

Table 2 - LNB/OFA Installed in 2011 (No SDA//FF or SCR)

Year	NOx		SO2		PM		Total Annual Aggregate	Total Cumulative
	lb/MMBTU ^a	Tons ^d	lb/MMBTU ^b	Tons ^d	lb/MMBTU ^c	Tons ^d		
1st half of 2011	0.45	5,937	0.60	7,916	0.04	528	14,380	14,380
LNB/OFA Installed								
2nd half of 2011	0.23	3,034	0.60	7,916	0.04	528	11,478	25,857
2012	0.23	6,069	0.60	15,831	0.04	1,055	22,955	48,812
2013	0.23	6,069	0.60	15,831	0.04	1,055	22,955	71,768
2014	0.23	6,069	0.60	15,831	0.04	1,055	22,955	94,723
2015	0.23	6,069	0.60	15,831	0.04	1,055	22,955	117,678
2016	0.23	6,069	0.60	15,831	0.04	1,055	22,955	140,633
2017	0.23	6,069	0.60	15,831	0.04	1,055	22,955	163,588
2018	0.23	6,069	0.60	15,831	0.04	1,055	22,955	186,543
2019	0.23	6,069	0.60	15,831	0.04	1,055	22,955	209,498
2020	0.23	6,069	0.60	15,831	0.04	1,055	22,955	232,453
Proposed Shutdown								
2021	0.23	6,069	0.60	15,831	0.04	1,055	22,955	255,408
2022	0.23	6,069	0.60	15,831	0.04	1,055	22,955	278,363
2023	0.23	6,069	0.60	15,831	0.04	1,055	22,955	301,318
2024	0.23	6,069	0.60	15,831	0.04	1,055	22,955	324,273
2025	0.23	6,069	0.60	15,831	0.04	1,055	22,955	347,228
2026	0.23	6,069	0.60	15,831	0.04	1,055	22,955	370,183
2027	0.23	6,069	0.60	15,831	0.04	1,055	22,955	393,138
2028	0.23	6,069	0.60	15,831	0.04	1,055	22,955	416,093
2029	0.23	6,069	0.60	15,831	0.04	1,055	22,955	439,048
2030	0.23	6,069	0.60	15,831	0.04	1,055	22,955	462,003
2031	0.23	6,069	0.60	15,831	0.04	1,055	22,955	484,959
2032	0.23	6,069	0.60	15,831	0.04	1,055	22,955	507,914
2033	0.23	6,069	0.60	15,831	0.04	1,055	22,955	530,869
2034	0.23	6,069	0.60	15,831	0.04	1,055	22,955	553,824
2035	0.23	6,069	0.60	15,831	0.04	1,055	22,955	576,779
2036	0.23	6,069	0.60	15,831	0.04	1,055	22,955	599,734
2037	0.23	6,069	0.60	15,831	0.04	1,055	22,955	622,689
2038	0.23	6,069	0.60	15,831	0.04	1,055	22,955	645,644
2039	0.23	6,069	0.60	15,831	0.04	1,055	22,955	668,599
2040	0.23	6,069	0.60	15,831	0.04	1,055	22,955	691,554

Calculations:

(a) NOx emission rate (lb/MMBTU) = [2007 NOx emissions (tons)] / [2007 annual heat input (MMBtu)] * 2000

2007 NOx emissions (tons) = 10,656 (1)

2007 Heat Input (MMBtu) = 46,913,216 (2)

(b) SO2 emission rate (lb/MMBTU) = [2007 SO2 emissions (tons)] / [2007 annual heat input (MMBtu)] * 2000

2007 SO2 emissions (tons) = 14,037 (1)

2007 Heat Input (MMBtu) = 46,913,216 (2)

(c) PM emission rate (lb/MMBTU) = [2007 PM emissions (tons)] / [2007 annual heat input (MMBtu)] * 2000

2007 PM emissions (tons) = 853 (1)

2007 Heat Input (MMBtu) = 46,913,216 (2)

(d) Annual emissions (tons/yr) = [emission rate (lb/MMBTU)] * [2007 hourly heat input (MMBTU/hr)] * [future operating hours (hours)] / 2000

2007 Heat Input (MMBTU/hr) = 6,024 (3)

Future Operating Hours = 8,760

Notes:

(1) Portland General Electric's 2007 Annual Title V Report

(2) US EPA Clean Air Markets

(3) Based on US EPA Clean Air Markets reported annual heat input / 2007 annual operating hours (7,787)

Table 3 - LNB/OFA Installed in 2011, SDA/FF Installed in 2014 (No SCR)

Year	NOx		SO2		PM		Total Annual Aggregate	Total Cumulative
	lb/MMBTU ^a	Tons ^d	lb/MMBTU ^b	Tons ^d	lb/MMBTU ^c	Tons ^d		
1st half of 2011	0.45	5,937	0.60	7,916	0.04	528	14,380	14,380
LNB/OFA Installed								
2nd half of 2011	0.23	3,034	0.60	7,916	0.04	528	11,478	25,857
2012	0.23	6,069	0.60	15,831	0.04	1,055	22,955	48,812
2013	0.23	6,069	0.60	15,831	0.04	1,055	22,955	71,768
1st half of 2014	0.23	3,034	0.60	7,916	0.04	528	11,478	83,245
SDA/FF Installed								
Second half of 2014	0.23	3,034	0.12	1,583	0.012	158	4,776	88,021
2015	0.23	6,069	0.12	3,166	0.012	317	9,551	97,572
2016	0.23	6,069	0.12	3,166	0.012	317	9,551	107,124
2017	0.23	6,069	0.12	3,166	0.012	317	9,551	116,675
2018	0.23	6,069	0.12	3,166	0.012	317	9,551	126,226
2019	0.23	6,069	0.12	3,166	0.012	317	9,551	135,778
2020	0.23	6,069	0.12	3,166	0.012	317	9,551	145,329
2021	0.23	6,069	0.12	3,166	0.012	317	9,551	154,881
2022	0.23	6,069	0.12	3,166	0.012	317	9,551	164,432
2023	0.23	6,069	0.12	3,166	0.012	317	9,551	173,983
2024	0.23	6,069	0.12	3,166	0.012	317	9,551	183,535
2025	0.23	6,069	0.12	3,166	0.012	317	9,551	193,086
2026	0.23	6,069	0.12	3,166	0.012	317	9,551	202,638
2027	0.23	6,069	0.12	3,166	0.012	317	9,551	212,189
2028	0.23	6,069	0.12	3,166	0.012	317	9,551	221,741
2029	0.23	6,069	0.12	3,166	0.012	317	9,551	231,292
Proposed Shutdown								
2030	0.23	6,069	0.12	3,166	0.012	317	9,551	240,843
2031	0.23	6,069	0.12	3,166	0.012	317	9,551	250,395
2032	0.23	6,069	0.12	3,166	0.012	317	9,551	259,946
2033	0.23	6,069	0.12	3,166	0.012	317	9,551	269,498
2034	0.23	6,069	0.12	3,166	0.012	317	9,551	279,049
2035	0.23	6,069	0.12	3,166	0.012	317	9,551	288,600
2036	0.23	6,069	0.12	3,166	0.012	317	9,551	298,152
2037	0.23	6,069	0.12	3,166	0.012	317	9,551	307,703
2038	0.23	6,069	0.12	3,166	0.012	317	9,551	317,255
2039	0.23	6,069	0.12	3,166	0.012	317	9,551	326,806
2040	0.23	6,069	0.12	3,166	0.012	317	9,551	336,358

Calculations:

(a) NOx emission rate (lb/MMBTU) = [2007 NOx emissions (tons)] / [2007 annual heat input (MMBtu)] * 2000

2007 NOx emissions (tons) = 10,656 (1)
 2007 Heat Input (MMBtu) = 46,913,216 (2)

(b) SO2 emission rate (lb/MMBTU) = [2007 SO2 emissions (tons)] / [2007 annual heat input (MMBtu)] * 2000

2007 SO2 emissions (tons) = 14,037 (1)
 2007 Heat Input (MMBtu) = 46,913,216 (2)

(c) PM emission rate (lb/MMBTU) = [2007 PM emissions (tons)] / [2007 annual heat input (MMBtu)] * 2000

2007 PM emissions (tons) = 853 (1)
 2007 Heat Input (MMBtu) = 46,913,216 (2)

(d) Annual emissions (tons/yr) = [emission rate (lb/MMBTU)] * [2007 hourly heat input (MMBTU/hr)] * [future operating hours (hours)] / 2000

2007 Heat Input (MMBTU/hr) = 6,024 (3)
 Future Operating Hours = 8,760

Notes:

- (1) Portland General Electric's 2007 Annual Title V Report
- (2) US EPA Clean Air Markets
- (3) Based on US EPA Clean Air Markets reported annual heat input / 2007 annual operating hours (7,787)

Table 4 - LNB/OFA Installed in 2011, SDA/FF Installed in 2014, and SCR Installed in 2017

Year	NOx		SO2		PM		Total Annual Aggregate	Total Cumulative
	lb/MMBTU ^a	Tons ^d	lb/MMBTU ^b	Tons ^d	lb/MMBTU ^c	Tons ^d		
1st half of 2011	0.45	5,937	0.60	7,916	0.04	528	14,380	14,380
LNB/OFA Installed								
2nd half of 2011	0.23	3,034	0.60	7,916	0.04	528	11,478	25,857
2012	0.23	6,069	0.60	15,831	0.04	1,055	22,955	48,812
2013	0.23	6,069	0.60	15,831	0.04	1,055	22,955	71,768
1st half of 2014	0.23	3,034	0.60	7,916	0.04	528	11,478	83,245
SDA/FF Installed								
Second half of 2014	0.23	3,034	0.12	1,583	0.012	158	4,776	88,021
2015	0.23	6,069	0.12	3,166	0.012	317	9,551	97,572
2016	0.23	6,069	0.12	3,166	0.012	317	9,551	107,124
1st half of 2017	0.23	3,034	0.12	1,583	0.012	158	4,776	111,899
SCR Installed								
2nd half of 2017	0.07	923	0.12	1,583	0.012	158	2,665	114,564
2018	0.07	1,847	0.12	3,166	0.012	317	5,330	119,894
2019	0.07	1,847	0.12	3,166	0.012	317	5,330	125,224
2020	0.07	1,847	0.12	3,166	0.012	317	5,330	130,554
2021	0.07	1,847	0.12	3,166	0.012	317	5,330	135,883
2022	0.07	1,847	0.12	3,166	0.012	317	5,330	141,213
2023	0.07	1,847	0.12	3,166	0.012	317	5,330	146,543
2024	0.07	1,847	0.12	3,166	0.012	317	5,330	151,873
2025	0.07	1,847	0.12	3,166	0.012	317	5,330	157,203
2026	0.07	1,847	0.12	3,166	0.012	317	5,330	162,532
2027	0.07	1,847	0.12	3,166	0.012	317	5,330	167,862
2028	0.07	1,847	0.12	3,166	0.012	317	5,330	173,192
2029	0.07	1,847	0.12	3,166	0.012	317	5,330	178,522
2030	0.07	1,847	0.12	3,166	0.012	317	5,330	183,852
2031	0.07	1,847	0.12	3,166	0.012	317	5,330	189,181
2032	0.07	1,847	0.12	3,166	0.012	317	5,330	194,511
2033	0.07	1,847	0.12	3,166	0.012	317	5,330	199,841
2034	0.07	1,847	0.12	3,166	0.012	317	5,330	205,171
2035	0.07	1,847	0.12	3,166	0.012	317	5,330	210,500
2036	0.07	1,847	0.12	3,166	0.012	317	5,330	215,830
2037	0.07	1,847	0.12	3,166	0.012	317	5,330	221,160
2038	0.07	1,847	0.12	3,166	0.012	317	5,330	226,490
2039	0.07	1,847	0.12	3,166	0.012	317	5,330	231,820
2040	0.07	1,847	0.12	3,166	0.012	317	5,330	237,149

Calculations:

(a) NOx emission rate (lb/MMBTU) = [2007 NOx emissions (tons)] / [2007 annual heat input (MMBtu)] * 2000

2007 NOx emissions (tons) = 10,656 (1)

2007 Heat Input (MMBtu) = 46,913,216 (2)

(b) SO2 emission rate (lb/MMBTU) = [2007 SO2 emissions (tons)] / [2007 annual heat input (MMBtu)] * 2000

2007 SO2 emissions (tons) = 14,037 (1)

2007 Heat Input (MMBtu) = 46,913,216 (2)

(c) PM emission rate (lb/MMBTU) = [2007 PM emissions (tons)] / [2007 annual heat input (MMBtu)] * 2000

2007 PM emissions (tons) = 853 (1)

2007 Heat Input (MMBtu) = 46,913,216 (2)

(d) Annual emissions (tons/yr) = [emission rate (lb/MMBTU)] * [2007 hourly heat input (MMBTU/hr)] * [future operating hours (hours)] / 2000

2007 Heat Input (MMBTU/hr) = 6,024 (3)

Future Operating Hours = 8,760

Notes:

(1) Portland General Electric's 2007 Annual Title V Report

(2) US EPA Clean Air Markets

(3) Based on US EPA Clean Air Markets reported annual heat input / 2007 annual operating hours (7,787)