# Reasonably Available Control Technology (RACT) for Oxides of Nitrogen (NOx) Determination for the 2015 8-Hour Ozone National Ambient Air Quality Standards (NAAQS)

## Proposed State Implementation Plan (SIP) Revision

**March 23, 2021**

DEPARTMENT OF ENERGY & ENVIRONMENT
GOVERNMENT OF THE DISTRICT OF COLUMBIA

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## Table of Contents

## List of Tables

## List of Figures

# 1.0 Background

The District Department of Energy and Environment (DOEE or the Department) is proposing a revision to the District of Columbia's State Implementation Plan (SIP) under the federal Clean Air Act (CAA), as amended in 1990. This SIP revision addresses the federal requirements for ozone and nitrogen oxide (NOx) for areas located in the Ozone Transport Region (OTR) and for marginal nonattainment areas, and provides analysis to demonstrate that the District has met its Reasonably Available Control Technology obligations under the CAA for the 2015 ozone national ambient air quality standards (NAAQS) and the nonattainment designations for the 2015 ozone NAAQS.[1]

The CAA, which was last amended in 1990, requires the U.S. Environmental Protection Agency (EPA) to set NAAQS (40 C.F.R. part 50) for pollutants considered harmful to public health and the environment. On October 26, 2015, the EPA promulgated revised 8-hour primary and secondary ozone NAAQS. 80 Fed. Reg. 65292 (October 26, 2015).

States with areas designated as nonattainment for the revised 2015 ozone NAAQS and states located in the Ozone Transport Region (OTR) are required revise their relevant SIPs to ensure that the SIP complies with updated statutory and regulatory requirements. These SIP Revisions must be submitted to EPA for review and approval. 42 U.S.C. § 7502(b).

The District was classified as marginal attainment for the 2015 ozone NAAQS. Because of this designation and because the District is located within the OTR, the District must submit a revised SIP for EPA approval. 83 Fed. Reg. 25776, 25795 (June 4, 2018). In revising the SIP, the District must review its regulations and determine if the District has implemented all Reasonably Available Control Technology (RACT) requirements on all major stationary sources of precursor pollutants of ozone—volatile organic compounds (VOCs) and oxides of nitrogen (NOx) (40 C.F.R. Part 51, Subpart X) for NAAQS. This SIP Revision covers the RACT standards for NOx under the 2015 8-hour ozone NAAQS; separate evaluation will address RACT with respect to VOCs

EPA has defined RACT as "the lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility… In evaluating economic feasibility for RACT determinations, the EPA gives

1 History of the District's Previous SIP Revisions based on revised NAAQS: Under the CAA amendments of 1990, the District was classified as a serious nonattainment area for the 1979 1-hour ozone NAAQS; the District submitted to the EPA certification of RACT provisions under the 1979 1-hour ozone NAAQS and this certification was adopted into the District's SIP effective December 26, 2000 (65 Fed. Reg. 81369).

The District was classified as a moderate nonattainment area for the 1997 8-hour ozone NAAQS; the District submitted its certification of RACT provisions under the 1997 8-hour ozone NAAQS and this certification was adopted into the District's SIP effective July 16, 2009 (74 Fed. Reg. 28447, June 16, 2009)

The District was classified as a marginal nonattainment area for the 2008 8-hour ozone NAAQS. The District submitted its certification of RACT provisions under the 2008 8-hour ozone NAAQS and this certification was adopted into the District's SIP effective November 12, 2019 (85 Fed. Reg. 10295, February 24, 2020).

significant weight to economic efficiency and relative cost effectiveness." 83 Fed. Reg. 62998, 63007, FN 16 (December 6, 2018).

DOEE's RACT analysis included with this SIP Revision supports the District's RACT determination for the 2015 8-hour ozone NAAQS. It concludes with a certification that proposed RACT controls now represent RACT for the 2015 ozone NAAQS, except with respect to District of Columbia Water and Sewer Authority (DC Water) – Blue Plains Wastewater Treatment Plant. This exception is addressed in Section 2.2.4 under the subsection for Other Sources.

## 1.1 RACT Requirements

To help determine RACT, EPA developed control techniques guidelines (CTGs) and alternative control techniques (ACT) documents. While CTGs from the 1970s through the 1990s are still used to presumptively limit RACT for VOC sources, there are no CTG-like presumptive RACT limits for NOx sources. ACTs were developed for VOCs and NOx in the late 1980s and 1990s, and describe available control technologies and their respective cost-effectiveness. ACTs provide historical background on controls but do not identify RACT. Additionally, since RACT can change over time, states must consider newly available information to supplement ACT documents and when establishing NOx RACT requirements.

In addition to the evaluation of economic feasibility for RACT Determinations, DOEE also considers current ozone levels in its evaluation of RACT. The District is required under its marginal ozone classification to achieve levels at or below 0.070 parts per million (ppm) by August 3, 2021. Using the 2017-2019 design value, ozone levels at the lead monitor in the District (McMillan Reservoir) are 0.071 ppm and at the lead monitor in the Washington, DC-MD-VA nonattainment area (Beltsville, MD) are 0.072 ppm, so decisions concerning RACT standards must be made in light of these levels.

States implementing the 2015 8-hour ozone standard must assure their RACT determination is met either with a RACT regulation, or a certification (with supporting information) that previously required RACT controls represent RACT for 8-hour implementation purposes.[2]

In the 2008 ozone NAAQS Implementation Rule, EPA states that, "in some cases, a new RACT determination under the 2008 standard would result in the same or similar control technology as the initial RACT determination under the 1-hour or 1997 standard because the fundamental control techniques, as described in the CTGs and ACTs, are still applicable. In cases where controls were applied due to the 1-hour or 1997 NAAQS ozone RACT requirement, we expect that any incremental emissions reductions from application of a second round of controls would be small and, therefore, the cost for advancing that small additional increment of reduction would not be reasonable" (80 Fed. Reg. 12279). In the 2015 ozone NAAQS Implementation Rule, EPA states that it is "retaining existing general

[2] In the case of VOCs, states may also certify their RACT determination with a negative declaration that there are no sources in the nonattainment area covered by a specific CTG category that would require RACT.

RACT requirements for purposes of the 2015 ozone NAAQS," which implies that the previous statement still holds (83 Fed. Reg. 63007).

The District was designated as a marginal nonattainment area for the 2015 ozone NAAQS. According to CAA Section 182(a)(2)(A), states in marginal nonattainment of a NAAQS must submit a "RACT fix-up," which is "a revision that includes such provisions to correct requirements in (or add requirements to) the plan concerning [RACT] as were required [prior to November 15, 1990]."

Additionally, the District is a member of the Ozone Transport Region (OTR)[3], and therefore CAA Section 184 is applicable; it requires states in the OTR to implement more stringent moderate area RACT at a minimum for major sources of NOx.[4]

## 1.2 Major Source Thresholds

Concerning major source thresholds, several factors must be considered. The District was classified as marginal nonattainment for 2015 ozone NAAQS RACT. The OTR requires major source thresholds of 50 tpy for VOCs and 100 tpy for NOx.[5] Finally, the District had been severe-15 nonattainment under the one-hour ozone NAAQS, for which a 25 tpy for NOx major source threshold is required. Therefore, all facilities that have the potential to emit 25 tpy NOx must be regulated under the District's NOx RACT Rule unless a case-by-case RACT determination is completed.

[3] States in the OTR include Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and the Consolidated Metropolitan Statistical Area that includes the District of Columbia.

[4] CAA Section 184 requires states in the OTR to implement more stringent RACT on any stationary source that has the potential to emit (PTE) at least fifty tons per year (tpy) of VOC, which shall be considered a major stationary source and subject to the requirements applicable to major stationary sources in Moderate nonattainment areas (CAA § 184(b)(2)). (*The requirements for major stationary sources of VOCs also apply to major sources of NOx (CAA § 182(f)), where a "major stationary source" directly emits or has the potential to emit one hundred tons per year or more of any pollutant.*)

[5] **Per Appendix I guidance:** "For purposes of meeting the 8-hour RACT requirement, the State's RACT analysis only needs to include an evaluation of RACT for CTG sources and for non-CTG major sources based on the area's 8-hour classification. We note, however, that under the anti-backsliding requirements, the State may not remove RACT requirements for sources that were subject to RACT for the 1-hour standard (but that would not be subject to RACT based on the area's 8-hour classification). Similarly, if the State has never met the RACT requirement for one or more sources for the 1-hour standard, the anti-backsliding requirements require the State to meet that obligation. The anti-backsliding provisions can be found at 40 C.F.R. § 51.905 and apply to all former 1-hour non-attainment areas."

## 2.0 Existing NOx RACT in the District

In January 1994, the District submitted its first "Reasonably Available Control Technology for Major Stationary Sources of the Oxides of Nitrogen" (NOx RACT) rulemaking (20 DCMR § 805) to EPA as a SIP revision for the 1-hour ozone NAAQS. Since the District was a serious nonattainment area at the time, RACT was applicable for sources that emitted or had a PTE of 50 tpy or more of NOx. Section 805 contained presumptive emissions limits for certain source categories: stationary combustion turbines (§ 805.4), fossil fuel-fired steam generating units (§ 805.5), and asphalt concrete plants (§ 805.6). Through "generic RACT" provisions, major sources not otherwise covered by presumptive limits were required to identify source-specific RACT-level controls by a specified date that would later go through the SIP process. The District received no source-specific RACT determinations. In December 1998, the District submitted a "negative declaration" to EPA, stating that all major sources of NOx were covered by presumptive limits in §§ 805.4, 805.5, and 805.6. Minor revisions to the NOx RACT rule were submitted to EPA in 2000, and the regulation was first approved as a SIP revision on December 26, 2000 (65 Fed. Reg. 81369).

The region failed to meet the attainment date of November 15, 1999, so the District was reclassified from serious to severe nonattainment for the 1-hour standard. The major source thresholds dropped to a PTE of 25 tpy for both VOC and NOx. In 2004, the District submitted SIP revisions to meet the more stringent major source definitions and new source offset ratio requirements for severe areas. EPA approved the revised thresholds on December 28, 2004 (69 Fed. Reg. 77647).

Later the District submitted to EPA, and EPA approved, a SIP amendment with revisions to the District's NOx RACT rule in response to requirements under the 2008 ozone NAAQS (85 Fed. Reg. 10295).

**Table 1: Proposed NOx RACT Regulation Updates in the District**

| **Source Category** | | **20 DCMR Section*** | **Previous EPA Approval(s)** |
|---|---|---|---|
| Fuel-burning equipment with input capacity… ** | Equal to or greater than 5, but less than 20, MMBtu/hr | 805.5 | n/a |
| | Equal to or greater than 20, but less than 50, MMBtu/hr | 805.5 | 12/28/2004 (69 Fed. Reg. 77645 & 69 Fed. Reg. 77647) |
| | Equal to or greater than 50, but less than 100, MMBtu/hr | 805.5, specifically (e) | |
| | 100 MMBtu/hr or greater | 805.5, specifically (d) | |
| Asphaltic concrete plants with a PTE of 25 tpy or greater | | 805.6 | |
| Other fuel burning equipment with a PTE of 25 tpy or greater | | 805.8 | |
| Combustion turbine with an input capacity of greater than 50 MMBtu/hr | | 805.4 | 2/24/2020 (85 Fed. Reg. 10295) |
| Stationary Engines (non-emergency) | | 805.7 | n/a |

* All listed categories are also covered for specific requirements (e.g., reporting) under §§ 805.1, 805.3, and 805.9 through 805.11

** The term used in § 805.5 is being updated from fossil-fuel steam generating units to fuel burning equipment so as to encompass more units, in particular water heaters

## 2.1 Major Non-CTG Sources of NOx

There are no CTGs for NOx, so the DOEE concludes that major sources of NOx are non-CTG sources.

There are limited categories of major sources of NOx in the District. The District's electric generating units (EGUs) at the Pepco-Benning Road and Pepco-Buzzard Point facilities were shut down by the end of 2012. Large combustion turbines at the Pepco-Buzzard Point facility are no longer in operation. There are, however, combustion turbines (CTs) that are part of newer combined heat and power (CHP) units at four of the 14 major source facilities.

The District is aware of 14 major source facilities in the District that have a PTE of 100 tons per year (TPY) or more of NOx. Most of the large units at major sources for NOx are Industrial/Commercial/Institutional (ICI) boilers with substantial contributions to PTE at some facilities from significant numbers of emergency engines:

**Table 2: NOx Emissions Controls at 100+ TPY Major NOx Facilities in the District**

| Facility | NOx-Emitting Units (sizes) & Controls* | Fuel Type |
|---|---|---|
| American University (153.21 tpy NOx) | Four boilers (one 26.1, two 63.6, one 5.86 MMBtu/hr) w/low NOx burners | Natural gas (NG) & #2 oil |
| | 20 emergency generator sets | Diesel |
| Catholic University (105.63 tpy NOx) | Four boilers (20.92 MMBtu/hr) | NG & #2 oil backup for gas interruptions |
| | 26 emergency generator sets | Ultra-Low Sulfur Diesel (ULSD) |
| District of Columbia Water and Sewer Authority (DC Water) – Blue Plains Wastewater Treatment Plant | Three boilers (one 8.31, two 5.98 MMBtu/hr) | NG |
| | Auxiliary boiler (62.52 digester gas (DG)/61.79 NG MMBtu/hr) | NG & DG |
| | Three gas turbines (each 46.3 MMBtu/hr) | DG & NG |
| | Three duct burners (each 21 MMBtu/hr) | DG |
| | Two emergency flares (each 126 MMBtu/hr) | DG (NG pilot light) |
| | Siloxane Flare (6.14 MMBtu/hr) | DG (NG pilot light) |
| Fort Myer Plant #1 (156.91 tpy NOx) | Asphalt plant (200 ton per hour asphalt de-rated production rate) with 75 MMBtu/hr rotary kiln with baghouse (PM) | NG with #2 oil backup for gas interruptions |
| | Screener with 99.9 hp engine | ULSD |
| | Crusher with 275 hp engine | ULSD |
| Gallaudet University (108.24 tpy NOx) | Three boilers (49.8, 33.48, and 10.04 MMBtu/hr) | NG & #2 oil (was #4 until recent years); oil backup for gas interruptions |
| | 17 emergency generator sets powered by compression ignition engines | ULSD |
| | 2 emergency generator sets powered by spark ignition engines | NG |
| Georgetown University | Three boilers (two 127 MMBTU/hr with flue gas recirculation and one 120.6 MMBtu/hr) | NG & ULSD |
| | Approximately 28 compression ignition emergency engines | Diesel |
| | Four spark ignition emergency engines | NG |
| George Washington University** (473 tpy NOx) | 21 boilers with heat inputs greater than 5 MMBtu/hr (two 48.7, two 20.9, two 10.2, two 9.7, thirteen between 5.0 and 7.0 inclusive, MMBtu/hr) | NG & #2 oil (many of these are NG only) |

| Facility | NOx-Emitting Units (sizes) & Controls* | Fuel Type |
|---|---|---|
| | Combustion turbine (52.9 MMBtu/hr) with heat recovery steam generator (HRSG) equipped with duct burner (16.8 MMBtu/hr) | NG |
| | 52 emergency engines (51 for generators, one for a fire pump) | NG, Diesel (most are diesel; a few are NG or dual diesel/NG) |
| Howard University | Three boilers (~148 MMBtu/hr each), two w/low NOx burners | NG & #2 oil |
| | 29 emergency generator sets powered by compression ignition engines | Diesel |
| | 2 emergency generator sets powered by spark ignition engines | NG |
| Joint Base Anacostia-Bolling | Five boilers (three 30.25 NG/28.82 oil, two 8.0 MMBtu/hr, two 6.0 MMBtu/hr) | NG & #2 oil |
| | 43 compression ignition emergency engines | Diesel |
| Naval Research Lab (214.89 tpy NOx) | Three boilers (two 84.8, one 56.7 MMBtu/hr) | NG & #2 oil |
| | 27 compression ignition emergency engines (26 for generators, one for a fire pump) | Diesel |
| | 2 spark ignition emergency engines for generators | NG |
| U.S. Capitol Power Plant (CPP) | Seven boilers:<br>• One 203 MMBtu/hr NG and #2 oil<br>• Two 160 MMBtu/hr coal and 60 MMBtu/hr NG<br>• Four 60 MMBtu/hr NG and #2 oil | NG, #2 oil, & coal |
| | One 7.5 MW combustion turbine (heat input 78.4 MMBTU/hr on gas or 74.37 MMBTU/hr on #2 oil) with HRSG (71.9 MMBTU/hr on gas or 68.3 MMBTU/hr on #2 oil) | NG, #2 oil |
| | Two compression ignition emergency engines (one for a generator, one for a fire pump) | Diesel |
| U.S. General Services Administration (GSA), Central Heating and Refrigeration Plant (CHRP) | Five boilers (three 250, two 500 MMBtu/hr) w/low NOx burners or dry low-NOx burners*** | NG with #2 oil backup for gas interruptions |
| | One cogeneration system consisting of two turbine generators, a HRSG, and duct burners (326 MMBtu/hr inclusive, high heating value (HHV) basis; NG-fired low NOx duct burners make up 211 MMBtu/hr of this total number; each of the two turbine generators are 64.58 MMBtu/hr) | NG with #2 oil backup for gas interruptions |
| | Three compression ignition emergency engines for generators | ULSD |
| Washington Navy Yard | Three boilers<br>• Two 101 MMBtu/hr with low NOx burners and flue gas recirculation<br>• One 20.92 MMBtu/hr | NG & #2 oil |
| | Approximately 17 compression ignition emergency engines | Diesel |
| | One spark ignition emergency engine | NG |
| Washington Hospital Center (210.7 tpy NOx) | Six boilers (four 56.8, two 57.3 MMBtu/hr) | NG & #2 oil |
| | Eight compression ignition emergency engines (seven for generators, one for a fire pump) | Diesel or #2 oil |

* Does not include miscellaneous/insignificant activities or units that do not emit NOx.

** George Washington University has approximately 365 units of equipment that burn fuel with heat input ratings less than 5 MMBtu/hr, nearly all burning natural gas, but a few that can burn either natural gas or #2 fuel oil. These are individually insignificant, but in combination, contribute significantly to the facility's PTE.
*** U.S. General Services Administration has permits allowing temporary installation of lower-emitting boilers for periods of time when permanent boilers are offline for maintenance, etc. The information in this table reflects the highest-emitting configuration of the facility.

Only two facilities' NOx PTE is not dominated by boilers and/or emergency engines as follows:

1. Ft. Myer Plant #1 is an asphaltic concrete production plant subject to existing RACT requirements in 20 DCMR § 805.6.

2. District of Columbia Water and Sewer Authority (DC Water) – Blue Plains Wastewater Treatment Plant has NOx emissions dominated by their cogeneration facility, designed to run primarily on digester gas. The facility also has three flares and one auxiliary boiler that run on digester gas. These units are not covered by current NOx RACT standards as they are not "fossil-fuel-fired", and are therefore not being addressed in this submittal. However, they were all subject to lowest achievable emissions rate (LAER) controls based on a non-attainment new source review determination in 2011 (as revised in a 2018 permitting action that revised upward the LAER limit for the two emergency flares and that was adopted into the District's SIP (85 Fed. Reg. 10295)).

Most of the major source facilities have emergency engines associated with generators or fire pumps (some in large numbers). More discussion of emergency engines is in Section 2.2.4 in the subsection on stationary engines.

At this time, the District considers emissions from boilers at major stationary sources with heat input ratings less than 5 MMBtu/hr to be *de minimis* for NOx RACT purposes. In the State Implementation Plan (SIP), nearly all of them are inventoried as nonpoint sources instead of major point sources. The District believes that control of these small individual source units of *de minimis* emissions is not cost effective RACT as it relates to the 2015 NAAQS.

## 2.2 NOx RACT Analysis

Based on the evaluation of sources above, the District has determined that presumptive NOx RACT must be established for non-emergency stationary generators and must be updated for fossil-fuel burning equipment. The District has also found that existing presumptive NOx RACT for combustion turbines and asphaltic concrete operations continues to be what is reasonably available. The District also found that the existing case-by-case RACT for Blue Plains constitutes what is currently reasonably available. A review of the District's analysis in determining RACT for these sources follows.

### 2.2.1 Point Source Contribution

Point sources in the District have a relatively small influence on the region's nonattainment status. All point sources contributed less than ten percent of the District's NOx emissions in 2017, according to

the base year (BY) emissions inventory. Most NOx emissions are from mobile sources. Point sources in the District contributed 6.25% of the emissions within the District (See Figure 1). It should be noted that "point source" is a convention used in inventory analysis and, in the District's case, the point source inventory is nearly identical, though slightly more expansive, than the inventory of major stationary sources.

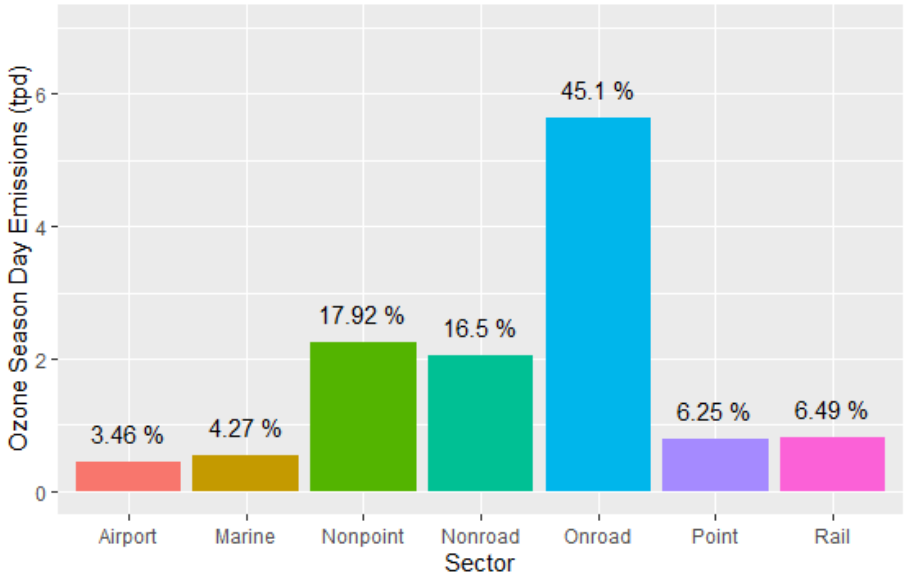


**Figure 1: 2017 Base Year Ozone Season Day NOx Emissions in the District (Source: 2017 Base Year Inventory, SIP-Final Submitted to EPA on November 4, 2020)**

In 2017, GSA produced nearly 20% of the NOx emissions from point sources, and 8 point sources produced nearly 90% of all the NOx emissions from point sources in the District (see Figure 2).

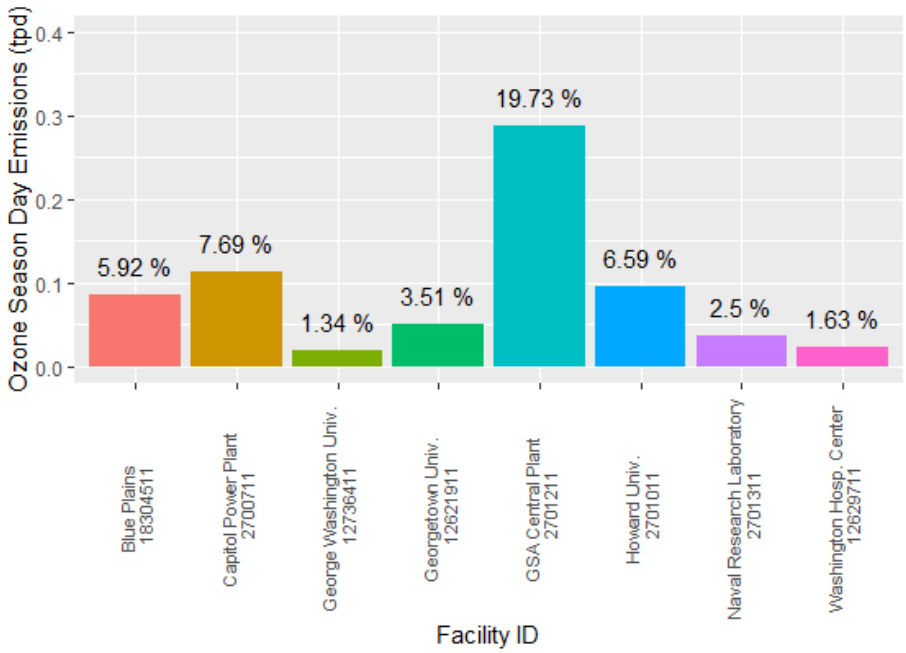


**Figure 2: 2017 Base Year Ozone Season Day Point Source NOx Emissions in the District for Facility that Produce More than One Percent of Emissions (Source: 2017 Base Year Inventory, Final Submitted to EPA on November 4, 2020)**

### 2.2.2 Existing Emissions Controls and Limits

Existing emissions controls and limits on NOx already minimize the impact of several major sources in the District. While these limits are not established as RACT, *per se*, they do impact the cost effectiveness and necessity of establishing further control requirements on the equipment for RACT purposes.

For example, emissions from the two most significant major sources are operationally restricted:

- GSA – Three of GSA's boilers were large enough to participate in the NOx SIP Call, EPA's initial cap and trade programs for NOx. To transition out of the NOx SIP Call, the District was required to adopt sunset provisions for non-EGUs that did not join the Clean Air Interstate Rule (CAIR) trading program, including GSA[6]. In 2015, the District imposed a strict NOx emissions cap of 25 tons per ozone season on GSA's three applicable units (20 DCMR Chapter 10). The cap was SIP-approved on February 22, 2016 (81 Fed. Reg. 8656). There are other large boilers at GSA that emit NOx primarily during the winter season. GSA also has a facility-wide annual cap of 268 TPY NOx contained in their Title V permit.
- CPP – On June 3, 2013, DOEE issued permits at CPP that established facility-wide emissions limits (also called Plantwide Applicability Limits, or PAL). The PAL lowered CPP emissions limits from the equivalent of 925 tpy for NOx to 197 tpy. The PAL was issued under a SIP-approved program which makes the limit federally enforceable. The permits issued at that time also allowed for the installation of a highly efficient natural gas-fired cogeneration system that will

[6] The District's EGUs were part of the NOx SIP Call and then CAIR. In 2012, they stopped operating. With the Cross-State Air Pollution Rule (CSAPR), which replaced CAIR, EPA determined that no sources in the District contribute significantly (at least 1%) to nonattainment in any other state. The District no longer participates in any of EPA's cap and trade programs for NOx.

reduce the facility's reliance on coal-burning units even further. This system is in the process of commissioning as of July 2018 and is covered by a NOx RACT regulation discussed further in 2.2.4. Additionally, effective January 24, 2016, a limit in one of the permits, issued pursuant to a SIP-approved permit program, went into effect establishing a facility-wide limit of 16,666 tons per 12-month rolling period of coal usage to avoid being a major source of HAPs. This limit has co-benefits of limiting NOx emissions from coal burning at the facility.

Multiple regulations that are included in the District's original SIP reduce emissions of NOx in addition to 20 DCMR § 805 as shown in Table 3: Additional District regulations that impact NOx emissions and have been adopted as SIP measures.

**Table 3: Additional District regulations that impact NOx emissions and have been adopted as SIP measures**

| Regulation | Requirement | EPA Approval Date (Fed. Reg. Citation) |
|---|---|---|
| 20 DCMR § 107 - Control Devices or Practices | Requires that, "the devices or practices provided for the control of air pollutants discharged from stationary sources…shall remain operative or effective, and shall not be removed." | 10/27/99 (64 Fed. Reg. 57777) |
| 20 DCMR § 801 - Sulfur Content of Fuel Oils | The rule is projected to achieve NOx reductions due the combustion of fuel oil of 22%. The typical emissions rates for number 6 fuel oil are 26 to 47 pounds of NOx per 1,000 gallons of fuel burned versus 10 to 24 pounds of NOx per 1,000 gallons of fuel burned for distillate oils.[7] | 5/1/17 (82 Fed. Reg. 20270) |

### 2.2.3 Attainment Status

The Washington DC-MD-VA nonattainment area is designated as a marginal nonattainment area for the 2015 8-hour ozone NAAQS. Based on EPA data for the period 2017 through 2019 for the Washington DC-MD-VA nonattainment area, the 2019 ozone design value (DV)[8] is 0.072 ppm. The DV for the District alone is also 0.071 ppm since the highest monitor in the nonattainment area is not in the District. Since the District is not monitoring attainment for the 2015 8-hour ozone NAAQS, the District finds it is reasonable and necessary to strengthen RACT and thus is placing new or stricter requirements to meet presumptive RACT for NOx for fuel burning equipment and stationary engines.

### 2.2.4 Potential for Additional NOx Controls

According to the Connecticut Department of Energy and Environmental Protection (CT DEEP) SIP, "EPA generally considers controls that have been achieved in practice by other existing sources in the same source category to be technologically and economically feasible" and thus these controls meet the requirements to be RACT.[9] The DOEE will show through a review of controls in place on existing sources what is reasonably available as presumptive RACT.

[7] Section 1.3 of EPA's AP 42, Fifth Edition Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, https://www3.epa.gov/ttn/chief/ap42/ch01/final/c01s03.pdf.

[8] A design value is a statistic that describes the air quality status of a given location relative to the level of the National Ambient Air Quality Standards (NAAQS) and is typically used to designate and classify nonattainment areas as well as to assess progress toward meeting the NAAQS.

[9] http://www.ct.gov/deep/lib/deep/air/ozone/ozoneplanningefforts/RACT_2008_NAAQS/2014-07-17_-_CT_Final_RACT_SIP_Revision.pdf

The DOEE evaluated each sector for which a source type is present in the District to determine what regulations have been adopted for that source type, in particular in OTR States, and whether any other agreements exist. The DOEE also relied on information from EPA's WebFIRE tool, which is designed to house the most up to date emissions control data available, to determine what additional controls may be available.[10] Furthermore, DOEE examined data in the RACT/BACT/LAER clearinghouse to determine if additional controls have been implemented that warrant further evaluation.

### *Combustion Turbines*

DOEE, on behalf of the District, certifies that emissions limits adopted for the 2008 ozone NAAQS constitute RACT for combustion turbines fired using natural gas as approved by EPA (85 Fed. Reg. 10295), with the exception of the emissions limits for combustion turbines fired by oil. The presumptive emissions limits to meet RACT for the 2008 and 2015 ozone NAAQS are in Table 4.

**Table 4: Presumptive RACT emissions limits (ppmvd @ 15% $O_2$ (lb/MMBtu)) for combustion turbines > 50 MMBtu/hour in the District of Columbia for the 2008 and 2015 Ozone NAAQS**

| Operation Date | Duct Burner Operation | Natural Gas | | Oil | |
|---|---|---|---|---|---|
| | | 2008 | 2015 | 2008 | 2015 |
| After February 18, 2005 | With Supplemental Duct Burning | 25 (0.092) | 25 (0.092) | 74 (0.279) | 42 (0.163) |
| On or before February 18, 2005 | Without Supplemental Duct Burning | 25 (0.092) | 25 (0.092) | 74 (0.279) | 42 (0.163) |
| | With Supplemental Duct Burning | 25 (0.092) | 25 (0.092) | 42 (0.163) | 42 (0.163) |

Table 5 shows the emissions limits in place for combustion turbines greater that 25MW in throughout the United States based on data compiled by OTC.[11]

**Table 5: Emissions limits (ppmvd @15% $O_2$) for combustion turbines > 25MW in states outside of California as of January 18, 2017**

| State | Geographic Area | Emissions Limits - Simple Cycle | | Emissions Limits - Combined Cycle | |
|---|---|---|---|---|---|
| | | Gas-fired | Oil-fired | Gas-fired | Oil-fired |
| **CT** | Statewide | 42 – 55<br>40 (2022) | 40 – 75<br>40 – 50 (2022) | 42<br>25 (2022) | 40 – 65<br>40 – 42 (2022) |
| **DE** | Statewide | 42 | 88 | 42 | 88 |
| **FL** | Broward, Dade Palm Beach Counties | 0.5 lb/MMBtu | 0.9 lb/MMBtu (258 ppmvd @15% $O_2$) | 0.5 lb/MMBtu | 0.9 lb/MMBtu (258 ppmvd @15% $O_2$) |
| **GA** | 45 county area | 6 | 6 | 6 | 6 |
| **IL** | Chicago & St Louis areas | 42 | 96 | 42 | 96 |
| **LA** | Baton Rouge 5 counties & Region of Influence | 0.2 lb/MMBtu (54 ppmvd @15% $O_2$) | 0.3 lb/MMBtu (86 ppmvd @15% $O_2$) | 0.2 lb/MMBtu (54 ppmvd @15% $O_2$) | 0.3 lb/MMBtu (86 ppmvd @15% $O_2$) |
| **MA** | Statewide | 65 | 100 | 42 | 65 |
| **MD** | Select counties | 42 | 65 | 42 | 65 |
| **ME** | Statewide | NA | NA | 3.5 – 9.0 | 42 |

[10] EPA. "WebFIRE Tool." https://cfpub.epa.gov/webfire/

[11] Ozone Transport Commission. "White Paper on Control Technologies and OTC State Regulations for Nitrogen Oxides (NOx) Emissions from Eight Source Categories." 2017. https://otcair.org/upload/Documents/Reports/WhitePaper_NOx_Control_04052017.pdf

| State | Geographic Area | Emissions Limits - Simple Cycle | | Emissions Limits - Combined Cycle | |
|---|---|---|---|---|---|
| | | Gas-fired | Oil-fired | Gas-fired | Oil-fired |
| **MO** | St Louis area | 75 | 100 | 75 | 100 |
| **NC** | Charlotte 6 county area | 75 | 95 | 75 | 95 |
| **NH** | Statewide | 25 (1999 and later); 55 (pre-1999) | 75 | 42 | 65 |
| **NJ** | Statewide (≥15 MW) | 25 (1.00 lb/MWh) | 42 (1.60 lb/MWh) | 25 (0.75 lb/MWh) | 42 (1.20 lb/MWh) |
| **NY** | Statewide | 50 | 100 | 42 | 65 |
| **OH** | Cleveland 8 county area | 42 | 96 | 42 | 96 |
| **PA** | Statewide | >1k bhp & <6k bhp (150); >6k bhp (42) | >1k bhp & <6k bhp (150); >6k bhp (96) | 1,000 bhp & <180 MW (42); >180 MW (4) | 1,000 bhp & <180 MW (96); >180 MW (8) F42 |
| **TX** | Dallas and Houston areas | 0.032 lb/MMBtu (9 ppmvd @15% $O_2$) | 0.032 lb/MMBtu (9 ppmvd @15% $O_2$) | 0.032 lb/MMBtu (9 ppmvd @15% $O_2$) | 0.032 lb/MMBtu (9 ppmvd @15% $O_2$) |
| **VA** | OTR Jurisdiction | 42 | 65 – 77 | 42 | 65 - 77 |
| **WI** | Milwaukee 7 county area | 25 to 42 | 65 to 96 | 9 | 9 |

The natural gas emissions limits in the District are equivalent to those found in New Jersey, New Hampshire, and Wisconsin. The remainder of states analyzed, with the exception of Georgia and Texas, have higher emissions limits.

Oil emissions limits in the District are similar to those in New Hampshire, Virginia, and Wisconsin, and less strict than Connecticut, Georgia, Maryland, and Texas. However, this comparison is not entirely equivalent, since the NOx emissions limits presented are for units greater than 25 MW and all the units in the District are closer to 5 MW, so achieving these stricter emissions limits is even more challenging. The emissions limits adopted by the District are also equivalent to regional priorities in the OTR such as the OTC High Electric Demand Day Turbine Model Rule and the MANE-VU Ask.[12],[13]

Existing facilities were also evaluated to determine if additional controls were reasonable. Existing facilities are classified by the District with Source Classification Code (SCC) of 20300102, 20300202 (Internal Combustion Engines; Commercial/Institutional; Natural Gas; Turbine) and 20300203 (Internal Combustion Engines; Commercial/Institutional; Natural Gas; Turbine: Cogeneration). Emissions limits were compared to emissions limits found on the EPA WebFIRE (Table 6). Natural gas-fired units with and without duct burners were found to emit at a lower rate than all of the available technologies in WebFIRE. The current emissions limit for oil-fired combustion turbines not using duct burners were found to be higher than currently available controlled emissions limits, but the proposed emissions limits were found to be lower than all available technologies.

[12] Ozone Transport Commission. High Electric Demand Day Turbine Model Rule. 2010. https://otcair.org/upload/Documents/Model%20Rules/OTC%20Model%20Rule%20-%20HEDD%20Turbines%20Final.pdf

[13] Mid-Atlantic Northeast Visibility Union. "Statement of the Mid-Atlantic/Northeast Visibility Union (MANE-VU) Concerning a Course of Action within MANE-VU toward Assuring Reasonable Progress for the Second Regional Haze Implementation Period (2018-2028)." August 2017. https://otcair.org/MANEVU/Upload/Publication/Formal%20Actions/MANE-VU%20Intra-Regional%20Ask%20Final%208-25-2017.pdf

**Table 6: Emissions Factors (lb/MMBtu) from EPA's WebFIRE database for Combustion Turbines**

| Control | Natural Gas | Oil |
|---|---|---|
| Uncontrolled | 0.320 | 0.880 |
| Steam or Water Injection | 0.130 | 0.240 |
| Pre-combustion Chamber | 0.099 | n/a |

On July 31, 2020, the DOEE conducted a review of the RACT/BACT/LAER clearinghouse for combustion turbines less than or equal to 25 MW fired by natural gas and oil,[14] which included a search of permits from January 1, 2000, to date. A review of the controls that were found to have been implemented through the RACT/BACT/LAER clearinghouse is in Table 22. A review of the median emissions rates concluded that the current natural gas and proposed oil emissions limits are stricter than the median emissions limits in the RACT/BACT/LAER clearinghouse and thus are reasonable.

**Table 7: Synopsis of controls for combustion turbines found in the RACT/BACT/LAER clearinghouse**

| Fuel | Controls | Median Emissions Rate |
|---|---|---|
| Natural Gas | Of 8 Entries:<br>• 3 had Dry Low NOx Combustors<br>• 1 relied on Flue Gas Recirculation3 had Low NOX Burners<br>• 3 had Selective Catalytic Reduction<br>• 2 had no controls | 0.16 (lb/MMBtu)<br>42.8 (ppmvd @ 15% $O_2$) |
| Oil | Of 3 Entries:<br>• 1 had LNB<br>• 2 had no controls | 0.24 (lb/MMBtu)<br>63.0 (ppmvd @ 15% $O_2$) |

Finally, DOEE examined the permitted and 2019 actual emissions rates at individual combustion turbines in the District. As demonstrated in Table 8, all of the units located in the District can reasonably be expected to meet the proposed emissions limits.

**Table 8: Permitted and 2019 actual emissions limits (lb/MMBtu) for combustion turbines in the District**

| Facility | Size (MMBtu) | Fuel | Permitted | 2019 Actual |
|---|---|---|---|---|
| American University | 11.5 | Natural Gas | 0.035 | n/a |
| Blue Plains – 3 Units* | 138.9 | Natural Gas | 0.073 | 0.09 |
| Capital Power Plant | 79.07 | Natural Gas | 0.092 | 0.05 |
| | 83.2 | Oil | 0.279 | 0.11 |
| GSA** | 326 | Natural Gas | 0.20 | 0.10 |
| | | Oil | | n/a |
| George Washington Univ. | 52.9 | Natural Gas | 0.055/0.07 | 0.04 |

*Combustion turbines at Blue Plains are also permitted to burn digester gas, but this fuel burning is regulated under case-by-case RACT

** Permits are currently being rewritten at GSA

This review of emissions limits adopted in other states and agreed to regionally and the availability of control technologies support that it is reasonable to maintain the presumptive RACT emissions limits

[14] The District has no units larger than 25 MW

for natural gas-fired combustion turbines and lower the presumptive emissions limits for oil-fired combustion turbines to 42 ppmvd @ 15% $O_2$.

### *Fuel Burning Equipment*

ICI boilers contribute more NOx to the District's point source inventory than any other category. The vast majority of the fuel used to operate ICI boilers is natural gas, with the remainder using #2 or #4 oil, with the exception of two coal-fired units used in limited operations at Capitol Power Plant. The currently adopted RACT and updated RACT emissions limits for the District are in Table 9. It should be noted that other fuel burning equipment, such as water heaters, had no presumptive RACT but will be included under the new terms used in the regulation. It should also be noted that equipment powered by digester gas is evaluated separately under case-by-case RACT given a different nature of operations and limited number of sources. Also only distillate oil was evaluated since residual oil is banned for use under 20 DCMR § 801.2(c).

**Table 9: Presumptive RACT emissions limits (lb/MMBTU) for fuel burning equipment in the District of Columbia for the 2008 and 2015 ozone NAAQS**

| Size | Coal | | Natural Gas | | Distillate | |
|---|---|---|---|---|---|---|
| | 2008* | 2015 | 2008* | 2015 | 2018* | 2015 |
| >=100 MMBtu/hr | 0.43 | 0.12 | 0.25 | 0.05 | 0.2 | 0.12 |
| >=50 & <100 MMBtu/hr | 0.3 | 0.12 | 0.3 | 0.05 | 0.3 | 0.09 to 0.12 |
| >=25 & <50 MMBtu/hr | Tune-up | 0.12 | Tune-up | 0.05 | Tune-up | 0.09 to 0.12 |
| >=20 & <25 MMBtu/hr | Tune-up | Tune-up | Tune-up | Tune-up | Tune-up | Tune-up |
| >=5 & <20 MMBtu/hr | None | Tune-up | None | Tune-up | None | Tune-up |

*2008 presumptive RACT only is applicable to fossil-fuel steam generating units, and not all fossil fuel equipment

Table 10 shows the emissions limits in place for ICI boilers > 50 MMBtu/hr throughout the United States based on data compiled by OTC.[15]

**Table 10: Emissions limits (lb/MMBTU) for ICI boilers in states outside of California as of January 18, 2017**

| State | Geographic Area | Coal - Fired | Gas-fired | | Distillate-fired | |
|---|---|---|---|---|---|---|
| | | >100 *,** | 50-100 | >100 * | 50-100 | >100* |
| CT | Statewide | 0.15 - 0.43<br>0.12 (2022) | 0.2 to 0.3<br>0.05 to 0.1 (2022) | 0.1 to 0.3<br>0.1 (2022) | 0.20 - 0.43<br>0.10 (2022) | 0.10 - 0.43<br>0.10 - 0.15 (2022) |
| DE | Statewide | 0.38 to 0.43 | LEA, low NOx, FGR | 0.2 | LEA, low NOx, FGR | 0.38 to 0.43 |
| FL | Broward, Dade<br>Palm Beach Counties | 0.9 | 0.2 to 0.5 | 0.2 to 0.5 | 0.36 to 0.62 | 0.36 to 0.62 |
| GA | 45 county area | 30 ppmvd<br>@ 3% O2 | 30 ppmvd<br>@ 3% O2 | 30 ppmvd<br>@ 3% O2 | 30 ppmvd<br>@ 3% O2 | 30 ppmvd<br>@ 3% O2 |
| IL | Chicago & St Louis areas | 0.12 | Tune-up | 0.08 | Tune-up | 0.1 |
| IN | Clark & Floyd Counties | 0.4 to 0.5 | No limits | 0.2 | No limits | 0.2 |
| LA | Baton Rouge 5 counties<br>& Region of Influence | 0.1 | 0.1 to 0.2 | 0.1 | Tune-up | 0.3 |
| MA | Statewide | 0.33 to 0.45 | 0.1 | 0.2 | 0.1 | 0.2 |

[15] OTC. "White Paper on Control Technologies and OTC State Regulations for Nitrogen Oxides (NOx) Emissions from Eight Source Categories." 2017. https://otcair.org/upload/Documents/Reports/WhitePaper_NOx_Control_04052017.pdf

| State | Geographic Area | Coal - Fired | Gas-fired | | Distillate-fired | |
|---|---|---|---|---|---|---|
| | | >100 *,** | 50-100 | >100 * | 50-100 | >100* |
| **MD** | Select counties | 0.7 | Tune-up | 0.2 | Tune-up | 0.2 |
| **ME** | Statewide | 0.38 | Tune-up | No limits | 0.3 | 0.3 |
| **MO** | St Louis area | 0.45 to 0.86 | No limits | 0.2 to 0.5 | No limits | 0.3 |
| **NC** | Charlotte 6 county area | 0.4 to 0.5 | 0.3 | 0.3 | 0.3 | 0.3 |
| **NH** | Statewide | 0.3 to 1.0 | 0.1 to 0.2 | 0.1 to 0.2 | 0.12 | 0.12 |
| **NJ** | Statewide | n/a | 0.05 | 0.1 | 0.08 | 0.1 |
| **NY** | Statewide | 0.08 to 0.20 | 0.05 | 0.06 | 0.08 | 0.15 |
| **OH** | Cleveland 8 county area | 0.3 | 0.1 | 0.1 | 0.12 | 0.12 |
| **PA** | Statewide | 0.45 | 0.1 | 0.1 | 0.12 | 0.12 |
| **RI** | Statewide | n/a | 0.1 | 0.1 | 0.12 | 0.12 |
| **TX** | Dallas & Houston areas | Unknown | No limits | 0.1 to 0.2 | 0.25 | 0.25 |
| **VA** | OTR Jurisdiction | 0.38 to 1.0 | 0.2 | 0.2 | 0.25 | 0.25 |
| **WI** | Milwaukee 7 county area | 0.1 to 0.25 | No limits | 0.08 | No Limits | 0.1 |

* In many cases these or more stringent limits apply to units over 250 MMBtu/hr

** The District does not have any coal-fired units < 100 MMBtu/hr and thus this is not being evaluated

**Table 11: Comparison of updated presumptive RACT emissions limits in the District to other states**

| Size | Coal | | | Natural Gas | | | Distillate (excepting curtailment) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Equiva-lent | Higher Than | Lower Than | Equiva-lent | Higher Than | Lower Than | Equiva-Lent | Higher Than | Lower Than |
| >=100 MMBtu/hr | None | CT, IL, LA, NY, WI | DE, FL, IN, MA, MD, ME, MO, NC, NH, OH, PA, VA | CT, LA, NJ, NH, OH, RI | IL, NY | DE, FL, IN, MA, MD, ME, MO, NC, VA | None | None | All States |
| >=50 & <100 MMBtu/hr | n/a | | | CT, DE*, NJ, NY | None | FL, IL, IN, LA, MA, MD, ME, MO, OH, NC, NH, RI, TX, VA, WI | None | NJ, NY | CT, DE, FL, IL, MA, MD, ME, NC, NH, RI, TX |

As the preceding table (Table 11) demonstrates, the District's emissions limits for coal, natural gas, and distillate are all in the range of the strictest in the nation. Additionally, with the exception of sources greater than 100 MMBtu/hr powered by natural gas, are all set to the levels agree to in the inter-Regional Planning Organization (RPO) collaborative.[16]

Existing facilities were also evaluated for potential additional. To begin, DOEE searched for potential controls using the SCCs listed in Table 12, which corresponded to the types of ICI boilers in the District.

**Table 12: SCCs of ICI boilers in the District**

| SCC | LEVEL2 | LEVEL3 | LEVEL4 |
|---|---|---|---|
| **10200501** | Industrial | Distillate Oil | Grades 1 and 2 Oil |
| **10200601** | Industrial | Natural Gas | > 100 Million Btu/hr |
| **10300209** | Commercial/Institutional | Bituminous/Subbituminous Coal | Spreader Stoker (Bituminous Coal) |

[16] Ozone Transport Commission. "Resolution 06-02 of the Ozone Transport Commission Concerning Coordination and Implementation of Regional Ozone Control Strategies for Certain Source Categories." June 7, 2006. https://otcair.org/upload/Documents/Model%20Rules/2006%20Jun%20Resolution%20RACT.PDF

| | | | |
|---|---|---|---|
| **10300501** | Commercial/Institutional | Distillate Oil | Grades 1 and 2 Oil |
| **10300502** | Commercial/Institutional | Distillate Oil | 10-100 Million Btu/hr |
| **10300503** | Commercial/Institutional | Distillate Oil | < 10 Million Btu/hr |
| **10300601** | Commercial/Institutional | Natural Gas | > 100 Million Btu/hr |
| **10300602** | Commercial/Institutional | Natural Gas | 10-100 Million Btu/hr |
| **10300603** | Commercial/Institutional | Natural Gas | < 10 Million Btu/hr |

Table 13 shows the emissions limits from EPA's WebFIRE tool. DOEE's updated NOX RACT emissions limits for coal-fired boilers are well below what EPA currently considers to be available technologies and warrant no further evaluation. The 2008 NOX RACT emissions limits for oil- and natural gas-fired boilers are less strict than what was found in WebFIRE and further evaluation follows.

**Table 13: Emissions factors (lb/MMBtu) from EPA's WebFIRE database for ICI Boilers**

| **Control** | **Bituminous/Subbituminous Coal*** | **Distillate Oil*** | **Natural Gas** | |
|---|---|---|---|---|
| | **No Post Comb.** | **No Post Comb.** | **No Post Comb.** | **SNCR** |
| Uncontrolled | 0.423 | 0.171/0.142** | 0.098 | 0.085 |
| Over-Fire Air (OFA) | 0.338 | n/a | n/a | n/a |
| Low NOx Burner (LNB) | 0.275 | 0.071 | 0.049 | 0.043 |
| LNB+OFA | 0.254 | n/a | n/a | n/a |
| Flue Gas Recirculation (FGR) | n/a | 0.071 | 0.049 | 0.043 |
| LNB+FGR | n/a | n/a | 0.031 | 0.027 |

* EPA's current documentation states that SNCR and SCR are "Commercially offered but not widely demonstrated on large boilers."[17,18]
** Emissions factors for boilers greater than 100 MMBTU and less than or equal to 100 MMBTU, respectively

DOEE then conducted a review of the RACT/BACT/LAER clearinghouse on July 31, 2020, for engines fired by distillate, natural gas, and digester. This included a search of permits from January 1, 2000, to date. Given that DOEE determined that the proposed emissions limit for coal-fired units was already reasonable in the last portion of the analysis, coal units were not included. Table 14 provides a review of the implemented controls from the RACT/BACT/LAER clearinghouse.

**Table 14: Synopsis of controls for ICI boilers found in the RACT/BACT/LAER clearinghouse**

| **Fuel** | **> 100 MMBtu** | **<= 100 MMBtu** |
|---|---|---|
| Distillate | Of 10 entries:<br>• 1 relied on Water Injection<br>• 1 relied on Over-Fire Air (OFA)<br>• 4 relied on Flue Gas Recirculation (FGR)<br>• 7 relied on Low NOX Burners (LNB)<br>• 2 had no listed control | Of 5 entries:<br>• 1 relied on Good Combustion Processes<br>• 2 relied on LNB<br>• 2 had no listed control |
| Natural Gas | Of 97 entries:<br>• 5 relied on Water Injection<br>• 7 relied on Good Combustion Processes<br>• 66 had installed LNB | Of 157 entries:<br>• 16 relied on Good Combustion Processes<br>• 41 relied on FGR<br>• 95 had installed LNB |

[17]

[18] AP-42 VOL. I: 1.3: Fuel Oil Combustion. https://www3.epa.gov/ttn/chief/ap42/ch01/final/c01s03.pdf

| | | |
|---|---|---|
| | • 14 had installed SCR<br>• 13 had no listed control | • 5 had installed SCR<br>• 19 had no listed control |

Note: some boilers rely on several technologies (e.g., SCR and Lean Burn)

DOEE examined the median emissions rate for ICI boilers less than 250 MMBtu (the District does not have any industrial boilers larger than that size). The results are presented in Table 15. Based on this data DOEE concludes that the presumptive RACT emissions limits are indeed reasonable.

**Table 15: Median emissions from applicable ICI boiler permits from RACT/BACT/LAER database**

| Fuel | Boilers > 100 MMBtu | Boilers <= 100 MMBtu |
|---|---|---|
| Distillate | 0.11 | 0.1 |
| Natural Gas | 0.04 | 0.05 |

Finally, DOEE reviewed 2019 actual emissions limits for large boilers (greater than 100 MMBtu/hr). The results are in Table 24. DOEE found that many of these units do not meet emissions limits in Table 9. However, given the rates of adoption of Low NOx Burners around the United States for this type of source, the installation and use of Low NOx Burners is indeed reasonable.

**Table 16: 2019 actual emissions limits (lb/MMBtu) for ICI Boilers sized greater than 100 MMBtu/hr in the District**

| Facility | Unit | Size (MMBtu) | Natural Gas | Oil |
|---|---|---|---|---|
| Capital Power Plant | 001 | 160 | Multiple units are monitored by a CEMS so emissions rates based on fuel burned cannot be determined. | |
| | 003 | 160 | | |
| | 004 | 203 | | |
| GSA | 001 | 250 | 0.065 | 0.099 |
| | 002 | 250 | 0.079 | 0.086 |
| | 003 | 500 | 0.129 | 1.591 |
| | 004 | 500 | n/a | n/a |
| | 006 | 250 | 0.456 | 0.886 |
| Georgetown | EPN-1 | 127 | 0.079 | 0.075 |
| | EPN-2 | 127 | 0.079 | 0.075 |
| | EPN-3 | 120.6 | 0.085 | 0.075 |
| Navy Yard | 3 | 101 | 0.085 | n/a |
| | 5 | 101 | 0.74 | n/a |

DOEE's review of emissions limits adopted in other states, and agreed to regionally, concludes that the level of emissions in Table 9 is presumptive RACT in the District, and stricter emissions limits are not reasonable.

### *Asphaltic Concrete Units*

The DOEE, on behalf of the District, certifies that existing emissions limits constitute RACT for asphaltic concrete units as approved by EPA (69 Fed. Reg. 77645, 69 Fed. Reg. 77647). The emissions limit approved as RACT for asphaltic concrete units with a PTE of 25 tons of NOx per year or more found in 20 DCMR § 805.6 is 150 ppmvd at 7% $O_2$ for all types of fuels (0.235 lb/MMBtu for natural gas, 0.247 lb/MMBtu for oil). There is only one unit in the District (Fort Meyer #1) that has a PTE of 25 tons of NOx per year or more.

Table 17 shows the emissions limits in place for asphaltic concrete units in throughout the United States based on data compiled by OTC.[19] Compared to other types of sources analyzed in the District, very few other states have presumptive RACT emissions limits for asphaltic concrete units. Compared to the states that do, all of which are in the OTR, the District's emissions limits are less strict than those in Massachusetts and New Jersey, stricter than those in Maine and New Hampshire, and relatively similar to those in Vermont. Based on the review of emissions limits adopted in other states, the existing emissions limits remains presumptive RACT in the District and stricter emissions limits are not reasonable.

**Table 17: Emissions limits for asphaltic concrete units in states outside of California as of January 18, 2017**

| State | Natural Gas | No. 2 Oil | Other Oils |
|---|---|---|---|
| **MA** | 0.044 lb/MMBtu | 0.113 lb/MMBtu | 0.113 lb/MMBtu |
| **ME** | 0.12 lb/ton asphalt (0.429 lb/MMBtu) | 0.12 lb/ton asphalt (0.429 lb/MMBtu) | 0.12 lb/ton asphalt (0.429 lb/MMBtu) |
| **NH** | 0.12 lb/ton asphalt (0.429 lb/MMBtu) | 0.12 lb/ton asphalt (0.429 lb/MMBtu) | 0.12 lb/ton asphalt (0.429 lb/MMBtu) |
| **NJ** | 75 ppmvd @7% O2 | 100 ppmvd @7% O2 | 125 ppmvd @7% O2 |
| **VT** | No specific regulatory emissions limits, but most permit contain 0.06 lb/ton asphalt (0.215 lb/MMBtu) limit in permits. | | |

DOEE completed an examination of additional control techniques for asphaltic concrete units to determine if additional requirements were necessary. Existing facilities are classified by the District with SCC of 30500245 (Industrial Processes; Mineral Products; Asphalt Concrete; Batch Mix Plant: Hot Elevators, Screens, Bins, Mixer & NG Rot Dryer) and 30500246 (Industrial Processes; Mineral Products; Asphalt Concrete; Batch Mix Plant: Hot Elevators, Screens, Bins, Mixer & NG Rot Dryer). Emissions limits were examined in WebFIRE and only uncontrolled emissions limits were available.
DOEE conducted a review of the RACT/BACT/LAER clearinghouse on July 21, 2020, for asphaltic concrete plants, which included a search of permits from January 1, 2000, to date. Only two plants were found in this search, both of which were for drum mixers rather than batch mixers, so comparable emissions limits were not available.

This review of emissions limits adopted in other states and agreed to regionally and the lack of evidence of additional available controls in EPA datasets imply that the existing emissions limits remain presumptive RACT in the District, and stricter emissions limits are not reasonable.

### *Stationary Engines*

Previously the District did not have presumptive RACT emissions limits for stationary engines. Upon review of regulations in place in other states and regionally agreed-to emissions limits, DOEE finds that presumptive RACT is necessary for stationary engines used for non-emergency purposes. DOEE has

[19] Ozone Transport Commission. "White Paper on Control Technologies and OTC State Regulations for Nitrogen Oxides (NOx) Emissions from Eight Source Categories." 2017.
https://otcair.org/upload/Documents/Reports/WhitePaper_NOx_Control_04052017.pdf

found that the updated emissions limits shown in Table 18 are presumptive RACT for stationary engines.

**Table 18: Presumptive RACT emissions limits (g/bh-hp) for non-emergency stationary engines in the District of Columbia**

| Construction | Burn | Fuel | Emissions Limit |
|---|---|---|---|
| New or Existing | Rich Burn | All Fuels | 0.7 |
| | Lean Burn | Natural Gas | 0.7 |
| | | Landfill, Waste, or Digester Gas | 0.6 |
| New | | Liquid Fuels | 2.3 |
| Existing | | | 6.5 |

Table 19 shows the emissions limits in place for stationary engines throughout the United States based on data compiled by OTC (Note that this analysis did not include engines powered by landfill gas).[20]

**Table 19: Emissions limits (g/hp-hr) stationary engines in states outside of California as of January 18, 2017**

| State | Geographic Area | Gas-fired, Lean Burn | Gas-fired, Rich Burn | Diesel |
|---|---|---|---|---|
| **CT** | Statewide | 1.5 - 2.0 | 1.5 - 2.0 | 1.5 - 2.3 |
| **DE** | Statewide | Technology Standards | | |
| **IL** | Chicago & St Louis areas | 210 ppmvd @ 15% $O_2$ (~ 2.9 g/hp-hr) | 150 ppmvd @ 15% $O_2$ (~ 2.2 g/hp-hr) | 660 ppmvd @ 15% $O_2$ |
| **LA** | Baton Rouge 5 counties & Region of Influence | 4.0 | 2.0 | |
| **MA** | Statewide | 3.0 | 1.5 | 9.0 |
| **MD** | Select counties | 150 ppmvd @ 15% $O_2$ (~ 1.7 g/hp-hr) | 110 ppmvd @ 15% $O_2$ (~ 1.6 g/hp-hr) | 175 ppmvd @ 15% $O_2$ |
| **MI** | Fine grid zone | 3.0 | 1.5 | 2.3 |
| **MO** | St Louis area | 3.0 to 10.0 | 2.5 to 9.5 | 2.5 to 8.5 |
| **NC** | Charlotte 6 county area | 2.5 | 2.5 | 8.0 |
| **NH** | Statewide | 2.5 | 1.5 | 8.0 |
| **NJ** | Statewide | 1.5 | 1.5 | 2.3 |
| **NY** | Statewide | 1.5 | 1.5 | 2.3 |
| **OH** | Cleveland 8 county area | 3.0 | 3.0 | 3.0 |
| **PA** | Statewide | 3.0 | 2.0 | 8.0 |
| **RI** | Statewide | 2.5 | 1.5 | 9 |
| **TX** | Dallas & Houston areas | 0.5 | 0.5 | 2.8 to 6.9 |
| **VA** | OTR Jurisdiction | 4.8 | 4.8 | 4.8 |
| **WI** | Milwaukee 7 county area | 3.0 | 3.0 | 3.0 |

**Table 20: Comparison of presumptive RACT emissions limits in the District to other states**

| Size | Natural Gas |
|---|---|

[20] Ozone Transport Commission. "White Paper on Control Technologies and OTC State Regulations for Nitrogen Oxides (NOx) Emissions from Eight Source Categories." 2017. https://otcair.org/upload/Documents/Reports/WhitePaper_NOx_Control_04052017.pdf

| | Equivalent | Higher Than | Lower Than |
|---|---|---|---|
| **Gas-fired, Lean Burn** | CT, MD, NJ, NY | TX | IL, LA, MA, MD, MI, MO, NC, NH, OH, PA, RI, VA, WI |
| **Gas-fired, Rich Burn** | CT, MA, MI, NJ, NY, RI | TX | IL, LA, MD, MO, NC, NH, OH, PA, VA, WI |
| **Diesel-fired** | MI, NJ, NY | CT | IL, LA, MA, MD, MO, NC, NH, OH, PA, RI, VA, TX, WI |

As the preceding table (Table 20) demonstrates, the District's presumptive RACT emissions limits for lean burn, rich burn, and diesel-powered stationary engines are reasonable. The emissions limits are stricter than many states. Additionally, the emissions limits are stricter than those proposed in the OTC stationary generator model rule.[21]

DOEE conducted an examination of additional control techniques to determine if additional requirements were necessary. Existing units are not included in the District's emissions inventory and SCCs have not been assigned to existing engines. As a result, a broader look of all potential SCCs was done for the SCCs listed in Table 21. Emissions limits were examined in WebFIRE and only uncontrolled emissions limits were available.

**Table 21: SCCs of stationary engines**

| SCC | LEVEL2 | LEVEL3 | LEVEL4 |
|---|---|---|---|
| **20100102** | Electric Generation | Distillate Oil (Diesel) | Reciprocating |
| **20100202** | Electric Generation | Natural Gas | Reciprocating |
| **20200102** | Industrial | Distillate Oil (Diesel) | Reciprocating |
| **20200202** | Industrial | Natural Gas | Reciprocating |
| **20200252** | Industrial | Natural Gas | 2-cycle Lean Burn |
| **20200252** | Industrial | Natural Gas | 2-cycle Lean Burn |
| **20200253** | Industrial | Natural Gas | 4-cycle Rich Burn |
| **20200253** | Industrial | Natural Gas | 4-cycle Rich Burn |
| **20200254** | Industrial | Natural Gas | 4-cycle Lean Burn |
| **20200254** | Industrial | Natural Gas | 4-cycle Lean Burn |
| **20200301** | Industrial | Gasoline | Reciprocating |
| **20300101** | Commercial/Institutional | Distillate Oil (Diesel) | Reciprocating |
| **20300201** | Commercial/Institutional | Natural Gas | Reciprocating |
| **20300301** | Commercial/Institutional | Gasoline | Reciprocating |

DOEE then conducted a review of the RACT/BACT/LAER clearinghouse on July 21, 2020, for engines fired by distillate, natural gas, and digester, which included a search of permits from January 1, 2000, to date. While we are including all of these fuels in our analysis, it should be noted that at this point only diesel-fired engines are permitted for non-emergency use in the District. Units that were strictly for emergency engines (to be discussed shortly) and for mining operations and natural gas compressor stations, neither of which exist in the District, were excluded from consideration. A review of the

[21] Ozone Transportation Commission. Stationary Generator Model Rule. 2010. https://otcair.org/upload/Documents/Model%20Rules/Stationary%20Generators%20Model%20Rule%20-%20Final.pdf

controls that were found to have been implemented through the RACT/BACT/LAER clearinghouse is in Table 22.

**Table 22: Synopsis of controls for stationary engines found in the RACT/BACT/LAER clearinghouse**

| Fuel | > 500 hp | <= 500 hp |
|---|---|---|
| Distillate | Of 17 entries:<br>• 2 relied on Good Combustion Processes<br>• 2 had Turbocharges<br>• 3 had installed SCR<br>• 6 had no listed control | Of 2 entries:<br>• 1 had Turbocharges<br>• 1 had no listed control |
| Natural Gas | Of 44 entries:<br>• 2 relied on Air/Fuel Ratio Control<br>• 5 relied on Lean Burn Technology<br>• 10 relied on Good Combustion Processes<br>• 3 had installed 3-way catalyst<br>• 1 had installed LNB<br>• 4 had installed NSCR<br>• 6 had installed SCR<br>• 15 had no listed control | Of 6 entries:<br>• 3 had installed 3-way catalyst<br>• 3 had no listed control |
| Landfill Gas | Of 45 entries:<br>• 17 relied on Air/Fuel Ratio Control<br>• 12 relied on Lean Burn Technology<br>• 9 relied on Good Combustion Processes<br>• 1 had installed SCR<br>• 7 had no listed control | No controls found |

Note: some engines rely on several technologies (e.g., SCR and Lean Burn)

DOEE examined the median emissions rate for engines greater than 500 hp. Engines that appeared to be miscalculated or were otherwise outliers.[22] DOEE did not examine units less than or equal to 500 hp since the data sets were too small for a sufficient analysis. The results are presented in Table 23. Thus, in addition to other evidence presented, the DOEE finds the presumptive RACT emissions limits to be reasonable.

**Table 23: Median emissions from applicable stationary engine permits from RACT/BACT/LAER database**

| Fuel | Median Emission Limit (g/hp-hr) |
|---|---|
| Distillate | 7.8 |
| Natural Gas | 2.0 |
| Landfill Gas | 0.6 |

DOEE reviewed permitted and 2019 actual emissions at existing permitted units under its jurisdiction. This analysis only affected diesel engines since only diesel engines are currently permitted for non-emergency purposes. The results are in Table 24.

**Table 24: Permitted emissions limits for non-emergency stationary engines in the District**

| Facility | Units | Size | Fuel | Control | Permitted |
|---|---|---|---|---|---|

[22] Outliers were instances of permits that were for more than one engine where total emissions rates were assumed to be for more than one engine.

| | | | | | | g/hp-hr |
|---|---|---|---|---|---|---|
| Ft Meyer #1 | Crusher | 275 hp | Diesel | None | 4.0 (g/kWh NOx+NMHC) | 5.36 |
| | Screener | 99.9 hp | Diesel | None | 4.7 (g/kWh NOx+NMHC) | 6.30 |
| Washington Convention Center | 4 Generators | 1,000 kW | Diesel | SCR | 10.61 (lb/hr) | 6.34 |

Emergency engines have been exempted from requirements to meet presumptive NOx RACT. In the District, emergency engines are not permitted to participate in demand response programs and are limited to 500 hours of operation per year or less (including emergency operations). Most operate far fewer hours than that. Additionally, given the intermittent nature of emergency generators, post combustion controls are not efficient for removing pollution due to the amount of time these units spend in start up or shut down. Finally, given the small number of hours per year these units operate, the sources are *de minimis*.

These reviews of emissions limits adopted in other states and agreed-to regionally, and the availability of control technologies, support a conclusion that the presumptive NOx RACT emissions limits for stationary engines are reasonably available.

### *Other Sources*

The District only has one other major NOx stationary source, the Blue Plains Wastewater Treatment Plant. Emissions limits are in place in its operating permit and these emissions limits have been adopted into the District's SIP. At this point the DOEE finds that the emissions limits that were based on LAER for the unit continue to represent RACT.

## 3.0 NOx RACT Certification

The Department of Energy and Environment, on behalf of the District of Columbia, certifies that the combination of existing NOx controls already established in the SIP and approved by EPA under the 1-hour ozone NAAQS, the 1997 8-hour ozone NAAQS, the 2008 8-hour ozone NAAQS, the approved case-by-case RACT determination for Blue Plains Wastewater Treatment Plant, and the District's proposed NOx RACT regulation updates, represent NOx RACT controls for the 2015 8-hour ozone NAAQS.