



Connecticut Department of  
**ENERGY &  
ENVIRONMENTAL  
PROTECTION**

**BUREAU OF AIR MANAGEMENT  
NEW SOURCE REVIEW PERMIT  
TO CONSTRUCT AND OPERATE A STATIONARY SOURCE**

Issued pursuant to Title 22a of the Connecticut General Statutes (CGS) and Section 22a-174-3a of the Regulations of Connecticut State Agencies (RCSA).

<b>Owner/Operator</b>	Lotus Danbury LMS100, LLC
<b>Address</b>	58 South Service Road, Suite 130, Melville, NY 11747
<b>Equipment Location</b>	100 Saw Mill Road, Danbury, CT 06810
<b>Equipment Description</b>	General Electric LMS100PA+ (112 MW Simple Cycle Turbine) Unit 2
<b>Town-Permit Numbers</b>	044-0200
<b>Premises Number</b>	328
<b>Stack Number</b>	2
<b>Permit Issue Date</b>	
<b>Expiration Date</b>	None

\_\_\_\_\_  
Michael Sullivan  
Deputy Commissioner

\_\_\_\_\_  
Date

This permit specifies necessary terms and conditions for the operation of this equipment to comply with state and federal air quality standards. The Permittee shall at all times comply with the terms and conditions stated herein.

## **PART I. DESIGN SPECIFICATIONS**

### **A. General Description**

General Electric LMS100PA+ 112 MW simple cycle turbine to be operated as a peaking unit.

### **B. Equipment Design Specifications**

1. Fuel Type: Natural gas
  2. Maximum Natural Gas Firing Rate<sup>1</sup> (MCF/hr): 947
  3. Maximum Gross Heat Input (MMBtu/hr):  
 $0.0003T^3 + 0.0172T^2 + 0.1582T + 966$ , where T = ambient temperature (°F)
- <sup>1</sup> at ISO conditions: 288 Kelvin, 60 percent relative humidity and 101.3 kilopascals pressure.

### **C. Control Equipment Design Specifications**

1. Water Injection for the Turbine
2. Selective Catalytic Reduction (SCR)
  - a. Minimum Design NO<sub>x</sub> Removal Efficiency (%): 90
  - b. Ammonia Injection Rate at Maximum Rated Capacity (gal/hr): Optimal ammonia injection rate to be determined during initial stack test
3. Oxidation Catalyst
  - a. CO Removal Efficiency (%): 95.6
  - b. Formaldehyde Removal Efficiency (%): 75

### **D. Stack Parameters**

1. Minimum Stack Height (ft): 45
2. Minimum Exhaust Gas Flow Rate at 100% load (acfm): 866,684
3. Minimum Stack Exit Temperature at 100% load (°F): 783
4. Minimum Distance from Stack to Property Line (ft): 255

## **PART II. OPERATIONAL CONDITIONS**

### **A. Equipment**

1. Fuel Type: Natural Gas

2. Maximum Natural Gas Consumption over any Consecutive 12 Month Period (MMCF/yr): 2,560
3. Maximum Allowable Heat Rate on a 12 month rolling basis (Btu/kWh): 11,363

**PART III. ALLOWABLE EMISSION LIMITS**

The Permittee shall not cause or allow this equipment to exceed the emission limits stated herein at any time.

**A. Short Term Emission Limits**

1. Criteria Pollutants

Pollutant	lb/hr	ppmvd @ 15% O <sub>2</sub>	lb/MMBtu
PM	6.00		0.01
PM <sub>10</sub>	6.00		0.01
PM <sub>2.5</sub>	6.00		0.01
SO <sub>2</sub>	1.35		0.0014
NO <sub>x</sub>	9.04	2.5	
VOC	2.52		
CO	11.01	5.0	

2. Non-Criteria Pollutants

Pollutant	ppmvd @ 15% O <sub>2</sub>	lb/MWh <sup>1</sup>
Ammonia	3.9	
GHG as CO <sub>2</sub> e		1,328

<sup>1</sup> – based on gross energy output on a 12-month rolling average.

**B. Startup or Shutdown Events**

1. Startup or Shutdown Emission Limits

In lieu of the emission limits for NO<sub>x</sub>, VOC and CO stated in Part III.A of this permit, during periods of startup or shutdown, the Permittee shall not cause or allow this unit to exceed the limits stated herein.

Startup shall be defined as the period of time from the initiation of combustion until the unit reaches steady-state operation. Shutdown shall be defined as the period of time from the initial lowering of turbine output until the point when combustion stops.

Pollutant	Startup or Shutdown Event Emission Rate (lb/hr)
NO <sub>x</sub>	31.20
VOC	10.87
CO	36.14

2. The Permittee shall minimize emissions during periods of startup or shutdown by the following work practices and time constraints:
  - a. Start the ammonia injection as soon as minimum catalyst temperature is reached;
  - b. The oxidation catalyst shall not be bypassed during startup or shutdown;
  - c. The duration of startup shall not exceed 60 minutes for a hot start;
  - d. The duration of startup shall not exceed 60 minutes for a warm start;
  - e. The duration of startup shall not exceed 180 minutes for a cold start;
  - f. The duration of shutdown shall not exceed 30 minutes; and
  - g. Emissions during these periods shall be counted towards the annual emission limits stated herein.

3. Definitions

A hot start shall be defined as startup when the turbine has been down for less than 8 hours.

A warm start shall be defined as startup when the turbine has been down for more than 8 hours.

A cold start shall be defined as startup when the turbine has been down for more than 48 hours.

**C. Annual Emission Limits**

Pollutant	tons per 12 consecutive months
PM	8.35
PM <sub>10</sub>	8.35
PM <sub>2.5</sub>	8.35
SO <sub>2</sub>	1.83
NO <sub>x</sub>	14.47
VOC	3.95
CO	17.13
GHG as CO <sub>2</sub> e	153,209

**D. Hazardous Air Pollutants**

This equipment shall not cause an exceedance of the Maximum Allowable Stack Concentration (MASC) for any hazardous air pollutant (HAP) emitted and listed in RCSA Section 22a-174-29. [STATE ONLY REQUIREMENT]

**E. Opacity**

This equipment shall not exceed 10% opacity during any six minute block average as measured by 40 CFR Part 60, Appendix A, Reference Method 9.

**F. Demonstration of compliance with the above emission limits may be met by calculating the emission rates using emission factors from the following sources:**

- PM, PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>x</sub>, CO, Ammonia and Formaldehyde: Most recent stack test results
- SO<sub>2</sub>: Mass balance based on 0.5 grains of sulfur per 100 scf of natural gas

- VOC: Vendor data
- HAPs: Compilation of Air Pollutant Emission Factors, AP-42, fifth edition, Section 3.1, April 2000
- Startup or shutdown event emissions: In accordance with Part III.B of this permit
- GHG as CO<sub>2</sub>e: Monitoring data as outlined in Part IV.A.5 of this permit and calculations as outlined in 40 CFR Part 75 and 40 CFR Part 98 Subparts A, C and W

The Permittee is not required to demonstrate compliance with the short-term emission limits stated herein during the initial shakedown period. Emissions during the initial shakedown period shall be counted towards the annual emission limits stated herein. The shakedown period shall not extend beyond the required date for the initial performance tests.

The commissioner may require other means (e.g. stack testing) to demonstrate compliance with the above emission limits, as allowed by state or federal statute, law or regulation.

## **PART IV. MONITORING, RECORD KEEPING AND REPORTING REQUIREMENTS**

### **A. Monitoring**

1. The Permittee shall use a non-resettable totalizing fuel metering device or billing meter to continuously monitor fuel feed to the turbine.
2. The Permittee shall continuously monitor and continuously record the water injection rate (gal/hr or lb/hr). The Permittee shall maintain this parameter within the range recommended by the manufacturer to achieve compliance with the emission limits in this permit.
3. The Permittee shall continuously monitor fuel consumption and water to fuel ratio. The ratio of water to fuel shall be determined during the initial performance test to demonstrate compliance with the NO<sub>x</sub> emissions rates in Part III. of this permit.
4. The Permittee shall calculate CO<sub>2</sub> emissions in accordance with 40 CFR Part 75.
5. The Permittee shall monitor gross electrical output of the turbine.
6. The Permittee shall continuously monitor and continuously record the SCR aqueous ammonia injection rate (gal/hr), operating temperature (°F), pressure drop (inches of water) across the catalyst bed and ammonia slip (ppmvd @ 15% O<sub>2</sub>). The Permittee shall maintain these parameters within the ranges recommended by the manufacturer to achieve compliance with the emission limits in this permit.
7. The Permittee shall continuously monitor and continuously record the oxidation catalyst inlet temperature (°F). The Permittee shall maintain this parameter within the range recommended by the manufacturer to achieve compliance with the emission limits in this permit.
8. The Permittee shall perform inspections of the SCR and oxidation catalysts as recommended by the manufacturer.

## B. Record Keeping

1. The Permittee shall keep records of monthly and consecutive 12 month fuel consumption. The consecutive 12 month fuel consumption shall be determined by adding the current month's fuel consumption to that of the previous 11 months. The Permittee shall make these calculations within 30 days of the end of the previous month.
2. The Permittee shall calculate and record the monthly and consecutive 12 month PM, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, NO<sub>x</sub>, VOC, CO and GHG (CO<sub>2</sub>e) emissions in units of tons. The consecutive 12 month emissions shall be determined by adding (for each pollutant) the current month's emissions to that of the previous 11 months. Such records shall include a sample calculation for each pollutant. The Permittee shall make these calculations within 30 days of the end of the previous month.

Emissions during startup and shutdown shall be counted towards the annual emission limitation in Part III.C of this permit.

3. The Permittee shall make and keep records sufficient to demonstrate compliance with the GHG emission limits in Part III of this permit. These records shall include but not be limited to:
  - a. CO<sub>2</sub> emissions measured on a continuous basis as outlined in Part IV.A.4 of this permit;
  - b. Methane (CH<sub>4</sub>) and Nitrous Oxide (N<sub>2</sub>O) emissions calculated using 40 CFR Part 98, Tables A-1 and C-2 emission factors;
  - c. Estimated CH<sub>4</sub> fugitive emissions from the natural gas pipeline and associated components calculated using 40 CFR Part 98, Tables A-1 and W-7 emission factors; and
  - d. Estimated Sulfur Hexafluoride (SF<sub>6</sub>) fugitive emissions from the electrical circuit breakers determined using Material Balance calculations and 40 CFR Part 98, Table A-1 emission factors.
4. The Permittee shall make and keep records of the turbine's heat rate and gross electrical output on a 12-month rolling average basis.
5. The Permittee shall keep records of CO<sub>2</sub> emissions in accordance with 40 CFR Part 75.
6. The Permittee shall keep records of excess emissions and monitor downtime, in accordance with 40 CFR Part 60.7(c) and 40 CFR Part 60.4380. Additionally, records of exceedances of any emission limitation or operating parameter shall include:
  - a. The date and time of the exceedance;
  - b. A detailed description of the exceedance; and
  - c. The duration of the exceedance
7. The Permittee shall keep all applicable records listed in 40 CFR Part 60.4365(a), demonstrating that the fuel combusted meets the specifications outlined in 40 CFR Part 60.4365(a). [40 CFR Part 60 Subpart KKKK]
8. The Permittee shall keep records of the occurrence and duration of any startup, shutdown, or malfunction in the operation of the stationary gas turbine and any malfunction of the air pollution control equipment. [40 CFR §60.7(b)]

Such records shall contain the following information:

- a. type of event (hot/warm/cold startup, shutdown, or malfunction);
  - b. equipment affected;
  - c. date of event;
  - d. duration of event (minutes).
9. The Permittee shall keep records of each delivery of aqueous ammonia. The records shall include:
- a. the date of delivery;
  - b. the name of the supplier;
  - c. the quantity of aqueous ammonia delivered; and
  - d. the percentage of ammonia in solution, by weight.
10. The Permittee shall keep records of the inspection and maintenance of the SCR and oxidation catalysts. The records shall include:
- a. the name of the person;
  - b. the date;
  - c. the results or actions; and
  - d. the date the catalyst is replaced.
11. The Permittee shall keep all records required by this permit for a period of no less than five years and shall submit such records to the commissioner upon request.

### **C. Reporting**

1. The Permittee shall notify the commissioner in writing of any exceedance of an operating parameter, and shall identify the cause or likely cause of such exceedance, all corrective actions and preventive measures taken with respect thereto, and the dates of such actions and measures as follows:
  - a. For any hazardous air pollutant, no later than 24 hours after such exceedance commenced; and
  - b. For any other regulated air pollutant or operating parameter, no later than ten days after such exceedance commenced.
2. The Permittee shall notify the commissioner in writing of any malfunction of the stationary gas turbine, the air pollution control equipment or the continuous monitoring system. The Permittee shall submit such notification within ten days of the malfunction. The notification shall include the following:
  - a. a description of the malfunction and a description of the circumstances surrounding the cause or likely cause of such malfunction; and
  - b. a description of all corrective actions and preventive measures taken and/or planned with respect to such malfunction and the dates of such actions and measures.
3. The Permittee shall notify the commissioner, in writing, of the date of commencement of construction, the date of initial startup and commencement of commercial operation of this equipment. Such written notifications shall be submitted no later than 30 days after the subject event. Commencement of commercial operations shall mean the date when the unit is released to ISO-New England for dispatch.

## PART V. STACK EMISSION TEST REQUIREMENTS

A. Stack emission testing shall be performed in accordance with the [Emission Test Guidelines](#) available on the DEEP website.

B. Initial stack testing shall be required for the following pollutant(s):

PM       PM<sub>10</sub>       PM<sub>2.5</sub>       SO<sub>2</sub>       NO<sub>x</sub>       CO  
 VOC       Opacity       Other (HAPs): Ammonia, Formaldehyde

1. For the purposes of determining maximum heat input (MMBtu/hr) of the turbine during stack testing, the following equation may be used:

$$0.0003T^3 + 0.0172T^2 + 0.1582T + 966, \text{ where } T = \text{ambient temperature } (^\circ\text{F})$$

C. The Permittee shall conduct initial stack testing within 60 days after achieving the maximum production rate, but not later than 180 days after initial startup.

D. Pursuant to 40 CFR §60.8(a), the Permittee shall conduct the initial stack testing and submit the test report within 60 days after achieving the maximum production rate, but not later than 180 days after initial startup.

E. Recurrent stack testing for NO<sub>x</sub> and CO shall be conducted within five years from the date of the previous stack test to demonstrate compliance with their respective limits.

F. Stack test results shall be reported as follows: all pollutants in units of lb/hr, PM-10/PM-2.5 in units of lb/MMBtu, NO<sub>x</sub> and CO in units of ppmvd at 15% O<sub>2</sub>, HAPs in units of µg/m<sup>3</sup> and ppmvd at 15% O<sub>2</sub>.

## PART VI. OPERATION AND MAINTENANCE REQUIREMENTS

A. The Permittee shall operate and maintain this equipment in accordance with the manufacturer's specifications and written recommendations.

B. The Permittee shall operate and maintain this equipment, air pollution control equipment, and monitoring equipment in a manner consistent with good air pollution control practices for minimizing emissions at all times including during startup, shutdown, and malfunction.

C. The Permittee shall properly operate the control equipment at all times that this equipment is in operation and emitting air pollutants.

## PART VII. SPECIAL REQUIREMENTS

A. The Permittee shall possess at least 41.78 tons of external NO<sub>x</sub> emissions reductions to offset the quantity of NO<sub>x</sub> emitted from the sources covered under the following permits to comply with RCSA §22a-174-3a(l):

Permit No. 044-0199 General Electric LMS100PA+ (112 MW Simple Cycle Turbine) Unit 1  
Permit No. 044-0200 General Electric LMS100PA+ (112 MW Simple Cycle Turbine) Unit 2  
Permit No. 044-0201 Jenbacher Type 624 H01 (4.3 MW Reciprocating Internal Combustion Engine)

This quantity is sufficient to offset NO<sub>x</sub> emissions allowed under the listed permits at a ratio of 1.3 to 1. Specifically, the reductions will be real, quantifiable, surplus, permanent, and enforceable as defined in RCSA §22a-174-3a(l)(5). The Permittee shall maintain sole ownership and possession of these emissions reductions for the duration of this permit and any subsequent changes to the permit.

The required emissions offsets must be obtained by the Permittee and approved by the Department at or before issuance of the initial construction/operating permits listed above.

The Permittee may be required to obtain additional NO<sub>x</sub> offsets and complete additional ambient air quality analysis to show that the NAAQS and PSD increments have not been violated if observed steady state or transient emissions exceed a limit specified in Parts III.A, B or C of this permit.

- B.** The Permittee shall comply with all applicable sections of the following New Source Performance Standard at all times.

Title 40 CFR Part 60, Subparts KKKK, TTTT and A.

Copies of the Code of Federal Regulations (CFR) are available online at the U.S. Government Printing Office website.

- C.** In the event that a malfunction causing either an emission exceedance or a parameter monitored out of recommended range is not corrected within three hours, the Permittee shall immediately institute shutdown of the turbine.
- D.** The Permittee shall comply with all applicable requirements of the Federal Acid Rain Program codified in Title 40 CFR Parts 72-78, inclusive, by the deadlines set forth with the aforementioned regulation.
- E.** The Permittee shall operate this facility at all times in a manner so as not to violate or contribute significantly to the violation of any applicable state noise control regulations, as set forth in RCSA Sections 22a-69-1 through 22a-69-7.4. [STATE ONLY REQUIREMENT]

## **PART VIII. ADDITIONAL TERMS AND CONDITIONS**

- A.** This permit does not relieve the Permittee of the responsibility to conduct, maintain and operate the regulated activity in compliance with all applicable requirements of any federal, municipal or other state agency. Nothing in this permit shall relieve the Permittee of other obligations under applicable federal, state and local law.
- B.** Any representative of the DEEP may enter the Permittee's site in accordance with constitutional limitations at all reasonable times without prior notice, for the purposes of inspecting, monitoring and enforcing the terms and conditions of this permit and applicable state law.
- C.** This permit may be revoked, suspended, modified or transferred in accordance with applicable law.
- D.** This permit is subject to and in no way derogates from any present or future property rights or other rights or powers of the State of Connecticut and conveys no property rights in real estate or material, nor any exclusive privileges, and is further subject to any and all public and private rights and to any federal, state or local laws or regulations pertinent to the facility or

regulated activity affected thereby. This permit shall neither create nor affect any rights of persons or municipalities who are not parties to this permit.

- E.** Any document, including any notice, which is required to be submitted to the commissioner under this permit shall be signed by a duly authorized representative of the Permittee and by the person who is responsible for actually preparing such document, each of whom shall certify in writing as follows: "I have personally examined and am familiar with the information submitted in this document and all attachments thereto, and I certify that based on reasonable investigation, including my inquiry of those individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief. I understand that any false statement made in the submitted information may be punishable as a criminal offense under section 22a-175 of the Connecticut General Statutes, under section 53a-157b of the Connecticut General Statutes, and in accordance with any applicable statute."
- F.** Nothing in this permit shall affect the commissioner's authority to institute any proceeding or take any other action to prevent or abate violations of law, prevent or abate pollution, recover costs and natural resource damages, and to impose penalties for violations of law, including but not limited to violations of this or any other permit issued to the Permittee by the commissioner.
- G.** Within 15 days of the date the Permittee becomes aware of a change in any information submitted to the commissioner under this permit, or that any such information was inaccurate or misleading or that any relevant information was omitted, the Permittee shall submit the correct or omitted information to the commissioner.
- H.** The date of submission to the commissioner of any document required by this permit shall be the date such document is received by the commissioner. The date of any notice by the commissioner under this permit, including but not limited to notice of approval or disapproval of any document or other action, shall be the date such notice is personally delivered or the date three days after it is mailed by the commissioner, whichever is earlier. Except as otherwise specified in this permit, the word "day" means calendar day. Any document or action which is required by this permit to be submitted or performed by a date which falls on a Saturday, Sunday or legal holiday shall be submitted or performed by the next business day thereafter.
- I.** Any document required to be submitted to the commissioner under this permit shall, unless otherwise specified in writing by the commissioner, be directed to: Office of Director; Engineering & Enforcement Division; Bureau of Air Management; Department of Energy and Environmental Protection; 79 Elm Street, 5th Floor; Hartford, Connecticut 06106-5127.