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Bureau of Air, Permit Section  
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Project Summary  
For a Construction Permit Application  
From Invenergy Nelson, LLC  
For Combined Cycle Power Plant For  
Nelson Energy Center, Rock Falls, Lee County

Site Identification No.: 103814AAC

Application No.: 98080039

Date Received: November 12, 2009

Schedule

Public Comment Period Begins: November 19, 2010

Public Comment Period Closes: December 19, 2010

Illinois EPA Contacts

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## **I. INTRODUCTION**

Invenergy Nelson, LLC (Invenergy) has requested a construction permit be reissued to complete construction of a natural gas-fired electric generating facility that would have two “combined cycle” combustion turbines (CT) equipped with heat recovery steam generators (HRSG). The Illinois EPA has reviewed Invenergy’s application and made a preliminary determination that the application meets applicable requirements. Accordingly, the Illinois EPA has prepared a draft of the construction permit that it would propose to issue. However, before issuing a permit, the Illinois EPA is holding a public comment period to receive comments on the proposed issuance of a permit and the terms and conditions of the draft permit.

## **II. BACKGROUND**

The proposed facility would be developed by completing construction of two combined cycle turbines on which LSP-Nelson Energy started construction pursuant to a permit for a facility that would have included four “combined cycle” gas turbines. However, LSP-Nelson Energy did not complete construction of the facility because of financial difficulties, which eventually resulted in LSP-Nelson entering bankruptcy. LSP-Nelson submitted information indicating that before construction activity ceased, substantial work was completed on the facility and the individual units. Construction of the foundations and infrastructure for all four units and physical installation of one turbine were completed. Construction was also completed on all four HRSGs, in which the required selective catalytic reduction (SCR) systems for control of emissions of nitrogen oxides (NO<sub>x</sub>) would be located.

Natural gas would be used to fire the two combined-cycle combustion turbines and the associated duct burners to produce electricity. As combined-cycle turbines, the turbines are followed by heat recovery steam generators, which produce steam from the hot exhaust from the turbines to produce electric power. The exhaust from each turbine and heat recovery steam generator pair is vented to the atmosphere through 160 foot high stacks. Emissions from the CT/HRSG are controlled or minimized by using good combustion practices, low-NO<sub>x</sub> combustors, and add-on selective catalytic reduction (SCR) systems.

Other emission units at the proposed facility would include: cooling towers, fuel heater, natural gas fired space heaters, backup diesel fire pump, and diesel engines for backup and emergency power for the facility.

Based on developments during design and initial construction of the facility, Invenergy was previously issued a permit in May 2008 that included certain changes to the facility compared to the one addressed in the original permit issued to LSP-Nelson in January 2000. In particular, the scope of the facility was reduced to only two units, rather than four units with lower emissions that reflect only two units. (Backup capability for firing fuel oil was eliminated, so that the generating units would utilize natural gas as their only fuel, without Capability for operation of the turbines as simple cycle units was not present and only combined cycle operation of the units is addressed.

## **III. CURRENT APPLICATION**

Invenergy has requested that the permit be extended to provide them with additional time to resume construction on the proposed facility. Invenergy indicates that further time is needed due to delays in the completion of an Electrical Interconnection Study by PJM, which coordinates movement of wholesale electricity in the region in which the facility would be located. This study is essential for the completion of the facility as it would confirm that the electricity generated by the facility can be accepted and distributed by the electrical power grid.

As part of this application, Invenergy has addressed new regulatory requirements since May of 2008. Accordingly, the permit now proposed for the facility would include: (1) BACT and emission limits for emissions of PM<sub>2.5</sub>, and (2) Numerical BACT limits for emissions of CO, VOM, PM<sub>10</sub>, PM<sub>2.5</sub> and SO<sub>2</sub>.

#### IV. FACILITY EMISSIONS

The potential emissions of the facility are listed below. Potential emissions are calculated based on continuous operation at the maximum hourly emission rate. The principal emission units at the facility are the two combustion turbines and associated heat recovery steam turbine generators. Actual emissions of the facility will be less to the extent that the turbines would not operate continuously at its maximum capacity. At this time, similar natural gas fired electric power facilities operate at less than 50 percent of the time.

Pollutant	Permitted Emissions (Tons/year)
CO	405.9
NO <sub>x</sub>	361.4
PM/PM <sub>10</sub>	196.6/190.9
PM <sub>2.5</sub>	94.7
VOM	65.3
SO <sub>2</sub>	122.0

#### V. APPLICABLE EMISSIONS STANDARDS

All emission units in Illinois must comply with state emission standards adopted by the Pollution Control Board. The state's emission standards represent the basic requirements for sources in Illinois. The various emission units in the proposed facility should readily comply with applicable state standards.

The duct burners in the heat recovery steam generators would subject to federal New Source Performance Standards (NSPS) for electric utility steam generating units, 40 CFR 60, Subpart Da. This NSPS sets emission limits for nitrogen oxides, sulfur dioxide, particulate matter, as well as opacity, from the units. The combustion turbines are subject to NSPS for stationary gas turbines, 40 CFR 60, Subpart GG.

#### VI. OTHER APPLICABLE REGULATIONS

##### A. Prevention of Significant Deterioration (PSD)

The facility would be a major source subject to the federal rules for Prevention of Significant Deterioration of Air Quality (PSD), 40 CFR 52.21. The facility would be major for emissions of NO<sub>x</sub>, SO<sub>2</sub>, PM/PM<sub>10</sub> and CO with potential annual emissions of more than 100 tons for each of these pollutants. Under the PSD rules, once a proposed source is major for any PSD pollutant, all PSD pollutants whose potential emissions are above the specified significant emission rates in 40 CFR 52.21(b)(23) are also subject to PSD review. Therefore, the facility is also subject to PSD review for VOM and PM<sub>2.5</sub>, with potential annual emissions that are greater than the significant emission rate of 40 and 10 tons, respectively.

Under the PSD rules, an applicant for a permit must demonstrate that Best Available Control Technology (BACT) will be used to control emissions of pollutants subject to PSD. Invenergy has provided a BACT demonstration in its application addressing emissions of pollutants that are subject to PSD, i.e., NO<sub>x</sub>, CO, SO<sub>2</sub>, VOM and PM.

##### B. Acid Rain Program

The proposed facility is an affected source and the two combustion turbines/heat recovery steam generators are affected units for Acid Deposition: Title IV of the Clean Air Act, and regulations promulgated thereunder. These provisions establish requirements for affected sources related to control of emissions of SO<sub>2</sub> and NO<sub>x</sub>, pollutants that

contribute to acid rain. Under the Acid Rain program, Invenergy would have to hold SO<sub>2</sub> allowances for the actual SO<sub>2</sub> emissions from the affected units. Effectively, the Acid Rain program requires reductions in SO<sub>2</sub> emissions from existing coal-fired power plants elsewhere in the United States. This is because the number of SO<sub>2</sub> allowances issued by USEPA to coal-fired power plants annually is fixed, to meet the SO<sub>2</sub> emission target set by the federal Clean Air Act as related to acid rain. Another requirement of the Acid Rain program is to operate pursuant to an Acid Rain permit. An Acid Rain permit was issued for the proposed facility in 2008 in conjunction with issuance of the previous construction permit for the facility.

C. Clean Air Interstate Rule (CAIR)

Combustion turbines used to produce electricity generally qualify as Electrical Generating Units (EGU) for purposes of the NO<sub>x</sub> and SO<sub>2</sub> Allowance Programs for Electrical Generating Units - Clean Air Interstate Rules (CAIR), 35 IAC Part 225, Subparts C, D, and E. As EGU, the Permittee would have to hold allowances for the NO<sub>x</sub> and SO<sub>2</sub> emissions of the CT/HRSGs during each calendar year and seasonal control period (NO<sub>x</sub> only). Another requirement of the CAIR program is to operate pursuant to a CAIR permit. A CAIR permit for the EGUs at the facility was also issued in conjunction with issuance of the 2008 construction permit for the facility.

D. Clean Air Act Permit Program (CAAPP)

This facility would be considered a major source under Illinois' Clean Air Act Permit Program (CAAPP) pursuant to Title V of the Clean Air Act. This is because the facility would be a major source for purposes of the CAAPP because it is a major source for purposes of the above regulatory programs, most notably PSD. Invenergy would have to apply for its CAAPP permit within 12 months after initial startup of the facility.

## VII. BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

BACT is defined as an emission limitation based on the maximum degree of pollution reduction determined on a case-by-case basis considering technical, economic, energy and environmental considerations.

As determined by Illinois EPA, BACT will include use of dry low-NO<sub>x</sub> combustors on the CTs and SCR in the HRSGs. The CT/HRSGs will meet a maximum NO<sub>x</sub> emission rate of 4.5 ppmvd at 15% oxygen on an hourly average, other than during periods of startup, malfunction, shutdown or periodic tuning. These practices represent a stringent level of control for NO<sub>x</sub> that is consistent with the design and capabilities of the CTs and SCRs installed by LSP Nelson.

The CT/HRSGs will employ good combustion control for emissions of VOM and CO. Hourly emissions rates for CO and VOM from each CT/HRSG of 5 and 4 ppmvd, respectively, at 15% O<sub>2</sub>, are achievable except during startup, shutdown or periodic tuning.

Use of natural gas and good combustion practices will be used at the facility to minimize emissions of PM/PM<sub>10</sub>/PM<sub>2.5</sub> and SO<sub>2</sub>. Emission rates for PM<sub>10</sub> and PM<sub>2.5</sub> from each CT/HRSG of 0.012 and 0.006 lb/mmBtu, respectively, are achievable. An SO<sub>2</sub> emission rate from each CT/HRSG of 0.0062 lb/mmBtu is achievable.

The cooling towers at the proposed facility must be equipped with high efficiency drift eliminators to minimize loss of water droplets from the cooling towers and associated PM/PM<sub>10</sub>/PM<sub>2.5</sub> emissions.

## VIII. AIR QUALITY ANALYSIS

The air quality analysis submitted by Invenergy and reviewed by the Illinois EPA shows that the facility will not cause violations of the ambient air quality standard for NO<sub>x</sub>, CO, SO<sub>2</sub>, and PM/PM<sub>10</sub>. The air quality analysis shows compliance with the allowable increment levels established under the PSD regulations. With the current application, Invenergy submitted additional air quality modeling to address air quality for PM<sub>2.5</sub>, as well as PM and PM<sub>10</sub>, and to address NO<sub>2</sub> and SO<sub>2</sub> air quality on a 1-hour average. The analyses show that, other than for NO<sub>2</sub> on a 1-hour average, the impacts would not be significant. For NO<sub>2</sub>, because the facility's modeled maximum impact is greater than the applicable significant impact level, 4 parts per billion (ppb), further analysis was conducted. This analysis further showed that the facility would not cause violations of applicable National Ambient Air Quality Standards (NAAQS) for NO<sub>2</sub> on a 1-hour average, as summarized below.

NO <sub>2</sub> Concentration on a 1-Hour Average (ppb)				
Operating Mode	Maximum Facility Impact	Maximum Background Concentration	Maximum Overall Concentration	NAAQS
Normal	9.8	50.3	60.1	100
Startup	36.5		86.8	

An analysis was also conducted for the impact of the facility's emissions on ozone air quality using a technique developed by USEPA. The analysis showed that the facility should not cause a violation of the NAAQS for ozone. This screening methodology predicts increases in 1-hour ozone concentrations from increase in VOC and NO<sub>x</sub> emissions. The Illinois EPA requires that 1-hour ozone impacts be used to address the 8-hour ozone NAAQS as an interim approach until an equivalent methodology is developed for this purpose. The screening tables are conservative in their assumptions concerning baseline conditions for VOC and NO<sub>x</sub> emissions from the source under evaluation. As recommended by Illinois EPA, Invenergy used this approach to calculate a maximum ozone concentration for the surrounding area. Based on this analysis, the 1-hour ozone concentration resulting from the facility was 0.012 ppm. Adding a background concentration of 0.081 ppm, from Illinois' ambient ozone monitor in Loves Park, near Rockford, yields a total ozone concentration of 0.098 ppm, 1-hour average. Since this is below the 1-hour ozone threshold of 0.120 ppm, this facility should not threaten the current NAAQS for ozone.

## IX. DRAFT PERMIT

The Illinois EPA has prepared a draft of the construction permit that it would propose to issue. The permit is intended to identify the applicable rules governing emissions from the facility and to set limitations on those emissions. As already discussed, the permit would include additional limits not present in the previous permit. The permit is also intended to establish appropriate compliance procedures to accompany those requirements, including requirements for emissions testing, continuous emissions monitoring, recordkeeping, and reporting. In particular, the permit would now also require continuous emissions monitoring for emissions of CO, as well as NO<sub>x</sub>.

The Acid Rain and Clean Air Act Interstate Rule (CAIR) permits previously issued for the facility would be included as attachments to the permit.

## X. REQUEST FOR COMMENTS

It is the Illinois EPA's preliminary determination that the application meets all applicable state and federal air pollution control requirements. The Illinois EPA is therefore proposing to issue a construction permit for the facility.

Comments are requested on this proposed action by the Illinois EPA and the proposed conditions on the draft permit. If substantial public interest is shown in this matter, the Illinois EPA will consider holding a public hearing in accordance with 35 Ill. Adm. Code Part 166.