

**ASSESSMENT OF REGULATORY ISSUES  
FOR EMERGENCY GENERATOR  
AGGREGATION PROGRAM**

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## **SUMMARY**

The purpose of this task is to assess the regulatory implications of planned aggregation and marketing of emergency generator capacity in New York City. Deployment of this generator capacity is intended as a temporary measure to alleviate critical near-term capacity shortfalls within the five boroughs of New York City.

Such use of emergency generator equipment voids regulatory exemptions that otherwise apply, and subjects the generators to air permitting and other regulatory requirements. This report reviews applicable regulations and describes necessary permitting steps. The report also details operational parameters that will maintain compliance with relevant emissions thresholds.

## SECTION 1

### BACKGROUND

#### **Purpose**

The purpose of this task is to assess the regulatory implications of planned aggregation and marketing of emergency generator capacity in New York City. Deployment of this generator capacity is intended as a temporary measure to alleviate critical near-term capacity shortfalls within the five boroughs of New York City.

#### **Approach**

The task references emergency generators owned by in-City facilities of the New York State Office of Mental Health (OMH), as prototype aggregation participants. OMH has seven psychiatric hospital campuses within New York City, all of which maintain emergency and stand-by generator capacity. The campuses represent a range of facility size and current air permitting status, and thus are illustrative of regulatory implications for a wide variety of potential program participants.

Use of emergency generators in an aggregation and marketing program raises two primary regulatory issues: air permitting applicability and NO<sub>x</sub> RACT compliance. These issues are of particular relevance in New York City, which is within a severe ozone nonattainment area and thus has lower applicability thresholds for both air permitting and NO<sub>x</sub> RACT.

## Section 2

### ANALYSIS

#### REGULATORY APPLICABILITY

##### Air Permitting

Air permitting requirements are addressed in Part 201 of Title 6, New York Code of Rules and Regulations (6 NYCRR). The level of permitting to which a facility is subject is a function of the facility's Potential to Emit (PTE), which is defined as "the maximum capacity of [a]...source to emit any regulated air pollutant under its physical and operational design." (6 NYCRR 200.1(b))

Registration is the simplest category of permitting, generally applicable to small facilities with low emission levels. Eligibility for registration is addressed at 6 NYCRR 201-4. Registrations have a one-page application form, and typically entail the lowest level of compliance requirements.

Title V permits (Subpart 201-6) are the most comprehensive level of permitting, and encompass all emissions sources at a facility. Title V permits apply to sources for which the PTE for any regulated contaminant exceeds the major source threshold. Within New York City, the major source thresholds are 25 tons per year (tpy) for oxides of nitrogen (NO<sub>x</sub>) and volatile organic compounds (VOC), 50 tpy for carbon monoxide (CO), and 100 tpy for sulfur oxides (SO<sub>x</sub>), particulate matter (PM and PM-10), and lead. Title V permits require annual compliance certification reports and generally entail the most significant level of monitoring and reporting for permit compliance.

For sources that are not eligible to obtain registrations, but are also not required to have Title V permits, the state facility permit (SFP) is typically the relevant permitting level. SFP sources often have a PTE exceeding major source thresholds, but have actual emissions below the threshold, allowing them to adopt permit conditions that cap their emissions below the threshold levels. Such sources are known as "synthetic minors". State facility permits typically cover the entire facility, but unlike Title V permits, exempt sources need not be listed in the permit application. SFP compliance requirements are usually somewhat less stringent than those for Title V permits, and typically focus on documentation of compliance with relevant emissions caps.

Some facilities are exempt from permitting, meaning that all emissions sources at the facility fall within the exemptions specified in Subpart 201-3.

##### Emergency Generator Exemption

Emergency power generating units are listed as a source exempt from permitting under 6 NYCRR 201-3.2(c)(6), on the condition that the generator is operated less than 500 hours per year. Emergency units are defined as being "for use when the usual sources of heat, power, water and lighting are temporarily unobtainable..." Emergency units operated "under contract with a utility to provide peak-shaving generation to the grid..." are, however, **excluded** from this exemption.

Based on the experience of the NYS Office of Mental Health, the NYS Department of Environmental Conservation (DEC) has interpreted this provision to mean that generators used

in any type of contractual relationship with a utility are not eligible for the permitting exemption. The interpretation applies even in circumstances where the contractual relationship is with a party other than the utility, as it would be if NYSERDA or some other entity served in an aggregation and marketing role for use of emergency generator capacity. **Permitting is applicable in such circumstances regardless of the number of hours in which the generator is operated each year.**

Participation in an emergency generator aggregation and marketing program would thereby subject a facility to air permitting requirements. Facilities with existing permits would be required to modify their permits to add the generators as a permitted source. Sources otherwise exempt from permitting would be required to obtain an air permit for such operation of generators.

### **NO<sub>x</sub> RACT Applicability**

Facilities that are major stationary sources of NO<sub>x</sub> must use Reasonably Available Control Technology (RACT) to control NO<sub>x</sub> emissions, per the requirements of 6 NYCRR 227-2. As a severe ozone nonattainment area, New York City's major source emissions threshold is lower than that applicable to attainment areas. The threshold is 25 tpy for either NO<sub>x</sub> or VOC.

Most Title V facilities would also be subject to NO<sub>x</sub> RACT requirements. There may be exceptions, since it is possible for a source to cap NO<sub>x</sub> emissions below the major source threshold, rendering NO<sub>x</sub> RACT inapplicable, while still being subject to Title V on the basis of PTE for other pollutants. Such circumstances would likely be rare, and do not apply to any OMH facility.

SFP, registration, and exempt sources cannot be subject to NO<sub>x</sub> RACT, in that major source status for NO<sub>x</sub> would render such sources ineligible for the lower level of permitting or exemption. NO<sub>x</sub> RACT considerations would therefore focus on the subset of potential program participants that are Title V sources.

RACT standards for stationary internal combustion engines are at Section 227-2.4(f). The standards apply to units exceeding 225 horsepower (~168 kW) in the severe ozone nonattainment area. As with permitting regulations, emergency generating units used less than 500 hours per year are exempt from the standards, but units "used for peak shaving generation" are **excluded from the exemption**.

## **PERMITTING OPTIONS**

Permitting actions required for program operation of emergency generators vary depending on the current permitting status of the facility. Typical requirements for each level of permitting are described below.

### **Exempt Facilities**

A facility is exempt from air permitting if all emissions sources at the facility fall within the definitions specified in 6 NYCRR 201-3 as exempt and trivial sources. An example of an exempt facility is South Beach Psychiatric Center on Staten Island, where all facility boilers fall below the 10 mmBtu/hr heat input threshold for permitting. The facility's stand-by and emergency generators qualify for exempt status, and facility operations such as woodworking

and paint shop qualify as trivial sources. Brooklyn Children's Psychiatric Center also constitutes an exempt facility.

If either of these campuses elected to participate in a generator operation program, the generator(s) in question would become subject to permitting. As a single source at an otherwise exempt facility, the campuses would likely be eligible for registration, the lowest level of air permitting. This eligibility is, however, dependent on the facility's ability to "cap by rule", by having actual emissions that are less than 50% of the major source threshold. In New York City, this would entail maximum NO<sub>x</sub> emissions of 12.5 tons per year (tpy) **from all facility sources** (including the exempt boilers, as well as any program and non-program generators). The registration application must demonstrate that at the expected level of operation, total NO<sub>x</sub> emissions would not exceed the 12.5 tpy threshold.

Calculations of NO<sub>x</sub> emissions from engine generators, using EPA-published emission factors for uncontrolled units, show that a 2,400 kW generator operated at full capacity for 300 hours per year would generate 12.5 tpy of NO<sub>x</sub>. This can be considered a maximum capacity (at 300 hours of operation) for registration eligibility, with this capacity applicable **only** if the facility has no other NO<sub>x</sub> emission sources. If other sources, such as exempt boilers, are in operation, then the generator capacity target must be reduced to allow for NO<sub>x</sub> emissions from the non-generator sources, such that total emissions remain below the 12.5 tpy cap.

If the cap-by-rule threshold cannot be met at the expected level of operation for all NO<sub>x</sub> sources, the facility would probably be required to obtain a State Facility Permit (see discussion below).

### **Registration Facilities**

Participant facilities may currently be subject to registration, based on operation of non-exempt boilers. (None of the OMH facilities in New York City have this permitting status.) Again, eligibility for registration is contingent on ability to cap by rule below 12.5 tpy of NO<sub>x</sub> emissions. If a current registration facility opts for participation in a generator operation program, the generator would lose exempt status and become subject to inclusion in the registration.

The facility would have to file a modified registration application, with calculations demonstrating the ability to meet the cap-by-rule emissions threshold at the expected level of operation. Allowable generator capacity and hours of operation would be determined by the increment remaining under the cap after boiler or other emissions are accounted for. In the case of currently registered sources, the Department of Environmental Conservation would probably review past actual emissions from the facility's permitted sources to determine whether there was room within the cap for anticipated generator operation.

### **State Facility Permits**

Facilities that are not required to obtain a Title V permit (see below), but are not eligible for registration would usually be required to obtain a State Facility Permit (SFP). SFP candidates are those facilities whose Potential to Emit (PTE) exceeds the major source threshold (25 tpy of NO<sub>x</sub> in New York City), but whose actual or anticipated emissions are below this level, allowing the source to accept an emissions cap. Among OMH facilities in New York City, Kingsboro Psychiatric Center is the sole SFP holder.

Facilities that are currently exempt or registration sources could be required to upgrade to an SFP on the basis of participation in a generator program. If the expected level of generator

operation would cause the source to exceed the 12.5 tpy cap-by-rule threshold, but would remain under the 25 tpy major source threshold, the facility could adopt an emissions cap under an SFP.

Using the EPA-published NO<sub>x</sub> emission factor yields a maximum generator capacity of 4,800 kW at 300 hours per year to meet a 25 tpy cap on NO<sub>x</sub> emissions. As with the lower cap-by-rule threshold, compliance with such a permit cap must account for emissions from all sources at the facility, whether exempt, trivial, or permitted. Thus, a facility with any additional emission sources, such as boilers, would be subject to a lower maximum generator capacity within the applicable cap.

If Kingsboro Psychiatric Center or other existing SFP holders opted to participate in a generator program, they would be required to modify their permit to list the subject generator as a regulated source. Generator emissions would have to be accounted for in determining compliance with an existing emissions cap.

### **Title V Facilities**

Facilities whose PTE exceeds the major source threshold for any contaminant, and who cannot cap emissions below that threshold, are required to obtain a Title V permit. Four OMH facilities in New York City hold Title V permits, including Bronx, Creedmoor and Manhattan Psychiatric Centers and New York Psychiatric Institute. Title V permit applications must list the number and location of exempt sources, such as emergency generators, although they need not provide detailed information on these sources.

Exempt, registration and SFP sources could be required to upgrade to a Title V permit if the contemplated level of generator program participation entailed emissions exceeding 25 tpy of NO<sub>x</sub>. As noted above, operations of a 4,800 kW generator for more than 300 hours per year could, on its own, yield NO<sub>x</sub> emissions exceeding this level. Such sources would be required to submit a Title V application that encompassed all permitted and exempt sources at the facility.

Existing Title V facilities opting to participate in a generator program would be required to file permit modifications reclassifying what were previously exempt emergency generators as permitted sources. Since such facilities are not subject to emissions caps, incorporation of additional permitted sources is generally easier than for capped sources at a lower permitting level.



## GENERATOR OPERATION CALCULATIONS

The following tables illustrate the operational parameters that accommodate the cap-by-rule and major source emissions thresholds. One table calculates the allowable level of generator capacity (in kilowatts), as a function of the desired hours of program operation, ranging from 100 to 700 hours per year. The other table calculates the operating hours to meet each emissions threshold while varying the generator capacity from 500 kW to 3,000 kW. It is important to note that the calculations account **solely** for emissions from the generators. Any contribution to NO<sub>x</sub> emissions from non-generator sources would necessitate a reduction in generator capacity or hours from the calculated values to meet the emissions cap.

Hours of operation	Allowable capacity – kW	
	NO <sub>x</sub> emissions = 12.5 tpy	NO <sub>x</sub> emissions = 25 tpy
100	7,334	14,668
200	3,667	7,334
300	2,445	4,889
400	1,833	3,667
500	1,467	2,934
600	1,222	2,445
700	1,048	2,095

Generator capacity - kW	Allowable Hours of Operation	
	NO <sub>x</sub> emissions = 12.5 tpy	NO <sub>x</sub> emissions = 25 tpy
500	1,467	2,934
1,000	733	1,467
1,500	489	978
2,000	367	733
2,500	293	587
3,000	244	489

## EFFECT OF FUEL SELECTION ON REGULATORY REQUIREMENTS

Most engine generators use diesel fuel or, less frequently, other distillate fuels including #2 fuel oil. Available emission factors do not distinguish between emissions from diesel fuel and #2 fuel oil. Some engine generators are designed to use natural gas, or other methane fuels such as landfill gas or digester gas. Some gas-fired units are designated as dual fuel because they use diesel fuel (typically 5-6% of total input) to ignite the natural gas.

EPA emission factors for stationary engines are limited to diesel and dual fuel units; there are no factors for gas-only units. Emission rates for NO<sub>x</sub> from diesel and dual fuel generators are virtually identical (3.2 lb per mmBtu of fuel input for diesel; 3.1 for dual fuel). Other pollutants, including carbon dioxide and sulfur oxides, have markedly lower emission rates from dual fuel units as compared to diesel units. Because NO<sub>x</sub> is the predominant emission from engine generators, and the pollutant that largely drives regulatory requirements in severe ozone nonattainment areas, there is no substantial regulatory benefit to the use of gas-fired generators over diesel-fired units for the purposes of this program.

The regulatory implications of fuel selection on NO<sub>x</sub> RACT requirements go in the direction of favoring diesel-fired units, which have higher maximum emissions. For lean burn engines, gas-only units are limited to 3 grams of NO<sub>x</sub> per brake horsepower-hour, while units firing other fuels can emit 9 grams per brake horsepower-hour.

## **NO<sub>x</sub> RACT COMPLIANCE**

### **NO<sub>x</sub> RACT/Title V Interface**

As noted above, NO<sub>x</sub> RACT applicability is generally limited to Title V sources because facilities that are major NO<sub>x</sub> sources are also subject to Title V permitting. Sources with existing Title V permits are already required to be in compliance with NO<sub>x</sub> RACT for permitted stationary combustion sources, including boilers exceeding 20 mmBtu/hr heat input (10 mmBtu/hr threshold for boilers using #6 oil). Participation in a generator program will void the exemption for those emergency generators; therefore, the generators must be brought into compliance with NO<sub>x</sub> RACT standards for internal combustion engines.

Sources for whom program participation would entail upgrading to a Title V permit would become subject to NO<sub>x</sub> RACT for **all** of their stationary combustion sources. They would, for example, be required to bring boilers into compliance with NO<sub>x</sub> RACT, which could entail combustion and/or post-combustion retrofits for boilers over 50 mmBtu/hr heat input. The potentially costly ramifications of such a permit upgrade suggest the need for a thorough evaluation in such circumstances.

### **NO<sub>x</sub> RACT Standards**

NO<sub>x</sub> RACT emission limits for generators are based on whether the unit is classified as a rich burn or lean burn engine, and on the fuel fired. RACT standards are as follows:

- 1) 2.0 grams per brake horsepower-hour for rich burn engines;
- 2) For lean burn engines:
  - i) 3.0 grams per brake horsepower-hour for gas-only fired units; or
  - ii) 9.0 grams per brake horsepower-hour for units firing other fuels.

The regulations define lean burn engines as those operated so that oxygen in the engine exhaust is 1.0% or more, by volume. All other units are rich burn. The regulations note that the emission limits for rich burn engines are based on the use of air/fuel ratio control and post combustion control. The emission limits for lean burn engines are based on the use of combustion modifications, including use of low emission combustion, retarded engine timing, and separate circuit after-cooling.

Diesel-fired units are typically lean burn units, with exhaust gas oxygen content of about 10%, and are thus subject to the 9 gram limit on NO<sub>x</sub> emissions. Many gas-fired units are also lean burn, with exhaust O<sub>2</sub> of about 2-3%; these units would be subject to the 3 gram limit. Gas-fired units that use diesel as a pilot ignition fuel would be subject to the 9 gram limit.

## Unit Conversions and Required Level of Control

The emission rate units used in the NO<sub>x</sub> RACT limits, which are based on power output, can readily be converted to units based on fuel/heat input. The conversions, assuming a generator efficiency of 32%, are as follows:

- 9 grams per brake horsepower-hour = 2.5 lb/mmBtu heat input
- 3 grams per brake horsepower-hour = 0.83 lb/mmBtu heat input
- 2 grams per brake-horsepower-hour = 0.55 lb/mmBtu heat input

The 9 gram limit represents a 22% reduction from the EPA-published emission factor for NO<sub>x</sub> from uncontrolled engine generators (3.2 lb/mmBtu). The 3 gram limit is a 73% reduction from the EPA factor for dual fuel units, with the 2 gram limit representing an 83% reduction.

## Economic and Technical Variances

The NO<sub>x</sub> RACT regulations (at 227-2.5(c)) include among compliance options the opportunity to demonstrate that the applicable limits are not economically or technically feasible. DEC can set a higher unit-specific limit based on the capabilities of combustion control. Procedures for such a demonstration are further detailed in DEC Air Guide-20, addressing Economic and Technical Analysis for RACT. AG-20 establishes \$3,000 per ton of reduced NO<sub>x</sub> emissions as the upper economic limit of RACT. In other words, a facility will not be required to implement any emission reduction or control technique whose cost exceeds this threshold. AG-20 specifies that several emission reduction techniques must be evaluated, including those which could reduce emissions from current levels although not to the RACT limit. If lesser control measures fall within the upper economic limit, and a full reduction to the RACT limit exceeds that cost threshold, the lesser control measures could be judged to constitute RACT for that source.

For applications where intended hours of operation are limited, as in the generator program, the correspondingly lower emission reduction potential increases the likelihood that control costs will exceed the upper economic limit. For example, reducing NO<sub>x</sub> emissions from 3.2 lb/mmBtu to the RACT level of 2.5 lb/mmBtu for a 2,000 kW generator operated 300 hours per year would yield 2.24 tpy of reductions. If the current uncontrolled NO<sub>x</sub> emissions were 3.9 lb/mmBtu (14 grams per brake horsepower-hour), a reduction to the RACT limit would entail 4.5 tpy of reduced emissions under the same conditions. As these calculations illustrate, the magnitude of potential emissions reductions from NO<sub>x</sub> RACT controls may be low. This suggests that a relatively low cost limit for RACT may be applicable.

## OMH Experience with NO<sub>x</sub> RACT for Generators

The experience of the Office of Mental Health supports the relevance of the upper economic limit for RACT. Rockland Psychiatric Center, subject to Title V and NO<sub>x</sub> RACT, has participated for several years in a peak-shaving program with Orange & Rockland Utilities. Compliance with NO<sub>x</sub> RACT for the diesel generators enrolled in the program (2 units at 2,000 kW each) would have entailed reducing emissions from 14 to 9 grams per brake hp-hr. Accounting for the number of hours in the peak-shaving program (limited by the utility's tariff), as well as hours for emergency use and periodic testing of the generator, the emissions reduction potential totaled 7.3 tpy of NO<sub>x</sub>. The cost estimate for installation of selective catalytic reduction (SCR) controls was \$284,000, exclusive of annual materials and maintenance costs. This cost obviously fell well above the upper economic limit for RACT, and was therefore not required.

## **REGULATORY PROCESSING ISSUES**

The critical inadequacy of capacity reserve margins in New York City during high load periods necessitates a tight timeframe for establishing a generator aggregation program. This raises the question of whether sources will be allowed to operate under such a program once the appropriate regulatory filings have been made and are under review. It is our understanding that DEC has given assurances that any processing delays will not result in enforcement action against participating facilities. There is the expectation, however, that regulatory filings will address all relevant requirements, and will be coordinated so as to facilitate timely review.

It is expected that a generator program will operate only until longer-term solutions to capacity shortfalls can be implemented. Preliminary indications are that this temporary nature will not relieve facilities of the need to take appropriate regulatory actions with regard to permitting and NO<sub>x</sub> RACT compliance. This suggests the importance of weighing the scope of required actions against the benefits of participation in a time-limited program.