

4 CSR 240-22.040 Appendix A Fossil Characterization Table

Characterization Parameters	Capacity / Performance				Cost Estimates (2007)										Fuel Assumptions			Characteristics				
	Net Plant Output, MW (Cool Day)	Net Plant Output, MW (Hot Day)	Full Load Net Plant Heat Rate HHV, Btu/kWh (Cool Day)	Full Load Net Plant Heat Rate HHV, Btu/kWh (Hot Day)	EPC Capital Cost, \$1,000	Capital Cost, \$/kW	Total Project Cost -Included Assumed Owners Cost, \$1,000	Total Project Cost -Included Assumed Owners Cost, \$/kW	First Year Fixed O&M Cost, \$1,000	First Year Fixed O&M Cost, \$/kW-yr	First Year Variable O&M Cost, \$1,000	First Year Variable O&M Cost, \$/MWh	Permitting Costs, \$1,000	Assumed Fuel Type / Source	First Year Fuel Cost, \$/MBtu	Fuel Flexibility	Technology Maturity	Permitting & Development, months	NTP to CO2, months	Assumed Annual Capacity Factor, percentage	EFOR, percentage	EFORd, percentage
Screened Fossil Technologies																						
Conventional Baseload Technologies																						
Atmospheric Bubbling Fluidized Bed BFB - 50 MW	50	49	11,400	11,510	161,000	3,210	225,000	4,500	5,900	118	1,540	4.14	950 - 1,800	PRB	1.75	Yes	Mature	24 to 30	40	85%	9%	9%
Atmospheric Circulating Fluidized Bed CFB 2x250 MW	500	494	9,560	9,630	949,000	1,900	1,329,000	2,660	12,710	25.4	8,750	2.35	950 - 1,800	PRB	1.75	Yes	Mature	24 to 36	46	85%	9%	9%
Subcritical PC SPC - 500 MW	500	494	9,340	9,410	894,000	1,790	1,252,000	2,500	10,980	22.0	7,150	1.92	950 - 1,800	PRB	1.75	Limited	Mature	24 to 36	49	85%	7%	7%
Supercritical PC SCPC - 500 MW	500	492	9,050	9,140	922,000	1,840	1,291,000	2,580	11,070	22.1	7,560	2.03	950 - 1,800	PRB	1.80	Limited	Mature	24 to 36	54	85%	8%	8%
SCPC - 850 MW	850	837	8,960	9,050	1,420,000	1,670	1,988,000	2,340	14,310	16.8	11,840	1.87	950 - 1,800	PRB	1.80	Limited	Mature	24 to 36	57	85%	8%	8%
SCPC - 850 MW w/ CCC	850	837	12,010	12,130	2,975,000	3,500	4,165,000	4,900	22,200	26.1	34,800	5.50	950 - 1,800	PRB	1.80	Limited	Developing	24 to 36	63	85%	10%	10%
SCPC - 850 MW - IL	850	837	8,770	8,860	1,340,000	1,580	1,876,000	2,210	14,840	17.5	16,576	2.62	950 - 1,800	Illinois	2.00	Limited	Mature	24 to 36	59	85%	8%	8%
Advancing Baseload Technologies																						
Advanced/Ultra Supercritical PC USPC - 850 MW	850	837	8,820	8,920	1,464,000	1,720	2,050,000	2,410	14,430	17.0	12,530	1.98	950 - 1,800	PRB	1.80	Limited	Developing	24 to 36	57	85%	9%	9%
USPC - 850 MW - IL	850	837	8,630	8,730	1,382,000	1,630	1,935,000	2,280	14,960	17.6	17,540	2.77	950 - 1,800	Illinois	2.00	Limited	Developing	24 to 36	59	85%	9%	9%
Integrated Gasification Combined Cycle IGCC - 2x1 600 MW, Shell	580	539	8,800	9,330	1,350,000	2,330	2,025,000	3,490	16,100	27.8	27,680	6.81	950 - 1,550	PRB	1.80	Limited	Developing	24 to 30	53	80%	13%	13%
IGCC - 2x1 600 MW, Shell w/ CCC	580	539	10,520	11,150	1,822,500	3,140	2,734,000	4,710	16,600	28.6	29,500	7.26	950 - 1,550	PRB	1.80	Limited	Developing	24 to 30	59	80%	14%	14%
IGCC - 2x1 600 MW, Shell - IL	586	545	8,660	9,180	1,300,000	2,220	1,950,000	3,330	16,100	27.5	32,030	7.80	950 - 1,550	Illinois	2.00	Limited	Developing	24 to 30	53	80%	13%	13%
Oxyfuel Combustion OxyComb - 850 MW	850	837	12,450	12,570	2,554,000	3,000	3,831,000	4,510	18,690	22.0	29,310	4.80	950 - 1,800	PRB	1.80	Limited	Developing	24 to 36	60	82%	11%	11%
OxyComb - 850 MW w/ CCC	850	837	14,350	14,490	2,870,000	3,380	4,305,000	5,060	23,760	28.0	37,240	6.10	950 - 1,800	PRB	1.80	Limited	Developing	24 to 36	62	82%	12%	12%
Supercritical CFB SCCFB 500 MW	500	492	9,260	9,350	1,014,000	2,030	1,521,000	3,040	12,810	25.6	8,520	2.29	950 - 1,800	PRB	1.80	Yes	Developing	24 to 36	51	85%	10%	10%
Pressurized Bubbling Fluidized Bed Combustion PBFB - 250 MW	250	245	8,700	8,870	670,000	2,680	1,005,000	4,020	9,030	36.1	14,200	8.11	950 - 1,800	PRB	1.80	Limited	Developing	24 to 36	53	80%	13%	13%
Intermediate Load Technologies																						
Combined Cycle Combustion Turbine 1x1 GE 7EA	125	115	7,730	7,760	138,000	1,200	179,400	1,560	2,270	19.7	1,910	4.21	650 - 1,250	Natural Gas	7.5	Yes	Mature	14 to 18	30	45%	4%	3%
1x1 GE 7FA	250	230	6,920	6,960	183,000	796	237,900	1,030	2,560	11.1	4,010	4.42	650 - 1,250	Natural Gas	7.5	Yes	Mature	14 to 18	30	45%	4%	3%
2x1 GE 7FA	505	470	6,900	6,940	299,000	636	388,700	830	3,200	6.81	7,990	4.31	650 - 1,250	Natural Gas	7.5	Yes	Mature	14 to 18	31	45%	4%	3%
Combined Cycle Reciprocating Engine 1x1 Wartsila 12V46	12	11.4	8,420	8,710	28,900	2,410	37,600	3,130	516	43.0	255	5.40	650 - 1,000	Diesel	10.5	Yes	Mature	14 to 18	27	45%	5%	4%
2x1 Wartsila 12V46	24	22.8	8,410	8,700	47,200	1,970	61,400	2,560	624	26.0	511	5.40	650 - 1,000	Diesel	10.5	Yes	Mature	14 to 18	28	45%	5%	4%
1x1 Wartsila 18V46	18.6	17.7	8,420	8,710	33,200	1,780	43,200	2,320	521	28.0	337	4.60	650 - 1,000	Diesel	10.5	Yes	Mature	14 to 18	27	45%	5%	4%
Cheng Cycle Cheng Cycle - 7EA	108	96	9,400	9,720	74,900	780	97,400	1,010	1,810	18.9	1,410	3.72	650 - 1,000	Natural Gas	7.5	Yes	Developing	14 to 18	25	45%	4%	7%
Thermal Steam Boiler TSB - 250 MW	250	247	9,400	9,470	349,000	1,396	453,700	1,810	5,798	23.2	1,230	1.27	650 - 1,250	Natural Gas	7.5	Yes	Mature	14 to 18	40	45%	3%	6%
Peaking Load Technologies																						
Simple Cycle Combustion Turbine GE LM6000PC	40	33	9,750	10,250	39,300	1,190	51,100	1,550	922	27.9	111	3.83	650 - 1,000	Natural Gas	7.5	Yes	Mature	14 to 18	21	10%	14%	5%
GE LMS100	103	92	8,750	9,000	63,500	690	82,600	900	975	10.6	238	2.95	650 - 1,000	Natural Gas	7.5	Yes	Mature	14 to 18	24	10%	14%	5%
GE 7EA	83	74	11,750	12,150	51,800	700	67,300	910	962	13.0	590	9.1	650 - 1,000	Natural Gas	7.5	Yes	Mature	14 to 18	21	10%	17%	5%
GE 7FA	164	151	10,500	10,850	71,900	476	93,500	620	1,018	6.74	1,830	13.8	650 - 1,000	Natural Gas	7.5	Yes	Mature	14 to 18	21	10%	17%	5%
Simple Cycle Reciprocating Engine Wartsila 12V46	11.1	10.5	9,100	9,420	4,900	460	6,400	610	512	48.6	49.9	5.40	650 - 1,000	Diesel	10.5	Yes	Mature	14 to 18	18	10%	15%	6%
Wartsila 18V46	17.2	16.3	9,100	9,420	6,400	390	8,300	510	516	31.6	63.0	4.40	650 - 1,000	Diesel	10.5	Yes	Mature	14 to 18	18	10%	15%	6%

	Environmental Characteristics					Economic Parameters										Levelized Cost of Energy									
Characterization Parameters	NOx, lbm/MBtu	SO2, lbm/MBtu	CO2, lbm/MBtu	PM10, lbm/MBtu	Water Consumption, gal/min	Debt Term, years	Economic Life, years	Owner's Cost, percent	AFUDC Cost, percent	Total Owner's Cost, percent	FOM Escalation Rate, percent	VOM Escalation Rate, percent	Fuel Escalation Rate, percent	Present Worth Discount Rate, percent	Fixed Charge Rate, percent	Levelized Cost of Energy w/o Allowances, \$/MWh	Levelized Cost of Energy w/o Allowances, ¢/kWh	Levelized Allowance Costs, \$/MWh	Levelized Allowance Costs, ¢/kWh	Levelized Cost of Energy w Allowances, \$/MWh	Levelized Cost of Energy w Allowances, ¢/kWh	Levelized Cost of CO2, \$/MWh	Levelized Cost of CO2, ¢/kWh	Levelized Cost of Energy w/ Allowances & CO2, \$/MWh	Levelized Cost of Energy w/ Allowances & CO2, ¢/kWh
Screened Fossil Technologies																									
Conventional Baseload Technologies																									
Atmospheric Bubbling Fluidized Bed BFB - 50 MW	0.06	0.1	212	0.015	450 to 850	40	40	25%	15%	40%	2.5%	2.5%	2.5%	8.90%	13.57%	134	13.4	5.8	0.58	140	14.0	35	3.5	175	16.9
Atmospheric Circulating Fluidized Bed CFB 2x250 MW	0.06	0.1	212	0.015	5,000 - 7,500	40	40	22%	18%	40%	2.5%	2.5%	2.5%	8.90%	13.57%	78	7.8	5.6	0.56	84	8.4	29	2.9	113	10.7
Subcritical PC SPC - 500 MW	0.06	0.1	212	0.015	5,000 - 7,500	40	40	21%	19%	40%	2.5%	2.5%	2.5%	8.90%	13.57%	73	7.3	5.5	0.55	79	7.9	29	2.9	107	10.2
Supercritical PC SCPC - 500 MW	0.06	0.1	212	0.015	5,000 - 7,500	40	40	19%	21%	40%	2.5%	2.5%	2.5%	8.90%	13.57%	75	7.5	5.5	0.55	80	8.0	28	2.8	108	10.3
SCPC - 850 MW	0.06	0.1	212	0.015	8,500 - 12,750	40	40	17%	23%	40%	2.5%	2.5%	2.5%	8.90%	13.57%	69	6.9	5.5	0.55	75	7.5	27	2.7	102	9.7
SCPC - 850 MW w/ CCC	0.06	0.1	21	0.015	13,300 - 20,000	40	40	15%	25%	40%	2.5%	2.5%	2.5%	8.90%	13.57%	129	12.9	5.9	0.59	135	13.5	4	0.4	139	13.3
SCPC - 850 MW - IL	0.06	0.1	205	0.015	8,500 - 12,750	40	40	16%	24%	40%	2.5%	2.5%	2.5%	8.90%	13.57%	70	7.0	5.4	0.54	75	7.5	26	2.6	101	9.6
Advancing Baseload Technologies																									
Advanced/Ultra Supercritical PC USPC - 850 MW	0.06	0.1	212	0.015	8,500 - 12,750	40	40	17%	23%	40%	2.5%	2.5%	2.5%	8.90%	13.57%	70	7.0	5.4	0.54	76	7.6	27	2.7	103	9.7
USPC - 850 MW - IL	0.06	0.1	205	0.015	8,500 - 12,750	40	40	16%	24%	40%	2.5%	2.5%	2.5%	8.90%	13.57%	71	7.1	5.4	0.54	76	7.6	25	2.5	102	9.6
Integrated Gasification Combined Cycle IGCC - 2x1 600 MW, Shell	0.06	0.015	212	0.015	3,600 - 5,400	30	30	29%	21%	50%	2.5%	2.5%	2.5%	8.90%	14.08%	104	10.4	2.3	0.23	106	10.6	27	2.7	133	13.1
IGCC - 2x1 600 MW, Shell w/ CCC	0.06	0.015	21.2	0.015	3,900 - 6,500	30	30	26%	24%	50%	2.5%	2.5%	2.5%	8.90%	14.08%	133	13.3	2.5	0.25	135	13.5	3	0.3	139	13.6
IGCC - 2x1 600 MW, Shell - IL	0.06	0.1	205	0.015	3,600 - 5,400	30	30	29%	21%	50%	2.5%	2.5%	2.5%	8.90%	14.08%	104	10.4	2.6	0.26	106	10.6	26	2.6	132	12.9
Oxyfuel Combustion OxyComb - 850 MW	0.06	0.1	212	0.015	11,800 - 17,700	40	40	26%	24%	50%	2.5%	2.5%	2.5%	8.90%	13.57%	125	12.5	6.0	0.60	131	13.1	38	3.8	169	16.3
OxyComb - 850 MW w/ CCC	0.06	0.1	4	0.015	13,300 - 20,000	40	40	25%	25%	50%	2.5%	2.5%	2.5%	8.90%	13.57%	143	14.3	6.2	0.62	149	14.9	1	0.1	150	14.3
Supercritical CFB SCCFB 500 MW	0.06	0.1	212	0.015	5,000 - 7,500	40	40	30%	20%	50%	2.5%	2.5%	2.5%	8.90%	13.57%	85	8.5	5.5	0.55	90	9.0	28	2.8	119	11.3
Pressurized Bubbling Fluidized Bed Combustion PBFB - 250 MW	0.06	0.1	212	0.015	3,500 - 5,250	30	30	29%	21%	50%	2.5%	2.5%	2.5%	8.90%	13.57%	114	11.4	5.4	0.54	120	12.0	27	2.7	146	14.1
Intermediate Load Technologies																									
Combined Cycle Combustion Turbine 1x1 GE 7EA	0.01	0.0005	117	0.01	600 to 950	30	30	19%	11%	30%	2.5%	2.5%	2.5%	8.90%	13.63%	139	13.9	0.1	0.01	139	13.9	13	1.3	152	15.2
1x1 GE 7FA	0.01	0.0005	117	0.01	1,050 to 1,550	30	30	19%	11%	30%	2.5%	2.5%	2.5%	8.90%	13.63%	111	11.1	0.1	0.01	111	11.1	12	1.2	122	12.2
2x1 GE 7FA	0.01	0.0005	117	0.01	2,050 to 3,050	30	30	18%	12%	30%	2.5%	2.5%	2.5%	8.90%	13.63%	102	10.2	0.1	0.01	102	10.2	12	1.2	114	11.4
Combined Cycle Reciprocating Engine 1x1 Wartsila 12V46	0.7	0.41	160	0.03	up to 100	30	30	20%	10%	30%	2.5%	2.5%	2.5%	8.90%	13.63%	240	24.0	11.1	1.11	252	25.2	19	1.9	271	26.0
2x1 Wartsila 12V46	0.7	0.41	160	0.03	up to 100	30	30	19%	11%	30%	2.5%	2.5%	2.5%	8.90%	13.63%	215	21.5	11.1	1.11	226	22.6	19	1.9	246	23.5
1x1 Wartsila 18V46	0.7	0.41	160	0.03	up to 100	30	30	20%	10%	30%	2.5%	2.5%	2.5%	8.90%	13.63%	207	20.7	11.1	1.11	218	21.8	19	1.9	237	22.6
Cheng Cycle Cheng Cycle - 7EA	0.01	0.0005	117	0.01	520 to 800	30	30	21%	9%	30%	2.5%	2.5%	2.5%	8.90%	13.63%	138	13.8	0.2	0.02	138	13.8	16	1.6	154	15.4
Thermal Steam Boiler TSB - 250 MW	0.06	0.0005	117	0.01	2,500 to 3,750	30	30	15%	15%	30%	2.5%	2.5%	2.5%	8.90%	13.63%	161	16.1	0.9	0.09	162	16.2	16	1.6	177	17.6
Peaking Load Technologies																									
Simple Cycle Combustion Turbine GE LM6000PC	0.1	0.0005	117	0.01	40 to 50	30	30	22%	8%	30%	2.5%	2.5%	2.5%	8.90%	13.63%	383	38.3	1.6	0.16	385	38.5	16	1.6	401	40.0
GE LMS100	0.1	0.0005	117	0.01	210 to 310	30	30	21%	9%	30%	2.5%	2.5%	2.5%	8.90%	13.63%	244	24.4	1.4	0.14	246	24.6	15	1.5	260	25.9
GE 7EA	0.04	0.0005	117	0.01	70 to 110	30	30	22%	8%	30%	2.5%	2.5%	2.5%	8.90%	13.63%	287	28.7	0.8	0.08	288	28.8	20	2.0	307	30.7
GE 7FA	0.04	0.0005	117	0.01	140 to 210	30	30	22%	8%	30%	2.5%	2.5%	2.5%	8.90%	13.63%	226	22.6	0.7	0.07	227	22.7	18	1.8	245	24.4
Simple Cycle Reciprocating Engine Wartsilla 12V46	0.7	0.41	160	0.03	negligible	30	30	23%	7%	30%	2.5%	2.5%	2.5%	8.90%	13.63%	297	29.7	12.0	1.20	309	30.9	21	2.1	330	31.8
Wartsilla 18V46	0.7	0.41	160	0.03	negligible	30	30	23%	7%	30%	2.5%	2.5%	2.5%	8.90%	13.63%	255	25.5	12.0	1.20	267	26.7	21	2.1	288	27.6