

Staff Review and Recommendations for
Case No. 13-1779-EL-REN

In the Matter of the Application of the
University of Cincinnati's Waste Heat Recovery
Facility for Certification as an Eligible Ohio
Renewable Energy Resource Generating Facility

Background

On September 10, 2012, Amended Substitute Senate Bill Number 315 became effective. With the enactment of this legislation, certain types of waste energy recovery systems became eligible for certification as renewable energy resource facilities.

Specifically, pursuant to Revised Code 4928.01(A)(37)(a)(ix), the definition of renewable energy resource was expanded to include a "...waste energy recovery system placed into service or retrofitted on or after the effective date of the amendment of this section by S.B. 315 of the 129th general assembly, except that a waste energy recovery system described in division (A)(38)(b) of this section may be included only if it was placed into service between January 1, 2002, and December 31, 2004..." Further, pursuant to Revised Code 4928.01(A)(38)(b), a waste energy recovery system was defined to include "A facility at a state institution of higher education as defined in section 3345.011 of the Revised Code that recovers waste heat from electricity-producing engines or combustion turbines and that simultaneously uses the recovered heat to produce steam, provided that the facility was placed into service between January 1, 2002, and December 31, 2004."

The energy resource under consideration in this application has been evaluated by Staff pursuant to these specific sections of the Ohio Revised Code.¹

Staff's Review of the Filing

On October 15, 2013, the University of Cincinnati (Applicant), submitted an application for Commission certification of its waste energy recovery system, located at its Central Utility Plant, as a renewable energy resource generating facility. The Central Utility Plant is located at 3000 Glendora Avenue, in Cincinnati, Ohio. According to the application, the facility is characterized as a combined heat and power plant. Facility certification was requested under the criteria of section G15, Waste Energy Recovery System. At the facility, electricity is generated with two natural gas fired combustion turbine generators, rated at 12.5 MW each, and a single 24 MW steam driven turbine generator. Additionally, a 1.8 MW diesel generator is available for emergency and black start purposes. Heat from each gas fired turbine's exhaust gas is captured via dedicated heat recovery steam generators (HRSGs), capable of producing 600 psi steam at 750°F. Each HRSG

¹ Staff is cognizant of the passage of Substitute Senate Bill Number 310 earlier this year. Any impacts of that legislation on certification of this facility as a renewable energy resource facility should be considered after September 12, 2014, the effective date of that legislation.

is equipped with auxiliary natural gas burners, which account for approximately 25% of the facility's steam production. The high pressure steam can be used to power a 24 MW steam driven turbine generator, or the steam pressure can be reduced to 125 psi and used for campus heating purposes.

The application, as filed, requested recognition of steam produced at the facility for renewable energy credit (REC) purposes. The Applicant proposed to determine a kWh equivalent for the 600 psig, 750°F steam produced by the HRSGs by using the steam's corresponding enthalpy value of 1,378.57 Btu/lb and an average heat rate for natural gas fired steam turbine generators of 10,416 kWh/Btu. The product of these, and the pounds of steam produced, would be used as the kWh equivalent to be used to determine the number of RECs produced.

The Applicant did not request that any of the actual electrical generation of the facility to be considered renewable for REC purposes, and did not include details in the application about monitoring the facility's electricity production. In response to Staff data requests, the Applicant established that the electrical output from each electric generator is individually metered with utility grade meters.

Staff's Analysis

1. Resource/Technology

As stated previously, pursuant to Revised Code 4928.01(A)(37)(a)(ix) and 4928.01(A)(38)(b), eligible renewable energy resources include facilities at state institutions of higher education that recover waste heat from electricity producing engines or combustion turbines and that simultaneously use the recovered heat to produce steam. Based on Staff's review of the application, interrogatory responses, and discussions with the Applicant, Staff concludes that the facility in question does make use of electricity producing combustion turbines and does recover the heat produced by those engines to produce steam. Further, consulting Revised Code 3345.011, Staff concludes that the University of Cincinnati is identified as a state institution of higher education.

2. Placed In Service Date

Revised Code 4928.01(A)(37)(a)(ix) includes a specified restriction on the dates in which the facility must have been placed in service in order to be considered a waste energy recovery system - between January 1, 2002, and December 31, 2004. The application provides the placed in service date for the both of the natural gas fired turbine generators and the steam powered turbine generator as June 1, 2004. This date was confirmed on a copy of a utility notification letter that was provided to Staff, and is within the statutorily defined window

3. Deliverability and Grid Interconnection

The facility in question is located in Cincinnati, Ohio, so the electricity produced by the facility would fulfill the requirement to be deliverable to Ohio. Further, the University of Cincinnati Central Utility Plant has interconnections with the electric grid of the local utility (Duke Energy

Ohio). Electricity produced at the UC Central Utility Plant can physically be delivered to the Duke Energy Ohio system, with no reconfiguration or unit shutdown necessary in order to accomplish this. Staff, therefore, believes that this facility complies with deliverability requirements.

4. Renewable Energy Output

As stated previously, the Applicant desires to obtain renewable certification only for the entire steam production from the two HRSGs that are associated with the gas fired turbine generators.² Electrical equivalents for steam production would be determined by the use of conversion factors. This calculated amount, converted to MWH, would be used for the number of RECs to be allocated to the facility for the production of steam.

Staff has concerns with the Applicant's proposal. One concern is the Applicant's intention to include steam that is produced directly from the combustion of natural gas (via the auxiliary burners in its HRSGs) as a renewable energy resource. However, natural gas is not considered a renewable energy resource pursuant to 4928.01(A)(37), Revised Code. An additional concern is the Applicant's intention to focus on the steam produced from the HRSGs associated with its two gas fired turbine generators as its renewable energy production. Measured steam production would be converted to a MWH equivalent through its conversion calculations, rather than actual physical conversion to electricity.

Staff notes that the statute applicable to this type of facility states that it must be a facility "...that recovers waste heat from electricity-producing engines or combustion turbines and that simultaneously uses the recovered heat to produce steam..." The statute does not address the usage of the steam that is produced through this process, or anything about converting the steam produced to a MWH equivalent. Staff therefore believes that the appropriate focus for this type of facility should be on the electricity producing engines and the recovery of their waste heat to produce steam. Staff also notes that ORC 4928.01(A)(38)(b) does not specify the output that is to be recognized as renewable from any facility that qualifies under this provision. However, ORC 4928.65, which addresses the creation and use of renewable energy credits (RECs), provides that the "public utilities commission shall adopt rules specifying that one unit of credit shall equal one megawatt hour of electricity derived from renewable energy resources..." Thus, Staff concludes that the output that should be recognized for the purpose of creation of renewable energy credits should be the electrical output of the facility.

Given the focus on the electrical output of the facility, and the recovery of heat from the electricity production process to produce steam, Staff believes that it would be appropriate to count as renewable energy a percentage of the net³ electrical generation from the gas fired combustion turbine generators that is based on the efficiency of the heat recovery process. The Applicant

² In response to a Staff request to clearly delineate the energy output(s) of the facility that the applicant wants to include as renewable energy, the applicant responded that it "seeks renewable energy credits only for the steam that is produced by the two HRSGs." Based on this response, Staff presumes that the steam production would include steam that is produced by the HRSGs' auxiliary natural gas burners.

³ The term "net" is used here to represent the resulting electrical output after taking into account and removing any use of the generated electricity to operate equipment that is intrinsic to the generation of the electricity.

initially stated that the efficiency of the HRSGs that it uses is calculated at 96%.⁴ That is, the Applicant claims that 96% of the heat that is processed by the HRSGs is converted to steam. However, based on Staff's review of data provided by the Applicant, and follow-up discussions with the Applicant, a more appropriate HRSG efficiency rating was determined to be 80%. Further, the Applicant has provided information to Staff showing that the facility only rarely (less than 1% of the MWH production) generates electricity without also using the HRSGs to recover heat to produce steam. Thus, Staff believes that the 80% efficiency factor should be applied to the electrical output from the combustion turbine generators in order to determine the amount of electrical output that should be considered renewable. If operational modes change so that the percentage of MWH production without heat recovery to produce steam becomes significant (greater than 1%), then the amount of generation considered renewable should be adjusted downward by the same percentage. Additionally, if the efficiency of the steam conversion process can be shown to differ significantly from 80%, the percentage of electricity production to be considered renewable should be adjusted accordingly.

The steam powered electric generator is powered from steam that is produced by the HRSGs, which would include steam produced directly from combustion of natural gas via the auxiliary burners. However, the exhaust heat from the steam powered generator is not used to produce steam.⁵ Staff, therefore, recommends that none of the electricity output of the steam powered electric generator be counted as renewable energy.

5. Initial Date for Recognition of Renewable Generation

On page 2 of the supplement to its application, the Applicant requests recognition for the facility's output as renewable generation as of the date of its filing of the application, which was October 15, 2013. Ohio Administrative Code 4901:1-40-04(D)(5) provides the initial date for which renewable energy credits can be created for use in compliance with Ohio's renewable energy requirements as July 31, 2008. This was the effective date of SB 221, which initiated Ohio's alternative energy portfolio standard. As previously noted, the effective date of SB 315, in which this type of waste energy recovery facility was initially deemed to be a renewable energy resource, was September 10, 2012. Therefore, Staff believes that the appropriate date for recognition of energy production from this waste energy recovery facility for the creation of renewable energy credits that can be used in compliance with Ohio's renewable energy requirements can be no earlier than September 10, 2012. Effective January 1, 2013, the Commission began recognizing REC production as of the date of filing a renewable facility certification application, for operational facilities.⁶ Thus the effective date of October 15, 2013, as requested by the Applicant, is appropriate for this facility.

6. Metering Requirements

Ohio Administrative Code (OAC) Section 4901:1-40-04(D)(1) requires renewable generating facilities of more than 6 kilowatts in generating capacity to have a utility-grade meter as a prerequisite to being certified. This utility-grade meter requirement includes a reference to OAC

⁴ Provided in response to Staff data requests.

⁵ Based on discussions between Staff and the Applicant's representative about operation of the facility.

⁶ See, for example, the Finding and Order issued on June 6, 2012, in case number 11-2667-EL-REN.

4901:1-10-05, where it is required that the meter accuracy complies with the 2001 ANSI C 12.1 standards. Staff believes that the electric meters being used by the applicant to measure the output of its electric generating turbines comply with this requirement.

Staff Recommendations

Based on the foregoing analysis, Staff recommends that the University of Cincinnati's Central Utility Plant be certified as a renewable generating facility. Staff recommends an initial date of October 15, 2013, for the purpose of creation of renewable energy credits for use in compliance with Ohio's renewable energy requirements. Based on the steam conversion efficiency of the facility's HRSGs, Staff recommends that 80% of the net electrical generation output of the facility's combustion turbine generators be recognized as renewable. Staff also recommends that none of the net electricity production from the steam driven generator be recognized as renewable. Further, should the facility at some future time cease producing steam by the recovery of waste heat from the electric generating turbines, Staff recommends that the facility's certification should be revoked.

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Summary: Staff Review and Recommendation electronically filed by Raymond W. Strom on behalf of PUCO Staff