



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

Mr. Albert Hatton, Manager
Environmental Programs
Alternate Designated Representative
Exelon Generation Company, LLC
300 Exelon Way
Kennett Square, PA 19348

OFFICE OF
AIR AND RADIATION

Re: Petition for Approval of a Methodology to Determine Site-specific F_C Values for Unit B0004 at the Albany Green Energy LLC (Facility ID (ORISPL) 60340)

Dear Mr. Hatton:

The United States Environmental Protection Agency (EPA) has reviewed the February 1, 2018 petition submitted under 40 CFR 75.66 by Exelon Generating Company, LLC ("Exelon"), in which Exelon requested approval of a methodology for determining site-specific values of carbon-based F-factors (F_C) to be used during normal operation of Unit B0004 at the Albany Green Energy LLC facility ("Albany"). EPA approves the petition in part, with conditions, as discussed below.

Background

Albany Green Energy LLC owns and Exelon operates the Albany facility, which is located in Albany, Georgia. Albany Unit B0004 is a 1,209 MMBtu/hr primarily biomass-fired circulating fluidized bed (CFB) cogeneration boiler. The boiler commenced commercial operation in May 2017. According to Albany's permit, only biomass and natural gas may be fired in the boiler. Combustion of natural gas is limited to periods of startup, shutdown, and as necessary during operation, and is further limited to a firing rate of 350 MMBtu/hr. The facility's permit allows combustion of a wide variety of biomass materials including, but not limited to, wood bark and wood residues.

According to Exelon, Unit B0004 is subject to the Acid Rain Program and trading programs for sulfur dioxide (SO_2) and annual and ozone-season nitrogen oxides (NO_x) emissions under the Cross-State Air Pollution Rule. Albany is therefore required to continuously monitor and report the unit's NO_x , SO_2 , and carbon dioxide (CO_2) mass emissions, NO_x emission rate, and heat input rate in accordance with 40 CFR Part 75. The formulas used at Albany to calculate both NO_x emission rate and heat input rate require the use of an F_C value - a fuel-specific factor representing the ratio of the volume of CO_2 generated to the calorific value of fuel combusted, expressed in standard cubic feet of CO_2 per million Btu of fuel heat input (scf CO_2 /MMBtu). The F_C value is not used in the calculations of SO_2 and CO_2 mass emissions for Unit B0004. The F_C value also has no effect on the reported NO_x mass emissions because the NO_x mass emission rate (lb/hr) is calculated as the product of the NO_x emission rate (lb/MMBtu) and the heat input

rate (mmBtu/hr), and the F_C value is in the numerator of the NO_x emission rate equation and in the denominator of the heat input rate equation and, therefore, cancels out when the results of the two equations are multiplied together.¹ According to Exelon, the unit is not subject to an Acid Rain NO_x emission rate limit.

Table 1 in appendix F to part 75 provides default F_C values for the most common fuels. As an alternative to use of the default values for any Table 1 fuel, part 75 allows the use of a site-specific F_C value based on sampling and analysis of the fuel's carbon content and gross calorific value (GCV).² Section 3.3.6 requires analysis of a minimum of nine fuel samples to determine a site-specific F_C value, which must be re-determined at least annually. If a unit burns a mixture of Table 1 fuels, part 75 allows the owner or operator to use either a "worst-case" F_C value determined as the highest F_C value for any of the individual fuels or a heat input-weighted F_C value based on the F_C values of the individual fuels.³ However, where a unit burns a mixture of a Table 1 fuel and a fuel not listed in Table 1, the F_C value is subject to approval by the Administrator under § 75.66.⁴

Table 1 of appendix F contains default F_C values for several of the fuels that may be combusted at Unit B0004, specifically wood bark, wood residue, and natural gas.⁵ However, as previously noted, Albany is permitted to burn many types of fuels that are not listed in Table 1. According to Exelon, non-Table 1 fuels are expected to contribute less than 10% of the total fuel input to the boiler. When Unit B0004 started operation, only Table 1 fuels were combusted (i.e., natural gas, wood bark, and wood residue). However, in recent months, peanut hulls and paper fines have been burned, and Exelon has stated that combustion of other types of non-Table 1 biomass fuels is continually being considered.

Proposed F_C Value Methodology

In its February 1, 2018 petition, Exelon proposed a methodology for determining site-specific F_C values for Albany Unit B0004, including a fuel sampling schedule. Exelon proposed the following two-step approach:

1. Determine an F_C value for each type of fuel combusted in the unit: and
2. When combinations of fuels are burned, either pro-rate the fuel-specific F_C value or apply the "worst-case" F_C value.

Details of the proposed procedures follow:

For each non-Table 1 fuel combusted in Unit B0004, a minimum of nine representative samples would be initially collected and analyzed for carbon content and GCV. Then, a site-specific F_C value would be calculated from each sample, using Equation F-7b in section 3.3.6 of appendix F to part 75. Exelon would use the arithmetic average of the calculated F_C values for

¹ Refer to Equation F-6 and F-15 in appendix F to part 75.

² Refer to Equation F-7b in appendix F to part 75.

³ Refer to sections 3.3.6.4 and 3.3.6.5 of appendix F to part 75.

⁴ Refer to section 3.3.6.3 of appendix F to part 75.

⁵ The Table 1 default F_C values for these fuels are 1,920 scf CO_2 /MMBtu for wood bark, 1,830 scf CO_2 /MMBtu for wood residue, and 1,040 scf CO_2 /MMBtu for natural gas.

the corresponding fuel. The proposed methodology would be applied to each permitted fuel as it becomes available. For Table 1 fuels (i.e. wood bark, wood residue, and natural gas), Exelon would use either the default Table 1 F_C values or determine site-specific F_C values using the protocol described in this paragraph for non-Table 1 fuels.

At the discretion of the owner or operator, the initial determination of any F_C value could be repeated by taking and analyzing at least nine new samples within a given calendar year to establish a new fuel-specific value. This would be considered if, for example, analytical data from a new supplier was consistently well below the established values.

Following the initial determination or (re-determination) of each non-Table 1 fuel, at least one sample of that fuel would be collected and analyzed in each calendar month in which it is combusted for the purposes of the on-going annual F_C value assessments or within a 168-unit operating hour grace period after the end of the month. If the newly calculated F_C value from any single sample is more than 5% lower or higher than the F_C value in use, Exelon would use the newly calculated F_C value from that sample, unless Exelon believes the results from that sample are anomalous, in which case Exelon would immediately collect and analyze three additional samples and would substitute the average value from those three samples for the value from the sample considered anomalous. If the newly calculated F_C value (for a single sample or a three-sample average) is within 5% of the F_C value in use, Exelon would continue using the existing F_C value. At least nine samples per calendar year of each fuel would be sampled and analyzed.

Exelon proposes to record the quantity and type of each solid fuel when it is delivered, and measure natural gas input to the boiler by a fuel flowmeter in real time. For each combination of fuels combusted in the unit, Exelon proposes to use these records to either: (a) determine a pro-rated F_C value in accordance with Equation F-8 of appendix F to part 75 using best available information on the quantity and the GCV of each fuel; or (b) apply a “worst-case” F_C value in accordance with Section 3.3.6.5 of appendix F. The facility will keep records of all site-specific F_C values determinations for at least three years.

EPA’s Determination

EPA approves Exelon’s petition in part, with conditions. At a general level, the provisions of the proposed approach for computing F_C values for non-Table 1 fuels from a minimum of nine representative samples using Equation F-7b in section 3.3.6 of appendix F to part 75 and for computing new F_C values from analysis of at least nine new samples annually are consistent with the procedures for determination of site-specific F_C values for Table 1 fuels. Similarly, the proposed approach to determination of F_C values for use in hours when combinations of fuels are combusted based on either a pro-rated F_C value computed using Equation F-8 in section 3.3.6.4 of appendix F or using the “worst case” F_C value in accordance with section 3.3.6.5 of appendix F closely parallel the analogous procedures for combinations of Table 1 fuels. These portions of Exelon’s petition are approved.

However, the additional specific provisions of Exelon’s proposed approach that call for potentially changing the F_C value in use based on analysis of a single sample, for establishing 168-unit operating hour grace periods for sample collection, and for retaining discretion to not use a

new calculated F_C value when it is higher than the existing F_C value do not parallel the standard appendix F procedures for computing site-specific values for Table 1 fuels, and the petition does not contain information indicating why these unique features of the proposed methodology might be necessary or superior to the provisions in appendix F for determining site-specific F_C values for Table 1 fuels. Accordingly, these portions of the petition are denied. Instead, consistent with the appendix F methodology for computing site-specific values for Table 1 fuels, Exelon must compute an initial site-specific F_C value for each non-Table 1 fuel from analysis of at least nine samples. At least annually, Exelon must compute a new site-specific F_C value for each non-Table 1 fuel from at least nine new samples. If the newly computed F_C value is higher than the F_C value already in use, Exelon must use the newly computed F_C value, and if the newly computed F_C value is lower than the F_C value already in use, Exelon may either use the newly computed F_C value or continue to use the existing F_C value.

The terms and conditions of this partial approval are as follows:

- (1) As specified in conditions (3) through (5) of this approval, Albany shall determine F_C values for any fuel combusted in Unit B0004 that is not listed in Table 1 of appendix F to part 75. These F_C values shall be used to calculate and report Unit B0004's hourly NO_x emission rates (lb/mmBtu) and hourly heat input rates (mmBtu/hr).
- (2) For each unit operating hour or partial hour in which natural gas, wood bark, or wood residue is combusted in Unit B0004, Albany shall either:
 - (i) Use the appropriate default F_C values of from Table 1 of appendix F to part 75 (i.e., 1,040 scf CO_2 /mmBtu, for natural gas, 1,920 scf CO_2 /mmBtu for wood bark and 1,830 scf CO_2 /mmBtu for wood residue); or
 - (ii) Determine site-specific F_C values for those fuels according to Equation F-7b in section 3.3.6 of appendix F.
- (3) For each calendar year in which fuels other than natural gas, wood bark, or wood residue are combusted in Unit B0004, Albany shall perform fuel sampling and analysis as follows to determine a site-specific F_C value for each fuel. Each calendar year, Albany shall obtain at least nine representative samples of each fuel not found in Table 1 of appendix F to part 75 combusted in the unit (e.g., peanut hulls, paper fines, and other biomass materials) either during the RATA for part 75 or whenever the fuel is being fired over the course of the calendar year. Each of the samples shall be analyzed for carbon content (weight percentage) and gross calorific value (Btu/lb). Based on the results of the analysis, Albany shall use Equation F-7b in appendix F to part 75 to calculate the F_C value for each sample. The F_C values for each of the samples collected in a given calendar year shall be arithmetically averaged to determine a new F_C value. If the newly computed average F_C value is higher than the F_C value already in use for that fuel, the newly computed value must be used prospectively from the date of the last of the samples until the next annual (or more frequent) determination. If the newly computed average F_C value is lower than the F_C value already in use for that fuel, Albany may use either the F_C value already in use or the newly computed F_C value

prospectively from the date of the last of the samples until the next annual (or more frequent) determination.

- (4) For each hour in which a mixture of fuels is co-fired in Unit B0004, Albany shall either:
- (i) Calculate and report a pro-rated F_C value, in accordance with section 3.3.6.4 of appendix F to part 75; or
 - (ii) Report the highest (“worst case”) F_C value, for any fuel in the mixture, in accordance with section 3.3.6.5 of appendix F to part 75.
- (5) If any mixture of fuels combusted in Unit B0004 includes a non-Table 1 fuel for which a site-specific F_C value has not been determined (e.g., if the required sample analyses are missing or invalid), Albany shall report the “worst case” (highest) F_C value for the other fuel(s) in the mixture until a site-specific F_C value for the non-Table 1 fuel has been determined.

EPA’s determination relies on the accuracy and completeness of Exelon’s February 1, 2018 petition and any supplementary information provided to EPA thereafter and is appealable under 40 CFR part 78. If you have any questions regarding this determination, please contact Carlos R. Martinez at (202) 343-9747 or by e-mail at martinez.carlos@epa.gov. Thank you for your continued cooperation.

Sincerely,



Reid P. Harvey, Director
Clean Air Markets Division

cc: David McNeal, EPA Region IV
Sean Taylor, Georgia DNR-EPD
Carlos R. Martínez, CAMD