



October 11, 2021

Viren Trivedi
Chief, Division of Permits
Bureau of Air Quality
Rachel Carson State Office Building
P.O. Box 8468
Harrisburg, PA 17105-8468

**RE: 25 PA Code Chs. 121 and 129
Additional RACT Requirements for Major Sources of NOx and VOCs for the
2015 Ozone NAAQS**

Solar Turbines Incorporated (Solar) appreciates the opportunity to comment on the proposed Reasonably Available Control Technology (RACT) III requirements.

Solar is a manufacturer of industrial combustion turbines (1000-32,000 hp). Solar's fleet includes more than 16,000 combustion turbines in over 100 countries. Our domestic fleet consists of over 8000 combustion turbines in power generation, pipeline compressor, and mechanical drive applications.

Solar asks that the Pennsylvania Department of Environmental Protection (PADEP) consider the following comments. Solar asks that the agency contact us if more information is necessary to explain the comments. Solar has been in contact with several customers that are also preparing comments to the proposal and ask that the PADEP also pay special attention to the comments prepared by these gas turbine users.

Summary of Comments

1. Modify the proposed NOx emissions level in section 129.112(g)(2)(iii) from 85 ppm to 150 ppm NOx.
2. Modify the bhp size range category boundary for section 129.112(g)(2)(iii) and (iv). Solar Turbines asks that PADEP replace the 3000 bhp level with 4100 bhp.
3. Split the source category for section 129.112(g)(2)(i). Solar asks that PADEP add a source category for combined cycle and CHP for ≥ 1000 to ≤ 4100 bhp and modify the current source category to range from >4100 bhp to ≤ 180 MW.
4. Solar recommends the PADEP consider a compliance schedule that considers the routine major maintenance schedule of affected units or extends the currently proposed compliance schedule from one year to two years.

Comment #1 - Modify the NOx emissions level in section 129.112(g)(2)(iii) from 85 ppm to 150 ppm NOx.

PADEP states, “most natural gas or non-commercial gaseous fuel-fired simple cycle or regenerative cycle combustion turbines with rated output equal to or greater than 1000 bhp and less than 3000 bhp are installed with DLNC [Dry Low NOx Combustion].”

This is not true. Solar does not have a DLNC option for turbines in the 1000-4100 bhp range.

PADEP also states that, “...an analysis of test results of actual NOx emissions show as high as 84 ppmv @ 15% oxygen.” And goes on to conclude, “Therefore, the Department is proposing that the owner and operator of a natural gas or a noncommercial gaseous fuel-fired simple cycle or regenerative cycle combustion turbine with a rated output equal to or greater than 1,000 bhp and less than 3,000 bhp, shall comply with the presumptive RACT emission limitation of 85 ppmvd NOx corrected at 15% oxygen. [25 Pa. Code § 129.112(g)(2)(iii)(A)]”

While the PADEP dataset for the 1000-3000 bhp may show a high of 84 ppm, setting a presumptive RACT at 85 ppm is not recommended. The value is significantly lower than manufacturer warranty levels for the affected equipment and does not allow for any margin to account for the effect of fuel variation, seasonal variation, engine to engine variation, etc.

The typical emissions warranty of Solar’s turbines in this size range is either 100 or 150 ppm ISO NOx depending on the model, rating, and date of manufacture. Warranty levels account for engine-to-engine variability, site conditions, fuel variability, operating margin, etc. Our test cell data for turbines in this size range show a high value of 123 ppm NOx. Over 1100 units in this size range have been factory tested over the last ~20 years – 85 ppm NOx is not an appropriate level.

Setting a RACT at the level of 85 ppm NOx will result in numerous alternative RACT submittals since manufacturers will not warranty this emissions level. To avoid this lengthy administrative process, Solar recommends the smallest RACT III category remain at 150 ppm NOx.

Comment #2 - Modify the bhp size range for section 129.112(g)(2)(iii) and (iv). Solar Turbines asks that PADEP replace the 3000 bhp level with 4100 bhp.

In addition to maintaining the 150 ppm NOx level in the smallest category, Solar recommends modification of the size range boundary from 3000 to 4100 bhp. Incorporating this change will alleviate alternative RACT submittals for the Solar Centaur® 40 4000 rating which does not have a DLNC technology option and therefore is unable to meet the 42 ppm NOx levels. The other two ratings of the Centaur 40, the 4500 and 4700, have a DLNC option and can meet the proposed 42 ppm NOx level.

Solar recently went through a similar rule making process/negotiation with New Mexico on their Ozone Rule for the Oil and Gas Sector, 20.2.50 NMAC, where the smallest category was set to ≥ 1000 to ≤ 4100 bhp at 150 ppm NOx. See the New Mexico rule’s Table 3 below for reference (20.2.50.113).

Table 3 - EMISSION STANDARDS FOR STATIONARY COMBUSTION TURBINES

For each applicable natural gas-fired combustion turbine constructed or reconstructed before the effective date of 20.2.50 NMAC, the owner or operator shall ensure the turbine does not exceed the following emission standards no later than the schedule set forth in Paragraph (7)(a) of Subsection B of 20.2.50.113 NMAC:

Turbine Rating (bhp)	NO _x (ppmvd @15% O ₂)	CO (ppmvd @ 15% O ₂)	NMNEHC (as propane, ppmvd @15% O ₂)
≥1,000 and <4,100	150	50	9
≥4,100 and <15,000	50	50	9
≥15,000	50	50 or 93% reduction	5 or 50% reduction

For each applicable natural gas-fired combustion turbine constructed or reconstructed on or after the effective date of 20.2.50 NMAC, the owner or operator shall ensure the turbine does not exceed the following emission standards upon startup:

Turbine Rating (bhp)	NO _x (ppmvd @15% O ₂)	CO (ppmvd @ 15% O ₂)	NMNEHC (as propane, ppmvd @15% O ₂)
≥1,000 and <4,100	100	25	9
≥4,100 and <15,900	15	10	9
≥15,900	9.0 Uncontrolled or 2.0 with Control	10 Uncontrolled or 1.8 with Control	5

While there may not be many Centaur 40 4000 combustion turbines left in Pennsylvania, changing the category size is important as the PADEP rules are looked at as a model by other state agencies. Making the change will have minimal impact, if any, in PA but will ensure the RACT conclusions match RACT technologies when other states follow PADEPs lead.

Comment #3 - Split the source category for section 129.112(g)(2)(i). Solar Turbines asks that PADEP add a source category for combined cycle and CHP for ≥1000 to ≤4100 bhp and modify the current source category to range from <4100 bhp to ≤180MW.

Solar Turbines requests that PADEP split the source category for section 129.112(g)(2)(i) and add a source category for combined cycle and CHP for ≥1000 to ≤4100 bhp. In addition, modify the current source category to >4100 bhp to ≤180MW. Solar requests the NO_x emissions level for the newly created category match those requested for simple cycle in section 129.112(g)(2)(iii) at 150 ppm NO_x.

Comment #4 - Solar Turbines recommends the PADEP consider a compliance schedule that considers the routine major maintenance schedule of affected units or extends the currently proposed compliance schedule from one year to two years.

The schedule for compliance is too aggressive. The proposed rule’s compliance schedule does not provide sufficient time to comply with the presumptive RACT requirements.

Solar requests a compliance schedule tied to the timing of the next major overhaul of affected combustion turbines. Typical major overhaul cycles run every 3.5 to 4.5 years depending on the operating hours of the turbine. To accommodate the emissions standards proposed in this rule it is anticipated, that in addition to a DLNC retrofit at time of overhaul, upgrades to the package, control system, fuel system, and other ancillary systems will be necessary.

At a minimum Solar recommends the compliance date be set for 2 years after the effective date of the final rule.

Please feel free to contact me at 858.694.6609 if you have any questions or need any additional information.

Sincerely,
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