

Clean River Energy Center Air Quality Application Evaluation

Prepared for
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1 Introduction

At your request, Fuss & O'Neill, Inc. has provided a review of the documents and information submitted to the Rhode Island Department of Environmental Management (RIDEM) and additional information provided to the Rhode Island Energy Facilities Siting Board (EFSB) related to air quality impacts associated with the potential siting of the Clean River Energy Center in the Town of Burrillville, Rhode Island. This report is designed to outline and describe the advantages and disadvantages (i.e., pros and cons) of each evaluated "air quality issue" that was assessed by Fuss & O'Neill, at the request of the Town of Burrillville. It is worth noting that there are many issues unrelated to air impacts which will bear upon the decision to recommend whether to site, or to not site, the Clean River Energy Center within the Town of Burrillville. These issues should be evaluated in concert with the air issues analysis described below.

2 Air Impacts Analysis

2.1 Air Quality Permitting Summary

Invenegy submitted an air quality Major Source Permit Application for a Combined-Cycle Electric Generating Facility to RIDEM Office of Air Resources on June 26, 2015. The original submittal did not include the Air Dispersion Modeling Report or Health Risk Assessment Report, both of which are needed for RIDEM to start their preliminary review to determine whether the application is administratively complete and start their technical review. Invenegy submitted the Air Dispersion Modeling Report for the project to RIDEM on October 30, 2015, and the Health Risk Assessment Report on January 27, 2016. Fuss & O'Neill received notice on April 28, 2016 that RIDEM had sent a letter to Invenegy stating the application had been deemed administratively complete. The application was deemed administratively complete by RIDEM on or about April 26, 2016.

The focus of our evaluation has been our review of the Major Source Permit Application for a Combined-Cycle Electric Generating Facility, Air Dispersion Modeling Report, and Health Risk Assessment Report at the Town's request.

Each of the noted documents has significant inconsistencies, omissions, and errors that require further clarification and correction by the applicant. Some of the inconsistencies noted in the Major Source Permit Application for a Combined-Cycle Electric Generating Facility submitted to RIDEM included, but were not limited to:

- The Property Line and Fence Line locations;
- Proposed use of Ultra-Low Sulfur Diesel (ULSD) as a secondary fuel in the Combustion Turbines;
- Proposed air permit limits for use of ULSD in the Combustion Turbines;
- ULSD storage tanks (size, number, location);
- General emission calculations; and,
- BACT/LAER selection consistent with methodology described in report text.

Some of the inconsistencies noted in Air Dispersion Modeling Report submitted to RIDEM included, but were not limited to:

- Flawed emission calculations and input parameters taken from Major Source Permit Application noted above;
- AERMOD (modeling software) emission source locations;
- Errors/inconsistencies in equipment specifications and operating parameters;
- Errors on Figures included in the Report (Figures, 3, 6, 8);
- AERMOD receptors; and,
- Missing and/or inconsistent information contained within the Tables (Tables 4, 5, 16).

The noted inconsistencies, errors, and omissions contained within the Air Dispersion Modeling Report are deemed to be significant and represent a major concern regarding our ability to evaluate the results of the modeling and analysis. In order to properly assess the results and provide recommendations to the town for the siting of this facility, the entirety of the Air Dispersion Modeling Report would need to be revised and revisited such that the results represent an accurate representation of facility operations.

Some of the inconsistencies noted in Health Risk Assessment Protocol (HRAP) and Health Risk Assessment Report (HRA) submitted to RIDEM included, but were not limited to:

- Assumptions related to ULSD fuel use and consumption were undefined;
- Assumptions related to modeled pollutants were not defined or referenced;
- Sensitive receptor information was missing from HRAP; and,
- Risk Exposure Scenario Assumptions were not defined or referenced.

Invenergy has subsequently provided additional information to the EFSB related to air quality in responses to Data Requests submitted by Interested Parties, including the Town of Burrillville. Presently, sixteen (16) separate data requests have been submitted by the Town to Invenergy, the most recent dated August 10, 2016. The Town of Burrillville's Data Request #7 (dated April 28, 2016) addressed air quality issues with forty-two (42) questions related to the Major Source permit application in general, as well as specific questions regarding the Air Dispersion Modeling Report, Health Risk Protocol, and Health Risk Assessment Report. Additional air quality questions were included in other data requests by the Town, including Data Request Nos. 4 and 6.

Even in light of information subsequently provided by Invenergy, neither the Major Source Permit Application for a Combined-Cycle Electric Generating Facility, Air Dispersion Modeling Report, nor Health Risk Assessment Report have been officially amended or revised within RIDEM's files. Therefore, Fuss & O'Neill would recommend that the information which was provided in the numerous data request responses relating to the significant inconsistencies, omissions, and errors within the above noted documents be incorporated into formally revised applications and reports submitted to RIDEM. Without formal revision and submission of these documents, Fuss & O'Neill cannot properly evaluate the air quality impacts of the proposed facility.

2.2 Ambient Air Quality – Existing Conditions

The Clean Air Act, which was last amended in 1990, requires US Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The Clean Air Act identifies two types of national ambient air quality standards. Primary standards provide public health protection, including protecting the health of “sensitive” populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

The EPA has set National Ambient Air Quality Standards for six principal pollutants, which are called “criteria” air pollutants. Periodically, the standards are reviewed and may be revised. The six principal pollutants are:

- Carbon Monoxide (CO)
- Lead (Pb)
- Nitrogen Dioxide (NO₂)
- Ozone (O₃)
- Particulate Matter (PM) less than 2.5-microns - PM_{2.5}
- Particulate Matter (PM) less than 10-microns - PM₁₀
- Sulfur Dioxide (SO₂)

At present, the Burrillville area is in attainment with NAAQS established by the EPA for all criteria pollutants. This is a statement of fact, representing neither an advantage (i.e., pro) or disadvantage (i.e., con) related to the proposed siting of the facility.

2.3 Ambient Air Quality – Future Conditions

The predicted impact of the project on current ambient air quality conditions has been estimated by Invenergy using an air quality dispersion model. The AERMOD model used by Invenergy is the EPA-approved model for estimating pollutant concentration values at discrete off-site locations resulting from one or more stationary sources of air emissions. Estimated emissions from the facility during operation are entered into the model, including exhaust stack design data, site structures, and area topography. The model is then executed using five (5) years of actual meteorological data for each pollutant during various future operational. Results are combined with background concentrations established by RIDEM and compared to the federal standards.

The modeling completed by Invenergy and submitted to RIDEM demonstrated that the maximum predicted impacts for the proposed facility will not cause or contribute to air pollution in violation of the NAAQS for any of the scenarios considered. Unfortunately, based on the many deficiencies of the Air Dispersion Modeling Report noted above, we are unable to verify this with a high level of confidence. Regardless, the facility will nonetheless contribute to an increase in the levels of criteria pollutants surrounding the site. For Burrillville residents, these emissions represent a net increase in air pollution, since facility is a new source, not a replacement or modified facility.

According to Rhode Island Air Pollution Control Regulation No. 9 "Air Pollution Control Permits", the owner or operator shall provide an analysis of the impairment to visibility, soils, and vegetation that would occur as a result of the source or modification and general commercial, residential, industrial and other growth associated with the source or modification. The sole criterion for determining if an application is approvable with regard to impairment to visibility and soils shall be compliance with the applicable provisions of Subsection 9.5.2(d). The sole criterion for determining if an application is approvable with regard to impairment to vegetation shall be compliance with all secondary national ambient air quality standards under Subsection 9.5.2(b)(1)(a) and compliance with the applicable provisions of Subsection 9.5.2(d). Similar to our NAAQS compliance evaluation, we are unable to verify the results and conclusions submitted by Invenergy at this time.

The same air quality model used to predict off-site concentrations of NAAQS pollutants was used for air toxics. The air quality model results submitted to RIDEM in support of its air quality application demonstrated that the maximum predicted impacts due to the proposed project are below acceptable ambient levels set in Rhode Island Air Pollution Control Regulation No. 22 "Air Toxics". However, the many deficiencies of the Air Dispersion Modeling Report noted above again prevent us from confirming that compliance with air toxic regulations has been successfully demonstrated by the facility and any potential issues have been adequately identified and addressed.

2.4 General Air Comments

In general, the Invenergy reports contain numerous instances of conflicting information, not just between the three reports (which is to be expected, since the submittal timeframe of the major RIDEM submittals spanned almost seven months), but also within the same report.

For example, all of the location data (i.e., provided coordinates) for on-site buildings and stack locations presented in Table 3 Modeling Input Parameters of the Air Modeling Report was different from the location data contained within the actual model files. When asked about the discrepancy (see Town Data Request 7-24), Invenergy responded that Table 3 "was not updated to reflect" the most recent information used in the model. Typically, when an applicant acknowledges an error affecting an entire table, a copy of an updated/corrected table is provided. No updated table was provided with Response 7-24.

When it was noted that the property line displayed on Figures 2, 4, and 5 of the Air Modeling Report was not consistent with the model's receptor locations (see Town Data Request 7-22), Invenergy noted that the proposed property line has changed once again since the model was completed. The response indicated that changes to the property line would not impact the air modeling results, since the receptors with the highest concentration values presented in the modeling summary tables were located beyond both the original and revised facility property lines. It is difficult to verify this claim, since the location data for the highest pollutant concentration value receptor are not contained within the table.

Typically, when an applicant acknowledges a change to a modeling parameter, such as stack location or property line, the model input files are updated and a copy would be provided to the permitting agency along with a copy of the model output files demonstrating compliance is maintained with the change. No updated model files were provided with Response 7-22.

Most regulatory standards for off-site receptor locations are based on the location of a facility's property line, while some are based upon the facility's fence line. When asked to provide a legal description of both the property line and fence line (see Town Data Request 7-1), Invenergy responded by providing a copy of the current Site Arrangement for the facility. The figure indicated the location of the proposed Property Line, but no reference to the proposed Fence Line could be found on the figure or in the response text. In addition, Invenergy did not provide a legal description for either the Property Line or the Fence Line as part of the response.

When asked to clarify whether the model's discrete boundary receptors represented the Property Line or the Fence Line (see Town Data Request 7-22), Invenergy did not provide the requested clarification. Instead the response indicated the property line has changed without any mention of the Fence Line.

For emission rates not based on EPA AP-42, Invenergy was asked to provide a copy of the emission factor reference source/document (see Town Data Request 7-7). The response to Town Data Request 7-7 only included a copy of the reference document used to estimate metals from combustion of ULSD in the combustion turbines. No documentation of the source used to calculate emissions from the combustion turbines for criteria pollutants, ammonia, sulfuric acid, and formaldehyde was provided. The response indicates that these values "were provided by the equipment manufacturer."

Typically, an applicant will provide a copy of Equipment Data Sheet, Emission Test Report, and/or correspondence with the manufacturer to document the basis for emissions. Without this documentation, it is difficult to verify that emission rates have been appropriately selected for the proposed operating conditions.

When asked to clarify the discrepancy between the 6.1-lb/year Acrolein emission rate listed on Table 2 and the 35-lb/year shown on Table A-2 (see Town Data Request 7-13), Invenergy responded that Table A-2 was correct. Similar to the response concerning the errors found in Table 3, the response did not include an updated Table 2.

In developing the questions for the Town to submit as Data Request 7, Fuss & O'Neill did not include all errors identified in the three reports, rather identification of typical errors believed to be representative of the types of issues uncovered during our review. We anticipated our questions would cause Invenergy to reexamine the content of each report and correct the information submitted to RIDEM by providing updated report text, tables, figures, etc. For example, we did not include any questions regarding the following items located in the reports, since we were confident that they were plainly errors and would easily be identified by Invenergy as such during their review:

- In Table A-2, the Benzene emission factor for combustion turbine ULSD is misidentified as 1.2E-05-lb/MMBtu which is the emission factor for natural gas, instead of the correct emission factor for ULSD 5.50E-05-lb/MMBtu listed in AP-42.
- In Table 16 and Table A-2, the hourly emission rate of Sulfuric Acid was misidentified as 3.69-lb/hour for the combustion turbines on natural gas which considers only a single turbine, rather than denoting the correct 7.46-lb/hour emission rate which would include both turbines.

- In Table 16 and Table A-2, the hourly emission rate of Sulfuric Acid for the combustion turbines on ULSD only considered one turbine, rather than two.
- In Table 16 and Table A-2, the hourly emission rate of Ammonia for the combustion turbines on both natural gas and ULSD only considered one turbine, rather than two.

Finally, Fuss & O'Neill did not reference in data requests or in information provided to the applicant anything regarding errors found within the model input files themselves, since it was assumed that such obvious mistakes would be identified during updates to the model related to changes in the property line and/or fence line receptor locations. Some of the model input file errors identified include, but are not limited to:

- For the 5-year average NO₂ Start-Up Shut-Down model scenario, the location for the ACS8 emission source is located almost 2-miles away from its actual location, almost 3,000-meters south of the Algonquin Compressor Station.
- For the five single year CO Start-Up Shut-Down model scenarios, the location for the ACSGH1 emission source is located almost 40-miles west of its actual location, 60-kilometers west of Algonquin Compressor Station.

Invenergy has provided information in response to formal requests, however, since revised application materials and/or report information were not provided to RIDEM for formal inclusion in the application documents, this omission would be considered a persuasive counterargument to siting the facility without adequate information and evaluation.

3 Health Risk Assessment Report

While the Health Risk Assessment Report indicates the project will conform and comply with all relevant standards, Fuss & O'Neill finds it difficult to verify the report's conclusions based on the issues previously identified within the reports in the absence of updated data/tables/figures/model files to correct the errors located to-date.

Until these inconsistencies are resolved and the missing information is provided, we are presently unable to state whether the supplemental information provided by Invenergy as part of a data request would change the compliance demonstration from pass to fail. Again, without formal revision to the documents submitted to RIDEM, a recommendation to siting the facility within the Town of Burrillville cannot be forthcoming.

4 Groundwater and MTBE Treatment

Assuming the treatment system proposed by Invenergy for Well 3A is installed, performs as-designed, and removes all MTBE from the groundwater, we don't anticipate any MTBE air emissions. The treatment system consists of two granular activated carbon (GAC) units in series to remove MTBE and other pollutants from the groundwater. The estimated pollutant loading at the proposed pumping rate (700-gallons per hour) has not been verified through the use of pump tests.

Should the treatment system experience an upset and breakthrough occur, Fuss & O'Neill inquired about the expected fraction of MTBE that would be expected to volatilize and what fraction would be expected to go to the Burrillville sewer (see Town Data Request 10-1). Unfortunately, the response from Invenergy did not contain any information related to the estimated fraction of MTBE expected to volatilize versus the estimated fraction expected to be discharged to the sewer. A Draft *Clean River Energy Center MTBE Issue Review letter*, prepared by CDR Maguire and dated May 23, 2016, stated there could be volatilization of MTBE at the Burrillville Sewer (and therefore MTBE air emissions), if breakthrough of the treatment system were to occur.

The draft CDR Maguire letter also stated that the activation of Well 3A could result in the potential for vapor from contaminated groundwater to enter adjacent buildings. CDR Maguire recommended that Invenergy perform a vapor intrusion assessment of commercial and residential properties located in the vicinity of the site. To our knowledge, this assessment has not yet been completed. Therefore, additional information and assessment may be required to determine if the MTBE impacts truly represent a disadvantage to siting the facility within the Town of Burrillville.

Therefore, the MTBE aspect of this project represents a benefit (i.e., removal of MTBE from groundwater) and a possible drawback (i.e., possibility of volatilization within the air and/or adjacent residential and commercial properties) which requires additional assessment.

5 Carbon Credits

The offset program is regional, not state-based, designed to cause a net regional reduction in CO₂. The Regional Greenhouse Gas Initiative (RGGI) is a collaboration of nine (9) northeastern states that set a CO₂ budget for each state. There is a quarterly auction where entities bid on allowances. The money goes to the States and is used for energy efficiency projects. The carbon credits that will be purchased by Invenergy could be produced in any of the nine member states. Generally, CO₂ emissions are not a local issue but rather a global issue. Therefore, carbon credit purchasing or trading would have no benefit to the local air quality, and therefore likely represents a disadvantage to siting the proposed facility within the Town of Burrillville. That is, locally carbon emissions would be produced, however, the offset (i.e., reduction in credits elsewhere) may likely be in any of the other of the nine member states.

6 Conclusions

At your request, Fuss & O'Neill, Inc. has provided a review of the documents and information submitted to the Rhode Island Department of Environmental Management (RIDEM) and additional information provided to the Rhode Island Energy Facilities Siting Board (EFSB) related to air quality impacts associated with the potential siting of the Clean River Energy Center in the Town of Burrillville, Rhode Island. Based on a review of these documents, the advantages and disadvantages (i.e., pros and cons) of each evaluated "air quality issue" that was assessed by Fuss & O'Neill. Based on a cumulative review, i.e., looking at all air related impacts in total based on only information provided and submitted to RIDEM to date, Fuss & O'Neill believes that the disadvantages of the proposed Invenergy facility within in the Town of Burrillville outweigh its potential benefits.