to the changes being requested, staff will draft a change order consistent with those changes and send three copies of it to the participant. (A sample form is available from program staff.) Participants

should sign all three copies and return them to program staff. Staff will circulate the change order internally for signature, and will ensure that a fully executed copy of the change order is returned to the applicant. The other two copies of the change order will be retained by the H-GAC Finance Department and by the CVP. The change order will then become part of the contract.

5.0 Compliance Phase

5.1 Quarterly Monitoring Reports and Usage Requirements

Once participants have invoiced H-GAC for the vehicles, equipment, or infrastructure they purchased/installed, they must begin submitting quarterly monitoring reports. Specifically, the first monitoring report should be submitted for the next full quarter (calendar year schedule) following the first invoice payment. For example, if the first invoice submittal took place on February 15, the first monitoring report should be submitted for the period April 1-June 30. Current monitoring report forms are available from program staff. Completed quarterly monitoring reports should be emailed to cleanvehicles@h-gac.com or mailed to the attention of the staff using the information listed in Section 3.1.

Monitoring reports must be submitted for the duration of the project's life, which may vary depending on the type(s) of funding included in the grant, and the type of project being implemented. (Upon request, program staff will provide a copy of the Project Specifications and Funding Attribute Matrix forms, which give more information on project life.) Specifically, the last monitoring report should correspond to the date of the final project payment, plus the project life. For example, if the last invoice submittal was made December 15, 2016, and the project life was five years, the final monitoring report should cover the period October 1-December 31, 2021.

Staff will review the forms to make sure they are complete, and to determine whether or not the project is achieving the emission reductions that were projected based on the information contained in the application. If auto, equipment, or infrastructure in-region usage is more than 30 percent below that identified in the project application, the participant will need to submit a description of any conditions (such as weather, accidents, major maintenance, economic problems, etc.) that significantly impacted usage. If the project's in-region usage does not average out to within 70 percent of the annual usage specified in the application and contract over at least a one-year period (for example, no more than 30 percent below the stated in-region usage), H-GAC will take appropriate action to ensure the emission reductions are realized.

Options for addressing actual in-region usage that is more than 30 percent below that stated in the application and contract include, but are not limited to:

- Extending of the project reporting period for up to two years or as limited by useful life requirements (the latter takes precedence over the former)
- Refunding of grant money in proportion to the loss in in-region usage
- Transfer ownership of the auto or equipment to an entity committed to comply with the contract terms (See Section 5.4 for information on transfer of ownership requirements.)

At the conclusion of the monitoring period, H-GAC staff will perform a final review of the project files to determine that all program and contract requirements have been met, and that all documentation has been submitted. Upon the completion of this review and the fulfillment of any outstanding requirements, staff will send a formal, written notice

to the participant indicating the project has been closed. Participants will also be sent an optional program survey requesting feedback about the efficiency and effectiveness of the compliance phase of the CVP work flow process.

5.2 Audits and Problem Resolution

As part of the contract, the participant may be subject to compliance reviews and/or additional site visits by H-GAC staff over the course of the project's life.

A compliance review is an internal review of the project file by H-GAC staff to identify potential problems, concerns, or areas of noncompliance. If an issue is identified, staff will notify the participant in writing to request that the matter be addressed. If the matter is not addressed to staff's satisfaction, a follow-up site visit will be conducted as described below to ensure all program requirements are being fulfilled.

Additional site visits may be conducted as part of normal auditing protocols and/or as the result of an unresolved compliance review (see above). If conducted, site visits will take place at a mutually agreed upon time by staff and the participant. Items that may be inspected during a site visit include:

- The proper, continued functioning of vehicles, equipment, and/or infrastructure
- Data relating to usage history (mileage, fuel consumption, operational hours, etc.)
- Administrative and financial records relating to the operation of the H-GAC funded vehicles, equipment, and/or infrastructure
- The completion and submission of all monitoring reports (See Section 5.1.)
- Continued use of operational protocols including the Auto/Equipment Operating Procedures, Workplace Drug Policies, and Insurance

The program participant will be notified in writing of the results of the site visit, and of any findings which need to be addressed by the participant. The participant will have 30 days from receipt of this notification to respond in writing to any findings by 1) demonstrating that they have resolved the problem immediately and/or 2) presenting a plan that is satisfactory to H-GAC staff for how they intend to resolve the problem, including a timeframe for resolution. Participants making use of option #2 should notify H-GAC staff in writing immediately following the resolution of the problem, and/or if there is a need for a change to the resolution plan.

If the participant fails to resolve the findings of a site visit to the satisfaction of H-GAC staff, staff will notify the participant in writing that they are in noncompliance of their contract and that enforcement processes will be initiated. Enforcement processes may ultimately result in a refund to H-GAC of any grant monies received and/or other legal remedies. Projects moving to the enforcement process will be referred to H-GAC's upper management and/or attorneys to determine the specific course of action on a case-by-case basis. At a minimum, participants involved in a project requiring enforcement will automatically be flagged and temporarily suspended from further program participation. (See Section 5.3.)

5.3 Supplemental Requirements and Sanctions

Program participants which have a poor compliance history with the CVP (see Section 5.2) and/or are considered to be higher risk due to other factors (per Sections 3.3 and 3.6) may be subjected to greater scrutiny, suspended from program

participation for a limited time, and/or excluded from future program participation at the discretion of H-GAC staff. Factors which may lead to being “flagged” include, but are not limited to:

- Failure to submit quarterly monitoring reports in a timely manner
- Failure to notify staff of contact/organizational information changes
- Failure to notify staff of any significant changes to auto/equipment/infrastructure usage and/or other substantive changes in contract scope
- Evidence that participants are not making a good faith effort in following through with their project commitments as reflected in their application and contract
- Evidence that participants are not making a good faith effort in the resolution of audit findings
- Evidence of submitting intentionally inaccurate or fraudulent data/information to program staff

Measures providing greater scrutiny may include, but are not limited to:

- A requirement to install GPS on all funded vehicles/equipment (may be covered by the grant), and the provision of GPS data to H-GAC staff for review. A list of H-GAC approved GPS vendors [will](#) be provided by program staff upon request.
- Becoming subject to performance-based reimbursement protocols, in which grant fund payments are only made to the participant after monitoring reports and audit requirements are fulfilled satisfactorily. More specifically, the payment schedule will be as follows:
 - 25% of the grant at the time of project implementation
 - 25% of the grant following the first year of reporting
 - 25% of the grant following the second year of reporting
 - the remaining 25% of the grant following the third year of reporting
- More frequent site visits by program staff

In the event supplemental requirements are imposed, staff will draft a Supplemental Requirements Form describing the measures to be taken and send two copies to the participant for signature. (A sample form is available from program staff.) The participant will sign and return the forms, where it will be circulated for signature within H-GAC. At this time the Supplemental Requirements will become part of the contract and H-GAC staff will send a fully executed copy of the form back to the participant for their records.

5.4 Voluntary Early Release

From time to time, circumstances arise which may call for the voluntary early release of vehicles and/or participants from their contractual obligations. For voluntary early release requests, H-GAC requires a thirty-day advance notice prior to the participant selling, relocating, or otherwise removing funded vehicles/equipment/infrastructure from in-region usage. If H-GAC approves the change, the participant may select one of three options to satisfy their contractual obligations:

1. **Termination:** Terminate the agreement as applicable to the item that was released, and provide a prorated reimbursement to H-GAC of the grant funds provided for that item. The reimbursement will be calculated based on shortfalls in in-region usage at the time of early release.

2. **Substitute Equipment:** Select a comparable item that may serve as a substitute and fulfill the remaining contractual requirements as they originally applied to the item that was released. The substitute item must meet the following requirements in order to be approved:
 - A. The substitute item must be acquired within six months of the release, Substitute items may not have been purchased prior to the release or more than six months after the release. “Purchased” is defined as when the contractor makes payment for the item.
 - B. Achieve at least as many documented emission reductions as was originally projected
 - C. Achieve emission reductions as a result of technological rather than operational changes

3. **Substitute Contractor:** Conveyance of contractual obligations to a new party which would take possession of the item and be willing to fulfill the remaining requirements as they originally applied to the primary grant recipient. The substitute contractor must meet the following requirements in order to be approved:
 - A. The substitute must become a party to the H-GAC contract for the item and meet all applicable eligibility requirements (for example, comparable or better in-region usage levels)
 - B. Achieve at least as many documented emission reductions as was originally projected
 - C. Achieve emission reductions as a result of technological rather than operational changes

Please note that Option 3 is only available to contractors that have completed at least two years of satisfactory reporting. (See Section 5.1.)

5.5 Involuntary Early Release

Involuntary early release occurs if vehicles/equipment/infrastructure funded through the program are destroyed or lost through fire, theft, accident, or an act of God (for example, hurricane). In the event of an involuntary early release, the participant is required to notify H-GAC as soon as possible and to submit a Vehicle Loss Documentation Form (available from program staff) describing the occurrence and attach the appropriate documentation. Participants will then be required to choose one of three options to satisfy their remaining contractual obligations:

1. **Termination:** If actual in-region usage levels *did not* reach the minimum required 70% projected usage level (per Section 5.1) prior to the vehicle’s loss, participants may choose to terminate the agreement as applicable to the item that was lost. Participants choosing this option will need to provide a prorated reimbursement to H-GAC of the grant funds provided for that item. The reimbursement will be calculated based on shortfalls in in-region usage at the time of early release.
2. **Substitute Equipment:** If actual in-region usage levels *did not* reach the minimum required 70% projected usage level (per Section 5.1) prior to the vehicle’s loss, participants may choose to substitute a comparable vehicle to fulfill the remaining contractual requirements as they originally applied to the vehicle that was lost. The substitute must meet the following requirements in order to be approved:
 - A. The substitute item must be acquired within one year of the incident. Substitute items may not have been purchased prior to the incident or more than one year after the incident which caused the loss. “Purchased” is defined as when the contractor makes payment for the item.
 - B. Achieve at least as many documented emission reductions as was originally projected
 - C. Achieve emission reductions as a result of technological rather than operational changes

A gap in equipment usage longer than six months (two quarters) due to delays in acquiring the substitute item may require a corresponding extension of the reporting period.

Null Reporting: If actual in-region usage levels *did* reach the minimum required 70% projected usage level (per Section 5.1) prior to the vehicle's loss, participants may choose to submit null reports for the vehicle that was lost through the end of the reporting period. Under this option, participants will continue their quarterly reporting for the lost vehicle, showing no usage each quarter, in order to satisfy the *reporting time requirement* for the project. For contracts for which the lost vehicle is the only vehicle funded, participants may alternatively request a contract amendment (per Section 4.4) to formally shorten the reporting time commitment in lieu of submitting null reports.

Appendix A: Emission Reduction Calculation Methodologies

Appendix A1: Introduction

Per the summary contained in Section 3.2.2, emissions are calculated using the following general form:

$$\begin{aligned} & (\text{Emissions Rate}) \times (\text{Usage Rate}) = (\text{Emissions}) \\ & (\text{Current Emissions}) - (\text{Future Emissions}) = (\text{Projected Emission Reductions}) \end{aligned}$$

Each of the two original terms (emissions rate and usage rate) are derived from more complex calculations based on a variety of assumptions. Sources for these calculations and assumptions include EPA and CARB approved modeling programs (such as MOVES 2016), region-specific data used in the modeling programs, data provided by the applicant, emissions testing and certification results, applicable laws and regulations, vendor information, and academic studies. Calculations may be further complicated by variations due to desired degrees of accuracy. Simplified calculations may be preferable for efficiency but achieve this efficiency by reducing the number of variables considered, and thus, by reducing the real-world accuracy of the calculation. Conversely, some agencies and organizations prefer to use more complex calculations which take into account as many variables as possible but in the process of enhancing specificity, reduce their efficiency.

Thus, it's important to understand that calculating emission reductions is as much an art as it is a science. It is not so much intended to be precise as it is intended to provide a reasonable approximation of real-world trends and orders of magnitude upon which effective decisions can be made. With this in mind, the following sections describe in greater detail the calculation methodologies utilized by CVP. They are not intended to be comprehensive or exhaustive in character. For more specific technical questions, please contact cleanvehicles@h-gac.com.

Appendix A2: Traditional Analysis Procedures

Generation of Adjusted Base Emission Rates

1. An EPA or CARB-approved modeling program, guidance documents, and/or certification documentation will be utilized to generate pollutant **base emission rates** for the auto/equipment type(s) that are under consideration for retrofit, conversion, or replacement.
2. The base rates will be **adjusted** for the use of Texas Low Emission Diesel (if applicable), the installation of any certified retrofits/conversions, and any differences in fuel economy that are not already reflected in the engine certification ratings.
3. The **adjusted base emission rates** are then converted to grams/mile or grams/hour as appropriate.

Generation of Applicant Usage Rates

4. Applicants will supply in their application the following information for **current** auto/equipment usage patterns:
 - Annual In-Region Mileage (Clean Vehicles and Clean Technologies projects only)
 - Annual In-Region Operational Hours (Clean Machines and Clean Technologies projects only)
 - Annual In-Region Fuel Consumption (all projects)
 - Approximate idling time

5. Development of the current usage profile:

- A. The current in-region mileage will be adjusted to account for idling time, which adds wear to the engine that is not reflected in the odometer data. This is done by assuming that wear is proportional to fuel consumption, that light-duty vehicles typically burn 0.5 gallons/hour of idling, and that heavy-duty vehicles typically burn 1 gallon/hour of idling. After adjusting the gallons/hour to account for differences in fuel type, “idle miles” can be approximated by: (idle hours/day)*(days/year)*(unit of energy/hour)*(miles/unit of energy). Therefore, the total equivalent usage in terms of mileage is idling miles + driving miles.
 - i. For bi-fuel vehicles, total equivalent mileage is then apportioned to each fuel type using fuel economy and fuel consumption data. Given that 1) the fuel economy for a given fuel is independent of whether that fuel is utilized 100% of the time or a smaller fraction of the time, and 2) Energy Conversion Ratio = Operational Energy/Total Energy, where “Operational Energy” is the amount of energy that actually does work, and “Total Energy” is the energy input, including energy that is lost as waste and energy that does work.
 - ii. Fuel economy = Total Equivalent Miles/[(Total Operational Energy/Energy Conversion Ratio of the Fuel)/Energy Content of the Fuel]
 - iii. Apportioned Miles = (Fuel Economy of the Fuel)*(Actual Consumption of the Fuel)
- B. The current in-region operational hours will be used without adjustment.
- C. The current in-region fuel consumption will be used without adjustment.

6. Development of the future usage profile:

- A. The future in-region mileage is assumed to be equal to total current equivalent mileage, minus reductions in idling miles due to the installation of anti-idling technologies. Please see Sections 3.2.1 and 5.1 for more information regarding future usage level requirements.
 - i. For bi-fuel vehicles, total equivalent mileage is then apportioned to each fuel type using fuel economy and fuel consumption data. Given that 1) the fuel economy for a given fuel is independent of whether that fuel is utilized 100% of the time or a smaller fraction of the time, and 2) Energy Conversion Ratio = Operational Energy/Total Energy, where “Operational Energy” is the amount of energy that actually does work, and “Total Energy” is the energy input, including energy that is lost as waste and energy that does work.
 - ii. Fuel economy = Total equivalent Miles/[(Total Operational Energy/Energy Conversion Ratio of the Fuel)/Energy Content of the Fuel]
 - iii. Apportioned Miles = (Fuel Economy of the Fuel)*(Actual Consumption of the Fuel)
- B. The future in-region operational hours will be assumed equal to the current in-region operational hours, minus reductions in idling time due to the installation of anti-idling technologies. Please see Sections 3.2.1 and 5.1 for more information regarding future usage level requirements.
- C. The future in-region fuel consumption will be projected based on fuel-specific energy conversion ratios and fuel-specific energy content data. The calculations are performed as follows:
 - i. Given Energy Conversion Ratio = Operational Energy/Total Energy, where “Operational Energy” is the amount of energy that actually does work, and “Total Energy” is the energy input, including energy that is lost as waste and energy that does work.
 - ii. Current Fuel Consumption x Baseline Fuel Energy Content (per unit) = Current Total Energy Consumption
 - iii. Current Total Energy Consumption x Energy Conversion Ratio of Current Fuel = Current Operational Energy Consumption

- iv. Given that Future Operational Energy Consumption is equal to the Current Operational Energy Consumption minus energy conserved as a result of the installation of anti-idling technology, because the amount of work actually performed is held constant
- v. $\text{Future Operational Energy Consumption} / \text{Energy Conversion Rate of Future Fuel} = \text{Future Total Energy Consumption}$
- vi. $\text{Future Total Energy Consumption} / \text{Future Fuel Energy Content (per unit)} = \text{Future Fuel Consumption}$

Calculation of Emission Reductions

7. $(\text{Current Emissions Rate (grams/mile or grams/hour)} - \text{Future Emissions Rate (grams/mile or grams/hour)}) * \text{Current In-Region Usage (miles/year or hours/year)} = \text{Emissions Reductions (grams/year)}$
8. Emission rates are converted to tons/year by:
 $\text{Emission Reductions (grams/year)} * (1 \text{ ton} / 907,200 \text{ grams}) = \text{Emission Reductions (tons/year)}$
9. $\text{Emission Reductions (tons/year)} * (\text{Project Life (years)}) = \text{Total Emission Reductions over the project's life (tons)}$

Appendix A3: Uneven Ratio Analysis Procedures

The Uneven Ratio Analysis is applied to projects in which the applicant wishes to replace vehicles in a 2-for-1, 3-for-1, 4-for-1, and/or 5-for-1 scenario. (See Section 3.2.1.)

The uneven ratio approach will utilize the Traditional Analysis calculation procedures to generate emission reduction rates for each auto/equipment included in the application and for calculating total baseline emissions for each baseline vehicle. However, the future usage profiles will be adjusted such that usage and energy values for each of the baseline vehicles being replaced are summed to generate a single usage value and a single energy value for the future vehicle that is replacing the baseline vehicle group (minus any reductions in idling miles/energy consumption due to the installation of anti-idling technologies). Total emissions for the future vehicle will then be calculated relative to the adjusted future usage profile, and emission reductions will be generated by subtracting total emissions for the single future vehicle from the sum of the total emissions of the baseline vehicle group. Cost-effectiveness will be calculated based on this emission reduction per standard protocols.

Appendix A4: Tiered Analysis Procedures

The Tiered Analysis is applied to projects in which the applicant wishes to quantify the indirect emission benefits from a project, for the purpose of including them in the grant award determination. (See Section 3.2.1.)

The tiered approach will utilize the Traditional Analysis calculation procedures to generate emission reduction calculations for each auto/equipment included in the application. However, instead of using these individual emissions reduction calculations to determine corresponding grant eligibility for each individual auto/equipment, individual emission reductions are instead summed over the group to calculate a “bottom-line” emission reduction between the current and future scenarios. This group-based overall emission reduction will be used to calculate an overall cost-effectiveness for the project and to determine grant eligibility for the project as a whole. The group-based emission reduction and cost-effectiveness values will be the figures included in the contract’s Project Specifications.

Appendix B: Cost-Effectiveness Calculation Methodology

Per the summary contained in Section 3.2.3, emissions are calculated using the following general form:

$$\begin{aligned} \text{Eligible Project Costs} \times \text{Capital Recovery Factor} &= \text{Annualized Project Costs} \\ \text{Annualized Project Costs} / \text{Projected Annual Emission Reductions} &= \text{Cost-Effectiveness} \end{aligned}$$

“Eligible” project costs may vary according to the funding types in question. Generally, these projects costs include the purchase of engines, retrofits, or alternative fuel components/equipment. Please contact program staff for more information about “eligible” project costs.

The capital recovery rate reflects the amortized value of the emissions benefits over time. This factor is calculated as follows:

$$\begin{aligned} \text{capital-recovery factor} &= [(1 + i)^n (i)] / [(1 + i)^n - 1] \\ \text{where } i &= \text{discount rate} \\ \text{where } n &= \text{project life} \end{aligned}$$

The discount rate represents the interest rate that an investment would have yielded if the funds were not expended on the project. At this time, a discount rate of 3% is being utilized. Based on this rate, the formula yields the following capital recovery factors for project life spans ranging from one to twenty years:

Project Life	1	2	3	4	5	6	7	8	9	10
Capital Recovery Factor	1.00	.5226	.3535	.2690	.2184	.1846	.1605	.1425	.1284	.1172
Project Life	11	12	13	14	15	16	17	18	19	20
Capital Recovery Factor	.1081	.1005	.0940	.0885	.0838	.0796	.0760	.0727	.0698	.0672

Once the eligible costs have been determined and the appropriate capital-recovery factor selected, annualized costs are simply calculated by multiplying the two terms:

$$\text{Eligible Project Costs (\$)} \times \text{Capital Recovery Factor (1/year)} = \text{Annualized Project Costs (\$/year)}$$

For the pollutant of interest, the annual emission reductions are recalled and the annualized project costs are divided over this value:

$$\text{Annualized Project Costs (\$/year)} / \text{Projected Annual Emission Reductions (tons/year)} = \text{Cost-Effectiveness (\$/ton)}$$

Once actual cost-effectiveness has been calculated for a project, it is compared to the applicable target cost-effective factor to determine if it may be fully funded. If the actual CE factor is greater than the target CE factor, then the project is not efficient enough, and a reduced amount of the project may be eligible for funding instead. This reduced eligible amount is determined by reversing the calculation:

$$\begin{aligned} \text{Target Cost-Effectiveness (\$/ton)} \times \text{Projected Annual Emission Reductions (tons/year)} &= \text{Annualized Project Costs (\$/year)} \\ \text{Annualized Project Costs (\$/year)} / \text{Capital Recovery Factor (1/year)} &= \text{Eligible Project Costs (\$)} \end{aligned}$$

The reduced eligible amount would be the “eligible project costs (\$)” value solved for in the final equation.