

Solar Turbines

A Caterpillar Company

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February 4, 2002

Mr. Rick Weston
The Regulatory Assistance Project
50 State Street
Suite 3
Montpelier, VT 05602

RE: Comments to Public Review Draft Dated October 2001

Dear Mr. Weston:

As a member of the Working Group representing mid-size gas turbines, Solar recognizes the responsibility to provide constructive comments to the draft rule that comes as a work product of the collective effort. Solar appreciates being a part of the working group and for the opportunity to provide Solar's views as comment.

As a matter of background, Solar Turbines Incorporated (Solar) manufactures mid-range industrial gas turbines, ranging from 1 to 14 MW. Solar has sold over 11,000 gas turbines in over 90 countries. In the U.S., over 1400 units have been deployed as "distributed generation" (DG), over 500 of those in combined heat and power (CHP) applications. Some of the more common applications for our turbines include:

- Oil and Gas
 - Transmission
 - Processing
 - Power generation
 - Gas Injection
- Power Generation
 - Combined heat and Power
 - Distributed generation
- Marine
 - On-board power
 - Propulsion

SPECIFIC COMMENTS

The task of developing a "model rule" is daunting. Throughout Solar's participation with the Regulatory Assistance Project (RAP) process, we have grown increasingly concerned that the "model rule" will do more to discourage, rather than to encourage, DG implementation. Model rules, by nature, should be generic and at the lowest common denominator level. Our concern is based on the fact that most of those involved in the process are either from non-attainment states/mind-sets or from utilities (heavily regulated). Solar believes that the draft model rule has a "non-attainment orientation" rather than the more appropriate "attainment area orientation".

The model rules' emission levels and requirements should reflect current and anticipated attainment area requirements. After all, the model rule will most likely be implemented in attainment areas, as non-attainment areas will either already have stricter requirements or will use the model rule as the framework to build a stricter program.

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Solar has heard that a “fear”, of those who oppose wide-spread DG implementation, is that there will be a large number of smaller generators installed that are just as bad as the “system average” or only slightly better. While the concern as some merit with respect to some technologies the RAP process must be careful that the model rule does not exclude clean, efficient DG technologies. The draft model rule as written will preclude the use of mid-size gas turbines, which are today, two times better than the system average and improving.

If the model rule emission levels remain as drafted, then RAP and its sponsors should consider positioning the model rule as a “fast-track permitting” program (similar to the Texas DG rule) while maintaining existing new source permitting programs for those who can’t comply with the very strict emission levels. Otherwise, the model rule, as written, will place more emission stringent requirements on smaller projects than emission requirements that would result from the PSD permitting process (top-down BACT analysis) on larger sources.

It is imperative to the success of the RAP effort that a level of “common sense” be maintained and that the model rule NOT fall into the “meet same emission levels as a new combined cycle natural gas power plant” way of thinking (potential fatal flaw that California signed up for through the SB1298 effort).

Solar’s comments are arranged in the order that they appear in the draft model rule and not necessarily in the order of importance to Solar.

II. DEFINITIONS (B), (E), AND (K)

Solar proposes altering the operating hour designations assigned to Baseload Generator, Emergency Generator, and Peaking Generator. There is a common fourth category: “Intermediate Duty”. We do not suggest adding a fourth category for intermediate duty, as the emissions should be the same as the peaking category. However, Solar does recommend that the Intermediate category be referenced. The following changes are recommended:

Emergency:	< 300 hours (see Note below)
Peaking/Intermediate Duty:	< 4000 hours
Baseload:	>4000 hours

Peaking applications usually fall into the 0 to 2000 hour category with intermediate duty typically ranging from 1000-4000 hours. Solar recommends categorizing intermediate duty with peaking due to their similar “simple cycle” configuration.

The peaking category should be expanded above 700 hours to include peaking/intermediate applications that have a need for hot summer day operation, 12 hours/day, June through September – this equates to ~1800 hours.

Note: During the initial Title V application process in the early to mid 90’s, EPA issued guidance that allowed facilities to use 500 hours to estimate the potential-to-emit for emergency generators. Most facilities, unless already limited, took advantage of the guidance document to limit the potential-to-emit of emergency generation. For continuity, Solar recommends the model rule use 500 hours for the “Emergency” category.

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Solar recommends that the model rule expand the emergency definition to include imminent blackout situations. Individual states can exclude imminent blackout if they have a problem with the concept.

IV. EMISSIONS

A marked up copy of the emission level tables are included as an appendix to this document. The values represent Solar's recommendation for an "attainment area based" model rule. We believe our recommendations simplify and increase continuity in the emission level tables.

NO_x

Refer to the appendix for Solar's proposed NO_x emission levels. Solar's proposed levels will not preclude the use of gas turbines while allowing time for innovation, technology development and commercialization. The levels in the current draft may discourage short-term implementation of some DG technologies.

PM₁₀

Our first recommendation is to remove PM₁₀ from the model rule.

Short of removing PM₁₀, refer to the appendix for Solar's recommended PM₁₀ emission levels. The current values in the draft would preclude the use of gas turbines in DG applications. Based upon our work, I don't think this is the intent of the model rule.

What is the source of the PM₁₀ emission values found in the draft?

Technically, how would one expect PM₁₀ emission levels to decrease over time? For gas turbines, a realistic/representative value is 0.3 lb/MW-hr for all three phases. Based on our experience, this value as it should be representative of most gas fired gas turbines using today's available testing methodology. The issue being, if a project does not meet the draft value, no control technologies are available to reduce PM_{10/2.5} from gas turbines.

CO

We must remember that NO_x and CO emissions have an inverse relationship with all combustion based DG technology. The values in the draft emissions tables appear to be representative of full-load operation. Solar recommends that the emission level values take into account part-load operation, dictating the need for flexibility in CO emission levels. The emission levels in the "baseload" table may preclude the use of many of today's DG technologies unless add-on control, CO oxidation, is used. CO oxidation adds significant cost to operation.

Solar suggests CO emission levels as shown in the appendix

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CO₂

CO₂ emission levels should be the same for all three categories.

Solar has marked up the values in the tables to represent achievable levels for mid-size gas turbines operating from 50 -100% load. The values in the draft tables are representative of CO₂ levels at full-load. However, equipment doesn't always operate at the full-load point, therefore the model rule should represent a typical operating range.

DUAL FUEL EMISSIONS ISSUES

Many of Solar's power generation/DG customers in the U.S. request that the turbines be equipped with dual fuel injectors to allow for liquid fuel use during times of curtailment or for limited hour use throughout the year. Both cases are regularly permitted in the U.S., even in the stricter air districts. The draft rule as written would preclude the use of liquid fuel.

Solar suggest that a section be added to address stand-by fuel liquid fuel operation. For example. During times of natural gas curtailment, liquid fuel operation must meet the standards found in "emergency" section.

Also, what about facilities that need liquid fuel operation capability? Under today's PSD/NA and state permitting programs, gas turbines in distributed generation applications are often permitted for approximately 2000 hours of liquid operation provided certain emission limits and/or other dispersion modeling requirements are met. The model rule should not preclude the use of liquid fuel and should allow for necessary operational flexibility.

VI. COMBINED HEAT AND POWER (B)

Thank you for including CHP "credit" in the model rule.

Solar's primary recommendation is to simplify the section. While the CHP "credit calculation" is very appropriate, it is also very complicated with the P/H ratio, boiler calculations, average system efficiency, etc. Solar recommends the inclusion of multiple examples illustrating the use of the "credit calculation" method.

The acceptance across the U.S. of the numerous benefits of CHP has been a struggle. This in part to due to the regulatory community, public and legislator's lack of understanding of the full range of CHP benefits. As written, the CHP credit section may continue to promote the lack of appreciation and confusion surrounding CHP.

Solar also recommends that additional resources be spent determining that the average system efficiencies are appropriate and representative of what is achievable. Solar also recommends that an organization, such as the Council of Industrial Boiler Owners (CIBO), be contacted to obtain the appropriate boiler efficiency value. Solar believes that 80% is not representative; 70% may be more appropriate.

VI. CONSERVATION AND RENEWABLES (C)

Solar suggests providing several examples.

VIII. RECORDKEEPING AND REPORTING

What is the reason/value/purpose for tracking fuel use and hours of operation?

Solar issues caution. In addition to these values, several other operating variables would be necessary to estimate emissions/verify compliance. Such a requirement may lead to the unprecedented necessity of continuous emissions monitoring systems on very small units.

OTHER CONSIDERATIONS

Title V impacts should be explored. The fallacy with DG "promotion" efforts that are underway across the U.S is that they are inherently designed to "pull-in" DG equipment into construction and Title V operating permit programs by essentially giving the DG equipment an applicable requirement. Much of the smaller DG equipment is currently is excluded from both permitting programs.

Under Title V all states (and other regulatory (local) programs) included a list of insignificant activities. Many DG technologies, due to their size, were/are considered insignificant.

For example insignificant activities in one state are those activities that:

1. Do not have any applicable requirements, and
2. a. Emit less than 150 lbs/day, or
- b. Is <10 MMBtu/hr (gas/LPG), or
- c. Is < 1 MMBtu/hr (other fuel)

The DG rules being developed will burden DG equipment with an applicable requirement rendering the equipment "significant". Are states, local agencies, industry, etc. ready for the additional compliance activity, paperwork, resources, etc. to manage very small, previously considered insignificant, emission sources?

SUMMARY

Solar commends the RAP and its sponsors for attempting to craft a reasonable program. Solar asks that the group thoughtfully consider Solar's recommendations. As stated earlier, it is important to keep in mind that this is a "model rule". Most of the parties involved are used to functioning in non-attainment areas. The "model" should be written with attainment areas in mind; states always have the option to make the "model" stricter. Solar has concern that some of the proposed emission level values are stricter than current PSD/BACT levels in attainment areas. Stricter levels for the smaller units will only discourage market acceptance due to cost and limitations on technology options to fit particular applications. There are too many benefits of environmentally responsible and fuel-efficient DG/CHP technologies to the emerging model of a new national energy infrastructure to ignore.

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Thank you again for your leadership in this effort. Please feel free to contact me at 858.694.6609 if you have any questions or need any additional information.

Sincerely,
Solar Turbines Incorporated



Leslie Witherspoon
Manager Environmental Programs

Appendix

Cc: Richard Brent, Solar Turbines, Government Affairs, Washington

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APPENDIX

DR EMISSIONS

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year]. Source must record date and start/stop time for every operation as well as total annual run hours. Maintenance hours must be separately accounted for. Emissions standards for emergency generators are as follows:

	Phase One: January 1, 2003, Through December 31, 2005	Phase Two: January 1, 2006, through December 31, 2008	Phase Three: January 1, 2009, And thereafter
NO _x	21.00 lb/MWh	17.00 lb/MWh	14.00 lb/MWh
PM-10	0.80 lb/MWh	0.80 lb/MWh	0.80 lb/MWh
CO	6.00 lb/MWh	6.00 lb/MWh	6.00 lb/MWh
CO ₂	1450.00 lb/MWh 1900	1450.00 lb/MWh 1900	1450.00 lb/MWh 1900

(B) **Peaking Generators.** Emissions standards for peaking generators are as follows.

	Phase One: January 1, 2003, Through December 31, 2005	Phase Two: January 1, 2006, through December 31, 2008	Phase Three: January 1, 2009, And thereafter
NO _x	1.00 lb/MWh	0.60 lb/MWh	[0.40 - 0.30] lb/MWh 0.4
PM-10	0.08 lb/MWh 0.3	0.05 lb/MWh 0.3	0.02 lb/MWh 0.3
CO	5.00 lb/MWh	3.00 lb/MWh	0.80 lb/MWh
CO ₂	1500.00 lb/MWh 1900	1500.00 lb/MWh 1900	1500.00 lb/MWh 1900

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(C) **Baseload Generators.** Emissions standards for baseload generators are as follows:

	Phase One: January 1, 2003, Through December 31, 2005	Phase Two: January 1, 2006, through December 31, 2008	Phase Three: January 1, 2009, And thereafter
NO _x	[0.5 - 0.47] 1.0 lb/MWh	[0.3 - 0.27] lb/MWh 0.4	[0.15 - 0.07] lb/MWh 0.3
PM-10	0.05 lb/MWh 0.3	0.05 lb/MWh 0.3	0.02 lb/MWh 0.3
CO	0.60 lb/MWh 1.3	0.30 lb/MWh 0.65	0.10 lb/MWh 0.33
CO ₂	1400.00 lb/MWh 1900	1400.00 lb/MWh 1900	1400.00 lb/MWh 1900

(D) **Technology Review.**

- (1) By December 31, 2007, the agency shall complete a review of the state of, and expected changes in, technology and emissions rates. This review shall be used by the agency in considering whether the 2009 standards should be amended.
- (2) Beginning in 2014 and every five years thereafter, the agency shall review the state of technology and emissions rates and determine whether the emissions set out herein should be amended.]

V. Emissions Certification, Compliance, and Enforcement.

(A) **Emissions Certification.** A manufacturer may seek to certify that its generators meet the provisions of this rule.

- (1) **Certification Process.** [This section needs to address process issues and the question of running at partial load operations.] Emissions of nitrogen oxides, PM-10, carbon monoxide, and carbon dioxide from the generator shall be certified by the manufacturer in pounds of emissions per megawatt hour (lb/MWh). This certification must be displayed on the nameplate of the unit or on a label attached to the unit. Test results from EPA Reference Methods, California Air Resources Board (CARB) methods, or equivalent testing may be used to verify this certification and shall be provided upon request to the agency.
- (2) **Responsibility of manufacturer.** Certification will apply to a specific make and model of generator. For a make and model of a generator to be certified, the