TO: Joe Galdo, Department of Energy, Office of Distributed Energy Resources
CC: Rick Weston, Regulatory Assistance Project

GTI appreciates DOE's leadership role in recognizing the potential for DER to reduce power generation emissions. The draft guidance provided provides a good general framework for regulation. However, GTI identified a number of unsupported assessments and assertions that could be misinterpreted by policy makers, and be implemented in a way that could hinder development of the DE market. Our preliminary research indicates that this standard as written could eliminate lean burn engines (currently the largest source for non-emergency small scale DE power generation) as an option for consumers, thereby, resulting in higher overall power generation emissions.

GTI recommends an action plan be developed to effectively engage the DE industry to develop the technical bases necessary for an effective standard that leads to an improved environment through deployment of DE resources. Key elements of this action plan should include:

- Establishing a process and criteria for determining BACT for DER, and future emissions requirements. It is recommended that this task be performed by an EPA DOE partnership, and include input from the Advanced Reciprocating Engine, Mictroturbine, and fuel cell programs..
- Additional research be performed to build a strong and broad technical basis for the assumptions on equipment emissions provided in the Appendices including information from multiple equipment vendors and a breakdown of size ranges.
- Additional research be performed to determine the relationship between DER and power generation emissions. This element should include further consideration of power generation displacement benefits.
- Incorporation of information gained from ongoing research on the environmental impact of DER currently being performed by DOE (Texas DER market study), EPA, the Western Region Air Quality Program, and GTI.
- A workshop to improve coordination of input from the DER community, EPA, and Air regulators

GTI requests an audience with DOE to address this action plan and the comments contained herein. In addition, GTI requests an extension of the comment due date to allow GTI to complete a detailed assessment and to coordinate other industry input. The following paragraphs represent our comments and recommendations on the draft guidance at this time.

Key Comments and Recommendations to Draft Guidance

1. The document has elements and principles that provide for a strong framework for regulatory guidance. Some of these elements and principles include:
   - Ouput based
   - Usage based
   - Having Phase One standards approximate the output of today's gas-fired engines and small gas turbines (current technologies)
   - Having Phase Two anticipate improvements to these technologies
   - Providing guidance on pre-certification of equipment
   - Recognizing emissions offsets from Combined Heat and Power and reduction of flared gas.

2. It does not appear that a process exists for the setting of BACT and the selection of the limits in Section II. It states that "Phase One standards for generators providing peaking power approximate the emissions output of today's gas-fired reciprocating engines and microturbines", however no process is shown on the selection of this criteria. A process needs to be established for setting these limits, which should include a technology review. Once criteria are established rigorous analysis should be performed and documented to determine standards based on these criteria. Recommended criteria include:
   a. Technology is economically viable, as evident by current use in a meaningful number of installations
   b. Technology has multiple manufactures and sufficient manufacturing capacity to impact market.
   c. Technology has proven reliability. Five years of operating experience minimum.
   d. Technology is similar scale (size) or category (supply vs demand). For example a 250 MW CCCT is not of the same scale as a 250kW reciprocating engine and should not have the same BACT due to economics and differences in emissions characteristics. A commercial building owner cannot use a CCCT to improve his reliability/efficiency and lower electricity costs.. In addition, emissions output can vary by size of equipment (ie 2MW recips are typically cleaner than 500 kw recips). With this in mind, it is recommended that limits be set for three sizes: less than 500 KW, 500 to 1000 kw, and over 1000 kw.

   Without specific criteria such as these, the potential exists that limits may be set at a level that eliminates DER as an option for power generation. These criteria should be applied to current technologies to determine the final values for this initial standard. Phase 2 standards should be set based on achievable goals per the current DOE DE R&D program. Phase 3 standards should be blank pending a technology review performed at start of Phase 2, and not based on technologies for large centralized power plants.

In moving forward DOE should work closely with EPA to establish this process for determining BACT for DER, and setting the limits in this guidance.

3. Though a very promising technology, microturbines are not yet in what could be called a "commercialized" state. The majority (if not nearly all) of the installations are demonstration units as work is being completed by manufactures to address equipment reliability and economic concerns. It would be more appropriate to include input from microturbines in setting limits for 5 years from now. As such, Phase 1 rule should be set by lean burn and rich burn (with catalyst) limits.

4. The information for gas IC engines in Appendix B appears to be based on information from one Caterpillar engine, and assumptions from consultants. Further research / investigation is required to develop a sound technical bases for Appendix B, and thus, the recommended limits provided in Section II. This should be performed through working with all advanced reciprocating engine vendors: Caterpillar, Cummins and Waukesha, and actual field performance data be considered. The following points are noted.:
   a. Discussions with Waukesha, Caterpillar, and Cummins indicate that the current lean burn engine product NOx emissions very between 2.2 and 6 lbs/MWh depending upon size and manufacturer.
   b. Waukesha quotes 40 lbs/MWh for the uncontrolled rich burn engine. Installing a single catalyst drops the NOx output to 4.1, adding a second catalyst drops NOx to 1.2. However, adding the second catalyst may not be practical or economical., and may be detrimental to engine life and reliability. Further investigation is needed in this area.

5. The document (Page 17, III.B) states that Phase One standards approximate the output of today's gas-fired engines and small gas turbines, and "does not aim to pick winners or losers.". To be consistent with these statements and actual sources deployed in the field, Phase 1 standards should reflect those identified in the recommendation above. The document fails to recognize that gas fired reciprocating engines (non-standby use) are the leading provider of distributed energy power production at levels less than 10 MW. Though this is due to its many advantages, two primary advantages exist that aren't found in other generation products: 1) strong load following ability, and 2) relatively high and steady efficiencies and reliable operation between 50 and 100 percent load, and at elevated temperatures. These features make the reciprocating engine extremely desirable for small scale onsite power generation, as is dictated by its leadership in the market. The leading engine in the marketplace is the lean burn engine, and as such is the target for improvements under DOE's Advanced Reciprocating Engine Program. The limits set in Section II, as they stand today would effectively eliminate this technology from the DER market,

thus indeed having this standard "pick a loser.", though these engines produce less emissions than that of many power plants generating electricity today. Losing the market technology leader at this critical time in the development of the DER market could effectively kill DER as an economically viable solution in the United States

6. DOE should work with EPA to explore more closely the relationship between distributed energy and power generation emissions. This includes reviewing the impact both on and off peak. GTI, EPA, and the Western Region Air Quality Program are all performing key research that can provide insight into DE environmental impact. Our preliminary research indicates that the lean burn reciprocating engine has the most significant potential for lowering power generation emissions in most states.

7. It is recommended that DOE reconsider omitting electric displacement benefits. Research by GTI and EPA indicates that data may be available to determine the emissions from displaced facilities. This research indicates that due to urban sprawl and transmission constraints, the vast majority of fossil fueled electricity power generation is in urban areas, many non-attainment. This provides for the potential to displace electricity from older less efficient fossil fueled boilers (e.g. emissions of 5 to 9 lbs/MWH, thereby improving air quality in urban areas. EPA is developing a tool for providing the offset by time of day and region. (Page 16,III).

8. In Section IIIA (Page 13) the document states that standards are needed to ensure that DER contributes to an improved environmental profile of the electric sector, or at least that is no worse than it would have been otherwise. GTI research is revealing that DER installed for intermediate and peak power use would displace central power generation emissions in the range of 4 to 9 lbs/MWh depending upon the state. EPA is also performing research to determine emissions offsets by region and time of day of generation. DOE should consider EPA and GTI research results in this important standard.

9. Though the document represents different operating categories for DER, it appears that a key operating mode of DER may be misrepresented. It is typically not the intent of DER to act as "peakers" operating only 300-700 hours a year, on a "merchant" basis. Typically merchant plants are much larger than 10 MWs. It difficult to cost justify the use of DER if it is not used at least 3000 hours per year, to maximize electric savings. In many applications, DER installations are operated during peak hours (say 6am to 10 pm) daily, 5 days a week to provide maximum peak reduction benefit while maintaining the benefit of low off peak power rates from the grid at night. In this application, DER is operating as a true peak shaver, not effecting baseload generation, but having the potential to effect the intermediate generation that comes on line to meet peak loads (coal, oil , and simple cycle gas plants). It is

therefore recommended that this document should include separate emissions regulations for intermediate power (700 to 3400 hours, see utility on peak rate definition). The intermediate supply varies from region to region and has different emissions characteristics when compared to baseload and peak. In the North East it appears that simple cycle oil and gas fired plants supply the bulk of the intermediate power. In the Mid West it appears that coal supplies the bulk of intermediate power. In both of these regions, nuclear and hydro supply baseload. It is noted that utilizing DE as intermediate power, depending on the region, can offset power generation from less cleaner sources such as oil and coal fired generation.

10. The document states (Page 15, IIII.B) that three years is a reasonable amount of time to accommodate manufacturer' s (and industy's)R&D cycles. This appears to be aggressive given that Fuel Cells have been under development for more than 40 years. Phase 2 should be implemented in 6 to 10 years, similar to the time frames listed in Section IV (Phase 2, Dec 2007 with Phase 3 review in Dec 2014). This will provide sufficient time for microturbines to develop and prove themselves as economically viable and reliable. This will also provide time for the ARES program research to be completed.

11. Though in many cases, the standard mentions "economic impact", it does not appear that economics have been adequately addressed for the proposed limits. For example, to meet the Phase One limits, reciprocating engines may need to add two means of tailpipe controls, that may make DG an unattractive economic option, though its implementation with one or zero controls can be much more environmentally friendly than a coal or oil plant it may offset. It is recommended that DOE perform a detailed economic impact analysis on a state by state basis due to the wide swings in electricity prices and technologies used in each state. Given the substantial investment into the ARES program and potential significant impact of these regulations, this analysis appears warranted. The DOE Texas DE market impact study might provide valuable input to this standard.

12. Though the document provides exclusions for some offsets (Page 10, Section II.VI), it is recommended that this guidance be provided to any offset, not just flared gas, where DE can be applied to offset existing emissions. For Combined Heat and Power applications, significant emissions benefit can be realized when the waste heat is used to retire boilers…the offset should be based on the type of boiler it replaces (coal or gas) and its associated offsets and not just a standard state of the art natural gas fired boiler. Allowances should be provided such that credit can be taken for any DER emissions offset, such as where DER is used effectively to reduce other plant Nox and VOC emissions.

13. The statement on Page 4, "The growing availability of cost-effective distributed generation micro-turbines, diesel, fuel cells, solar, natural gas-fired systems….. – is changing the nature of the electric network" This general statement is not supported by fact and could mislead policy makers. The Wall Street Journal has stated that DE deployment has remained at about 5% for the past three years. Much more work and technology development is needed to develop this market, as other than reciprocating engines and large turbines, these technologies are not cost effective at this time or in the very near future.. DE economics varies widely from state to state. Standby charges, interconnect fees, and rate structures do not support investment in DE technologies. NYSERDA is spending over $4,000/kW for DE demonstrations in New York supporting the lack of economics. It is recommended that this statement be deleted, or modified to reflect accuracy in that it may take several years to develop these technologies.

14. Section III (page 13) of this document provides exclusions for existing plants and plant less than 37 kws, and in other sections of the document proposes that non-emergency use of DGs be considered. It is postulated that one of the biggest challenges to the environment is operation of standby diesel generators as peakers during summer hours when the envirionment is most vulnerable. Today, the first proposed solution for reliability improvements by electric utilities is emergency diesel generators, which, in fact are excellent for this application. However, some utilities are creating programs where customers operate their backup diesel generators as peakers during the summer months for financial gain, to the detriment of the environment. It is recommended that this standard be expanded to existing units in the case of operation of backup DGs, such that this practice can be discontinued.

15. The document states that the working group feels confident that Phase II and III standards can be achieved.(Page 18, Section III.B). It is recommended that the working group provide detailed grounding and technical bases for these claims. For example, Phase II standards (both timeline and output) can be based on what is expected to be achieved through DOE's advanced technology programs. For Phase 3, as an alternate to publishing limits that may have little technical basis, it is recommended that technical market studies be performed to establish these limits.

16. Finally, with regard to the degree of participation in the development of this document, two key issues come to note: 1) Though approximately 30 people are listed as contributors to this document, of those in the DE industry that we contacted, not one expressed an endorsement of the standard, and 2) Though the document references input from the DE industry, only two manufactures and one or two consultants appear to have been directly involved. It is our understanding that other representatives from the DE industry, including the USCHPA, were turned down when they volunteered to participate in the development of this standard. Due to the

critical nature of this document on the impact of the DER market, it is recommended that more well rounded participation of the DER industry be invited to participate in setting the direction for and in the resolving of comments to this document. This input will provide for a more "complete" document with technically justified bases that can serve to better the environment.

In conclusion, it is recommended that the action plan identified on the first page of this document be followed to develop the draft standard to a workable standard that can move to promote installations of DER while at the same time providing for a cleaner environment. Please contact me at 847-768-0637 to set up a meeting to address the above comments, and address any questions you may have.

Respectfully,

John Kelly
Director, Distributed Energy Resources
Gas Techology Institute