

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
BUREAU OF AIR, PERMIT SECTION
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PROJECT SUMMARY
FOR CONSTRUCTION PERMIT APPLICATIONS
FROM
ELWOOD ENERGY II LLC AND
ELWOOD ENERGY III LLC FOR
FIVE ADDITIONAL GAS TURBINES AT
THE ELWOOD ENERGY CENTER POWER PLANT,
ELWOOD, ILLINOIS

Elwood Energy II	Site Identification No.:197035AAG	Application No.: 00010076
Elwood Energy III	Site Identification No.:197035AAH	Application No.: 00010077

Schedule

Public Comment Period Begins: August 14, 2000

Public Hearing: September 28, 2000

Illinois EPA Contacts

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I. INTRODUCTION

Elwood Energy currently operates an existing electric power plant on Noel Road in Elwood. Two other companies, which are associated with Elwood Energy, have proposed to install additional natural gas turbines at the power plant. These companies, known as Elwood Energy II LLC and Elwood Energy III LLC, have proposed to construct two and three turbines, respectively. The additional five turbines, in total, would add about 850 MW of peaking power capacity to the plant. Because the gas turbines are sources of emissions, construction permits must be obtained for these projects from the Illinois EPA.

The proposed installation of these turbines is being addressed as a modification to the existing plant. This is because the projects would occur at the existing plant site, which Elwood Energy operates, and Elwood Energy and Peoples Energy Resources are both partners in the new companies, Elwood II and Elwood III, which have been organized to install the additional turbines. The five additional turbines are similar to the four gas turbines presently at the existing plant (680 MW total installed capacity). The existing plant also has a permit that allows it to construct up to ten combined cycle turbines to provide base load power.

II. PROJECT DESCRIPTION

The proposed projects would add five simple cycle gas turbines (total) to the plant. to directly generate electricity. The gas turbines would be equipped with low NO_x burners, that minimize formation of nitrogen oxides (NO_x). These turbines are intended to operate as peaking units, operating primarily during periods of peak electrical demand. In Illinois, peak electrical demand currently occurs during daylight and evening hours on hot summer weekdays. Heat recovery would not be effective on these units because the turbines will change operating levels rapidly to respond to changes in electrical demand from consumers.

Fuel heaters will be used in conjunction with all the turbines in order to restore the temperature of the natural gas from the pipeline after its pressure is lowered to the operating pressure of the turbines.

III. PROJECT EMISSIONS

The projects' emissions result from the combustion of fuel in the proposed gas turbines and fuel heaters.

The principal air contaminants emitted from the proposed projects are NO_x and CO. NO_x can be formed thermally by combination of oxygen and nitrogen in the air at the temperatures at which fuel is burned. Thermal NO_x is formed during the operation of all common high temperature combustion processes. NO_x can also be formed from the combination of any nitrogen in the fuel with ambient air oxygen component. This is not significant for burning of natural gas, which contains trace amounts of nitrogen. Factors affecting NO_x formation from a turbine include design, ambient

conditions, turbine load and fuel type. The NO_x emissions from the proposed turbine will be controlled with low-NO_x burners. Low-NO_x burners minimize NO_x formation by lowering the peak combustion flame temperature.

CO is formed by the incomplete combustion of fuel. CO is associated with most combustion processes and is found in measurable amounts in turbine exhaust. VOM and PM/PM₁₀ are also emitted as a result of incomplete combustion of fuel. SO₂ is found only in trace amounts from combustion of natural gas.

CO and VOM are controlled by providing adequate residence time and high temperature in combustion zone to ensure complete combustion. PM/PM₁₀ are controlled by proper combustion control and firing natural gas fuel, which has negligible ash content.

The potential emissions from the proposed turbines are provided below. The emissions are based on maximum operation at full load for 3,200 hours per year.

Table 1: Potential Project Emissions (tons/year)

<u>Pollutant</u>	<u>Elwood II</u>	<u>Elwood III</u>	<u>Total</u>
NO _x	217.9	326.9	644.8
CO	60.1	99.0	159.1
PM/PM ₁₀	57.7	86.5	144.2
VOM	7.57	11.35	18.92
SO ₂	3.58	5.40	8.98

IV. APPLICABLE REGULATIONS

A. GENERAL

The proposed project will comply with applicable state and federal air pollution control laws and rules, including the Illinois Environmental Protection Act, the federal Clean Air Act, the Illinois Air Pollution Control Board emission standards and regulations (35 Ill. Adm. Code: Subtitle B) and applicable federal emission standards.

B. ADDITIONAL REQUIREMENTS FOR MAJOR MODIFICATIONS

Pursuant to the PSD rules for attainment areas, any significant net emissions increase of a regulated pollutant at a major stationary source (i.e., major modification) will trigger a requirement for PSD review.

Will County is classified as attainment for NO_x, CO and PM/PM₁₀. The existing plant is a major stationary source under PSD regulations. The proposed projects constitute a major modification NO_x, CO and PM/PM₁₀, because the net increases in emissions of these

pollutants, as shown above in Table 1, are significant. Therefore, the proposed projects are subject to the additional requirements imposed by the federal PSD rules for a major modification.

With regard to VOM emissions, Elwood Energy is requesting emissions limitations so that there would not be a significant net increase in these emissions. Because the overall increase in VOM emissions will be less than 25 tons per year, the projects are not considered a major modification under the state rules for Major Stationary Sources Construction and Modification (MSSCAM), 35 IAC Part 203.

V. PREVENTION OF SIGNIFICANT DETERIORATION (PSD)

A project that constitutes a major modification in an attainment area is subject to the federal PSD rules. The PSD rules were established to ensure that new sources will not adversely impact “clean air” areas and will comply with applicable standards.

A PSD review requires: 1) a case-by-case Best Available Control Technology (BACT) determination, taking into account energy, environmental and economic impacts, as well as technical feasibility; 2) an ambient air quality impact analysis, including a baseline determination and dispersion modeling, to determine whether the allowable emissions from the source, in conjunction with the proposed net emissions increase, would cause or contribute to a violation of the applicable PSD increment or National Ambient Air Quality Standard (NAAQS); 3) an assessment of the impact on soils, vegetation and visibility; and, 4) public notice and comment, including an opportunity for public hearing. The Illinois EPA has been delegated authority by the USEPA to administer the federal PSD program.

A. 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.

A BACT analysis was conducted for NO_x, CO and PM/PM₁₀ in order to determine the most appropriate level of control required at the facility for these pollutants. In considering the technical, economic, energy and environmental considerations, the Illinois EPA determined that the project will utilize BACT.

The proposed turbines will use dry low-NO_x burners to minimize emissions of NO_x. The proposed BACT emission limit for NO_x is 9 ppmv at 15% oxygen. BACT also will include utilization of low-NO_x burners with the fuel heaters to minimize emissions of NO_x. These practices represent a stringent level of control for NO_x required on peaking turbines on other similar projects across the country.

Good combustion practices, including use of gaseous fuels will be used on the proposed turbines and fuel heaters to minimize emissions of CO and PM/PM₁₀. The proposed BACT emission limit for CO is 3.5 ppmv at 15% oxygen.

B. AIR QUALITY ANALYSIS

An ambient air quality impact analysis was submitted by Elwood Energy to assess the impacts of the proposed projects. Under the PSD rules, this analysis must determine whether the proposed projects will cause or contribute to a violation of any applicable air quality standard. The analysis performed conforms to the guidance and requirements of the USEPA and the Illinois EPA. This analysis indicates that the projects will not have significant impacts on air quality.

Table 2: Air Quality Impacts

Pollutant	Averaging Period	Maximum Predicted Impact ($\mu\text{g}/\text{m}^3$)	Significant Impact Level ($\mu\text{g}/\text{m}^3$)	PSD Class II Increment ($\mu\text{g}/\text{m}^3$)	Air Quality Standard ($\mu\text{g}/\text{m}^3$)
NO _x	Annual	0.17	1	25	100
PM ₁₀	24-hour	0.61	5	30	150
PM ₁₀	Annual	0.03	1	17	50
CO	1-hour	63	2,000	-	40,000
CO	8-hour	27	500	-	10,000

Maximum predicted impacts are worst case, combining the maximum impacts of the projects proposed by Elwood Energy II and Elwood Energy III.

Elwood Energy has provided adequate information to determine that proposed emission increases will not cause a violation of the NAAQS or the significant impact levels established under the PSD rules for NO_x, CO and PM₁₀.

C. ASSESSMENT OF ENVIRONMENTAL IMPACTS

The ambient air quality assessment performed also assessed the potential impact of these projects on soils, vegetation and visibility. The Illinois EPA concluded that the project would not cause any adverse effect to these environmental media.

VI. PROPOSED PERMIT

The conditions of the proposed permits contain limitations and requirements for the proposed gas turbines. The permit also establishes appropriate compliance procedures, including inspection practices, recordkeeping requirements and reporting requirements.

VII. REQUEST FOR COMMENTS

It is the Illinois EPA's preliminary determination that the proposed permits meet all applicable state and federal air pollution control requirements. The Illinois EPA is therefore proposing to issue permits to Elwood II and Elwood III for construction of the additional five turbines.