PERMITTEE

Tampa Electric Company
702 North Franklin Street
Tampa, Florida 33602

PERMITTING AUTHORITY

Florida Department of Environmental Protection (Department)
Division of Air Resource Management
Office of Permitting and Compliance
2600 Blair Stone Road, MS #5505
Tallahassee, Florida 32399-2400

PROJECT

Air Permit No. 0570039-119-AC
Minor Air Construction Permit
Big Bend Station

This project entails the construction of a natural gas-fueled, 2-on-1 combined-cycle unit and the retirement of two existing boilers. The two combustion turbines of the combined-cycle unit will also be equipped to operate in simple-cycle mode.

NOTICE AND PUBLICATION

The Department distributed a draft minor air construction permit package on May 25, 2018. The applicant published the Public Notice in La Gaceta on June 1, 2018. The Department received the proof of publication on June 1, 2018. No requests for administrative hearings or requests for extensions of time to file a petition for administrative hearing were received.

COMMENTS

Public

On June 15, 2018, the Department received comments from the Sierra Club[1]. The following summarizes the comments and the Department's response. The Sierra Club letter contained six major points which are addressed below.

1. The commenter states that the Department underestimated the Potential to Emit (PTE) for nitrogen oxides (NO_X) for the turbines under simple-cycle operation. The PTE under simple-cycle operation was based on the Subpart KKKK limit of 15 parts per million (ppm), which applies at combustion turbines loads of 75% or greater. For turbines loads less than 75% of peak load, the Subpart KKKK limit of 96 ppm applies. Since there are no restrictions on permitting operating loads of the turbines, the commenter states that the PTE for NO_X should be based on 96 ppm, rather than 15 ppm. Under the applicant's requested limit of 1,262,701 megawatt-hours per year in simple-cycle mode, the applicant could conceivably operate for long periods of time at reduced load, rather than at full load for short periods of time as was envisioned by the applicant and in the Department's analysis. The commenter suggests limiting the PTE of NO_X from the turbines, on a 12-month rolling basis, to assure that the project does not increase emissions of NO_X above the significant emissions rate that would trigger a review for Prevention of Significant Deterioration (PSD).

   Response: Simple-cycle combustion turbines are typically operated at high load for short periods of time to meet peak electrical demand, rather than at lower load for long periods of time. Since turbines operate most efficiently at high loads, there is a natural incentive to operate only at higher loads. The Department also

[1] Sierra Club comment letter and supplemental data available in Oculus.

notes that, while the Subpart KKKK limit for NO_X for loads below 75% is 96 ppm, the turbine manufacturer[2] states that this turbine model can achieve emissions of 25 ppm through dry low-NO_X combustion at loads as low as 30%. At a combustion turbine load of 30%, the turbine would be expected to emit NO_X at roughly half the rate, in terms of pounds per hour, as it would be expected to emit at full load. Therefore, emissions should be well below 96 ppm for most lower-load operation.

While the Department finds that extended simple-cycle operation at reduced load (< 75%) is highly unlikely, the commenter is correct that it is allowed by the draft permit, which reflects the applicable federal New Source Performance Standards in Subpart KKKK. The Department will add 12-month rolling limits on NO_X emissions which will cap the PTE for this project. These limits will provide further assurance that the project does not trigger PSD.

The first phase of the project entails the retirement of either existing Unit 1 or 2, and the commencement of simple-cycle operation of one of the new combustion turbines. Since Unit 1 has the smaller Baseline Actual Emissions (BAE) of the two existing units, we will assume that Unit 1 is the first to be retired for this analysis. The BAE for NO_X for Unit 1 is 1,318 tons per year (TPY). The contemporaneous project that installed two natural gas process heaters had associated NO_X emissions of 5 TPY. For the first phase of the project, when only one turbine is operating, the Department will set a limit on NO_X emissions of (1,318 - 5 + 35) = 1,348 TPY, on a 12-month-rolling basis. The 35 TPY from this equation is slightly less than the PSD significant emissions rate for NO_X of 40 tons per year. This limit will expire once the second existing unit is retired and the second new turbine enters service.

Once the second turbine is in operation, the Department will set a limit of 1,816 TPY of NO_X for the two turbines combined. This equals the applicant's stated PTE for NO_X for the two turbines, plus a 10% safety margin to account for operational variability. This cap is 730 TPY less than the BAE for NO_X from Units 1 and 2 (2,546 TPY).

The following condition will be added to Section 3.A of the permit:

12. NO_X Cap for PSD Avoidance:
    a. *One Simple-Cycle Combustion Turbine*: For the first phase of this project, when one combustion turbine is operating in simple-cycle mode but the second turbine has not yet become operational, emissions of NO_X from the operating turbine shall not exceed 1,348 tons per year, on a 12-month rolling basis. This limit shall expire once the second turbine becomes operational.
    b. *Two Combustion Turbines*: Once the second combustion turbine becomes operational, emissions of NO_X from the two turbines, combined, and regardless of whether the turbines operate in simple-cycle mode or combined-cycle mode, shall not exceed 1,816 tons per year, on a 12-month rolling basis.

    [Rule 62-210.200(PTE), F.A.C.; Avoidance of PSD]

A semi-annual reporting requirement has also been added in order to establish compliance with this cap.

This cap has been discussed with the applicant, and the applicant confirms that it is acceptable.

2. The commenter states, "To properly ensure contemporaneous emission decreases from the cessation of firing fuel at Big Bend Units 1 and 2, the permit must require the cessation of firing fuel at Big Bend Units 1 and 2 by the time the combustion turbines become operational and begin emitting pollutants." The commenter asserts that "[t]he draft permit does not sufficiently ensure contemporaneous emission decreases from the cessation of firing fuel at Big Bend Units 1 and 2 since it does not require the emissions reductions until *after* commercial operation of the combustion turbines begin." The commenter states in a footnote, "While the definition of "net emissions increase" allows for a 6 month shakedown period before a replacement unit is considered operational, the new combustion turbines do not meet the definition of "replacement unit" in 40 C.F.R.§52.21(b)(33)."

[2] General Electric 7HA fact sheet and validation testing available in Oculus.

Response: The commenter does not believe that a shakedown period should be allowed between the first firing of fuel in the new unit and the permanent cessation of fuel in the existing units to be shut down. It is important to note that, under Florida's EPA-approved PSD program, the definitions in the Florida Administrative Code (F.A.C.) are used. Rule 62-210.200(166), F.A.C., the definition of "Net Emissions Increase," states, "An increase that results from a physical change at a source occurs when the emissions unit on which construction occurred becomes operational and begins to emit a particular pollutant. Any replacement unit that requires shakedown becomes operational only after a reasonable shakedown period, not to exceed 180 days" [Rule 62-210.200(166)(g), F.A.C.]. Even if the new turbines are not considered "replacement units," it is clear that a unit needs to be able to produce useful output (such as electricity) to be considered "operational." The new combustion turbines are not truly operational until they can be dispatched to deliver power to the electric grid. In addition, the definition of "Net Emissions Increase" states the increase occurs when the unit "becomes operational **and** begins to emit a particular pollutant" (emphasis added). The "becomes operational" part of this definition would not be necessary if the "begins to emit a particular pollutant" part of the definition were the only part that is intended to govern.

Further, US EPA has issued permits in the relatively recent past that have allowed a similar shakedown period to occur before the existing unit is required to shut down. For example, in EPA Region 9's analysis of a PSD applicability for the Carlsbad Energy Center Power Project[3] from 2011, EPA stated, "[These] permit conditions […] require the emission units to be shut down by the end of the shakedown period for the CTGs, making the contemporaneous decreases enforceable." A reasonable shakedown period is a practical necessity for working out post-construction issues on large, complex systems while maintaining grid reliability.

The Department will also address the commenter's assertion that "[t]he draft permit does not sufficiently ensure contemporaneous emission decreases from the cessation of firing fuel at Big Bend Units 1 and 2 since it does not require the emissions reductions until *after* commercial operation of the combustion turbines begin." This mischaracterizes the permit. Condition 10 of Section 2 of the permit states, "The Permittee shall not commence commercial operation of either combustion turbine (exclusive of sale of test generation) until either Big Bend Unit 1 or Unit 2 has permanently ceased firing fuel." It is clear from this condition that commercial operation of a turbine may not begin until after one of the existing units has permanently ceased firing fuel (*i.e.*, the ceasing of firing of fuel in the existing unit comes first; then commercial operation of the turbine may begin).

The Department will make one change to Condition 10 to clarify when the turbines "become operational". This does not change the intent or stringency of this condition; it simply clarifies the point in time by which the existing units will be required to be permanently shut down.

10. Permanent Shutdown of Big Bend Units 1 and 2: The Permittee shall not commence commercial operation of either combustion turbine (exclusive of sale of test generation) until either Big Bend Unit 1 or Unit 2 has permanently ceased firing fuel. The Permittee shall not commence commercial operation of the second combustion turbine (exclusive of sale of test generation) until both Big Bend Units 1 and 2 have permanently ceased firing fuel. The turbine "becomes operational" for the purposes of Rule 62-210.200(189), F.A.C., and "commences commercial operation" for the purposes of this condition when the combustion turbine has completed all testing and is ready for routine operation and normal dispatch to deliver power to the electric grid. [Rule 62-210.200(189), F.A.C. and Avoidance of Rule 62-212.400, F.A.C.]

3. The commenter states that the Department failed to consider possible increases in usage of Big Bend Units 3 and 4 as a result of the project. The retirement of Units 1 and 2, and the operation of the new turbines in only simple-cycle mode, with an annual capacity restriction, while the heat recovery steam generators are constructed, leaves open the possibility that the permittee could temporarily increase utilization of Units 3 and 4.

[3] Available in Oculus or from the EPA website.

Response: Units 3 and 4 are not included in this project, and no modification is taking place to either Unit 3 or Unit 4 as a result of this project. Therefore, the Department has no authority to consider Units 3 and 4, and it would be improper to include Units 3 and 4 in this project.

Additionally, the Department finds an increase in utilization of Units 3 and 4 to be very unlikely. A review of data from EPA's Clean Air Markets Division[4] shows that the capacity factor for Unit 1 for the period 2015-2017 was 50%, and the capacity factor for Unit 2 for the same period was 42%. These relatively low capacity factors suggest that Tampa Electric's system will have little to make up for after these units are removed from service. The permitted annual simple-cycle operation of the new turbines would account for approximately 79% of the annual output from Units 1 and 2. (Once the turbines are operating in combined-cycle mode, the combined-cycle unit will produce much more electricity than Units 1 and 2.)

Units 3 and 4 began operation in 1976 and 1985, respectively. After Units 1 and 2 are retired, Units 3 and 4 will be the oldest units in the Tampa Electric fleet. The combined-cycle unit at the utility's Bayside plant began operation in 2003-2004. The integrated gasification combined-cycle unit at the Polk Power Station began operation in 1996, and the combined-cycle unit at Polk began combined-cycle operation in 2017. These units, due to their age and their combined-cycle configurations, are more efficient than Big Bend Units 3 and 4, and therefore would be expected to be dispatched preferentially. Additionally, since Tampa Electric serves a rather small geographic area, there is not a major concern about the necessity to locate generation near load.

According to Tampa Electric's 2018 Ten Year Site Plan[5], the new turbines to be constructed in this project are expected to enter service in June 2021. Between September 2018 and January 2021, the utility plans to add 600 megawatts of utility-scale solar capacity. This further decreases the likelihood that Units 3 and 4 will have increased utilization.

The relatively low capacity factors of the units to be shut down, the generation capacity of the new turbines, the presence of newer, more efficient units in the Tampa Electric system, and the addition of substantial solar resources to the Tampa Electric system together assure that Units 3 and 4 will not face increased utilization as a result of this project.

No changes were made to the permit as a result of this comment.

4. The commenter states that the draft permit fails to consider climate change and the cumulative impacts of climate change. The commenter asserts that the Department, under state authority from the Florida Air and Water Pollution Control Act, should have considered climate change, including the project's direct, indirect, and cumulative climate impacts. The commenter also highlights many of the expected impacts of climate change on Florida, especially the impacts of sea level rise. Since the existing Big Bend units are reaching the end of their useful lives, the commenter claims that adding natural gas units will lock in fossil-fueled power for thirty more years. Additionally, the commenter suggests that the Department should consider Tampa Electric's announced plans for future peaking generation, to be added in the 2023 to 2026 timeframe.

   Response: This project entails the retirement of two existing units, fueled largely by coal, and the construction of two new natural gas-fueled construction turbines. According to the Technical Evaluation and Preliminary Determination for this project, the project will result in a net <u>decrease</u> in greenhouse gas (GHG) emissions of over 2 million tons per year. Both state and federal PSD rules allow for the use of creditable emissions decreases from retiring existing units, and the rules make no exception for units that are nearing the end of their useful lives. When Tampa Electric applies for air pollution permits for additional peaking units in the future, it will consider the air pollution impacts of those turbines and, if required by state rules, the air pollution impacts from other sources, pursuant to PSD permitting procedures.

[4] EPA CAMD Air Markets Program Data website
[5] Available on the Florida Public Service Commission website.

As the commenter notes, the Florida Air and Water Pollution Control Act aims to "achieve and maintain such levels of air quality as will protect human health and safety …" [Section 403.021(3), Florida Statutes]. The US EPA has declined to establish an ambient air quality standard for CO_2 due to the global nature of CO_2 emissions (i.e., the level of CO_2 at any given location is influenced by the world-wide emission of CO_2). In the absence of an ambient standard, it is necessary to rely on technology-based emission standards to determine permissible emissions rates of the pollutant. Using the procedures in the state's well-established rules and in the state's EPA-approved State Implementation Plan and PSD program, the Department has evaluated the project and determined that the limits on CO_2 emissions in 40 CFR 60, Subpart TTTT, are the only greenhouse gas limits that are applicable for this project.

Further, guidance from EPA sheds light on the feasibility of analyzing the climatic impacts of individual projects. In its "PSD and Title V Permitting Guidance for Greenhouse Gases"[6] from March 2011, EPA wrote:

> *As a general matter, GHG emissions contribute to global warming and other climate changes that result in impacts on the environment and society. However, due to the global scope of the problem, climate change modeling and evaluations of risks and impacts of GHG emissions currently is typically conducted for changes in emissions orders of magnitude larger than the emissions from individual projects that might be analyzed in PSD permit reviews. Quantifying these exact impacts attributable to the specific GHG source obtaining a permit in specific places is not currently possible with climate change modeling. Given these considerations, an assessment of the potential increase or decrease in the overall level of GHG emissions from a source would serve as the more appropriate and credible metric for assessing the relative environmental impact of a given control strategy. (Pages 41-42)*

In this permitting decision, the Department is tasked with reviewing this particular project. As stated above by EPA, the quantitative and qualitative tools to link an individual project to particular climate change-related outcomes do not exist.

In this permitting project, the Department does regulate GHG emissions by including the applicable federal standards. In addition, after completion of the project, annual GHG emissions will <u>decrease</u> by 2 million tons per year.

The Department did not make any changes in the permit related to this comment.

5. The commenter states that the turbines in this project should be subject to the same requirements as the turbines in the recently permitted project for Florida Power & Light's Dania Beach Energy Center. The Dania Beach Energy Center received a limit on greenhouse gas emissions of 850 pounds per megawatt-hour, CO_2-equivalent, and a work practice requirement to monitor methane leakage. The commenter maintains that, since another facility has received these greenhouse gas limits in a Department-issued permit, this facility must also receive these same limits in light of the state's policy contained in Section 403.021(3), Florida Statutes, to "achieve and maintain such levels of air quality as will protect human health and safety…[and to] afford [citizens] reasonable protection from the dangers inherent in the release of toxic or otherwise hazardous…gases…into the environment."

   Response: The Dania Beach Energy Center project triggered a PSD review for greenhouse gases, pursuant to Chapter 62-212, F.A.C. Therefore, the Department made a case-specific determination of Best Available Control Technology (BACT) for greenhouse gases for that project. This present Big Bend project did not trigger a PSD review for greenhouse gases; in fact, the project entails a net decrease of 2 million tons per year in greenhouse gas emissions. Therefore, the Department has no authority to require BACT for this project. (The Department notes that, even without BACT, Tampa Electric will have a financial incentive to operate as efficiently as possible. Using less fuel per unit of electricity produced equates to both lower operating costs and lower emissions.)

   The Department will not make any changes in the permit related to this comment.

[6] Available on the EPA website.

6. The commenter states that any revision to the PSD analysis should be made available for public review during a second public comment period, on a re-issued draft permit.

   Response: Because the minor changes to the permit described in this Final Determination do not constitute a substantial modification to the project, a second public notice of the intent to issue this permit is not required.

Applicant

On June 15, 2018, the Department received comments from the applicant[7]. The comments all relate to the timing of initial testing and application for a Title V air operation permit. The following summarizes the comments and the Department's response.

1. The applicant requests a clarification to the timing for the application to revise the facility's Title V air operation permit, after construction has been completed. The requested addition to the permit condition is marked in yellow with a double underline.

   9. Application for Title V Permit: This permit authorizes construction of the permitted emissions units and initial operation to determine compliance with Department rules. A Title V air operation permit is required for regular operation of the permitted emissions unit. The permittee shall apply for a Title V air operation permit at least 90 days prior to expiration of this permit, but no later than 180 days after commencing simple-cycle operation. The permittee shall also apply for a Title V air operation permit at least 90 days prior to expiration of this permit, but no later than 180 days after commencing combined-cycle operation. "Commence combined-cycle operation" shall mean the first flow of combustion turbine exhaust gas through the HRSG. To apply for a Title V operation permit, the applicant shall submit the appropriate application form, compliance test results, and such additional information as the Department may by law require. The application shall be submitted to the appropriate Permitting Authority with copies to the Compliance Authority. [Rules 62-4.030, 62-4.050 and Chapter 62-213, F.A.C.]

   Response: The Department will make the requested change. This clarifies when the Title V revision application must be submitted, without altering the stringency of the permit.

2. The applicant requests revisions to Condition 8 to clarify the limits of operation in simple-cycle mode and combined-cycle mode and to repeat the greenhouse gas limits, which are already included elsewhere in the permit. Also, the applicant seeks to clarify that potential electric output was calculated in the permit application using the gross electric output in megawatt-hours (MWh).

   8. ~~Hours of~~ Limits of Operation:

   a. *Combined Cycle*: Each CTG shall be limited to 1,000 lb CO2/MWh (based on gross electrical output) on a 12-operating month rolling average basis in combined cycle mode. The hours of operation of the turbines in combined-cycle mode are not restricted (i.e., 8,760 hours per year).

   b. *Simple Cycle*: Each CTG shall be limited to 120 lb CO2/MMBtu on a 12-operating month rolling average basis operating less than or equal to ~~may generate no more than~~ 1,262,701 gross electric output megawatt-hours (MWh) on a 12-operating-month or a 3-year rolling average basis ~~per rolling 12-month period~~ in simple-cycle mode.

   Response: The applicant requests these changes to clarify to operators the emissions and operating limits. The Department generally separates operating limits from emission limits into separate sections of the permit, but the applicant has requested that the greenhouse gas emissions limits appear together with the operating limits to assist operators with compliance. The greenhouse gas emissions limits are repeated in the section of the permit focused on emission limits. The Department will make the requested change, though in a slightly modified form for the sake of clarity. The condition will be modified as follows:

   8. ~~Hours of~~ Limits of Operation:

[7] Tampa Electric comment letter available in Oculus.

a. *Combined Cycle*: Emissions of CO_2 from each CTG shall be limited to 1,000 lb/MWh (based on gross electrical output) on a 12-operating month rolling average basis in combined-cycle mode. The hours of operation of the turbines in combined-cycle mode are not restricted (i.e., 8,760 hours per year).

b. *Simple Cycle*: ~~Each~~ Emissions of CO_2 from each CTG shall be limited to 120 lb/MMBtu on a 12-operating month rolling average basis. Each CTG may generate no more than 1,262,701 gross electric output megawatt-hours (MWh) on a 12-operating-month or a 3-year rolling average basis ~~per rolling 12-month period~~ in simple-cycle mode.

3. The applicant requests the following revisions consistent with Condition 9 in Section 2, to clarify the initial testing requirements in simple-cycle operation and combined-cycle operation.

13. Subpart KKKK Initial Compliance Demonstrations: The initial compliance demonstrations for NO_X shall be in accordance with Subpart KKKK. This subpart allows for the initial compliance demonstration to be performed as part of the relative accuracy test audit (RATA) for the NO_X CEMS. Each turbine shall be tested for initial compliance under simple-cycle operation. After the turbines are capable of operating in combined-cycle mode, each turbine shall be tested for initial compliance under combined-cycle operation. The initial compliance demonstration shall ~~must~~ be conducted within 60 days after achieving the maximum production rate of the turbine, but not later than 180 days ~~after initial startup of the turbine~~. The initial compliance demonstration shall be conducted 60 days after achieving the maximum production rate of the turbine, but not later than 180 days after "commencing combined-cycle operation" as specified in Specific Condition 9, Section 2. [Rules 62-4.070 and 62-297.310(8)(b), F.A.C., and 40 CFR 60.8 and 60.4405]

Response: The Department will clarify the condition. However, the Department will slightly modify the applicant's requested change, in order to avoid unnecessary cross-referencing between permit conditions. The condition will be modified as follows:

13. Subpart KKKK Initial Compliance Demonstrations: The initial compliance demonstrations for NO_X shall be in accordance with Subpart KKKK. This subpart allows for the initial compliance demonstration to be performed as part of the relative accuracy test audit (RATA) for the NO_X CEMS. Each turbine shall be tested for initial compliance under simple-cycle operation. After the turbines are capable of operating in combined-cycle mode, each turbine shall be tested for initial compliance under combined-cycle operation. The initial compliance demonstration for simple-cycle operation shall ~~must~~ be conducted within 60 days after achieving the maximum production rate of the turbine, but not later than 180 days after initial startup of the turbine. The initial compliance demonstration for combined-cycle mode shall be conducted within 60 days after achieving the maximum production rate of the combined-cycle unit, but not later than 180 days after the first flow of combustion turbine exhaust gas through the HRSG. [Rules 62-4.070 and 62-297.310(8)(b), F.A.C., and 40 CFR 60.8 and 60.4405]

CONCLUSION

The final action of the Department is to issue the permit with the minor changes, corrections and clarifications as described above.