Appendix 8
On-Vehicle Electrification and Idle-Reduction Infrastructure

This appendix outlines the criteria for project eligibility and gives the methods for calculating the reductions in NO_x emissions for an on-vehicle electrification and idle-reduction infrastructure project. The emissions reductions will be estimated using the applicant's information on the type of vehicles or equipment on which the infrastructure is being installed. The emissions reduction for the activity will be the reduction in the idling emissions level in tons of NO_x expected to be produced by baseline vehicles, within the eligible counties.

The emissions standards and emissions factors applicable to this program are contained in a technical supplement, which will be made available in conjunction with these guidelines on the TERP website at <www.terpgrants.org>. Potential grant applicants should contact the TCEQ for copies of the supplement and for answers to questions about which emissions standards and factors to use.

In accordance with Texas Health and Safety Code 386.104(j) and TERP program rules, 30 TAC 114.622(g), the executive director or his or her designee has the authority to waive certain eligibility requirements, based on a finding of good cause. Situations where good cause may be determined and a waiver granted are explained in the discussion of eligibility requirements in this appendix or the appendix applicable to the type of vehicle or equipment activities used to show that emissions reductions will be achieved as a result of the infrastructure project.

The executive director may identify other eligibility criteria for which a waiver may be considered, based on a finding of good cause and subject to the statutory and regulatory requirements. Waiver options will be explained in the grant-application materials.

In determining good cause and deciding whether to grant a waiver, the executive director shall ensure that the emissions reductions that will be attributable to the project will still be valid and, where applicable, meet the conditions for assignment for credit to the State Implementation Plan.

Eligible Activities and Costs

An eligible activity may include the purchase and installation of equipment that enables a vehicle or equipment to use electric power to operate while parked, of the systems normally supplied power by the propulsion engine, or of another onboard internal combustion engine that emits NO_x.

Eligible equipment may include: (1) the add-on of devices to enable acceptance of electricity from an external power source or (2) the purchase and installation on the vehicle or equipment of an auxiliary power unit (APU) to generate electricity.

The TCEQ may also accept, case by case, idle-limiting devices for locomotives, as well as other types of idle-reduction devices.

Note, that in some areas, idling of on-road vehicles may be limited by state regulations. Accordingly, the project emissions reductions used to determine the cost-effectiveness for infrastructure activities in an area with such a requirement may not include the replacement of idling hours of operation for on-road vehicles. Non-road equipment and other eligible uses of the electricity by on-road vehicles are not covered by this restriction.

The TCEQ may further limit the types of eligible activities, and may more narrowly define eligibility requirements, during a particular funding period or by geographic area, as needed to best achieve the objectives of the TERP.

The grant recipient may be eligible for reimbursement of the cost for the purchase and installation of the infrastructure. However, expenses for salaries, travel, land purchases, and overhead, including indirect costs, will not be covered. Costs that may be reimbursed by the TCEQ, subject to its approval, include:

- the invoice cost of the infrastructure equipment, including sales tax and delivery charges;
- the cost of associated supplies directly related to the installation of the infrastructure;
- installation costs;
- reengineering costs, if the vehicle or equipment must be modified to allow for installation of the infrastructure; and
- other costs directly related to the project.

All vehicles and equipment must be owned by the grant applicant, including the vehicle and equipment that will benefit from the add-on or idle-reduction infrastructure. All grant-funded add-on devices, APUs, and other idle-reduction equipment must be purchased and not leased.

Project Criteria

In addition to the eligibility criteria previously presented, the criteria listed below apply to projects involving electrification infrastructure. The TCEQ may impose additional criteria, and may more narrowly define the criteria, during a particular funding period or by geographic area, as needed to best achieve the objectives of the TERP.

- One or more eligible activities of the same project type (i.e., on-road, non-road, locomotive, etc.) that will occur in the same primary area may be included under one project application.
- Infrastructure used to service vehicles and equipment used primarily for competition or recreation is not eligible for funding.
- The cost-effectiveness of a project, other than a demonstration project, may not exceed any limits established by the TCEQ on the cost per ton of NO_x emissions reduced in the eligible counties for which the project is proposed. An activity is not eligible if it is required by any state or federal law, rule, regulation, memorandum of agreement, or other legally binding document. However, this restriction does not apply to an otherwise qualified activity—regardless of the State Implementation Plan's assumption that the change in equipment, vehicles, or operations will occur—if, on the date the grant is awarded, the change is not yet required by any state or federal law, rule, regulation, memorandum of agreement, or other legally binding document. This restriction also does not apply to a purchase of vehicles or equipment that is required only by local law or regulation, or by controlling-board policy of a public or private entity. Projects used to demonstrate a technology that may be used to comply with an emissions reduction requirement may be funded, as long as the reductions directly attributable to the project are not used to comply with those requirements.
- In the areas of the state where TxLED is required, the baseline and reduced emissions-rate calculations for diesel engine use after September 2005 must be adjusted using a correction factor, in addition to any other calculation adjustments.
- An activity involving a new emissions-reduction measure that would otherwise generate marketable credits under state or federal programs for averaging, banking, or trading emissions-reduction credits is not eligible for funding under this program unless:
    - the activity includes the transfer of the reductions that would otherwise be marketable credits to the State Implementation Plan or the owner or operator as provided under Texas Health and Safety Code 386.056, and
    - the reductions are permanently retired.
- The incremental cost of the proposed activity must be reduced by the value of any existing financial incentive that directly reduces the cost of the proposed activity, including tax credits or deductions, other grants, or any other public financial assistance.
- For infrastructure activities, the activity life must be a minimum of five years. The TCEQ will establish the required activity life for each grant period. Not less than 75% of the annual use of the electricity dispensed from the infrastructure, or the idling operation reduced, projected for the activity life, must be projected to take place in one or more of the eligible counties. For infrastructure activities involving

marine vessels, not less than 75% of the annual use of the electricity dispensed from the infrastructure projected for the activity life must be projected to take place in bays adjacent to one or more of the eligible counties, or in the Texas portion of the Gulf Intracoastal Waterway.

- Annual use will normally be measured using hours of idling operation by the vehicles or equipment being replaced by the electricity from the infrastructure.
- The TCEQ will determine an acceptable activity life for infrastructure activities case by case.
- Applicants must agree to monitor the use of grant-funded vehicles, equipment, infrastructure, and fuel, and to report to the TCEQ for the life of each grant-funded activity.
- Applicants must also agree to notify the TCEQ of any changes in the following during the activity life: termination of use; change in use, sale, transfer, or accidental or intentional destruction of grant-funded vehicles, equipment, or infrastructure; or change in use of the qualifying fuel.
- Administrative costs and other internal costs of the grant recipient—including but not limited to personnel expenses, internal salaries, indirect costs, and travel—are not eligible. This restriction also applies when the grant recipient acts as a transportation provider for delivery of the grant-funded vehicle or equipment before or after accepting it.
- Consultant fees for the preparation of a grant application, either directly or as an addition to the cost basis of the grant-funded vehicle, equipment, or engine, are not eligible.
- Fees for a third-party consultant hired by the grant recipient to manage and administer the grant-funded activities, including coordination of the work and submission of reports and paperwork to the TCEQ for the grant recipient, are not eligible. This restriction is not intended to limit the ability of the vehicle or equipment supplier or installer to include reasonable and necessary costs for managing the work to be performed in the price of the vehicle, equipment, or installation. The costs for professional services, including engineering and technical work, required for completion of the activity may be included, subject to the restrictions pertaining to that type of project. Per the Uniform Grant Management Standards, the “cost plus a percentage of cost” method of contracting for professional services must not be used.
- The TCEQ may impose additional criteria for certain projects and funding periods, consistent with these guidelines.

Figure A8.1
Correction Factor for TxLED

The TCEQ adopted rules (30 TAC 114.312–19) requiring that diesel fuel sold or supplied for use in compression-ignition engines in certain counties in Texas must meet low-emission-diesel standards.

The counties affected by the TxLED requirements currently include all those eligible for TERP incentive funding, as listed in Table 3.1, except for El Paso County.

The requirements set a maximum for content of aromatic hydrocarbons of 10% by volume. The requirements also set a minimum cetane number for TxLED of 48.

The TxLED requirements are intended to result in reductions in NO_x emissions from diesel engines. Currently, reduction factors of **5.7%** (0.057) for on-road use and **7.0%** (0.07) for non-road use have been accepted as estimates for use of TxLED. However, these estimates are subject to change, based on the standards accepted by the EPA for use in the Texas State Implementation Plan. The TCEQ will identify the appropriate reduction factors to use in the technical supplement prepared to support these guidelines.

For activities in the applicable counties, a correction factor will need to be applied when calculating the baseline or reduced emissions for diesel engines.

On-road:
TxLED correction factor = 1 – 0.057 = ***0.943***

Non-road:
TxLED correction factor = 1 – 0.070 = ***0.93***

NO_x Emissions Factors

The baseline NO_x emissions factors for this program normally should be the federal standards applicable to the engines being provided the electricity from the infrastructure. The federal NO_x emissions standards for various categories of engines are listed in a technical supplement available from the TCEQ. Potential grant applicants should consult with the TCEQ to ensure they use the appropriate baseline standards.

Calculating Reductions in NO_x Emissions

In general, the emissions-reduction benefit represents the difference in the emissions level of a baseline engine and the auxiliary power unit, if it emits NO_x. For infrastructure to allow a vehicle or equipment to accept electricity from an external source, the emissions-reduction benefit will be the reduction in emissions from the onboard internal combustion engine as a result of the use of electricity.

For APUs and idle-limiting devices on locomotives, the emissions-reduction benefit is to be determined by the reduction in fuel use or hours of idling. Grant applicants should consult with the TCEQ to determine the most appropriate methodology to use

in calculating the reductions in NO_x emissions attributable to these types of locomotive projects.

The reductions in NO_x emissions should be calculated based on information regarding the type of vehicles and equipment using the electricity. The idling emissions level is calculated by multiplying an emissions factor, an activity level, and a conversion factor, if necessary.

Calculating NO_x Idling Emissions Reductions Based on Hours of Operation

For most applications, the idling activity level should be established by the annual hours of idle operation. The calculation of emissions and emissions reductions based on annual hours of operation as the usage factor is determined by the steps shown in Table A8.1.

For activities involving the add-on of idle-limiting devices or devices to enable acceptance of electricity from an external power source, the emissions reductions can be calculated using just the baseline emissions. The APU emissions will be set at zero.

Appropriate baseline NO_x idling emissions factors, APU NO_x emissions standards, and APU load factors appear in the technical supplement to these guidelines. Use the factors most closely associated with the vehicle or engine. Potential grant applicants should consult with the TCEQ to ensure they use the appropriate factors.

Calculating Cost-Effectiveness

Only the amount of incentive funds requested under the program should be used in calculating cost-effectiveness. The incremental costs for each activity must be reduced by the value of any existing financial incentive that directly reduces the cost of the proposed activity, including tax credits or deductions, other grants, or any other public financial assistance.

To determine the cost-effectiveness of an activity—with the exception of qualifying fuel activities—the incentive amount for the activity included in the project must be amortized over the activity life designated by the applicant, at a discount rate of 3%.

The following amortization formula yields a *capital-recovery factor* (CRF).

$$\text{capital-recovery factor} = [(1 + i)^n (i)] / [(1 + i)^n - 1]$$

where i = discount rate (3%)
n = activity life

The discount rate of 3% reflects the opportunity cost of public funds—the level of earning that reasonably could be expected by investing state funds in various financial instruments, such as U.S. Treasury securities.

Table A8.1
Calculating the Idling NO_x-Emissions Reduction Based on Annual Hours of Operation

Applying the TxLED Correction Factor

The counties affected by the TxLED requirements currently include all those eligible for TERP incentive funding, as listed in Table 3.1, except for El Paso County.	
TxLED correction factor for on-road: *1 – 0.057*	0.943

Calculate the NO_x Idling Emissions Reduction

Baseline		APU	
Idling NO_x emissions factor (g/hr)		APU NO_x emissions factor grams per brake horsepower-hour (g/bhp-hr)	
		× TxLED correction factor *(diesel engines only)*	
× TxLED correction factor *(diesel engines only)*		× APU load factor	
		× APU horsepower	
= NO_x emissions factor (g/hr)		= NO_x emissions factor (g/hr)	
Baseline g/hr – APU emissions (g/hr)			
× annual idling hours			
× percent within eligible counties (%)			
= g/yr			
		÷ 907,200 grams per ton	
= estimated annual NO_x-emissions reduction (tons/yr)			
× activity life (years)			
= estimated activity-life NO_x-emissions reduction (tons)			

The incentive amount should be multiplied by the incremental cost or incentive amount requested to determine the annualized cost.

$$incremental\ cost \times CRF = annualized\ cost$$

The cost-effectiveness calculations appear in Table A8.2. Capital-recovery factors for up to 20 years appear in Table A8.3, for use in the calculations.

Table A8.2
Calculating Cost-Effectiveness

Step 1. Determine the capital-recovery factor (CRF)	
CRF = $[(1 + i)^n (i)] / [(1 + i)^n - 1]$ i = discount rate (.03) n = activity life	
Capital-recovery factor:	
Step 2. Determine the annualized cost	
Incentive amount × CRF = annualized cost	
Annualized cost ($/year):	
Step 3. Determine cost-effectiveness	
Annualized cost ($/year) / annual NO_x-emissions reduction (tons/year) = cost-effectiveness ($/ton)	
Cost-effectiveness ($/ton):	$

Table A8.3
Capital-Recovery Factors Using a Discount Rate of 0.03

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

For projects that include more than one activity, the total project incentive amount should be used to determine the cost-effectiveness of the project. The applicant may request an incentive amount that is less than the full incremental costs, in order to meet the cost-effectiveness criteria.

To determine the cost-effectiveness: First sum all of the annualized costs for the activities included in the project. Also sum the annual emissions reductions from each activity to determine an annual emissions reduction for the project. Then divide the combined annualized costs for all activities included in the project application by the total annual reductions in NO_x emissions for the combined project activities.

total annualized costs / total annual NO_x reductions = project cost-effectiveness