

**NYC-DOC-Rikers Island  
Facility Emission Calculations  
Existing Potential To Emit**

Equipment	Potential Fuel Consumption			Potential Direct Emissions		
	Residual Fuel Oil (1000 gal)	Distalate Fuel Oil (1000 gal)	NG (MMSCF)	Residual Fuel Oil (metric ton)	Distalate Fuel Oil (metric ton)	NG (metric ton)
Boilers	-	1,277.31	177.99	-	13,112.31	9,710.07
PLM Engines	-	277.53	-	-	2,849.00	-
Turbines	-	1.77	1,922.10	-	18.15	104,856.43
The maximum PTE emissions for the dual-fuel boilers were determined as the maximum of emissions associated with fuel usage						

**Facility PTE Fuel Consumption**

	Distalate Fuel Oil (gal)	NG (scf)
<b>Boilers on Oil</b>	1,556,608	1,922,104,854
<b>Boilers on NG</b>	279,298	2,100,098,382

Distalate Fuel Oil (metric ton)	NG (metric ton)
15,979	104,856
2,867	114,566

**Upstream Emissions**

Residual Fuel Oil (metric ton)	Distalate Fuel Oil (metric ton)	NG (metric ton)
-	4,541.52	7,653.56
-	986.77	-
-	6.28	82,648.74

**Upstream Emissions**

	Distalate Fuel Oil (metric ton)	NG (metric ton)	Total
<b>Boilers on Oil</b>	5,535	82,649	<b>88,183</b>
<b>Boilers on NG</b>	993	90,302	<b>91,295</b>

**Total Emissions**

Residual Fuel Oil (metric ton)	Distalate Fuel Oil (metric ton)	NG (metric ton)
-	17,653.83	17,363.62
-	3,835.77	-
-	24.43	187,505.17

**Total Emissions**

	Distalate Fuel Oil (metric ton)	NG (metric ton)	Total
<b>Boilers on Oil</b>	21,514	187,505	<b>209,019</b>
<b>Boilers on NG</b>	3,860	204,869	<b>208,729</b>

**NYC-DOC-Rikers Island  
Facility Emission Calculations  
Future Potential To Emit**

Equipment	Potential Fuel Consumption			Potential Direct Emissions		
	Residual Fuel Oil (1000 gal)	Distalate Fuel Oil (1000 gal)	NG (MMSCF)	Residual Fuel Oil (metric ton)	Distalate Fuel Oil (metric ton)	NG (metric ton)
Boilers	-	48,751.30	6,531.73	-	500,459.44	356,324.84
PLM Engines	-	73.67	-	-	756.27	-
Turbines	-	1.77	1,922.10	-	18.15	104,856.43
The maximum PTE emissions for the dual-fuel boilers were determined as the maximum of emissions associated with fuel usage						

**Facility PTE Fuel Consumption**

	Distalate Fuel Oil (gal)	NG (scf)
<b>Boilers on Oil</b>	48,826,743	1,922,104,854
<b>Boilers on NG</b>	75,438	8,453,833,010

Distalate Fuel Oil (metric ton)	NG (metric ton)
501,234	104,856
774	461,181

**Upstream Emissions**

Residual Fuel Oil (metric ton)	Distalate Fuel Oil (metric ton)	NG (metric ton)
-	173,336.71	280,858.30
-	261.94	-
-	6.28	82,648.74

**Upstream Emissions**

	Distalate Fuel Oil (metric ton)	NG (metric ton)	Total
<b>Boilers on Oil</b>	173,605	82,649	<b>256,254</b>
<b>Boilers on NG</b>	268	363,507	<b>363,775</b>

**Total Emissions**

Residual Fuel Oil (metric ton)	Distalate Fuel Oil (metric ton)	NG (metric ton)
-	673,796.15	637,183.14
-	1,018.21	-
-	24.43	187,505.17

**Total Emissions**

	Distalate Fuel Oil (metric ton)	NG (metric ton)	Total
<b>Boilers on Oil</b>	674,839	187,505	<b>862,344</b>
<b>Boilers on NG</b>	1,043	824,688	<b>825,731</b>

**NYC-DOC-Rikers Island  
Facility Emission Calculations  
Capped Potential To Emit**

Equipment	Potential Fuel Consumption			Potential Direct Emissions		
	Residual Fuel Oil (1000 gal)	Distalate Fuel Oil (1000 gal)	NG (MMSCF)	Residual Fuel Oil (metric ton)	Distalate Fuel Oil (metric ton)	NG (metric ton)
Boilers	-	9,138.22	1,224.34	-	93,808.94	66,791.54
PLM Engines	-	73.67	-	-	756.27	-
Turbines	-	1.77	1,922.10	-	18.15	104,856.43
The maximum PTE emissions for the dual-fuel boilers were determined as the maximum of emissions associated with fuel usage						

**Facility PTE Fuel Consumption**

	Distalate Fuel Oil (gal)	NG (scf)
<b>Boilers on Oil</b>	9,213,658	1,922,104,854
<b>Boilers on NG</b>	75,438	3,146,448,812

Distalate Fuel Oil (metric ton)	NG (metric ton)
94,583	104,856
774	171,648

**Upstream Emissions**

Residual Fuel Oil (metric ton)	Distalate Fuel Oil (metric ton)	NG (metric ton)
-	32,491.21	52,645.66
-	261.94	-
-	6.28	82,648.74

**Upstream Emissions**

	Distalate Fuel Oil (metric ton)	NG (metric ton)	Total
<b>Boilers on Oil</b>	32,759	82,649	<b>115,408</b>
<b>Boilers on NG</b>	268	135,294	<b>135,563</b>

**Total Emissions**

Residual Fuel Oil (metric ton)	Distalate Fuel Oil (metric ton)	NG (metric ton)
-	126,300.15	119,437.20
-	1,018.21	-
-	24.43	187,505.17

**Total Emissions**

	Distalate Fuel Oil (metric ton)	NG (metric ton)	Total
<b>Boilers on Oil</b>	127,343	187,505	<b>314,848</b>
<b>Boilers on NG</b>	1,043	306,942	<b>307,985</b>

NYC-DOC-Rikers Island  
 Facility Emission Calculations  
 Actual Emissions

Equipment	Fuel Consumption			Direct Emissions			Total
	Residual Fuel Oil (1000 gal)	Distalate Fuel Oil (1000 gal)	NG (MMSCF)	Residual Fuel Oil (metric ton)	Distalate Fuel Oil (metric ton)	NG (metric ton)	
Boilers	-	305.35	748.33	-	3,135	40,824	43,958.18
PLM Engines	-	31.95	-	-	328	-	328.01
Turbines	-	1.77	678.79	-	18	37,030	37,048.26
<b>Total</b>	-	<b>339.07</b>	<b>1,427.12</b>	-	<b>3,481</b>	<b>77,854</b>	<b>81,334.44</b>
1990 Boilers	12,828.94	1,718.20	-	145,371.89	17,638.25	-	163,010.15

Distalate Fuel Oil (gal)		NG (scf)	
305,350	1%	748,330,000	11%
31,952	43%	-	-
1,768	100%	678,792,593	35%

Upstream Emissions				
	Residual Fuel Oil (metric ton)	Distalate Fuel Oil (metric ton)	NG (metric ton)	Total
Boilers	-	1,086	32,178	33,263.18
PLM Engines	-	114	-	113.61
Turbines	-	6	29,187	29,193.74
<b>Total</b>	-	<b>1,206</b>	<b>61,365</b>	<b>62,570.53</b>
1990 Boilers	48,871.79	6,109.10	-	54,980.89

Total Emissions						
	Residual Fuel Oil (metric ton)	Distalate Fuel Oil (metric ton)	NG (metric ton)	Total	Maximum PTE Total	Facility Utilization
Boilers	-	4,220	73,001	77,221	673,796	11%
PLM Engines	-	442	-	442	1,018	43%
Turbines	-	24	66,218	66,242	187,530	35%
<b>Total</b>	-	<b>4,686</b>	<b>139,219</b>	<b>143,905</b>	<b>862,344</b>	<b>17%</b>
PTE		674,839	187,505	862,344		
		1%	74%	17%		

Actual Co-Pollutants Emissions (tons/year)							
Pollutant	U-00001 (Boilers)	U-00002 (Boilers)	U-00003 (Boilers)	U-00009 (Spray Booth)	U-00010 (PLM Engines)	U-00011 (Cogeneration Plant)	Total
NOx	42.9	11.1	9.0	-	6.0	18.5	87.5
CO	28.6	7.2	5.9	-	2.8	21.1	65.7
VOC	1.9	0.5	0.4	2.5	0.3	1.2	6.7
SO2	0.2	0.1	0.0	-	0.8	0.9	2.1
PM10	2.8	0.8	0.6	-	0.4	0.4	4.9
PM2.5	2.7	0.7	0.6	-	0.4	0.4	4.8

**NYC-DOC-Rikers Island  
Facility Fuel Usage  
2017-2019**

**BOILERS**

Year	Emission Unit U-00001		Emission Unit U-00002		Emission Unit U-00003		Boiler Total Fuel Consumption	
	Fuel Oil (1000 gal)	NG (MMSCF)	Fuel Oil (1000 gal)	NG (MMSCF)	Fuel Oil (1000 gal)	NG (MMSCF)	Fuel Oil (1000 gal)	NG (MMSCF)
2017	181.81	670.52	87.4	61.37	36.14	16.44	305.35	748.33
2018	98.17	224.51	110.44	164.29	64.73	137.64	273.34	526.45
2019	106.41	187.16	89.22	143.15	51.32	91.98	246.94	422.29
Max (2017-2019)	<b>181.81</b>	<b>670.52</b>	<b>110.44</b>	<b>164.29</b>	<b>64.73</b>	<b>137.64</b>	<b>305.35</b>	<b>748.33</b>

9,138 1,224

**Combustion Turbines- Natural Gas**

Year	Emission Unit U-00011	
	Turbine NG (MMSCF)	Ductburners NG (MMSCF)
2017	46.967	7.939
2018	571.37	37.06
2019	586.64	92.16
Max (2017-2019)	<b>586.64</b>	<b>92.16</b>

Turbine Fuel Consumption
NG (MMSCF)
54.906
608.44
678.79
<b>678.79</b>

**PLM Engines**

Year	Fuel Oil (1000 gal)
2017	8.232
2018	31.952
2019	9.521
Max (2017-2019)	<b>31.95</b>

**PLM Total Fuel Consumption**

Fuel Oil (1000 gal)
8.232
31.952
9.521
<b>31.95</b>

**NYC-DOC-Rikers Island  
Boiler Fuel Usage  
1990**

**BOILERS**

	Boiler Total Fuel Consumption	
	#6 Fuel Oil (1000 gal)	#2 Fuel Oil (1000 gal)
Year		
1991	12,829	1,718

**NYC-DOC-Rikers Island  
Emission Unit U00001 Emission Calculations**

**U00001:Emission Sources: 00001, 00002, 00003, 00004**  
**4 boilers** 96 mmBtu/hr each  
 384 mmBtu/hr total firing rate  
 PTE Operating hrs 8,760 hrs/yr per boiler

NG HHV: 1030 Btu/scf  
 #2 Oil HHV: 138 mmBtu/1000 gal

**PTE Fuel Usage**

NG: 3,266 mmcf burned  
 #2 Oil: 24,376 1000 gals burned

**Capped PTE Fuel Usage**

Existing Energy Co 715,725  
 Cap Safety Factor 20%  
 NG: 834 mmcf burned  
 #2 Oil: 6,224 1000 gals burned

**Fuel Usage (2016-2018)**

NG: 670.52 mmcf burned  
 #2 Oil: 181.81 1000 gals burned

Pollutant	Natural Gas				#2 Oil					TOTAL				
	Emission Factor (lbs/mmscf)	Actual Emissions		Capped PTE Emissions		Emission Factor (lbs/10 <sup>3</sup> gals)	Actual Emissions		Capped PTE Emissions		Actual Emissions <sup>2</sup>		Capped PTE Emissions <sup>3</sup>	
		Emissions (lbs/yr)	Emissions (tpy)	Emissions (lbs/yr)	Emissions (tpy)		Emissions (lbs/yr)	Emissions (tpy)	Emissions (lbs/yr)	Emissions (tpy)	Emissions (lbs/yr)	Emissions (tpy)	Emissions (lbs/yr)	Emissions (tpy)
<b>NOx<sup>1</sup></b>	123.6	82,876	41.44	103,064	51.5	16.56	3,010.8	1.51	103,064.5	51.5	85,887.0	<b>42.9</b>	103,064.5	<b>51.5</b>
<b>CO</b>	84	56,324	28.16	70,044	35.0	5	909.1	0.45	31,118.5	15.6	57,232.7	<b>28.6</b>	70,043.8	<b>35.0</b>
<b>VOC</b>	5.5	3,688	1.84	4,586	2.3	0.34	61.8	0.03	2,116.1	1.1	3,749.7	<b>1.9</b>	4,586.2	<b>2.3</b>
<b>SO2</b>	0.6	402	0.20	500	0.3	0.213	38.7	0.02	1,325.6	0.7	441.0	<b>0.2</b>	1,325.6	<b>0.7</b>
<b>PM10</b>	7.6	5,096	2.55	6,337	3.2	2.38	432.7	0.22	14,812.4	7.4	5,528.7	<b>2.8</b>	14,812.4	<b>7.4</b>
<b>PM2.5</b>	7.6	5,096	2.55	6,337	3.2	2.13	387.3	0.19	13,256.5	6.6	5,483.2	<b>2.7</b>	13,256.5	<b>6.6</b>

Based on NOx RACT of 0.12 lb/MMBtu

**Notes:**

- NOx PTEs are based on the NOx RACT limits of 0.12 lbs/mmBtu on natural gas and #2 Oil. CO, VOC, SO2, PM10, and PM2.5 PTEs are obtained from Federal AP-42 emission factors.
- Annual Actual emissions are based on fuel usage estimates obtained from emission statements for 2016-2018.
- Annual PTE emissions assume a 20 percent safety factor

**Existing Permit Caps**

	Emissions (tpy)	Emissions (lbs/yr)	Emission Factor (lbs/mmscf)	Fuel Consumption (mmscf/yr)
<b>NOx</b>	8	16000	123.6	129.45
<b>PM10</b>	1.1	2200	7.6	289.47

Emission Factor (lbs/10 <sup>3</sup> gals)	Fuel Consumption (10 <sup>3</sup> gals/yr)
16.56	966.18
2.38	924.37

**NYC-DOC-Rikers Island  
Emission Unit U00002 Emission Calculations**

**U00002:Emission Sources: 00005, 00006**

**2 boilers** 96 mmBtu/hr each NG HHV: 1030 Btu/scf  
192 mmBtu/hr total firing rate #2 Oil HHV: 138 mmBtu/1000 gal  
PTE Operating hrs 8,760 hrs/yr per boiler

**PTE Fuel Usage**

NG: 1,633 mmcf burned  
#2 Oil: 12,188 1000 gals burned

**Capped PTE Fuel Usage**

Existing Energy Cor 184,464  
Cap Safety Factor 20%  
NG: 215 mmcf burned  
#2 Oil: 1,604 1000 gals burned

**Fuel Usage (2016-2018)**

NG: 164.29 mmcf burned  
#2 Oil: 110.44 1000 gals burned

Pollutant	Natural Gas					#2 Oil					TOTAL			
	Emission Factor (lbs/mmcf)	Actual Emissions		Capped PTE Emissions		Emission Factor (lbs/10 <sup>3</sup> gals)	Actual Emissions		Capped PTE Emissions		Actual Emissions <sup>2</sup>		Capped PTE Emissions <sup>3</sup>	
		Emissions (lbs/yr)	Emissions (tpy)	Emissions (lbs/yr)	Emissions (tpy)		Emissions (lbs/yr)	Emissions (tpy)	Emissions (lbs/yr)	Emissions (tpy)	Emissions (lbs/yr)	Emissions (tpy)	Emissions (lbs/yr)	Emissions (tpy)
<b>NOx<sup>1</sup></b>	123.6	20,307	10.15	26,563	13.3	16.56	1,828.9	0.91	26,562.9	13.3	22,135.7	11.1	26,562.9	13.3
<b>CO</b>	84	13,801	6.90	18,052	9.0	5	552.2	0.28	8,020.2	4.0	14,352.9	7.2	18,052.4	9.0
<b>VOC</b>	5.5	904	0.45	1,182	0.6	0.34	37.6	0.02	545.4	0.3	941.2	0.5	1,182.0	0.6
<b>SO2</b>	0.6	99	0.05	129	0.1	0.213	23.5	0.01	341.7	0.2	122.1	0.1	341.7	0.2
<b>PM10</b>	7.6	1,249	0.62	1,633	0.8	2.38	262.9	0.13	3,817.6	1.9	1,511.5	0.8	3,817.6	1.9
<b>PM2.5</b>	7.6	1,249	0.62	1,633	0.8	2.13	235.2	0.12	3,416.6	1.7	1,483.9	0.7	3,416.6	1.7

Based on NOx RACT

**Notes:**

1. NOx PTEs are based on the NOx RACT limits of 0.12 lbs/mmBtu on natural gas and #2 Oil. CO, VOC, SO2, PM10, and PM2.5 PTEs are obtained from Federal AP-42 emission factors.
2. Annual Actual emissions are based on fuel usage estimates obtained from emission statements for 2016-2018.
3. Annual PTE emissions assume a 20 percent safety factor

**Existing Permit Caps**

	Emissions (tpy)	Emissions (lbs/yr)	Emission Factor (lbs/mmcf)	Fuel Consumption (mmcf/yr)
<b>NOx</b>	2	4000	123.6	32.36
<b>PM10</b>	0.28	560	7.6	73.68

Emission Factor (lbs/10 <sup>3</sup> gals)	Fuel Consumption (10 <sup>3</sup> gals/yr)
16.56	241.55
2.38	235.29



**NYC-DOC-Rikers Island  
Emission Unit U00003 Emission Calculations**

**U00003:Emission Sources: 00007, 00008**

**2 boilers** 96 mmBtu/hr each NG HHV: 1030 Btu/scf  
 192 mmBtu/hr total firing rate #2 Oil HHV: 138 mmBtu/1000 gal  
 PTE Operating hrs 8,760 hrs/yr per boiler

**PTE Fuel Usage**

NG: 1,633 mmcf burned  
 #2 Oil: 12,188 1000 gals burned

**Capped PTE Fuel Usage**

Existing Energy Cor 150,706  
 Cap Safety Factor 20%  
 NG: 176 mmcf burned  
 #2 Oil: 1,310 1000 gals burned

**Fuel Usage (2016-2018)**

NG: 137.64 mmcf burned  
 #2 Oil: 64.73 1000 gals burned

Pollutant	Emission Factor (lbs/mmcf)	Natural Gas				Emission Factor (lbs/10 <sup>3</sup> gals)	#2 Oil				TOTAL			
		Actual Emissions		Capped PTE Emissions			Actual Emissions		Capped PTE Emissions		Actual Emissions <sup>2</sup>		Capped PTE Emissions <sup>3</sup>	
		Emissions (lbs/yr)	Emissions (tpy)	Emissions (lbs/yr)	Emissions (tpy)		Emissions (lbs/yr)	Emissions (tpy)	Emissions (lbs/yr)	Emissions (tpy)	Emissions (lbs/yr)	Emissions (tpy)	Emissions (lbs/yr)	Emissions (tpy)
<b>NOx<sup>1</sup></b>	<b>123.6</b>	17,013	8.51	21,702	10.9	<b>16.56</b>	1,071.9	0.54	21,701.6	10.9	18,084.7	<b>9.0</b>	21,701.6	<b>10.9</b>
<b>CO</b>	84	11,562	5.78	14,749	7.4	5	323.6	0.16	6,552.4	3.3	11,885.7	<b>5.9</b>	14,748.7	<b>7.4</b>
<b>VOC</b>	5.5	757	0.38	966	0.5	0.34	22.0	0.01	445.6	0.2	779.0	<b>0.4</b>	965.7	<b>0.5</b>
<b>SO2</b>	0.6	83	0.04	105	0.1	0.213	13.8	0.01	279.1	0.1	96.4	<b>0.0</b>	279.1	<b>0.1</b>
<b>PM10</b>	7.6	1,046	0.52	1,334	0.7	2.38	154.1	0.08	3,118.9	1.6	1,200.1	<b>0.6</b>	3,118.9	<b>1.6</b>
<b>PM2.5</b>	7.6	1,046	0.52	1,334	0.7	2.13	137.9	0.07	2,791.3	1.4	1,184.0	<b>0.6</b>	2,791.3	<b>1.4</b>

Based on NOx RACT

**Notes:**

1. NOx PTEs are based on the NOx RACT limits of 0.12 lbs/mmBtu on natural gas and on #2 Oil. CO, VOC, SO2, PM10, and PM2.5 PTEs are obtained from Federal AP-42 emission factors.
2. Annual Actual emissions are based on fuel usage estimates obtained from emission statements for 2016-2018.
3. Annual PTE emissions assume a 20 percent safety factor

**Existing Permit Caps**

	Emissions (tpy)	Emissions (lbs/yr)	Emission Factor (lbs/mmcf)	Fuel Consumption (mmcf/yr)
<b>NOx</b>	1	2000	123.6	16.18
<b>PM10</b>	0.14	280	7.6	36.84

Emission Factor (lbs/10 <sup>3</sup> gals)	Fuel Consumption (10 <sup>3</sup> gals/yr)
16.56	120.77
2.38	117.65

**NYC-DOC-Rikers Island  
Existing Facility Potential - to - Emit (PTE) Emission Calculations**

U00010: 19 generators: Emission Sources: 00010, 00011, 00012, 00013, 00014, 00015, 00016, 00017, 00018, 00019, 00020, 00021, 00022, 00023, 00024, 00025, 00026, 00027, 00028.

No. of Gens.	Output (KW)	Output (KW)
4	1100	4400
2	800	1600
3	900	2700
1	625	625
9	1150	10350

**22.5 TPY NOX Permitted Condition**  
19675 TOTAL KW  
26384.61 Total hP

Pollutant	Emission Factor (lbs/hp-hr) <sup>1</sup>	Emissions (lbs/hr)	Annual hrs	Emissions (lbs/yr)	Emissions (tpy)	Emissions (metric ton)
NOx	See (a) below	309	145.54	45000	22.5	
CO	5.50E-03	145		21,120	10.56	
VOC	6.42E-04	17		2,464	1.23	
SO2	0.001618	43		6,213	3.11	
PM10	0.0007	18		2,688	1.34	
PM2.5	0.0007	18		2,688	1.34	
CO2	1.34	35,321		5,140,615	2,570	2833
CH4	0.000054	1.43		209	0.10	0.11
N2O	0.000011	0.29		42	0.02	0.02
CO2e					2,584.6	2,849

Fuel Usage 277,530 gal

**Reduced PLM Capacity Restrictions**  
5,223 TOTAL KW  
7003.82 Total hP

Pollutant	Emission Factor (lbs/hp-hr) <sup>1</sup>	Emissions (lbs/hr)	Annual hrs	Emissions (lbs/yr)	Emissions (tpy)	Emissions (metric ton)
NOx	See (a) below	82	145.54	11,944	6.0	
CO	5.50E-03	39		5,606	2.8	
VOC	6.42E-04	4		654	0.3	
SO2	0.001618	11		1,649	0.8	
PM10	0.0007	5		714	0.4	
PM2.5	0.0007	5		714	0.4	
CO2	1.34	9,376		1,364,582	682.3	752
CH4	0.000054	0		55	0.0	0.03
N2O	0.000011	0		11	0.0	0.01
CO2e					686.1	756

Fuel Usage 73,671 gal

**Notes:**

1. Criteria pollutant emission factors are from AP-42. GHG emission factors are from 40 CFR 98.

(a): PLM unit NOx lb/hr emission limits in the latest Title V permit

Source	kW	NOx Emission Factor (g/hp-hr)	Emissions (lbs/hr)	PLM Annual hrs	Emissions (lbs/yr)	Emissions (tpy)
00010	1100	7.70	25	145.54	3644.50	1.82
00011	1100	9.20	30	145.54	4354.47	2.18
00012	625	7.50	14	145.54	2016.95	1.01
00013	900	7.40	20	145.54	2865.69	1.43
00014	800	7.80	18	145.54	2684.97	1.34
00015	800	8.10	19	145.54	2788.24	1.39
00016	900	6.70	18	145.54	2594.61	1.30
00017	900	4.74	13	145.54	1835.59	0.92
00018	1100	8.88	29	145.54	4203.01	2.10
00019	1100	8.56	28	145.54	4051.55	2.03
00020	1150	6.90	23	145.54	3414.30	1.71
00021	1150					
00022	1150	7.00	24	145.54	3463.78	1.73
00023	1150					
00024	1150	7.70	26	145.54	3810.16	1.91
00025	1150	6.60	22	145.54	3265.85	1.63
00026	1150					
00027	1150					
00028	1150					
<b>TOTAL</b>	<b>19675</b>		<b>309.15</b>			<b>22.50</b>

<b>Conversion Factor</b> 1.102311 MT/ton
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**NYC-DOC-Rikers Island  
Existing Emission Calculations**

Engines participating in PLM	Permitted NOx Cap	Future Conditions Maximum Allowed under Permit Modification (kW)	
Source	Capacity (kW)		
00010	1,100	715	
00011	1,100	638	
00012	625	468.75	
00013	900	540	
00014	800	200	
00015	800	200	
00016	900	0	
00017	900	0	
00018	1,100	0	
00019	1,100	0	
00020	1,150	615.25	
00021	1,150	-	NOx RACT not performed
00022	1,150	615.25	
00023	1,150	-	NOx RACT not performed
00024	1,150	615.25	
00025	1,150	615.25	
00026	1,150	-	NOx RACT not performed
00027	1,150	-	NOx RACT not performed
00028	1,150	-	NOx RACT not performed
<b>Total</b>	<b>13,925</b>	<b>5,223</b>	
<b>Permitted Total</b>	<b>19,675</b>		

-62%  
-73%

**NYC-DOC-Rikers Island  
Cogeneration Plant Emissions**

Emission Unit U00011. Emission Sources 00029,00030, 00031, 00032, and 00033.

NG HHV: 1030 Btu/scf

**Solar Taurus 70**

Turbine Heat Input	86.4	MMBtu/hr, HHV
Number of Turbines	2	
Total Turbine Heat Input	172.8	MMBtu/hr
Duct Burner Heat Input	38.2	MMBtu/hr, HHV
Number of Duct Burners	2	
Total Duct Burner Heat Input	76.4	MMBtu/hr
Turbine + DB Operating Hours	6,100	hours/year
Turbine only Operating Hours	2,660	hours/year

Annual Turbine Fuel Usage 446,260,194 cf  
Annual Turbine +Duct Burner fuel usage 1,475,844,660 cf

Pollutant	Combustion Turbine Emissions					Combustion Turbine with Duct Burner Emissions					Blackstart Generator		Total U-00011 Emissions	
	per Turbine			PTE Emissions		per unit			PTE Emissions		Emissions (lbs/yr)	Emissions (tpy)	PTE Emissions	
	Emission Factor (lbs/mmbtu)	Emission Factor (lbs/mmcf)	Emissions (lbs/hr)	Emissions (lbs/yr)	Emissions (tpy)	Emission Factor (lbs/mmbtu)	Emission Factor (lbs/mmcf)	Emissions (lbs/hr)	Emissions (lbs/yr)	Emissions (tpy)			Emissions (lbs/yr)	Emissions (tpy)
Nox	0.043	44.03	3.7	19,647	9.8	0.055	56.92	6.9	84,001	42.0	312.2	0.16	103,961	51.98
CO	0.054	55.83	4.7	24,915	12.5	0.062	64.06	7.7	94,547	47.3	100.5	0.05	119,563	59.8
VOC	0.003	3.09	0.3	1,379	0.7	0.008	7.73	0.43	5,259	2.6	20.6	0.01	6,659	3.3
SO2	0.0001	0.10	0.01	46	0.0	0.003	3.51	0.42	5,177	2.6	0.4	0.0002	5,223	2.6
PM10	0.0017	1.75	0.15	781	0.4	0.0009	0.93	0.11	1,368	0.7	10.6	0.01	2,160	1.1
PM2.5	0.0017	1.75	0.15	781	0.4	0.0009	0.93	0.11	1,368	0.7	10.6	0.01	2,160	1.1

Stack Test Data

**PPM to Lbs/Mmbtu conversion**

EPA Reference Method 19, Table 19-1

Fd	8,710 dscf/MMBtu
1 ppm NOx	1.194E-07 lb/dscf
1 ppm CO	7.25E-08 lb/dscf
1 ppm VOC	4.14E-08 lb/dscf

Emission factor of NOx (lb/MMBtu) = Cd \* Fd \* [20.9 / (20.9 - %O2d)]

where:

Cd = Pollutant Concentration, dry basis, 0% O2 (lb/dscf) = ppm X (ppm to lb/dscf conversion factor)

Fd = volume of combustion components per unit of heat content, 8710 dscf/MMBtu 0% O2

%O2d = Concentration of O2 in Exhaust Gas, %

NOx ppm to lb/dscf conversion factor: 1ppm NOx = 1.194E-7 lb/dscf, at 0% O2

## NYC-DOC-Rikers Island Emergency Blackstart Engine Emission Rates

Capacity	2000 kW	22.02 mmBtu/hr
Operating Hours	12 hours/yr	
Max. Fuel Flow	147 gals/hr	
Max. Fuel Flow	1768 gals/yr	

Pollutant	Emission Factor	Units	Emissions (lbs/hr)	Emissions (lbs/yr)	Emissions (tons/yr)
NOx + NMHC <sup>1</sup>	5.9	g/kW-hr	26.01	312	0.16
CO	1.9	g/kW-hr	8.38	101	0.050
VOC <sup>2</sup>	0.00064	lb/hp-hr	1.72	21	0.010
PM10/PM2.5	0.2	g/kW-hr	0.88	11	0.0053
SO <sub>2</sub> <sup>3</sup>	0.000012	lb/hp-hr	0.03	0.39	0.00020
CO <sub>2</sub>	163	lbs/mmBtu	3590	43,085	21.54
CH <sub>4</sub>	0.01	lbs/mmBtu	0.15	1.75	0.00087
N <sub>2</sub> O	0.00	lbs/mmBtu	0.029	0.35	0.00017

### Notes:

1. Emission factors for NOx + NMHC, CO, and PM are from manufacturer data. PM10/PM2.5 are assumed equal to PM emissions.
2. From AP-42. TOC is by weight 9% methane and 91% nonmethane.
3. Assumes a sulfur in fuel content of 15 ppm.

**NYC-DOC-Rikers Island  
HAPS Emissions Calculations  
PTE**

	Units Operating 4				Units Operating 2				Units Operating 2				EU:00010		EU:00011		EU:00011		Total HAP
	EU: 00001, 00002, 00003				EU: 00001, 00002, 00003				EU: 00001, 00002, 00003				EU:00010		EU:00011		EU:00011		
	Heat Input (MMBtu/hr)				Heat Input (MMBtu/hr)				Heat Input (MMBtu/hr)				19,675		249.2		2,000		
	Annual Hours/yr				Annual Hours/yr				Annual Hours/yr				146		8,760		12		
	Boilers No. 2 Oil		Boilers Natural Gas		Boilers No. 2 Oil		Boilers Natural Gas		Boilers No. 2 Oil		Boilers Natural Gas		PLM Engines		Turbines & Duct Burner		Black Start Generator		
	(lb/10 <sup>3</sup> Gal)	tons/yr	(lb/10 <sup>6</sup> scf)	tons/yr	(lb/10 <sup>3</sup> Gal)	tons/yr	(lb/10 <sup>6</sup> scf)	tons/yr	(lb/10 <sup>3</sup> Gal)	tons/yr	(lb/10 <sup>6</sup> scf)	tons/yr	(lb/MMBtu)	tons/yr	(lb/MMBtu)	tons/yr	(lb/MMBtu)	tons/yr	tons/yr
Acetaldehyde	--	0.000	--	0.000	--	0.000	--	0.000	--	0.000	--	0.000	2.52E-05	0.0004	4.00E-05	0.04	2.52E-05	0.000	0.044
Acrolein	--	0.000	--	0.000	--	0.000	--	0.000	--	0.000	--	0.000	7.88E-06	0.0001	6.40E-06	0.007	7.88E-06	0.000	0.007
Benzene	0.000214	0.003	2.10E-03	0.003	0.000214	0.001	2.10E-03	0.002	0.000214	0.001	2.10E-03	0.002	7.76E-04	0.0122	1.20E-05	0.013	7.76E-04	0.000	0.032
1,3-Butadiene	--	0.000	--	0.000	--	0.000	--	0.000	--	0.000	--	0.000	--	0.0000	4.30E-07	0.000	--	0.000	0.000
Ethylbenzene	6.36E-05	0.001	--	0.000	6.36E-05	0.000	--	0.000	6.36E-05	0.000	--	0.000	--	0.0000	--	0.000	--	0.000	0.002
Formaldehyde	0.033	0.402	7.50E-02	0.122	0.033	0.201	7.50E-02	0.061	0.033	0.201	7.50E-02	0.061	7.89E-05	0.0012	--	0.000	7.89E-05	0.000	0.806
Hexane	--	0.000	1.80E+00	2.939	--	0.000	1.80E+00	1.470	--	0.000	1.80E+00	1.470	--	0.0000	--	0.000	--	0.000	5.879
Methyl chloroform (1,1,1-Trichloroethane)	2.36E-04	0.003	--	0.000	2.36E-04	0.001	--	0.000	2.36E-04	0.001	--	0.000	--	0.0000	--	0.000	--	0.000	0.006
Naphthalene	0.00113	0.014	6.10E-04	0.001	0.00113	0.007	6.10E-04	0.000	0.00113	0.007	6.10E-04	0.000	1.30E-04	0.0020	1.30E-06	0.001	1.30E-04	0.000	0.031
Propylene oxide	--	0.000	--	0.000	--	0.000	--	0.000	--	0.000	--	0.000	--	0.0000	2.90E-05	0.032	--	0.000	0.032
Toluene	0.0062	0.076	3.40E-03	0.006	0.0062	0.038	3.40E-03	0.003	0.0062	0.038	3.40E-03	0.003	2.81E-04	0.0044	1.30E-04	0.142	2.81E-04	0.000	0.297
Xylenes (isomers and mixture)	--	0.000	--	0.000	--	0.000	--	0.000	--	0.000	--	0.000	1.93E-04	0.0030	6.40E-05	0.070	1.93E-04	0.000	0.073
o-Xylenes	0.000109	0.001	--	0.000	0.000109	0.001	--	0.000	0.000109	0.001	--	0.000	--	0.0000	--	0.000	--	0.000	0.003
PAH	--	0.000	--	0.000	--	0.000	--	0.000	--	0.000	--	0.000	--	0.0000	2.20E-06	0.002	--	0.000	0.002
		<b>0.50</b>		<b>3.07</b>		<b>0.25</b>		<b>1.54</b>		<b>0.25</b>		<b>1.54</b>		<b>0.02</b>		<b>0.31</b>		<b>0.00</b>	<b>Total HAP 7.21</b>

NG HHV: 1030 Btu/scf  
#2 Oil HHV: 138 mmBtu/1000 gal

**NYC-DOC-Rikers Island  
HAPS Emissions Calculations  
Actual Emissions**

	EU: 00001, 00002, 00003				EU: 00001, 00002, 00003				EU: 00001, 00002, 00003				EU:00010		EU:00011		EU:00011		Total HAP
	EU: 00001, 00002, 00003				EU: 00001, 00002, 00003				EU: 00001, 00002, 00003				EU:00010		EU:00011		EU:00011		
	Heat Input (MMBtu/hr)				Heat Input (MMBtu/hr)				Heat Input (MMBtu/hr)				5,223		79.8		2,000		
	Acutal Annual Fuel Consumption				Acutal Annual Fuel Consumption				Acutal Annual Fuel Consumption				146		8,760		12		
	Boilers No. 2 Oil		Boilers Natural Gas		Boilers No. 2 Oil		Boilers Natural Gas		Boilers No. 2 Oil		Boilers Natural Gas		PLM Engines		Turbines & Duct Burner		Black Start Generator		
	(lb/10 <sup>3</sup> Gal)	tons/yr	(lb/10 <sup>6</sup> scf)	tons/yr	(lb/10 <sup>3</sup> Gal)	tons/yr	(lb/10 <sup>6</sup> scf)	tons/yr	(lb/10 <sup>3</sup> Gal)	tons/yr	(lb/10 <sup>6</sup> scf)	tons/yr	(lb/MMBtu)	tons/yr	(lb/MMBtu)	tons/yr	(lb/MMBtu)	tons/yr	tons/yr
Acetaldehyde	--	0.000	--	0.000	--	0.000	--	0.000	--	0.000	--	0.000	2.52E-05	0.0001	4.00E-05	0.01	2.52E-05	0.000	0.014
Acrolein	--	0.000	--	0.000	--	0.000	--	0.000	--	0.000	--	0.000	7.88E-06	0.0000	6.40E-06	0.002	7.88E-06	0.000	0.002
Benzene	0.000214	0.000	2.10E-03	0.001	0.000214	0.000	2.10E-03	0.000	0.000214	0.000	2.10E-03	0.000	7.76E-04	0.0032	1.20E-05	0.004	7.76E-04	0.000	0.009
1,3-Butadiene	--	0.000	--	0.000	--	0.000	--	0.000	--	0.000	--	0.000	--	0.0000	4.30E-07	0.000	--	0.000	0.000
Ethylbenzene	6.36E-05	0.000	--	0.000	6.36E-05	0.000	--	0.000	6.36E-05	0.000	--	0.000	--	0.0000	--	0.000	--	0.000	0.000
Formaldehyde	0.033	0.000	7.50E-02	0.025	0.033	0.002	7.50E-02	0.006	0.033	0.001	7.50E-02	0.005	7.89E-05	0.0003	--	0.000	7.89E-05	0.000	0.040
Hexane	--	0.000	1.80E+00	0.603	--	0.000	1.80E+00	0.148	--	0.000	1.80E+00	0.124	--	0.0000	--	0.000	--	0.000	0.875
Methyl chloroform (1,1,1-Trichloroethane)	2.36E-04	0.000	--	0.000	2.36E-04	0.000	--	0.000	2.36E-04	0.000	--	0.000	--	0.0000	--	0.000	--	0.000	0.000
Naphthalene	0.00113	0.000	6.10E-04	0.000	0.00113	0.000	6.10E-04	0.000	0.00113	0.000	6.10E-04	0.000	1.30E-04	0.0005	1.30E-06	0.000	1.30E-04	0.000	0.001
Propylene oxide	--	0.000	--	0.000	--	0.000	--	0.000	--	0.000	--	0.000	--	0.0000	2.90E-05	0.010	--	0.000	0.010
Toluene	0.0062	0.000	3.40E-03	0.001	0.0062	0.000	3.40E-03	0.000	0.0062	0.000	3.40E-03	0.000	2.81E-04	0.0012	1.30E-04	0.045	2.81E-04	0.000	0.049
Xylenes (isomers and mixture)	--	0.000	--	0.000	--	0.000	--	0.000	--	0.000	--	0.000	1.93E-04	0.0008	6.40E-05	0.022	1.93E-04	0.000	0.023
o-Xylenes	0.000109	0.000	--	0.000	0.000109	0.000	--	0.000	0.000109	0.000	--	0.000	--	0.0000	--	0.000	--	0.000	0.000
PAH	--	0.000	--	0.000	--	0.000	--	0.000	--	0.000	--	0.000	--	0.0000	2.20E-06	0.001	--	0.000	0.001
		<b>0.00</b>		<b>0.63</b>		<b>0.00</b>		<b>0.15</b>		<b>0.00</b>		<b>0.13</b>		<b>0.01</b>		<b>0.10</b>		<b>0.00</b>	<b>Total HAP 1.02</b>

NG HHV: 1030 Btu/scf  
#2 Oil HHV: 138 mmBtu/1000 gal

## NYC-DOC-Rikers Island Natural Gas Emission Factors

### EPA Emission factors--(Federal Register EPA, April 1, 2021)

[https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors\\_apr2021.pdf](https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors_apr2021.pdf)

Natural Gas	
CH4	1.00 g/MMBtu
N2O	0.10 g/MMBtu
CO2	53,060 g/MMBtu
CH4	0.00103 g/scf
N2O	0.00010 g/scf
CO2	54.44 g/scf

CO2e	5.317E-02	metric ton/MMBtu
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CO2e	5.455E-05	metric ton/scf
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[https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors\\_apr2021.pdf](https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors_apr2021.pdf)

Natural Gas Heating Value	
	1,020 btu/scf

### NYSDEC Upstream Emission Factor

Table 1. Current Upstream and Out-of-State Emission Factors for Imported Fossil Fuels

Natural Gas as Stationary Fuels	
CH4	357.000 g/MMBtu
N2O	0.140 g/MMBtu
CO2	12,131 g/MMBtu

Natural Gas as Stationary Fuels		
CH4	0.0004	metric ton/MMBtu
N2O	0.0000	metric ton/MMBtu
CO2	0.0121	metric ton/MMBtu
	0.0422	metric ton/MMBtu
CO2e	42.9991	metric ton/MMscf

NYSDEC, *Appendix A of the 2021 Statewide GHG Emission Report. January 2022*

## NYC-DOC-Rikers Island Number 2 Fuel Oil Emission Factors

### EPA Emission factors--(Federal Register EPA, April 1, 2021)

[https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors\\_apr2021.pdf](https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors_apr2021.pdf)

Distillate Fuel Oil 2	
CH4	3.00 g/MMBtu
N2O	0.60 g/MMBtu
CO2	73,960 g/MMBtu
CH4	0.41000 g/gal
N2O	0.08000 g/gal
CO2	10,210.00 g/gal

CO2e	7.437E-02	metric ton/MMBtu
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CO2e	1.027E-02	metric ton/gal
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[https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors\\_apr2021.pdf](https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors_apr2021.pdf)

No 2 Fuel Oil HHV
140,000 btu/gal

### NYSDEC Upstate Emission Factor

Table 1. Current Upstream and Out-of-State Emission Factors for Imported Fossil Fuels

Conv. Diesel	
CH4	121.000 g/MMBtu
N2O	0.260 g/MMBtu
CO2	15,164.000 g/MMBtu

Conv. Diesel	
CH4	0.0001 metric ton/MMBtu
N2O	0.0000 metric ton/MMBtu
CO2	0.0152 metric ton/MMBtu
CO2e	0.0254 metric ton/MMBtu
	3.5555 metric ton/1,000 gal

NYSDEC, *Appendix A of the 2021 Statewide GHG Emission Report. January 2022*



## NYC-DOC-Rikers Island Number 6 Fuel Oil Emission Factors

### EPA Emission factors--(Federal Register EPA, April 1, 2021)

[https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors\\_apr2021.pdf](https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors_apr2021.pdf)

Residual Fuel Oil 6	
CH4	3.00 g/MMBtu
N2O	0.60 g/MMBtu
CO2	75,100 g/MMBtu
CH4	0.45000 g/gal
N2O	0.09000 g/gal
CO2	11,270.00 g/gal

CO2e	7.551E-02	metric ton/MMBtu
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CO2e	1.133E-02	metric ton/gal
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[https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors\\_apr2021.pdf](https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors_apr2021.pdf)

No 6 Fuel Oil HHV
150,000 btu/gal

### NYSDEC Upstate Emission Factor

Table 1. Current Upstream and Out-of-State Emission Factors for Imported Fossil Fuels

Resid. Diesel	
CH4	121.000 g/MMBtu
N2O	0.260 g/MMBtu
CO2	15,164.000 g/MMBtu

Resid. Diesel	
CH4	0.0001 metric ton/MMBtu
N2O	0.0000 metric ton/MMBtu
CO2	0.0152 metric ton/MMBtu
CO2e	0.0254 metric ton/MMBtu
	3.8095 metric ton/1,000 gal

NYSDEC, *Appendix A of the 2021 Statewide GHG Emission Report. January 2022*

## NYC-DOC-Rikers Island Global Warming Potentials

	GWP
CH4	84
N2O	264
CO2	1

6 NYCRR 496.5