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| OZONE TRANSPORT COMMISSION |
| **Strategies to Reduce Emissions of Nitrogen Oxides on High Electric Demand Days** |
| STATIONARY and AREA SOURCES COMMITTEE |

August 10, 2017

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Strategies to Reduce Emissions of Nitrogen Oxides (NOx) on High Electric Demand Days (HEDD)

**Recommendations of the Stationary and Area Sources Committee of the Ozone Transport Commission**

# 1. Introduction and Purpose Statement

In its November 17, 2016 meeting, the Ozone Transport Commission (OTC) charged the OTC’s Stationary and Area Sources (SAS) Committee to:

*“Develop recommendations for at least one specific strategy to reduce High Electric Demand Day (HEDD) emissions and an implementation mechanism.”*

To fulfill this charge, we developed recommendations for three potential strategies: (A) an enforceable rule-based strategy to limit ozone season NOx emissions from boilers, turbines, and other fuel combustion devices at minor sources for NOx; (B) another rule based strategy to further limit NOx emissions from non-emergency generators powered by reciprocating engines; and (C) a voluntary outreach-based strategy. We also drafted three possible options for an implementation mechanism: a statement, a resolution, and aMemorandum of Understanding (MOU). Overviews of the strategies are provided in the main text of this document. The strategies themselves and the implementation options are presented in Attachments A - D.

# 2. Methodology

Our general methodology for developing strategy recommendations consisted of defining the issue and then implementing a survey to gather information on any existing or planned HEDD rules or regulations.

## 2.1 Defining the Problem

As a first step in fulfilling the charge, two important questions had be answered: what is a high electric demand day, and what is the universe of high electric demand day units?

***What is a*** ***high electric demand day?***

A *high electric demand day* or HEDD is a day in which the demand for electricity is higher than what is normal or typical. While HEDD events can occur during winter months, in most of the OTC region HEDDs more often occur in the summer when hot temperatures lead to increased use of cooling devices like air conditioners, fans, etc. This is an important issue because these hot summer days are also often the most conducive to ozone formation. However, it is important to note that HEDDs and high ozone days do not necessarily overlap/coincide all the time.

Although the concept of HEDDs is fairly well understood and has been studied extensively, it is challenging to explicitly define a HEDD for the purposes of developing a regulatory strategy. In its NOx RACT rule,[[1]](#footnote-1) New Jersey (NJ) defines a HEDD as the day following a day in which the next day forecast load is estimated to have a peak value of ≥52,000 megawatts (MW) as predicted by the PJM Interconnection 0815 update to its Mid-Atlantic Region Hour Ending Integrated Forecast Load[[2]](#footnote-2). However, for the purposes of recommending a geographically broad strategy, it is difficult to apply a single HEDD definition, since air agencies in the OTC are located in regions administered by different ISOs which may have different means of forecasting load. Also, it would be cumbersome, both for regulators and the regulated community, to have to undertake specific actions based on forecasts of electric demand since that would require them to keep track of their respective ISO’s load forecast. So, this document identifies strategies to limit NOx emissions at all times during the ozone season, which will reduce NOx emissions and improve air quality on HEDDs since most high-temperature HEDDs[[3]](#footnote-3) occur during the ozone season.

***What is a High Electric Demand Day Unit?***

“HEDD units” are relatively easy to define generally, but challenging to define specifically for the purposes of developing a regulatory strategy. For the purposes of this effort, HEDD units could be considered those units that are generally dispatched by the RTO/ISO to meet demand during times when electricity demand is higher than can be reliably met by available base and intermediate load generation resources. These units generally run less frequently than base load and intermediate units and are often not subject to the same stringent emission controls as base load units. Combustion turbines and diesel reciprocating engines are typical emission units that are considered “HEDD units”, and the terms “peaking units” and “HEDD units” are sometimes used interchangeably. In addition to “HEDD units”, many sources of NOx pollutants may be running on a summer day as part of an industrial process or supplemental power generation.

Any electric generating unit may reasonably operate during any high electric demand day. As the grid loading increases during the HEDD, the electric load on units that are already on line will be increased up to their specified economic limit, and additional units will be brought on line to meet the additional demand. Available information indicates that the fleet of operating units is not always consistent between HEDD events, depending upon a great many factors including actual magnitude of grid demand, unit availability, unexpected fluctuation in renewables output, operating restrictions, incremental cost, startup/shutdown cost, and expected operating duration.

NJ’s NOx RACT rule explicitly defines a HEDD unit as an electric generating unit (EGU) capable of generating ≥15 MW, that commenced operation prior to May 1, 2005, and that operated less than or equal to an average of 50% of the time during the ozone seasons of 2005 through 2007. New Hampshire’s NOx RACT rule[[4]](#footnote-4), generally defines HEDD units as “load shaving units”, which are devices used to generate electricity for sale or use during high electric demand days, including but not limited to stationary combustion turbines or stationary internal combustion engines (note: Env-A 1300 does not explicitly define the term “high electric demand days”). Some states focus on emission units that operate very few hours per year but generally only on HEDD. Other states may consider additional units that operate on HEDD as well as other days.

In addition to differences in the capacity factor that defines a HEDD unit in different states, the type of emission units dispatched to operate on HEDD varies considerably from state to state.

Thus, as with defining HEDD, it would be challenging to apply a single HEDD unit definition for the purposes of recommending a geographically broad strategy. Therefore, this paper does not define a “HEDD unit”. Instead, the recommendations in this paper cover a wide range of NOx-emitting source types that may be operating during periods of high electric demand. A state should tailor the implementation of the strategies to address the emission units of concern on HEDDs in that state.

## 2.2 Survey of Existing HEDD Rules and Regulations

As the next step in the process, we conducted a survey of OTC member agencies to understand the current landscape of any existing or proposed rules and regulations pertaining to HEDDs or HEDD units. The purpose of this survey was to determine if any existing or proposed rules or regulations would serve as a useful starting point for developing recommendations.

The survey responses from OTC state agencies are available on request. The responses from Connecticut (CT) and Delaware (DE) serve as useful starting points for developing strategy recommendations as discussed in the following sections.

# 3. Rule-Based Strategy to Limit NOx Emissions from Boilers, Turbines, and Other Combustion Devices

In its survey response, CT provided information on two rules geared towards limiting NOx from fuel combustion sources which were used as the starting points for developing our recommendations.

1. **RCSA section 22a-174-22e** (Control of NOx emissions from fuel-burning equipment at major stationary sources of NOx) is Connecticut’s NOx RACT rule for the 2008 ozone National Ambient Air Quality Standard (NAAQS). It limits NOx emissions from fuel-burning emission units located at major sources of NOx and includes ozone season emissions limitations for certain boilers serving EGUs, ICI boilers, and simple cycle combustion turbines.
2. **RCSA section 22a-174-22f** (High daily NOx emitting units at non-major sources of NOx) requires that certain NOx emitting units at non-major sources of NOx meet daily mass-based NOx emissions limitations during the ozone season.

Since NOx emissions at major stationary sources are addressed by other Federal and state regulatory programs, such sources were omitted from our HEDD strategy development. The efforts here are focused on developing a recommendation for a strategy to limit NOx from combustion devices at facilities that are not major sources of NOx based on CT’s RCSA section 22a-174-22f (hereafter referred to as “22f”).

Simply stated, our strategy development first incorporates 22f, which requires fuel-burning emissions units located at facilities that are not major sources of NOx to meet enforceable daily NOx mass emissions limits. If the daily mass emission limits are exceeded, then the affected device must meet the more stringent emission rate limits of RCSA section 22a-174-22e (hereafter referred to as “22e”), which is CT’s NOx RACT rule for major sources of NOx (noting however, that our strategy is not intended as a RACT rule - we are simply proposing to use RACT-like performance standards, such as those in 22e, as a backstop to the daily mass emission limits).

We determined that daily mass-based emissions limits, such as those in 22f, would provide emission unit operators the flexibility to operate their various combustion devices (whether boilers, turbines, or engines), in whatever combination or number of operating hours necessary, so long as the enforceable daily emissions thresholds are not exceeded per emission unit. The emission rate limits in 22e (or any state’s recent NOx RACT rule) serve as an effective backstop or penalty in those instances where the daily mass-based thresholds are exceeded. Additionally, the more stringent emission rate limits in 22e (or any state’s recent NOx RACT rule) provide incentive for facility owners to meet the enforceable daily mass-based limits.

We developed a strategy for combustion devices at facilities that are not major for NOx based on a combination of CT’s 22f and 22e. The daily mass-based NOx emission limits in 22f are 137 lb/ozone season day for severe areas (which corresponds to the major source applicability threshold of 25 tons per year (tpy)) and 274 lb NOx/ozone season day for serious areas (which corresponds to the major source applicability threshold of 50 tpy). However, we recommend a geographically broad strategy with a single mass-based NOx threshold of 137 lb/day applicable throughout the OTR.

Similarly, 22f provides device applicability thresholds based on serious and severe nonattainment areas, but we recommend a geographically broad strategy that is independent of attainment status. For example, the 22f applicability thresholds for gas-fired simple-cycle combustion turbines are 32 MMBtu/hr for serious areas and 16 MMBtu/hr for severe areas. In this case, we recommend 16 MMBtu/hr as the applicability threshold which is the lower and therefore more stringent applicability threshold.

An initial analysis performed by the workgroup indicates that the types of facilities that could be affected by this strategy include, but are not limited to, small EGUs, medical centers, lumber mills, and manufacturing facilities.

Our recommendation for a strategy to limit NOx emissions from combustion devices at facilities that are not major sources of NOx is presented in Attachment A.

# 4. Rule-Based Strategy to Further Limit NOx from Non-Emergency Generators Powered by Reciprocating Engines

In our earlier work[[5]](#footnote-5), we found that diesel reciprocating engines used for electric demand response purposes could have an impact on air quality if they were to respond to an electric demand event in a widespread manner. However, we also found that most states are regulating these types of devices quite effectively. This is documented in Appendix A of the OTC HEDD white paper[[6]](#footnote-6) and in Appendix A of the NESCAUM report[[7]](#footnote-7).

In its response to the HEDD rules survey, DE provided details on its rule to control emissions for stationary generators[[8]](#footnote-8) which applies to all new and existing generators, irrespective of size and fuel type, and subject non-emergency generators must meet stringent limits. So this rule served as a useful starting point to develop a strategy to further reduce NOx from non-emergency generators powered by reciprocating engines which is presented in Attachment B.

# 5. Voluntary Outreach-Based Strategy

Expecting benefit from raising public awareness of the nexus between air quality and high electric demand days, we have developed an outreach based strategy which is intended to be voluntary and not regulation-based. This strategy does not afford quantifiable emissions reduction benefit and is not intended to be SIP-approvable. It does, however, have the intangible benefit of raising public awareness of the importance of air quality and making the public aware that their small individual efforts can have a collective benefit.

Our outreach strategy provides template wording to introduce the public to the concept of high electric demand days. Also provided with the wording is a list of energy-related suggestions for improving air quality during forecasted high electric demand and/or high ozone days. Some of the suggestions are targeted towards the general public while others are geared toward facility owners. The template language and accompanying energy-related suggestions could be added to state, local, and tribal air agencies’ websites at relevant locations such “Air Quality Forecasting”, “Effects of Ozone”, “What You Can Do to Reduce Air Pollution”, etc.

A significant advantage to this strategy is that it involves no cost to air agencies beyond the outreach and/or IT staff time. An additional component of a voluntary outreach strategy could include working with ISOs/utilities to incorporate a "high electric demand day" forecast into air agencies' daily air quality forecasting & outreach activities. However, this would involve the additional cost of ongoing staff time to conduct these activities.

Our recommendation for a voluntary outreach-based strategy in the form of website wording is presented in Attachment C.

# 6. Actions by Commissioners

In addition to our recommendations of potential strategies for NOx reductions on HEDDs, we have also developed three options for the Commissioners to act on this report: a statement, a resolution, and an MOU.

Our recommendations for these potential implementation mechanisms are presented in Attachment D.

# 7. Output-Based Regulations

In the final version of EPA’s Handbook on output-based regulations[[9]](#footnote-9), regulations which relate limits to the productive output of a process (e.g. lb/MWh of electricity generated) are shown to have potential additional benefits over traditional input-based regulations (e.g. lb/MMBtu of fuel input). For example, output-based regulations can encourage energy efficiency as a means to comply with the limit. This can provide even more flexibility to the regulated community. In addition, because they encourage energy efficiency - including less fuel consumption - output-based regulations can result in emissions decreases for all pollutant products of a process, as opposed to many traditional regulatory programs that target a specific pollutant.

Although this does not constitute an endorsement of the Handbook by the OTC, we recommend the idea of output-based regulations as a possible future study topic.

# 8. Reciprocating Engines and Federal New Source Performance Standards

Reciprocating internal combustion engines, or RICE, are addressed in both of the recommended rule-based strategies described here, noting, however, that the rule-based strategy for non-emergency generators (Attachment B) only applies to RICE used for powering non-emergency generators. We are offering our recommendations in a “menu” format so that an air agency could choose to pursue either or both of the rule-based strategies. Therefore, an air agency may want to pay particular attention to how it addresses RICE depending on which strategy (or strategies) is (or are) pursued.

Similarly, RICE and other combustion devices addressed by the recommended strategies are also covered by Federal New Source Performance Standards (NSPS)[[10]](#footnote-10). Most notably, stationary compression ignition internal combustion engines are covered under Subpart IIII and stationary spark ignition internal combustion engines are covered under Subpart JJJJ. Other NSPS exist for stationary combustion turbines and certain types of steam generating units (boilers). Air agencies will have to consult with their NSPS staff as they consider how to pursue these recommendations.

# 9. Summary and Conclusions

The OTC SAS Committee was charged with recommending at least one strategy to reduce high electric demand day emissions and an implementation mechanism. In fulfilling this charge, we found it challenging to explicitly define a HEDD and the universe of HEDD units for the purposes of recommending a regulatory strategy. Instead we opted for an approach that would address NOx emissions from a range of combustion sources during the course of the ozone season. Such a strategy would, by extension, reduce HEDD emissions and would have the additional benefit of reducing NOx emissions at all times during the ozone season.

As part of the development process, we conducted a survey of OTC member agencies to understand the current landscape of existing and planned HEDD rules and to evaluate existing rules to serve as a useful starting point for developing a recommendation. Based on the survey results, we developed two regulatory-based strategies: The first is aimed at combustion devices at facilities that are not major sources of NOx (major sources are already covered by other regulatory programs such as NOx RACT). The second is aimed at non-emergency generators powered by reciprocating engines. In addition to the two regulatory-based strategies, we have recommended a voluntary outreach-based strategy to raise public awareness of the issue of HEDDs. We have also drafted three options for an implementation mechanism for the recommended strategies. This approach covers a wide range of non-major NOx emission sources throughout the OTR. Individual states can assess the applicable sources, understanding the overall NOx reduction benefit comes from the regional effort.

Lastly, we recommend the concept of output-based regulations as a potential future study topic.

# Attachment A: Rule-Based Strategy to Limit NOx Emissions from Combustion Devices

The purpose of this rule-based strategy is to limit NOx emissions from applicable device types. The proposed limits shall apply during the ozone season which, by extension, will help reduce emissions during High Electric Demand Days (HEDDs). The outline below could serve as a starting point to developing appropriate rule language. Although this outline attempts to mimic rule language, it is not specifically intended as formal rule language. In summary, applicable devices must meet the enforceable daily NOx mass emissions limit listed in Section 3 (which applies per device). Devices that do not meet the daily NOx mass limit are subject to the more stringent emission rate limits shown in the tables in Section 4.

Note: Multiple options are presented with respect to reciprocating engines. The extra options are shown in green and blue font.

## 1. Applicability

(a) Sources not Major for NOx. The following device types located facilities that are not Major for NOx are subject to this strategy:

(1) A gas-fired boiler serving an EGU or ICI boiler with a maximum rated capacity >76 MMBtu/hr.

(2) A residual oil-fired boiler serving an EGU or ICI boiler with a maximum rated capacity >30 MMBtu/hr.

(3) A distillate oil-fired boiler serving an EGU or ICI boiler with a maximum rated capacity >72 MMBtu/hr.

(4) A solid fuel-fired boiler serving an EGU or ICI boiler with a maximum rated capacity >6 MMBtu/hr.

(5) A gas-fired reciprocating engine with a maximum rated capacity >4 MMBtu/hr or ≥**1,500 HP**.(conversion: 4 **MMBtu/hr = 1.172 MW = 1,572 HP)**

(6) A distillate oil-fired reciprocating engine with a maximum rated capacity >2 MMBtu/hr or ≥**750 HP**. (conversion: **2 MMBtu/hr = 0.586 MW = 786 HP)**

Optional (5)/(6) A gas-fired or distillate oil-fired reciprocating engine with a maximum rated capacity of 100 HP

Additional Option (5)/(6): Don’t include RICE in this strategy, let them be covered by Federal NSPS.

(7) A gas-fired simple cycle combustion turbine with a maximum rated capacity >32 MMBtu/hr.

(8) A distillate oil-fired simple cycle combustion turbine with a maximum rated capacity >12 MMBtu/hr.

(9) A gas-fired combined cycle combustion turbine with a maximum rated capacity >32 MMBtu/hr.

(10) A distillate oil-fired combined cycle combustion turbine with a maximum rated capacity >12 MMBtu/hr.

(11) A gas-fired fuel-burning emission unit that combusts fuel for heating materials including air with a maximum rated capacity >76 MMBtu/hr.

(12) A distillate oil-fired fuel-burning emission unit that combusts fuel for heating materials including air with a maximum rated capacity >72 MMBtu/hr.

(b) Exemptions. The following device types are exempt from this strategy:

(1) An emergency generator (as defined by each state's rules and/or Federal NSPS).

(2) A device that is subject to NOx RACT (in accordance with each state's NOx RACT rules) or consent order.

(3) A mobile source.

**(c) Time Period.** The daily NOx mass emissions limit in 3. below and the emission rate limitations in 4. below shall apply at all times during the ozone season.

## 2. Definitions

(a) "Ozone Season" means the period from May 1st to September 30th, inclusive.

## 3. Daily NOx Mass Emissions Limit

Each applicable device is limited by enforceable permit condition to <137 lb/day of NOx.

## 4. Emission Rate Limitations

Each applicable device that does not meet the daily NOx mass emission limit in Section 3 shall be subject to the following emission rate limits (or any state’s recent NOx RACT rule).

(a) Boilers serving EGUsshall be subject to the following emissions limits:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Emissions limitations from June 1, 2018 – May 31, 2023** | | | | |
| **Boilers serving EGUs** | **Emissions Limit (lb/MMBtu)** | | | |
| **Gas-fired** | **Residual oil-fired** | **Distillate oil-fired** | **Coal-fired** |
| Cyclone boiler | 0.3 | 0.43 | 0.43 | -- |
| Other boiler | 0.2 | 0.25 | 0.2 | 0.28 |
|  | | | | |
| **Emissions limitations beyond June 1, 2023** | | | | |
| **Boilers serving EGUs** | **Emissions Limit (lb/MMBtu)** | | | |
| **Gas-fired** | **Residual oil-fired** | **Distillate oil-fired** | **Coal-fired** |
| Boiler serving EGU | 0.1 | 0.2 | 0.1 | 0.12 |

(b) ICI boilers shall be subject to the following emissions limits:

|  |  |  |  |
| --- | --- | --- | --- |
| **Emissions limitations from June 1, 2018 through May 31, 2023** | | | |
| **ICI Boilers** | **Emissions Limit (lb/MMBtu)** | | |
| **Gas-fired** | **Residual oil-fired** | **Distillate oil-fired** |
| Boilers with a maximum rated capacity >5 MMBtu/hr | 0.2 | 0.25 | 0.2 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Emissions limitations beyond June 1, 2023** | | | |
| **ICI Boilers** | **Emissions Limit (lb/MMBtu)** | | |
| **Boilers with a maximum rated capacity** | **Gas-fired** | **Residual oil-fired** | **Distillate oil-fired** |
| 5 > and <25 MMBtu/hr | 0.2 | 0.25 | 0.2 |
| >25 MMBtu/hr and <100 MMBtu/hr | 0.05 | 0.2 | 0.1 |
| >100MMBtu/hr | 0.1 | 0.2 | 0.15 |

(c) Simple cycle combustion turbines shall be subject to the following emissions limits:

|  |  |  |
| --- | --- | --- |
| **Emissions limitations from June 1, 2018 through May 31, 2023** | | |
| **Simple cycle combustion turbines** | **Gas-fired** | **Distillate oil-fired** |
| Simple cycle combustion turbine | 55 ppmvd | 75 ppmvd |

|  |  |  |
| --- | --- | --- |
| **Emissions limitations from June 1, 2023 and after** | | |
| **Simple cycle combustion turbines** | **Gas-fired** | **Distillate oil-fired** |
| Simple cycle combustion turbine | 40 ppmvd | 50 ppmvd |

(d) Combined cycle combustion turbines shall be subject to the following emissions limits:

|  |  |  |
| --- | --- | --- |
| **Emissions limitations from June 1, 2018 through May 31, 2023** | | |
| **Combined cycle combustion turbines** | **Gas-fired** | **Distillate oil-fired** |
| Combined cycle combustion turbine | 42 ppmvd | 65 ppmvd |

|  |  |  |
| --- | --- | --- |
| **Emissions limitations from June 1, 2023 and after** | | |
| **Combined cycle combustion turbines** | **Gas-fired** | **Distillate oil-fired** |
| Combined cycle combustion turbine | 25 ppmvd | 42 ppmvd |

(e) Reciprocating engines shall be subject to the following emissions limits:

|  |  |  |  |
| --- | --- | --- | --- |
| **Emissions limitations from June 1, 2018 through May 31, 2023** | | | |
| **Reciprocating engines** | **Gas-fired** | **Distillate oil-fired** | **Landfill/digester gas** |
| Reciprocating engine | 2.5 g/bk hp-hr | 8.0 g/bk hp-hr | 2.5 g/bk hp-hr |
| **Emissions limitations from June 1, 2023 and after** | | | |
| **Reciprocating engines** | **Gas-fired** | **Distillate oil-fired** | **Landfill/digester gas** |
| Rich burn reciprocating engine | 1.5 g/bk hp-hr | 1.5 g/bk hp-hr | 2.0 g/bk hp-hr |
| Lean burn reciprocating engine | 1.5 g/bk hp-hr | 2.3 g/bk hp-hr | 2.0 g/bk hp-hr |

**Optional 3(e):** Exclude RICE from this strategy and let them be covered by Federal NSPS.

(f) Additional fuel burning devices not identified in the sections above shall be subject to the following emissions limits:

|  |
| --- |
| **Other emissions limitations** |
| For a fuel-burning emission unit of the types identified in the above tables but fired by a fuel other than those fuels identified in the above tables:   * 0.3 lb/MMBtu from June 1, 2018 through May 31, 2023; * 0.1 lb/MMBtu from June 1, 2023 and after. |
| For an emission unit of a unit type not identified in the above tables that combusts fuel for heating materials including air: 180 ppmvd, corrected to 12% CO2. |

Note: Compliance averaging time (other than seasonal limits) is a daily block average for an emission unit that monitors NOx emissions using CEMS; compliance based on average of three one-hour emission tests if emission unit does not monitor NOx emissions using CEMS.

## 5. Tune-up Requirements

(a) The owner/operator of an ICI boiler or a reciprocating engine subject to this strategy shall conduct an inspection and tune-up of the device at least one per calendar year, beginning with the year 2018. Each subsequent annual tune-up shall occur no sooner than 180 days after the previous tune-up. The inspection and tune-up of the device shall be conducted according to the manufacturer’s recommended procedures, or, if the manufacturer’s recommendations are not available, according to best available practices.

(b) The owner/operator of a device that is subject to 40 CFR 60 or 40 CFR 63 and required to conduct a periodic tune-up by the applicable requirements of 40 CFR 60 or 40 CFR 63 may conduct tune-ups according to the schedule and procedures of the applicable requirements of 40 CFR 60 or 40 CFR 63. If the period between tune-ups in the applicable requirements of 40 CFR 60 or 40 CFR63 is greater than 60 months, a tune-up shall be conducted at least once every 60 months.

## 6. Record Keeping and Reporting

(a) Record-Keeping Requirements. The owner of the device(s) shall maintain the following records on the property where the device is installed, or at such other readily accessible location that the air agency approves in writing:

(1) The owner shall determine the maximum potential daily NOx emissions for the device(s) using the methodology in (4) below. If the potential daily NOx emissions are equal to or greater than 137 lb/day, then the owner shall maintain records pursuant to (2) through (6) below.

(2) During the ozone season, an owner shall maintain records sufficient to determine the NOx emissions (lbs) per day.

(3) A calculation of NOx emissions, to be performed no later than the last day of the month, for each day of operation during the preceding month.

(4) The method used to calculate daily NOx emissions and the information used to determine the NOx emission rate, chosen from the following options:

(i) A continuous emissions monitoring system (CEMS) installed, operated, and certified in accordance with a permit, order, or regulation (or a CEMS installed voluntarily and operated and certified as approved by the air agency);

(ii) Stack testing performed in accordance with protocols approved in writing by the air agency in advance of the testing;

(iii) Manufacturer emission rate data, provided the data were derived from EPA-approved testing of the equipment performed by or for the manufacturer;

(iv) EPA’s Compilation of Air Pollutant Emission Factors (AP-42), WebFIRE database, AIRS Facility Subsystem Emission Factors, Air Emissions Inventory Improvement Program (EIIP); or

(v) Other method(s) as approved by the air agency

(5) The date and work performed for repairs, replacement of parts, and other maintenance.

(6) For each tune-up, the date on which the tune-up is performed; the name, title, and affiliation of the person(s) performing the tune-up; and a description of the work performed.

**(b) Reporting Requirements**. If a device exceeds the daily NOx mass threshold, the owner/operator shall submit a notification to the air agency. Such notification shall be submitted no later than 60 days after the daily NOx mass threshold was exceeded and shall include:

(1) The legal name(s), address(es) and telephone number(s) of the device owner/operator.

(2) Location address where the device is located.

(3) Make and model of the device.

(4) Each fuel type combusted in the device.

(5) NOx emissions data for the subject device, including emission rates or emission factors, if available, or the manufacturer’s estimate of emissions.

(6) If the device is operated pursuant to a Federal or air agency permit, the type of permit and the permit number.

(7) The longitude and latitude, or the Universal Transverse Mercator (UTM) coordinates and UTM zone of the device.

(8) The date on which the NOx emissions exceeded the threshold.

(9) A statement that the device will be operated pursuant to the applicable requirements of Section 3.

(10) A signed certification from the owner/operator or authorized representative stating that the submitted information is true, accurate, and complete to the best knowledge and belief.

# Attachment B: Rule-Based Strategy to Reduce NOx from Non-Emergency Generators Powered by Reciprocating Engines

The purpose of this rule-based strategy is to further reduce NOx from non-emergency generators powered by reciprocating engines. As with Attachment A, the outline below attempts to mimic rule language, but it is not specifically intended as formal rule language.

## 1. Applicability

Any new or existing stationary non-emergency generator (where “emergency” is defined in each agency’s rules and “emergency generators” are permitted accordingly (under a general state permit, etc.)) with a standby power rating greater than or equal to 10 kW

## 2. Definitions

“Existing” means a generator that is not new. An existing generator shall not be considered new if it is relocated and reinstalled on the same property, nor if it is reclassified from an emergency generator.

“Generator” means an internal combustion engine, except for a combustion turbine, and associated equipment that converts primary fuel into electricity, or electricity and thermal energy.

“Standby Power Rating” means the amount of power the generator is capable of supplying during a power need for the duration of the power need event, as specified by the manufacturer.

## 3. Emissions Limitations

(a) Non-emergency generators powered by reciprocating engines shall be subject to the following emissions limits:

|  |
| --- |
| **Installed before June 1, 2018:** |
| 4.0 lb/MWh (1.3 g/bk hp-hr) |
| **Installed on or after June 1, 2018:** |
| 0.6 lb/MWh (0.2 g/bk hp-hr) |

## 4. Record Keeping and Reporting

(a) Record-Keeping Requirements. The owner of the generator(s) shall maintain the following records on the property where the generator is installed, or at such other readily accessible location that the State approves in writing:

(1) An owner shall monitor the daily, monthly and yearly amounts of fuel, or fuels, consumed by their generator(s). Yearly fuel consumption shall be calculated and recorded each calendar month by recording (for each fuel) the current calendar month’s fuel consumption and adding it to those of the previous eleven consecutive months.

(2) A non-resettable hour meter, or other means, shall be used by an owner to continuously monitor the monthly and yearly operating hours for each of their generators. Yearly operating hours shall be calculated and recorded each calendar month by recording the current calendar month’s operating hours and adding them to those of the previous eleven consecutive months.

(3) Daily, monthly and yearly operating hours for each generator. Yearly operating hours during which testing or maintenance occurred shall be calculated and recorded each calendar month by recording the current calendar month’s testing or maintenance hours and adding them to those of the previous eleven consecutive months. A brief description of each testing or maintenance performed shall also be recorded.

## 5. Registration

(a) The owner/operator of a non-emergency generator powered by a reciprocating engine shall submit to the air agency the following information, prior to the installation of any new generator, or prior to XXXX (3 months after effective date) for any existing generator:

(1) The generator owner/operator’s name, address, and telephone number;

(2) The physical address where the generator is installed, or will be installed;

(3) The latitude and longitude, or the Universal Transverse Mercator (UTM) coordinates and UTM zone of the generator;

(4) A description of the generator, including the make, model, and serial number of both the engine and the generator set;

(5) The generator’s year of manufacture;

(6) The standby power rating or the prime power rating (or both, if known) of the generator; and

(7) The date of installation for existing generators or the expected date of installation for new generators.

# Attachment C: Voluntary Outreach-Based Strategy

**Template wording to introduce the concept of High Electric Demand Days and energy-related suggestions for improving air quality during periods of forecasted high electric demand and/or high ozone:**

High electric demand days (HEDDs) occur when there is a significantly higher than usual demand for electricity requiring more electric generating units (abbreviated as EGUs, and more commonly known as power plants) that must run. HEDDs often occur during the summer months when hot, humid weather leads to increased use of air conditioners. This can have particular implications for air quality because these same hot summer days can be the most conducive to the formation of ground-level ozone. Ground-level ozone, or smog as it is commonly known, can cause respiratory illness or trigger existing respiratory conditions such as asthma.

The increased demand for electricity during HEDDs means that EGUs must work harder to meet the need. This also has implications for air quality because fossil fuel-fired EGUs emit nitrogen oxides and other pollutants that contribute to ozone formation. In general, “Base load” EGUs are those EGUs that run almost continuously to meet typical everyday electricity needs. Because base load EGUs run so frequently, they are often equipped with stringent pollution controls to meet federal and state requirements. However, during HEDDs, not only must the base load EGUs increase their operation, but electric utilities may have to dispatch additional EGUs to meet the demand. Since these additional EGUs are not operated as frequently, they are sometimes not equipped with the same stringent pollution controls as the base load EGUs.

It should be noted that high electricity demand does not always coincide with hot weather and ozone formation. But often, the combination of heat and the need for higher than usual EGU operation – including the dispatch of EGUs with less stringent pollution controls – can lead to increased ground-level ozone. However, there are steps that you can take to reduce the demand for electricity and help maintain and improve air quality. Following these steps is important at all times during the year to reduce energy consumption and pollution, but they become even more important when high electric demand and hot weather is expected and/or when air quality is forecasted to be “Unhealthy for Sensitive Individuals” or higher.

## General Public

* Remember to turn off lights, computers, and electric appliances when not in use
* Set air conditioners to the highest comfortable temperature (try 78 oF)
* Use ceiling fans to increase cooling efficiency
* Participate in your local utility’s energy conservation program
* Run dishwashers and washer/dryers only when full; line-dry clothing when possible
* Unplug phone chargers and other electronic devices when not in use
* Use ceiling fans or portable fans in place of air conditioning when possible
* Close curtains and drapes to keep out unwanted heat
* Use programmable thermostats or timers to avoid running air conditioners during times when no one is home

## Facility Owners

* If possible, do not operate fire pumps or other fossil fuel-fired equipment for purposes of maintenance or readiness testing when air quality is forecasted to be “Unhealthy for Sensitive Individuals” or higher
* Set HVAC systems to the highest comfortable temperature
* Remember to turn off lights, computers, printers, and other equipment when not in use
* Close window shades to keep out unwanted heat

# Attachment D: Actions by Commissioners

Option 1: Statement, to be generally worded as shown below

**Statement of Recommended Strategies to Control Emissions of Oxides of Nitrogen from Stationary Fuel Combustion Devices**

The Ozone Transport Commission (OTC) is a multi-state organization created under the Clean Air Act (CAA) to ensure the development of practical and cost-effective strategies or measures, based on sound science, which are aimed at addressing the environmental and health problems associated with ground-level ozone that negatively impacts the Northeast and Mid-Atlantic Regions.

Ozone is a significant health threat, and oxides of nitrogen (NOx) are a precursor to the formation of ground-level ozone. Ozone is known to cause respiratory illnesses, exacerbate or trigger asthma-related episodes, increase respiratory-related emergency room and hospital admissions, and compromise immune systems leading to increased incidence of other respiratory illnesses, including pneumonia and bronchitis. Ozone is also known to cause premature death, while NOx causes its own adverse respiratory issues.

The United States Environmental Protection Agency adopted a new ozone National Ambient Air Quality Standard (NAAQS) of 0.070 parts per million on October 1, 2015 which must be attained by October 2020 for marginal nonattainment areas, October 2023 for moderate nonattainment areas, and October 2026 for serious nonattainment areas. The OTC member states have already taken aggressive steps to reduce ozone air pollution within the Ozone Transport Region, but recognize that additional emissions reductions will be needed to facilitate attainment of the 2015 ozone NAAQS.

Analyses documented in the November 10, 2016 final draft OTC white paper “Examining the Air Quality Effects of Small EGUs, Behind the Meter Generators, and Peaking Units during High Electric Demand Days” have shown that electric generating units (EGUs) can contribute to NOx emissions and ozone concentrations during periods of high electric demand and/or elevated ground-level ozone and that the potential exists for further NOx emissions reductions from these units. Further, analyses documented in the April 13, 2016 final draft OTC white paper “An Analysis of Emissions from Industrial and Commercial/Institutional Boilers Using the Emissions Modeling Framework – Version 2” have shown that, although the magnitude of NOx emissions from industrial/commercial/institutional boilers has been decreasing, the percent contribution relative to other sectors has been increasing as emissions from other sectors (e.g. mobile sources) become more heavily controlled.

Therefore, the OTC member states strongly believe that the possibility exists for further control of NOx emissions from stationary fuel combustion devices and that meaningful NOx emissions reductions can be achieved. Such reductions will result in decreased levels of ground-level ozone, which will, in turn, help facilitate attainment with the 2015 ozone NAAQS and achieve significant environmental and health benefits. To this end, Attachments A and B of the OTC work product “Strategies to Reduce Nitrogen Oxides Emissions on High Electric Demand Days” have been drafted for States to consider in developing rules or other regulatory mechanisms to reduce or further reduce NOx from stationary fuel combustion devices at sources that are not Major for NOx and from non-emergency generators powered by reciprocating engines.

Further, the OTC states believe that there is benefit to raising public awareness of the phenomenon of high electric demand days (HEDDs) and that there are voluntary steps that the general public, including facility owners and operators, can take to improve air quality during these periods. Attachment C of the OTC work product “Strategies to Reduce Nitrogen Oxides Emissions on High Electric Demand Days” has been drafted for States to consider in developing outreach material to raise public awareness of the phenomenon of HEDD.

Option 2: Resolution, to be generally worded as shown below

**RESOLUTION OF THE OZONE TRANSPORT COMMISSION CONCERNING ADOPTION OF RULES TO CONTROL EMISSIONS OF OXIDES OF NITROGEN FROM STATIONARY FUEL COMBUSTION DEVICES TO ACHIEVE AND MAINTAIN THE OZONE NATIONAL AMBIENT AIR QUALITY STANDARD**

**WHEREAS,** the Ozone Transport Commission (OTC), a multi-state organization created under the Clean Air Act (CAA), was established to ensure the development of practical and cost-effective strategies or measures, based on sound science, aimed to address the environmental and health problems associated with ground-level ozone that negatively impacts the Northeast and Mid-Atlantic Regions; and

**WHEREAS,** ozone is a significant health threat and oxides of nitrogen (NOx) are a precursor to the formation of ground-level ozone. Ozone is known to cause respiratory illnesses, exacerbate or trigger asthma-related episodes, increase respiratory-related emergency room and hospital admissions, and compromise immune systems leading to increased incidence of other respiratory illnesses, including pneumonia and bronchitis, and to cause premature death, while NOx causes its own adverse respiratory issues; and

**WHEREAS,** the OTC strives to apply a consistent regulatory framework and consistent emission control levels throughout the region in the interest of the public, stakeholders, and regulated parties; and

**WHEREAS,** the United States Environmental Protection Agency adopted a new ozone National Ambient Air Quality Standard (NAAQS) of 0.070 parts per million on October 1, 2015 which must be attained by October 2020 for marginal nonattainment areas, October 2023 for moderate nonattainment areas, and October 2026 for serious nonattainment areas; and

**WHEREAS,** the OTC member states have already taken aggressive steps to reduce ozone air pollution within the Ozone Transport Region, but recognize that additional emissions reductions will be needed to facilitate attainment of the 2015 ozone NAAQS; and

**WHEREAS,** analyses documented in the November 10, 2016 final draft OTC white paper “Examining the Air Quality Effects of Small EGUs, Behind the Meter Generators, and Peaking Units during High Electric Demand Days” have shown that electric generating units (EGUs) can contribute to NOx emissions and ozone concentrations during periods of high electric demand and/or elevated ground-level ozone and that the potential exists for further NOx emissions reductions from these units; and

**WHEREAS,** analyses documented in the April 13, 2016 final draft OTC white paper “An Analysis of Emissions from Industrial and Commercial/Institutional Boilers Using the Emissions Modeling Framework – Version 2” have shown that, although the magnitude of NOx emissions from industrial/commercial/institutional boilers has been decreasing, the percent contribution relative to other sectors has been increasing as emissions from other sectors (e.g. mobile sources) become more heavily controlled; and

**THEREFORE, BE IT RESOLVED** that the undersigned member states will work with interested stakeholders and pursue state-specific rulemakings, as necessary and appropriate, to reduce or further reduce ozone precursor emissions from stationary fuel combustion devices at sources that are not Major for NOx and from non-emergency generators powered by reciprocating engines. Attachments A and B of the OTC work product “Strategies to Reduce Nitrogen Oxides Emissions on High Electric Demand Days” have been drafted for States to consider as they pursue their respective rulemakings.

**Be it further resolved** that the undersigned states will work with interested stakeholders and pursue voluntary outreach measures, as appropriate, to raise public awareness of the phenomenon of high electric demand days and the steps that can be taken to improve air quality during these periods. Attachment C of the OTC work product “Strategies to Reduce Nitrogen Oxides Emissions on High Electric Demand Days” has been drafted for States to consider as they pursue voluntary outreach measures.

Option 3: MOU, to be generally worded as shown below

**MEMORANDUM OF UNDERSTANDING**

**AMONG THE STATES OF THE OZONE TRANSPORT COMMISSION ON ADOPTION OF RULES TO CONTROL EMISSIONS OF OXIDES OF NITROGEN FROM STATIONARY FUEL COMBUSTION DEVICES TO ACHIEVE AND MAINTAIN THE OZONE NATIONAL AMBIENT AIR QUALITY STANDARD**

**WHEREAS,** the Ozone Transport Commission (OTC), a multi-state organization created under the Clean Air Act (CAA), was established to ensure the development of practical and cost-effective strategies or measures, based on sound science, aimed to address the environmental and health problems associated with ground-level ozone that negatively impacts the Northeast and Mid-Atlantic Regions; and

**WHEREAS,** ozone is a significant health threat and oxides of nitrogen (NOx) are a precursor to the formation of ground-level ozone. Ozone is known to cause respiratory illnesses, exacerbate or trigger asthma-related episodes, increase respiratory-related emergency room and hospital admissions, and compromise immune systems leading to increased incidence of other respiratory illnesses, including pneumonia and bronchitis, and to cause premature death, while NOx causes its own adverse respiratory issues; and

**WHEREAS,** the OTC strives to apply a consistent regulatory framework and consistent emission control levels throughout the region in the interest of the public, stakeholders, and regulated parties; and

**WHEREAS,** the United States Environmental Protection Agency adopted a new ozone National Ambient Air Quality Standard (NAAQS) of 0.070 parts per million on October 1, 2015 which must be attained by October 2020 for marginal nonattainment areas, October 2023 for moderate nonattainment areas, and October 2026 for serious nonattainment areas; and

**WHEREAS,** the OTC member states have already taken aggressive steps to reduce ozone air pollution within the Ozone Transport Region, but recognize that additional emissions reductions will be needed to facilitate attainment of the 2015 ozone NAAQS; and

**WHEREAS,** analyses documented in the November 10, 2016 final draft OTC white paper “Examining the Air Quality Effects of Small EGUs, Behind the Meter Generators, and Peaking Units during High Electric Demand Days” have shown that electric generating units (EGUs) can contribute to NOx emissions and ozone concentrations during periods of high electric demand and/or elevated ground-level ozone and that the potential exists for further NOx emissions reductions from these units; and

**WHEREAS,** analyses documented in the April 13, 2016 final draft OTC white paper “An Analysis of Emissions from Industrial and Commercial/Institutional Boilers Using the Emissions Modeling Framework – Version 2” have shown that, although the magnitude of NOx emissions from industrial/commercial/institutional boilers has been decreasing, the percent contribution relative to other sectors has been increasing as emissions from other sectors (e.g. mobile sources) become more heavily controlled; and

**THEREFORE,** the undersigned member states commit to work with interested stakeholders and pursue state-specific rulemakings, as necessary and appropriate, to reduce or further reduce ozone precursor emissions from stationary fuel combustion devices at sources that are not Major for NOx and from non-emergency generators powered by reciprocating engines. Attachments A and B of the OTC work product “Strategies to Reduce Nitrogen Oxides Emissions on High Electric Demand Days” have been drafted for States to consider as they pursue their respective rulemakings.

**FURTHERMORE,** that the undersigned states will commit to work with interested stakeholders and pursue voluntary outreach measures, as appropriate, to raise public awareness of the phenomenon of high electric demand days and the steps that can be taken to improve air quality during these periods. Attachment C of the OTC work product “Strategies to Reduce Nitrogen Oxides Emissions on High Electric Demand Days” has been developed for States to consider as they pursue voluntary outreach measures.

1. NJ Admin Code Title 7, Chapter 27, Subchapter 19 - “Control and Prohibition of Air Pollution from Oxides of Nitrogen”, <http://www.state.nj.us/dep/aqm/Sub19.pdf> [↑](#footnote-ref-1)
2. <http://www.pjm.com/markets-and-operations/energy/real-time/7-day-load-forecast.aspx> [↑](#footnote-ref-2)
3. HEDDS do occur in the New England Power Pool (NEPOOL) on the coldest days of winter if gas availability is limited. Ozone formation is not a concern on those low temperature HEDDs. [↑](#footnote-ref-3)
4. NH RACT Rule: Chapter Env-A 1300 “Nitrogen Oxides (NOx) Reasonably Available Control Technology (RACT)” <http://des.nh.gov/organization/commissioner/legal/rules/documents/env-a1300.pdf> [↑](#footnote-ref-4)
5. OTC Whitepaper: “Examining the Air Quality Effects of Small EGUs, Behind the Meter Generators, and Peaking Units during High Electric Demand Days” Section 3 and Appendix A <http://www.otcair.org/upload/Documents/Reports/HEDD_Workgroup_White_Paper_Final_2016-11-10.pdf> [↑](#footnote-ref-5)
6. Ibid 4 [↑](#footnote-ref-6)
7. “Air Quality, Electricity, and Back-up Stationary Diesel Engines in the Northeast”, revised January 2, 2014, <http://www.nescaum.org/activities/major-reports> [↑](#footnote-ref-7)
8. 7 DE Admin Code 1144 [↑](#footnote-ref-8)
9. “Output-Based Regulations: A Handbook for Air Regulators” August 2014, updated from the 2004 draft; <https://www.epa.gov/sites/production/files/2015-07/documents/output-based_regulations_a_handbook_for_air_regulators.pdf>, [↑](#footnote-ref-9)
10. 40 CFR Part 60, <https://www.gpo.gov/fdsys/pkg/CFR-2011-title40-vol6/xml/CFR-2011-title40-vol6-part60.xml#seqnum60.4300> [↑](#footnote-ref-10)