

DRAFT

Updates for Table 2: Plant Typical Emission (pounds per million Btu) - Baseload Coal Options only

NOx Emissions (lb/MMBtu)

Type of Plant	NOx (CNF Report)	NOx ¹	NOx ²
<i>Pulverized Coal</i>		0.067	0.07
Sub-critical	0.08		
Super-critical	0.08		
<i>Fluidized Bed</i>	0.10	0.07	0.07
<i>IGCC</i>	0.06	0.075	0.05

1 Technology Transfer Network Clean Air Technology Center RACT/BACT/LAER Clearinghouse - Lowest Emission Rate search (http://cfpub.epa.gov/rblc/cfm/menu_search.cfm).

IGCC is Tampa Electric Co., Polk Power, NOx is estimated from 15 ppmvd/15% O₂ in the Clearinghouse and is not a BACT determination.

2 Common BACT number. IGCC is a representative emission number from a Black & Veatch presentation to the DEQ (Overview of Coal-Fueled Intergrated Gasification Combined Cycle (IGCC) and Pulverized Coal (PC) Power Plants, 11/2/06).

SOx Emissions (lb/MMBtu)

Type of Plant	SO ₂ (CNF Report)	SOx ¹	SOx ²
<i>Pulverized Coal</i>		0.10	0.065-0.086
Sub-critical	0.05		
Super-critical	0.05		
<i>Fluidized Bed</i>	0.02	0.14	
<i>IGCC</i>	0.03	0.17	0.043

1 Technology Transfer Network Clean Air Technology Center RACT/BACT/LAER Clearinghouse - Lowest Emission Rate search (http://cfpub.epa.gov/rblc/cfm/menu_search.cfm). Only three entries. IGCC is Tampa Electric Co., Polk Power.

2 Presentation "Environmental Footprints of IGCC and PC Plants - An Update", Workshop on Gasification Technologies, March 2 - 3, 2006, Tampa Florida, by Sikander R. Khan, US EPA.

PC numbers are subbituminous for the low end and bituminous for the high end.

Particulate (PM) Emissions (lb/MMBtu)

Type of Plant	PM (CNF Report)	PM ¹	PM10 ¹	PM/PM10 ²
<i>Pulverized Coal</i>		0.012	0.012	0.012
Sub-critical	0.015			
Super-critical	0.015			
<i>Fluidized Bed</i>	0.02	0.015	0.01	
<i>IGCC</i>	0.006	0.013		0.007

1 Technology Transfer Network Clean Air Technology Center RACT/BACT/LAER Clearinghouse - Lowest Emission Rate search (http://cfpub.epa.gov/rblc/cfm/menu_search.cfm). IGCC is Tampa Electric Co., Polk Power.

2 Presentation "Environmental Footprints of IGCC and PC Plants - An Update", Workshop on Gasification Technologies, March 2 - 3, 2006, Tampa Florida, by Sikander R. Khan, US EPA.

Carbon Monoxide (CO) Emissions (lb/MMBtu)

Type of Plant	CO (CNF Report)	CO ¹	CO ²
<i>Pulverized Coal</i>		0.05	0.10
Sub-critical	--		
Super-critical	--		
<i>Fluidized Bed</i>	--	0.10	
<i>IGCC</i>	--	0.06	0.03

1 Technology Transfer Network Clean Air Technology Center RACT/BACT/LAER Clearinghouse - Lowest Emission Rate search (http://cfpub.epa.gov/rblc/cfm/menu_search.cfm). IGCC is Tampa Electric Co., Polk Power. CO is based on 25 ppmvd/15% O2 in the Clearinghouse.

2 Presentation "Environmental Footprints of IGCC and PC Plants - An Update", Workshop on Gasification Technologies, March 2 - 3, 2006, Tampa Florida, by Sikander R. Khan, US EPA.

Carbon Dioxide (CO₂) Emissions (lb/MMBtu)

Type of Plant	CO ₂ (CNF Report)	CO ₂ ¹	CO ₂ ²
<i>Pulverized Coal</i>		NA	205.45-212.58
Sub-critical	201		
Super-critical	201		
with carbon capture (older processes)			
with carbon capture (new processes)			
with Oxy combustion			
<i>Fluidized Bed</i>	200	NA	
<i>IGCC</i>	195	NA	205.45
<i>IGCC with capture</i>			

1 Technology Transfer Network Clean Air Technology Center RACT/BACT /LAER Clearinghouse - Lowest Emission Rate search (http://cfpub.epa.gov/rblc/cfm/menu_search.cfm).

2 "Climate Change and Power: Carbon Dioxide Emissions Costs and Electricity Resource Planning," L. Johnston, E. Hausman, A. Sommer, B. Biewald, T. Wolf, D. Schlissel, A. Roschell, D. White, Synapse Energy Economics, Inc., May 18, 2006.

PC numbers are bituminous for the low end and subbituminous for the high end.

Mercury (Hg) Emissions (lb/MMBtu)

Type of Plant	Hg (CNF Report)	Hg ¹	Hg ²
<i>Pulverized Coal</i>		NA	0.42 - 0.76E-06
Sub-critical	1.22E-06		
Super-critical	1.22E-06		
<i>Fluidized Bed</i>	1.22E-06	NA	
<i>IGCC</i>	8.05E-07	NA	7.60E-07

1 Technology Transfer Network Clean Air Technology Center RACT/BACT/LAER Clearinghouse - Lowest Emission Rate search (http://cfpub.epa.gov/rblc/cfm/menu_search.cfm).

2 Presentation "Environmental Footprints of IGCC and PC Plants - An Update", Workshop on Gasification Technologies, March 2 - 3, 2006, Tampa Florida, by Sikander R. Khan, US EPA.

PC numbers are subbituminous for the low end and bituminous for the high end.

Carbon Capture and Storage Potential

% reduction	commercial av.	capture cost
		DOE goal to demonstrate 4 different technologies to achieve 90% capture at less than 10% increase in cost by 2012.
85% reduction	5 yrs	\$45/t up
90% capture?	5 yrs	\$10/t up
near 100% capture	5-10 yrs	\$12/t up
86% reduction	now	\$15/t up

3 "Carbon capture and storage" IPCC 2003 (% reduction).

4 "Carbon sequestration: Technology roadmap and program plan" NETL, May 2005.

5 "Canada's Carbon Dioxide Capture and Storage Technology Roadmap", Nat. Resources Canada 2006.

6 Remarks of Frank Alix, CEO Powerspan, at 2005 Clean Coal and Power Conference.