RESPONSE TO PEER REVIEW COMMENTS

The American Carbon Registry (ACR), in collaboration with IdleAir Technologies Corporation, has developed a draft *Methodology for GHG Emission Reductions through Truck Stop Electrification*. The methodology applies to truck stop electrification (TSE) projects in which diesel engine idling by parked long-haul trucks is reduced through the use of single-system electrification technologies operating with the truck's main propulsion engine shut off. The current version of the methodology applies only in the United States. Baseline emissions are calculated using USEPA emission factors for diesel engines idling at different RPM levels. Project emissions from the consumption of grid-connected electricity are calculated using USEPA Emissions & Generation Resource Integrated Database (eGRID) data for specific electricity generating companies, regions or states. The methodology addresses boundary definition, baseline determination, additionality, quantification of baseline and with-project GHG emissions, leakage, uncertainty, data collection and monitoring requirements, quality assurance/quality control, ownership of emission reductions, and permanence.

The methodology was posted for public comment on the ACR website from August 9 through September 2, 2011. No comments were received.

Following public consultation, the methodology was submitted to three peer reviewers, experts in the field of engine idling, truck stop electrification and GHG emissions. Peer review comments and responses are given below.

General / Overall Comments by Peer Reviewers

	1st review	Response	2nd review	Response	3rd review	Response	Final
	• The authors need to utilize current scientific studies as the basis for assumptions. Numerous generalizations need to be replaced with referenced data. For example, current emissions rates need to be included. Idling duration, fuel consumption, temperature at which idling occurs, and RPM need to be based on evidence/data. • The treatment of temperatures needs to be consistent. • The guidelines for estimation of uncertainty need to be completed. • The terminology is confusing and the writing overall needs to be improved. For example, definitions for uncommon terms, such as those used in the ACR Standard, should be included together, early in the document. There is considerable repetition and excessive language even for a rough draft. • There are many website references, and those websites could change. Use more enduring reference information. *Specifics are provided in the following sections.*	We thank the reviewers for these comments. Please see the specific sections below where each comment is addressed.	N/a	N/a	N/a	N/a	N/a

1 Background and Applicability

	1st review	Response	2nd review	Response	3rd review	Response	Final
1	It should be noted that in-cab air quality is generally	Completed; see page 4	No comment	N/a	N/a	N/a	N/a

	1st review	Response	2nd review	Response	3rd review	Response	Final
	better using Idle Aire devices. Lee, Zietsman, Farzaneh, 2009. http://tse.tamu.edu/pdfs/InCab_TRR.PDF	and footnote 6.					
2	The current mandate of 10h rest for every 14h of driving should be included and properly referenced.	Completed; see footnote 2.	No comment	N/a	N/a	N/a	N/a
3	The descriptions of the different idle reduction methods need to be improved. These are clearly characterized in the literature and should be referenced.	A fuller list of the options has been added to section 1.1.	No comment	N/a	N/a	N/a	N/a
4	There are many acronyms missing: ERT, VER, CH4, N2O…	See response to comment 6 – any definitions and acronyms defined in the *ACR Standard* are not repeated in methodologies.	No comment	N/a	N/a	N/a	N/a
5	The term "method" should be used to refer to the method by which carbon credits for electrification will be evaluated OR the actual construction and use of electrified parking spaces. The dual use is confusing.	The term "method" appears only twice in the document, once clearly referring to ACR methods. The other was changed to "approaches."	No comment	N/a	N/a	N/a	N/a
6	Terms such as leakage, permanence, and additionality need to be defined up front if their use is required.	As noted in section 1.4, all definitions in the latest version of the *ACR Standard* apply, and the methodology only defines terms not defined in the *ACR*	No comment	N/a	N/a	N/a	N/a

	1st review	Response	2nd review	Response	3rd review	Response	Final
		Standard. Projects applying this methodology are required to comply with all relevant eligibility criteria, requirements and definitions in the latest version of the *ACR Standard.* Besides avoiding redundancy and keeping the methodology shorter, there is a practical consideration here: referencing the latest version of the *ACR Standard* makes it unnecessary, in the event a definition or requirement should be updated in the *Standard*, for ACR to revise and re-publish all existing methodologies to make them consistent.					
7	Page 3: The claim of 90% CO2 reduction is higher than the reviewers would anticipate. Reference the source/method for this assertion. See Gaines, Transportation Research Board 09-3395, 2009.	The percentage reduction is actually quite variable, so we put in "up to" 90% on page 3. The CO_2 reduction is basically the difference	Documentation/ reference still needed.	The 90% claim is actually irrelevant to this methodology, since it was just part of the background material and not a variable used in any	OK	N/a	N/a

	1st review	Response	2nd review	Response	3rd review	Response	Final
		between the emissions factor used for the idling and the indirect emissions from the power supplied. In a section of the country with a great deal of hydropower, an extremely cold night that would have led to a high-level of idling would mean a higher CO_2 reduction than a coal-dominated grid and a mild night. An example for California is now given in footnote 5.		formula to calculate GHG emission reductions. We took out the 90% and replaced with "substantial."			
8	Page 3: 40 TSE locations currently. There were 130 previously. (See later note- #9 under 3 Baseline Scenario and Additionality)	There used to be 130, but many went out of service, so today there are about 56. Number changed.	No comment	N/a	N/a	N/a	N/a
9	Page 4 top: "TSE will pave the way to an efficient, sustainable freight industry" should be replaced with "TSE could play a small but measureable role in mitigating GHG impacts from truck freight movement."	Agreed; suggested wording has been incorporated on page 4.	No comment	N/a	N/a	N/a	N/a
10	Please explain why dual system TSE doesn't count.	Dual systems require additional equipment to provide heating and	Dual systems should be included with	We still believe that dual-systems should be excluded. The reason is	The reviewers do not understand the	*ACR comment*: while a methodology applying also to dual	*ACR decision*: initial methodology

	1st review	Response	2nd review	Response	3rd review	Response	Final
		cooling. They are left out of the methodology because of the complications associated with measuring whether the TSE power would be meeting the requirements for this additional equipment or not. With a single-system, no additional equipment is required and all potential needs for a trucker are bundled together; thus, it's very clear the impact the TSE system is having.	some assumptions made as needed and a thorough description and clarification.	that single-systems provide heat and cooling (the primary reason for idling) directly to the cab of the vehicle, so when a truck hooks up to a TSE system, we know that the kWh used for that TSE system is displacing the need for idling. With dual-systems, an electric-powered heating and cooling unit are installed directly on the truck, and they simply plug into the outlet to consume electricity. However, it is not clear how much of that power is used for heating and cooling – as opposed to other on-board uses of electricity – and therefore is it not clear how much idling is being displaced. Given this uncertainty, we felt it was conservative and appropriate to exclude dual-systems. If, however, the reviewer insists that dual-systems be included, a process for estimating the true displacement of	argument that the electricity from a dual system could be used for something else beyond what IdleAir provides and therefore might not be displacing idling. What power use is there that wouldn't have been supplied by idling but would be supplied by shore power?	systems might be useful, it is acceptable for the methodology author to make this version narrower in scope. A future methodology modification could expand its scope to dual systems.	applying only to single systems is acceptable.

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				idling would be required. We could suggest a default or discount, saying that the grams of CO2/hr should be reduced by X% in order to account for the uncertainty surrounding dual-systems. It is not clear how to come up with a default except to make it very conservative (perhaps discounting the baseline emissions rate by one-third). We also argue that the current methodology could allow single systems only for simplicity, meeting the needs of IdleAir; if another project proponent in the future wished to expand the methodology to dual systems, this will be done via ACR's methodology modification process.			

2 Project Boundaries

	1st review	Response	2nd review	Response	3rd review	Response	Final
1	Define "sinks".	Term is defined in *ACR*	No comment	N/a	N/a	N/a	N/a

	1st review	Response	2nd review	Response	3rd review	Response	Final
		Standard but has been removed throughout the section since not needed. This methodology deals only with sources of GHGs and the reductions of these sources, not with GHG sinks (forests etc).					
2	The word "are" is missing in Section 2.3. "…excluded from accounting either because they ARE insignificant…"	Correction made on page 8.	No comment	N/a	N/a	N/a	N/a
3	Page 8 top paragraph: emissions from disposal should be included. Evidence should support these overall emissions being considered insignificant.	It is quite difficult to obtain emission estimates from the disposal of TSE systems at the end of life. Our position that these emissions can be excluded are based on the following considerations: • Most of the materials associated with TSE systems are metal and can be sold for scrap and recycled – in which case, this metal could be displacing the production of	Were the materials from the installations that went out of service sold for scrap or recycled? Reference whatever the process was and include the justification in the methodology.	The vast majority of the material for the old installations was recycled for the new installations going into service, and the rest was sold for scrap. It is safe to assume that the discarded steel and other metals from the old installations, which has a market value, was used for other purposes. Thus, we can also assume that the majority of the recycled materials were used for purposes that would have otherwise required virgin metals. We know that production of virgin steel and other	OK	N/a	N/a

	1st review	Response	2nd review	Response	3rd review	Response	Final
		more energy-intensive virgin materials. • Whatever components are landfilled would not be causing any additional emissions, as opposed to organic wastes. • The only other emissions would be the transportation of the systems to and from the truck stops at the beginning and end of life. We are under the impression that other projects, such as landfill gas projects, do not require the consideration of transporting methane collection or energy-production systems to and from the		metals is more energy and carbon intensive than use of recycled materials. Therefore, the overall leakage associated with the scrapping of old TSE systems is either neutral or net positive and does not have to be considered in the overall life-cycle emissions of a TSE unit.			

	1st review	Response	2nd review	Response	3rd review	Response	Final
		landfill sites.					
4	The reviewers suggest the using full fuel cycle emissions. See the ANL GREET model, http://greet.es.anl.gov/.	We did not consider the GREET model because we believed it to be more focused on vehicles on the road as opposed to idling. We also used the California Air Resources Board's Motor Vehicle Emissions Inventory (EMFAC) model over GREET because the GREET model does not appear to allow for different operating modes and to distinguish for cruise vs. idle – whereas EMFAC does separate these operating modes. If by "full fuel cycle", the reviewers are proposing that the methodology consider the emissions associated with oil extraction, refining and transportation, leaving those emissions out would be conservative as Baseline Emissions would be lower when excluding these	Upstream impacts for electricity generation are non-trivial. Thus ignoring upstream impacts is not conservative either. This is especially true if some of the power is from natural gas, because upstream CH4 emissions can be significant.	Thank you for this clarification. We interpreted the original comment as referring to the upstream emissions on the baseline scenario side – i.e. upstream emissions from production, refining and transport of the diesel fuel used in the baseline scenario – which it would be conservative to exclude. If the reviewers are referring to upstream emissions on the project side, i.e. upstream emissions from the production of electricity used by TSE systems in the project scenario, it is true that it is not conservative to exclude these emissions, though per *ACR Standard*, they could still be excluded if insignificant (*de minimis* rule). We believe the emissions that could be connected to a TSE facility do meet this *de minimis* criterion.	The upstream emissions estimates need to be provided. Only once the upstream estimates are presented will it be possible to determine their significance and hence justification for exclusion.	*ACR comment*: ACR accepts the methodology author's rationale that upstream emissions from electricity production (as opposed to direct emissions from electricity generation, which are included as project emissions) are likely to be insignificant. More to the point, no other ACR methodologies (or other voluntary or compliance protocols) include such upstream emissions within the project boundary. The *ACR Standard* does not require a full lifecycle accounting approach.	*ACR decision:* it is acceptable to exclude upstream impacts associated with electricity generation from the project boundary. Direct emissions from electricity generation are included as project emissions, calculated using eGRID factors, and subtracted from baseline emissions.

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		upstream emissions. We have added the following paragraph to section 2.3: *Life-Cycle Emissions from Avoided Diesel Use*. This methodology classifies as baseline emissions only the direct emissions from diesel combustion by the truck engines. A hypothetical alternative would be to estimate the full life-cycle emissions from diesel, including upstream emissions from production, refining and transport, and credit these to the TSE project since it reduces use of diesel. However these emissions are complex to quantify. It would also be difficult or impossible to ensure no double-counting, since the TSE project proponent does not have title to the upstream emissions,		Let's say we have an 800 MW gas-fired power plant. That power plant may generate 5,300,000 MWh in a typical year, assuming a fairly conservative capacity/load factor. Loss and unaccounted for losses in a gas pipeline might be in the range of 0.05% (which is likely quite high). An 800 MW power plant would likely consume around 570,000,000 cubic meters of natural gas in a typical year. If we assume that 0.05% leaks, there would be a loss of 2,850,000 m3 and assuming a density of .0007168 tCH4/m3CH4, multiplied by the GWP of methane (21), that would equal 42,900 tCO2eq in fugitive emissions from that gas-fired power plant. Of those 5,300,000 MWh from that gas plant, perhaps about 40 MWh/month (using approximate data from the original protocol			

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		and therefore could not prevent the upstream sources responsible for diesel production, refining and transport from claiming those emission reductions from reduced diesel. Considering these difficulties in both quantification and title, and considering that not including the upstream emissions in the quantification of baseline emissions is conservative – will result in lower-than-actual baseline emissions, and thus lower-than-actual emission reductions credited to the TSE project activity – we believe the upstream emissions should be excluded. This is consistent with the ISO 14064-2 principle of conservativeness.		submission) or 480 MWh/year would go to a TSE facility. Thus, the losses attributed to electricity use by the TSE facility itself would be 480/5,300,000 or .009% * 42,900 = 3.88 tCO2eq. Again using the original protocol's example of 2,477 tCO2 reduced/yr, the impact of upstream CH4 emissions would be 3.88/2,477 or 0.15%. And that does not even take into account that gas-fired plants make up only a portion of the electricity mix (in addition to coal, hydro, nuclear and renewables). Thus, we believe the upstream emissions are truly negligible and can be excluded.			
5	Given the 2000 start date, different emissions factors need to be used for early 2000 MY trucks	We didn't feel the need to take this into account	Emit or burn? (this section	Correct. Our response to the 1st review should have	OK	N/a	N/a

	1st review	Response	2nd review	Response	3rd review	Response	Final
	than for current trucks. A 6 year crediting period is more appropriate.	because project years do not necessarily equate to truck model years. A 2012 TSE site can engage any combination of truck models years, makes, or engine types. Recent EMFAC data (with data derived from West Virginia Data Sets) suggests that CO_2 emitted from Heavy Duty Trucks has little variability. For example, model years 1998 – 2002 burn 11,145 grams per hour (High Idle for summer), whereas newer truck years 2003 – 2009 burn 11,349 grams per hour high idle. This also suggests that CO_2 emissions are increasing, at the benefit of lowering NOx emissions for regulation purposes. Should this continue to be an issue, we can discuss adjusting the first year the projects would be	deals with emissions)	more precisely stated "emit," not "burn."			

	1st review	Response	2nd review	Response	3rd review	Response	Final
		eligible.					
6	Second sentence under assessment boundary: typo	Same as Comment 2? If so, corrected.	No comment	N/a	N/a	N/a	N/a

3 Baseline Scenario and Additionality

	1st review	Response	2nd review	Response	3rd review	Response	Final
1	Paragraph 2: "There are various…" is unclear. Reference these and their relevance.	This paragraph simply described existing approaches to baseline determination in GHG offset protocols. We agree it was distracting and unnecessary, so the paragraph has been removed.	No comment	N/a	N/a	N/a	N/a
2	One of the reviewers did not understand why a baseline was needed. The usual use of baseline emissions (emissions at the truck stop with no TSE present) does not seem to be how "baseline" is used in the paper.	The baseline is indeed the expected emissions at truck stops in the absence of any TSE systems; that is, trucks continuing to idle their engines to regulate temperature and power accessories, at rates typical for the industry when no TSE option is available. All GHG offset projects require a baseline – a "counterfactual scenario that forecasts the likely stream of emissions or removals to occur if the Project Proponent does not implement the project, i.e., the 'business	No comment	N/a	N/a	N/a	N/a

	1st review	Response	2nd review	Response	3rd review	Response	Final
		as usual' case" (*ACR Standard*). To calculate emission reductions creditable as offsets, the emissions associated with the baseline scenario (idling) are calculated and project scenario emissions (from the use of grid power by TSE systems) are deducted from baseline emissions. A baseline is needed to determine what would have happened if the TSE installation were not there. Here that baseline is determined by measured hours of TSE use multiplied by an emissions factor based on diesel engine idling.					
3	Third paragraph: "In the absence of the project activity, the methodology assumes drivers idle their engines to deliver heating and cooling…" This is an over estimation.	As mentioned in Footnote 14, we did find a study that showed the main reason for idling trucks was for cab comfort, not other uses such as small electronic devices. It is also reasonable to assume that many small devices could be charged by the truck battery when driving or be powered by the truck battery at night. Again, outside of heating and cooling, the potential for	Remove	Item has been removed	N/a	N/a	N/a

	1st review	Response	2nd review	Response	3rd review	Response	Final
		electricity usage is quite small in a vehicle. This would seem to be substantiated by the fact that TSE usage tends to spike in weather extremes (summer and winter). However, since the statement is more background and not necessarily directly related to key assumptions in the baseline scenario, we could take it out.					
4	Next paragraph: "When away from home long-haul drivers rest in the truck for periods that average 8 to 12 hours per day. And 12 to 17 per weekends." These numbers are higher than indicated in current studies. Replace with referenced numbers.	Similar to the last comment, we can remove this statement since it is not directly relevant to determining the baseline scenario. Baseline emissions as calculated in the methodology will be based on actual hours of TSE system use, not industry averages (see section 4.1, which discusses the activity data from which baseline and project emissions are calculated). It is challenging to find exact numbers, and these numbers are based on the level of TSE usage that does occur in IdleAir's experience. Again, we can amend to provide a wider range or even remove the	Remove or state at Idle-aire locations.	Statement has been removed	N/a	N/a	N/a

	1st review	Response	2nd review	Response	3rd review	Response	Final
		statement.					
5	On page 10 under TEST1: "Project proponent presents evidence …that anti-idle regulations are routinely not enforced." Enforcement levels can change daily and are difficult to prove. Include a method by which to prove non-enforcement over the long term.	We agree non-enforcement is difficult to quantify and prove, but not impossible. See the new proposed language on p. 12 for demonstration of non-enforcement.	The following statement is not clear "If tickets or fines are given for less than 1% of overnight or layover periods for truck drivers,.." It is not clear what 1% of layover period means – should it be 1% of truck visits?	Yes, 1% of truck visits is an accurate way to express this .	OK	*ACR comment:* note also that the latest version of the methodology incorporates an Anti-Idling Law Enforcement Factor (AILEF) index reflecting the level of anti-idling enforcement in a particular state or region and discounting baseline emissions by this index.	N/a
6	First paragraph under TEST2: The practice – based standards portion needs to be clarified.	The paragraph has been clarified.	No comment	N/a	N/a	N/a	N/a
7	On page 12 second paragraph: Define "unregulated" travel centers.	Term has been removed.	No comment	N/a	N/a	N/a	N/a
8	Last sentence of the second paragraph: "..need to document financial, institutional, or technological implementation barriers." This needs to be explained better and used with examples.	We have removed the sentence to avoid confusion. To demonstrate additionality ACR allows either the performance standard approach adopted in this methodology, or documentation of financial, institutional or technological	No comment	N/a	N/a	N/a	N/a

	1st review	Response	2nd review	Response	3rd review	Response	Final
		implementation barriers. The point here was that if a project has less than a 1% penetration rate, it can automatically be considered additional and ACR does not require the project proponent to document financial, institutional or technological implementation barriers. It would be an option to specify a certain level of penetration -- say 5% or 10% -- beyond which the TSE project is no longer considered automatically additional, but still could qualify as additional by documenting implementation barriers. However since the current level of penetration is currently under 1% according to our calculations, for the moment it seems unnecessary to address this hypothetical scenario. The performance standard data will be reassessed periodically – as specified in the methodology, at least every 10 years – to ensure that the use of TSE systems is still not					

	1st review	Response	2nd review	Response	3rd review	Response	Final
		common practice.					
9	The numerous previous TSE locations should be discussed.	As mentioned previously, the number of TSE stations was around 130, but the number was reduced significantly when the original company went out of business. Currently, 56 installations are listed on the website cited in the methodology document.	No comment	N/a	N/a	N/a	N/a
10	The last sentence in the third paragraph and the sentences in the fourth paragraph should be referenced. Available, non-proprietary studies should be included in addition to the proprietary data.	We assume this comment refers to the third and fourth paragraphs in section 3.1, regarding truckers' rest and driving patterns. If so see our response to comment #4. This data is extremely difficult to come by; we have not seen any reliable studies on the matter. In any case the typical hours of rest serve here more as background information and are not directly pertinent to determining the baseline scenario. Baseline and project emissions are calculated based on whatever hours the TSE system is actually used. See section 4.1, which discusses the activity data from which baseline and project emissions	Remove hours.	Item has been removed.	N/a	N/a	N/a

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		are calculated.					
11	The parking space growth rate estimates and truck use data are a decade old. As acknowledged, economic changes have occurred that may affect parking and use. An effort should be made to identify more recent information (e.g., ATRI, Iowa State U).	More comprehensive data has been difficult to acquire. Some states, such as Iowa and Minnesota, have state-specific studies, although the limited number of studies makes it difficult to develop national-level assumptions with a high degree of confidence. In any case, we believe that if there were any major change in parking space growth rates, it would not make a material impact on the additionality determination. The TSE penetration rate is still tiny, and if the rate of parking space increase were 1% or 15%, that penetration rate would still be extremely low. We were able to find more recent data on truck use and emissions, which is referenced in section 4 of the new version.	State reliable data difficult and decade old date used, and limitations.	Statement put into the methodology.	N/a	N/a	N/a

4 Quantification of Baseline and Project Emissions

4.1 Activity Data

	1st review	Response	2nd review	Response	3rd review	Response	Final

	1st review	Response	2nd review	Response	3rd review	Response	Final
1	Define TSE System, project, facilities, spots, parking places, etc. Include earlier in the document.	These terms have been added to the definitions list in section 1.4.	No comment	N/a	N/a	N/a	N/a
2	Clarify whether the approach is applicable for completed projects (operational systems) and not planned projects. Mention this at the beginning of the document.	Completed projects are acceptable as long as they comply with the *ACR Standard* requirements on additionality and start date.	Is this clarified in the document?	Statement put in document. See section 2.2.	N/a	N/a	N/a
3	Page 13, third paragraph: "…electric power usage on a site by site basis allows the calculation of both hours of idle reduction and kWh consumed". Clarify consistently thoughout the document whether the TSE usage will be calculated based on electricity or there will be actual TSE usage data.	The following has been inserted into the document: TSE usage will be measured by a mechanism separate from electricity metering. The truck will drive up to the TSE unit, open a module to swipe a credit or member card. Then the billing will start hourly. When the driver disconnects, another time stamp will occur, which is logged into a database. This is how TSE monitoring will occur; electricity bills will be sent to the owner/operator of the TSE facility as per usual utility practice (ie: at the end of the month).	No comment	N/a	N/a	N/a	N/a

4.2 Baseline Emissions

	1st review	Response	2nd review	Response	3rd review	Response	Final

	1st review	Response	2nd review	Response	3rd review	Response	Final
1	Regarding the idling fuel consumption and emissions rates, the EPA document used (2002, not 2004) is for trucks over 10 years old and before 2 steps down in truck emissions. Also this study presents few data points. Use current data. See TTI and WVU, Journal of the Air and Waste Management Association 2006 and 2009, Khan.	We have incorporated newer CO_2 emission factors, for high and low idle, based on the Motor Vehicle Emissions Inventory (EMFAC) model used by the California Air Resources Board (2011). These data are more conservative, i.e. result in slightly lower baseline emissions, and therefore a lower estimate of net GHG reductions credited to the TSE project activity. EMFAC emission data uses data from the **CRC E-55/59 project** conducted by West Virginia University. This appears to be the largest study of truck emission data under various operating modes. This data also suggests that there is only a slight difference in Lim 2002 data for CO_2 truck idle emissions, when high and low idle rates are compared. In fact, data suggests CO_2 emissions have increased. Page 85 of the CRC E-55/59 Final Report: "There is little variation in the CO_2 emissions values over MY or by phase, because CO_2 values are	No comment	N/a	N/a	N/a	N/a

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		governed by the engine efficiency and cycle energy demands. (The standard deviation of the data below is 302 g/mile, approximately 13 percent of the average.)" Thus the revised methodology still uses the concept of two different emission factors, based on high and low idle RPM levels used at different temperature ranges, but uses the more conservative emission factors from the California Air Resources Board's EMFAC model (11,349 g CO_2/hour for high idle and 4,934 g CO_2/hour for low idle).					
2	On page 14: "truckers operate their heaters at below 50F and their ACs at above 70F." The reviewers believe the temperature range is not representative, and monthly low is not a good measure of temperature. A better method based on evidence should be presented.	The method came from the 2002 Lim study as a way to conservatively and simply distinguish when high levels of idling would occur vs. low level of idling. This approach has been validated somewhat by the EMFAC data where the levels of high-idling and low-idling were categorized by months, indicating that average temperatures from month to month were a good predictor as to the level of idling that	Average monthly is just too aggregate. A few cold and hot days can skew the data considerably.	Project proponents suggest using daily instead of monthly data readings – see amendments to formulas in the document.	Temperatures should be based on degree-day data. Further, assumptions on this and also on idling RPM should use current data. See attached report, *Development of a NOx Verification*	Shifting from the current approach -- 50-70 degree range for Low Idle and below 50/over 70 for High Idle –- to an approach based on daily temperatures relative to CDD/HDD benchmarks is possible. However this would still not allow for any sort of continuous	Since EMFAC rates are used, which are higher, that is acceptable.

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		would take place. It would seem that evidence does support the method of using average monthly temperatures to estimate levels of idling. There could be one other option, which would be to have a middle-range default, such as the "winter idle" level. The EMFAC study lists this level as 8,882 gCO_2/hr. One could in fact argue this number is more conservative because TSE usage spikes in the summer. If the summer is when the systems are used the most, using what is almost the exact average of the high and low-idle defaults would tend to undercount emission reductions, because the bulk of the usage would be used when the RPM levels are highest. Thus, an average default would be conservative.			*Protocol and Actual Testing of Onboard Idle Reduction Technologies* (Texas Transportation Institute, January 2012).	increment of typical idle rates and emissions at different temps. We have done a good bit of searching and haven't seen any data that would allow us to scale idle rates to incremental changes in temp. So the new approach would still be just the binary High or Low idle rates, corresponding now to CDD/HDD benchmarks rather than specific temperature ranges. Note also that the CO_2 emission rates currently assigned to Low and High Idle (4,934 g/hr and 11,349 g/hr respectively) appear conservative relative to those in the Zietsman study, since those in the study are generally	

	1st review	Response	2nd review	Response	3rd review	Response	Final
						higher for both Low and High idle.	
3	There is not a basis provided for the assumption that trucks idle at higher than 1000 RPM when accessory loads are present. RPMs varied based on the specific truck during recent tests. The low idle points varied between 600 RPM and 700 RPM. See http://www.transportation.anl.gov/engines/idling.html. Similarly, fuel use assumptions should be referenced.	See response at end of this document in red text. We did make one change that says "up to" and in some cases, "higher" than 1,000 RPM.	1) State that the assumption is that the truck is idling if not plugged in. In cases where the truck is not otherwise idling, the emission reductions are overestimated. 2) The proposed method overestimates for cold weather. Make a table of idle speed and emissions as a function of temperature, e.g, using 5- 10 degree bins or linear variation from 50-20 F and 70-90 F. Have the appropriate maximum (i.e. lower for	After extensive review, the project participants have not been able to find any data that could be used to support the table described in Question #2. We made numerous attempts to secure the necessary data from WVU, without response, suggesting to us that the data the reviewer is asking for (to create a table linking idling rates to different increments of ambient temperature) are not available. Given this, we propose to use our original baseline approach of default emission rates which are based on similar studies and we believe are quite conservative. As for Question #1, we can state the assumption that if a truck is idling at a TSE facility, it is not plugged in (there is no reason to idle AND be plugged in).	We think the temperature/idle rate approach needs to be revised to prevent overestimation of idling. a. Please use average daily highs and lows instead of the current temperature approach. b. Based on our experience, there are times when the temperatures are between 50 and 70 where there is no idling taking place, and there are temperatures outside of these limits where low idle occurs.	a. Average daily highs and lows are now used. b. The project proponents reviewed all available material and reached out to several experts in the field. We could not find any data that measured idle rates at multiple temperature intervals. We also reviewed the results of the study that the methodology reviewer sent to us, which measured idle rates at two temperatures. These idle emission rates were generally higher and less conservative that the defaults we proposed in the methodology (which came from a	*ACR decision*: current approach of temperature ranges and associated High/Low idle is acceptable considering that no data appears available to substantiate a range of different idle speeds at different temperature bands.

	1st review	Response	2nd review	Response	3rd review	Response	Final
			heating than cooling) only achieved for extreme temperatures, based on monthly night-time average temperature (not low temperatures).		Thus, the current approach of low idle occurring between 50-70, and high idle at all other cases does not reflect our observations. We suggest estimating a distribution (percentage) of no-idle, low-idle and high-idle for different temperature bands.	California study). For example, the lowest emissions rate from the study sent to us by the reviewers was 5,800 grams of CO_2 per hour, which is higher than the proposed low-idle default in the protocol (4,934 gCO_2/hr). Because idle emissions data for multiple temperature bands do not seem to exist and because we can demonstrate that our defaults are the most conservative of the studies that are available, we believe this concern can be sufficiently addressed with simply using the defaults.	
4	Reference the 2004[2] EPA study.	Lim, H. "Study of Exhaust Emissions from Idling Heavy-Duty Diesel Trucks and Commercially Available Idle-	No comment	N/a	N/a	N/a	N/a

	1st review	Response	2nd review	Response	3rd review	Response	Final
		Reducing Devices", 2002. This reference is provided in footnote 13. The methodology now uses for baseline emission factors the more recent data from ERC 55/59, using EMFAC 2011 data.					

4.3 Project Emissions

	1st review	Response	2nd review	Response	3rd review	Response	Final
1	Consider time-of-day and seasonal variations. For example, even though a region might have a mix of fuels, coal may be what the truck is using when it plugs in overnight.	eGrid has baseload and non-baseload emission factors, which could represent the carbon intensity of a grid at a particular time of day. However, non-baseload, which is typically higher, reflects more peak demand and tends to be higher than off-peak – the time overnight when truckers are most likely to use TSE facilities (see insert at end of this table). In addition, eGrid states: "*Annual total output emission rates for greenhouse gases (GHGs) can be used as default factors for estimating GHG emissions from electricity use when developing a carbon footprint or emission inventory.*	No comment	N/a	N/a	N/a	N/a

	1st review	Response	2nd review	Response	3rd review	Response	Final
		Annual non-baseload output emission rates should not be used for those purposes, but can be used to estimate GHG emissions reductions from reductions in electricity use." For this reason, we believe the emissions factor in eGrid is appropriate. As for seasonal, eGrid should be averaged out, so if TSE systems are used uniformly throughout the year, this should not be a factor.					

4.4 Leakage

	1st review	Response	2nd review	Response	3rd review	Response	Final
1	No comment	N/a	N/a	N/a	N/a	N/a	N/a

4.5 Emission Reductions

	1st review	Response	2nd review	Response	3rd review	Response	Final
1	No comment	N/a	N/a	N/a	N/a	N/a	N/a

4.6 Uncertainty

	1st review	Response	2nd review	Response	3rd review	Response	Final
1	Again, under life cycle emissions, the disposal of TSE facilities should also be considered and	See responses to comments #3 and 4 under 2, Project	No comment	N/a	N/a	N/a	N/a

	1st review	Response	2nd review	Response	3rd review	Response	Final
	full fuel cycle emissions should be considered.	Boundaries. By GHG accounting convention, emission sources may be excluded from accounting either if they are insignificant, or if it is conservative (tends to understate net GHG reductions) to exclude them. Regarding disposal, we believe these emissions are insignificant for the reasons described in our response to comment #3. Regarding full fuel cycle emissions, we believe it is conservative to exclude upstream emissions associated with oil extraction, refining and transportation from the baseline emissions, since this lowers baseline emissions and thus net GHG reductions credited to the TSE project activity.					
2	Table 4 : terminology needs to be improved and made consistent, such as system, spaces, project, etc.	Terms used in this table (TSE system, TSE facility, TSE project) have been added to the list of definitions and acronyms in section 1.4.	No comment	N/a	N/a	N/a	N/a
3	Provide a guideline and example for	This analysis will be provided at	OK	N/a	N/a	N/a	N/a

	1st review	Response	2nd review	Response	3rd review	Response	Final
	determining the uncertainty percentages for baseline and project scenarios.	the second review, after consideration of the comments made thus far.					
4	Because of various problems identified above, the reviews think the levels of uncertainty in Table 4 are underestimated. More conservative assumptions need to be used, as suggested, to minimize overestimation.	We hope that with the changes we made above, the levels of uncertainty have been addressed. Baseline emissions factors, such as gCO_2/hr, have been reduced somewhat and have relied on more recent data.	No comment	N/a	N/a	N/a	N/a

4.7 Calculation of ERTs

	1st review	Response	2nd review	Response	3rd review	Response	Final
1	"Irreversible" needs to be explained	Explanation added in footnote 23. Emission reductions achieved through the avoidance of fossil fuel combustion cannot be reversed subsequent to crediting. In contrast emission reductions achieved through some project types – e.g. forest carbon and other types of sequestration – can be reversed, for example through fire or harvest, and for that reason ACR requires these types of projects to mitigate reversal risk by depositing ERTs in a buffer pool. No buffer	No comment	N/a	N/a	N/a	N/a

	1st review	Response	2nd review	Response	3rd review	Response	Final
		deduction is required for TSE projects since there is no reversal risk.					

5 Data Collection and Monitoring

	1st review	Response	2nd review	Response	3rd review	Response	Final
1	Under 5.2 first bullet: "average monthly low temperatures" appears to need to include high temperatures as well.	Correction made.	No comment	N/a	N/a	N/a	N/a
2	Table 5: Again address terminology. Define the length of credit period. Define the location—by zipcode? Consistently refer to temperatures. Nightly low temperatures are introduced here.	Crediting Period, as defined in the *ACR Standard*, is the finite length of time for which a GHG Project Plan is valid, and during which a project can generate offsets against its baseline scenario. Crediting Period for TSE projects, as defined in the methodology section 2.2, is ten (10) years. Other corrections made in table – geographic location defined by zip code, average monthly low and high temperatures, etc.	No comment	N/a	N/a	N/a	N/a

6 Emissions Ownership and Quality

	1st review	Response	2nd review	Response	3rd review	Response	Final
1	A statement should be provided saying that	It's not clear what guidance	No comment	N/a	N/a	N/a	N/a

	1st review	Response	2nd review	Response	3rd review	Response	Final
	the guidance document will be updated at a determined period, and the latest version should be used.	document is being referred to here, but please see statement added to section 6.1.					
2	6.6: Clarify indirect emissions reductions.	To avoid confusion, this sentence has been removed. Indirect emission reductions are not credited under this methodology.	No comment	N/a	N/a	N/a	N/a
3	Discuss how the GHG relinquishment agreements from truck stop owners and truckers be obtained, verified and monitored.	We would propose that the TSE system require that when a driver swipes their card to turn the power on, there is a statement that says they are waiving right to own all environmental attributes of using this system. Then, they have to press "ok".	OK same for owners?	Yes, if the drivers relinquish these rights, that automatically applies to the owners of the trucks as well.	OK	Note the latest version of the methodology also adds, in 6.7: The Project Proponent shall address in the GHG Project Plan any potential conflicting claims, and if necessary provide supporting evidence that they have title or contractual rights to the claimed emission reductions and that no other entity has a conflicting claim, prior to ACR registration. In addition, Project Proponents shall	N/a

	1st review	Response	2nd review	Response	3rd review	Response	Final
						review available material from the users of TSE systems (both fleets and their owners) to ensure that none are claiming reductions in their own carbon footprint from the use of TSE systems. If such claims are made, the Project Proponent shall request the truck fleets or their owners remove such claims from public materials, whether a website, sustainability report or other publication. In addition Project Proponents shall review available material from state or local government to ensure that public agencies are not claiming reductions from the use of TSE systems within their	

	1st review	Response	2nd review	Response	3rd review	Response	Final
						territories. If such claims are made, the Project Proponent shall request these agencies have such claims removed from public materials, whether a website, sustainability report or other publication.	
4	Define VER.	VER is a Verified Emission Reduction, i.e. a verified unit registered on some voluntary or regulatory GHG program. Each of the various programs have their more specific names, e.g. Emission Reduction Tonne (ERT) for ACR, CRT for the Climate Action Reserve, etc. The language has been changed to ERT, the specific unit for ACR, which is equivalent to one metric ton of CO_2 reduced and verified.	No comment	N/a	N/a	N/a	N/a
5	Document what constitutes "demonstration" of non-enforcement.	See new language inserted under Test 1 in section 3.2.	No comment	N/a	N/a	N/a	N/a

Appendix A Worked Example for Baseline and Project Emissions

	1st review	Response	2nd review	Response	3rd review	Response	Final
1	A new example will be needed based on the changes suggested.	The example has been adjusted using the new more conservative emission factors from EMFAC.	No comment	N/a	N/a	N/a	N/a
2	The header in the appendix seems to be pasted from other document.	Change has been made.	No comment	N/a	N/a	N/a	N/a

Section 4.2, Comment 3: "There is not a basis provided for the assumption that trucks idle at higher than 1000 RPM when accessory loads are present. RPMs varied based on the specific truck during recent tests. The low idle points varied between 600 RPM and 700 RPM. See http://www.transportation.anl.gov/engines/idling.html." See response below of some studies that link RPM and accessory loads:

a. Lutsey, Brodrick, 2004, "Heavy-Duty Truck Idling Characteristics – Results from a Nationwide Survey"
   i. Engine speed, measured in revolutions per minute (rpm), has a substantial effect on fuel consumption and emissions of heavy-duty trucks at idle
      1. Brodrick – 2002, Lim - 2002, Pekula -2003, and Tario - 2003
   ii. Because drivers can adjust the setting for engine speed information was requested about idle engine revolutions per minute setting and whether and for what reason drivers change that setting.
   iii. Generally, factory default settings for engines, ranging from 600 to 700 rpm, are lower than those that drivers reported to us.
   iv. When respondents were asked the idle speed of their engines, the average response was about 810 rpm, with responses fairly evenly distributed from 600 to 1,200 rpm and small peaks around 650 and 1,000 rpm
   v. About 33% of drivers responded that they periodically change their engine speed from their more usual setting.
   vi. Drivers offered many different explanations for changing their engine speed, including increased power for air-conditioning, increased electric power for accessories, reduced engine vibration, reduced engine noise, reduced problems with respect to oil (maintain oil pressure, circulation), and ability to maintain sufficiently high engine temperature in the winter.
b. Brodrick et al, 2001, "Truck Idling Trends: Results of a Pilot Survey in Northern California"
   i. Of the truck drivers surveyed, 67% idled to power the heater and 83% reported they idled to power the air conditioner