APPENDIX D
DETAILED RESULTS

APPENDIX D-4
ELECTRICITY

Electricity Sector Forecast Summary

CEF-NEMS Business As Usual (990811)

demand side efficiency	*Base*	*Base*	*Base*	*Base*	*Base*	*Base*
carbon charge ($/t)	*0*	*0*	*0*	*0*	*0*	*0*
supply side efficiency	*Base*	*Base*	*Base*	*Base*	*Base*	*Base*
	1997	*2000*	*2005*	*2010*	*2015*	*2020*
Electricity Generation (TWh) (no cogeneration)						
Coal	1796	1927	1970	2021	2092	2172
Petroleum	82	98	34	22	20	18
Natural Gas	299	337	628	893	1108	1269
Nuclear Power	629	660	633	579	550	521
Renewables	389	382	400	409	422	442
Hydro	351	322	323	323	324	324
Wind	3	6	7	8	8	9
Biomass	4	14	26	26	27	31
Geothermal	16	15	17	24	34	47
Other	15	24	26	28	30	31
Other	-3	-1	-1	-1	-1	-1
Total	3192	3401	3663	3924	4190	4421
Net Imports	32	43	33	30	27	27
Electricity Cogeneration (TWh)						
Coal	60	58	57	57	57	57
Petroleum	10	8	7	7	7	7
Natural Gas	210	211	214	221	231	233
Other Gaseous Fuels	4	5	5	5	5	5
Renewables	41	48	52	57	61	63
Biomass	33	41	45	50	53	56
MSW	2	2	2	2	2	2
Hydro	6	5	5	5	5	5
Other	4	4	4	4	4	4
Total	328	335	340	352	365	370
Sales to Utilities	183	178	179	180	182	183
Generation for Own Use	146	157	162	172	183	187
Generation Capacity (GW) (no cogeneration)						
Coal Steam	305	305	305	307	311	320
Other Fossil Steam	139	138	102	81	79	77
Combined Cycle	16	27	88	126	164	199
Combustion Turbine/Diesel	78	98	137	149	171	184
Nuclear Power	99	95	87	78	75	72
Renewable	88	90	91	93	95	98
Hydro	78	78	78	79	79	79
Wind	2	3	3	3	3	4
Biomass	2	2	2	2	3	3
Geothermal	3	3	3	4	5	7
Other	4	4	4	5	5	5
Other	20	22	22	22	22	22
Total	744	775	832	855	916	971
Cogeneration Capacity (GW)						
Coal	9	10	10	10	10	10
Petroleum	1	1	2	2	2	2
Natural Gas	33	35	35	36	37	38
Other Gaseous Fuels	1	1	1	1	1	1
Renewables	7	8	8	8	9	9
Biomass	5	6	7	7	7	8
MSW	0	0	0	0	0	0
Hydro	1	1	1	1	1	1
Other	0	0	0	0	0	0
Total	52	55	56	57	59	60
Cumulative Retirements (GW)	15	20	69	101	111	118
Cumulative Additions (GW)	23	59	164	221	291	353

Electricity Sector Forecast Summary

CEF-NEMS Business As Usual (990811)

demand side efficiency	*Base*	*Base*	*Base*	*Base*	*Base*	*Base*
carbon charge ($/t)	*0*	*0*	*0*	*0*	*0*	*0*
supply side efficiency	*Base*	*Base*	*Base*	*Base*	*Base*	*Base*
	1997	*2000*	*2005*	*2010*	*2015*	*2020*
Capacity Factor (excludes cogeneration)						
Coal	67%	72%	74%	75%	77%	77%
Natural Gas and Petroleum	19%	19%	23%	29%	31%	32%
Nuclear Power	72%	79%	83%	85%	84%	83%
Renewables	51%	49%	50%	50%	51%	52%
Hydro	52%	47%	47%	47%	47%	47%
Wind	21%	25%	25%	26%	26%	27%
Biomass	29%	92%	149%	133%	116%	109%
Geothermal	62%	56%	63%	71%	77%	80%
Other	46%	70%	69%	68%	67%	66%
Total	49%	50%	50%	52%	52%	52%
Fuel Consumption (Quadrillion Btu) (no cogeneration)						
Coal	18.6	20.1	20.7	21.2	21.8	22.4
Natural Gas	3.4	3.3	4.9	6.6	7.9	8.8
Distillate	0.1	0.1	0.0	0.0	0.0	0.0
Residual	0.8	1.0	0.3	0.2	0.2	0.2
Nuclear	6.7	7.1	6.8	6.2	5.9	5.6
Renewable	4.4	4.3	4.5	4.8	5.1	5.6
Electricity Imports	0.3	0.4	0.3	0.3	0.3	0.3
Total	34.3	36.2	37.5	39.3	41.2	42.9
Electricity Prices (1997¢/kWh)						
Residential	8.5	7.9	7.7	7.6	7.3	6.9
Commercial	7.6	7.2	6.8	6.5	6.1	5.8
Industrial	4.6	4.4	4.3	4	3.7	3.5
Transportation	5.6	5.4	5.1	4.9	4.7	4.4
Average	6.9	6.6	6.3	6.1	5.8	5.5
Price Components (1997¢/kWh)						
Capital Component	3.6	3.4	3.2	3	2.8	2.6
Fuel Component	1.1	1.1	1.1	1.2	1.2	1.2
O&M Component	2	1.9	1.8	1.8	1.7	1.7
Wholesale Power Cost	0.2	0.2	0.2	0.1	0.1	0.1
Total	6.9	6.6	6.3	6.1	5.8	5.5
Carbon Emissions (MtC)						
Petroleum	17.6	21.6	7.2	4.6	4.1	3.7
Natural Gas	43.8	47.3	70.2	95.4	114	127.1
Coal	471	517.3	531.5	544.8	561.8	577.9
Total	532.4	586.2	608.9	644.8	679.9	708.7
SO2 Emissions (MtSO2)	11.6	10.4	9.5	8.4	8.1	8.2
SO2 Allowance Price	50.95	134.5	143.6	224	154.4	113.6
NOx Emissions (MtNOx)	5.3	4.2	3.6	3.7	3.8	3.8
Electricity Generation Shares by Fuel Type						
Coal	56%	57%	54%	52%	50%	49%
Petroleum	3%	3%	1%	1%	0%	0%
Natural Gas	9%	10%	17%	23%	26%	29%
Nuclear Power	20%	19%	17%	15%	13%	12%
Renewables	12%	11%	11%	10%	10%	10%
Hydro	11%	9%	9%	8%	8%	7%
Wind	0%	0%	0%	0%	0%	0%
Biomass	0%	0%	1%	1%	1%	1%
Geothermal	0%	0%	0%	1%	1%	1%
Other	0%	1%	1%	1%	1%	1%
Other	0%	0%	0%	0%	0%	0%

Electricity Sector Forecast Summary

CEF-NEMS Business As Usual (990811)

demand side efficiency	*Base*	*Base*	*Base*	*Base*	*Base*	*Base*
carbon charge ($/t)	*0*	*0*	*0*	*0*	*0*	*0*
supply side efficiency	*Base*	*Base*	*Base*	*Base*	*Base*	*Base*
	1997	*2000*	*2005*	*2010*	*2015*	*2020*
Cumulative Planned Additions (GW)						
Advanced Coal	0.0	0.0	0.0	0.0	0.0	0.0
Conventional Coal	0.1	0.9	1.4	1.4	1.4	1.4
Other Fossil Steam	0.1	0.1	0.1	0.1	0.1	0.1
Advanced Combined Cycle	0.0	0.0	0.0	0.0	0.0	0.0
Conventional Combined Cycle	0.7	2.0	5.3	5.3	5.3	5.3
Advanced Combustion Turbine/Diesel	0.0	0.0	0.0	0.0	0.0	0.0
Conventional Combustion Turbine/Diesel	1.5	6.7	18.6	18.6	18.6	18.6
Nuclear Power	0.0	0.0	0.0	0.0	0.0	0.0
Pumped Storage	0.0	2.0	2.0	2.0	2.0	2.0
Fuel Cells	0.0	0.0	0.0	0.0	0.0	0.0
Renewable Sources	0.1	1.6	2.5	2.8	2.8	2.8
Total	2.5	13.3	29.8	30.1	30.2	30.2
Cumulative Unplanned Additions (GW)						
Advanced Coal	0.0	0.0	0.3	2.4	6.5	15.4
Conventional Coal	0.0	0.0	0.9	1.7	2.5	3.2
Other Fossil Steam	0.0	0.0	0.0	0.0	0.0	0.0
Advanced Combined Cycle	0.0	5.1	61.1	99.6	137.4	172.6
Conventional Combined Cycle	0.0	4.2	5.7	5.7	5.7	5.7
Advanced Combustion Turbine/Diesel	0.0	2.5	24.0	34.0	53.8	64.9
Conventional Combustion Turbine/Diesel	19.9	32.6	40.7	44.2	49.8	53.0
Nuclear Power	0.0	0.0	0.0	0.0	0.0	0.0
Pumped Storage	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Cells	0.0	0.0	0.0	0.0	0.0	0.0
Renewable Sources	0.8	0.9	1.5	3.0	5.3	8.2
Total	20.7	45.3	134.2	190.5	261.0	323.1
Cumulative Retirements (GW)						
Advanced Coal	0.0	0.0	0.0	0.0	0.0	0.0
Conventional Coal	1.6	1.7	4.4	5.1	5.7	6.3
Other Fossil Steam	7.2	7.5	43.1	64.1	66.2	68.3
Advanced Combined Cycle	0.0	0.0	0.0	0.0	0.0	0.0
Conventional Combined Cycle	0.1	0.1	0.1	0.1	0.1	0.1
Advanced Combustion Turbine/Diesel	0.0	0.0	0.0	0.0	0.0	0.0
Conventional Combustion Turbine/Diesel	0.8	0.8	3.5	4.5	8.6	9.9
Nuclear Power	5.1	9.3	16.8	26.1	29.3	32.4
Pumped Storage	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Cells	0.0	0.0	0.0	0.0	0.0	0.0
Renewable Sources	0.3	0.3	0.6	0.8	1.1	1.2
Total	15.0	19.7	68.5	100.8	111.0	118.1

Energy Bill Estimate (1)

CEF-NEMS Business As Usual (990811)

	1995	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2020*
Energy Bill (Billion 1997$) (2)																						
Residential Sector Petroleum Bill	9.9	11.7	11.6	9.5	9.9	10.2	10.4	10.6	10.8	10.9	11.1	11.1	11.1	11.0	10.9	10.9	10.9	10.9	10.7	10.6	10.6	10.2
Residential Sector Gas Bill	30.4	33.8	35.0	30.7	34.3	34.0	33.7	33.4	33.1	33.0	33.0	33.1	33.2	33.2	33.0	32.9	32.9	32.9	32.9	32.9	32.9	33.5
Residential Sector Other Bill																						
Residential Sector Electricity Bill	89.6	91.8	90.9	90.5	92.0	93.3	94.4	94.5	95.9	97.4	97.8	98.6	99.5	100.6	101.1	102.1	102.6	103.0	103.4	104.3	105.0	107.4
Residential Sector Total Bill	129.9	137.4	137.5	130.6	136.2	137.5	138.4	138.5	139.8	141.3	141.9	142.8	143.8	144.8	145.0	145.9	146.4	146.8	147.0	147.8	148.4	151.1
Commercial Sector Petroleum Bill	2.6	3.0	2.8	1.7	1.7	1.8	1.9	1.9	2.0	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1
Commercial Sector Gas Bill	16.0	17.3	18.9	16.7	18.9	18.9	18.9	19.0	19.1	19.2	19.3	19.5	19.6	19.7	19.7	19.7	19.7	19.8	19.8	19.8	19.8	19.9
Commercial Sector Other Bill																						
Commercial Sector Electricity Bill	73.6	75.3	76.7	77.1	77.6	77.6	77.6	77.2	78.4	79.1	79.3	79.9	80.3	80.4	80.7	81.3	81.2	81.0	81.4	81.6	81.7	81.1
Commercial Sector Total Bill	92.1	95.7	98.4	95.5	98.3	98.3	98.4	98.1	99.5	100.3	100.8	101.5	102.1	102.3	102.5	103.2	103.0	103.0	103.3	103.5	103.6	103.1
Industrial Sector Petroleum Bill	19.6	24.5	24.5	15.3	16.0	16.7	17.7	18.7	19.9	21.1	22.4	23.4	24.0	23.8	24.0	24.4	24.7	25.0	25.6	26.1	26.1	28.8
Industrial Sector Gas Bill	23.9	30.1	29.4	26.5	28.3	28.4	29.4	30.1	30.5	30.9	31.4	32.3	33.0	33.3	33.7	34.0	34.1	34.5	34.6	35.1	35.5	37.0
Industrial Sector Other Bill	3.6	3.8	3.6	3.5	3.5	3.4	3.4	3.4	3.3	3.3	3.2	3.2	3.2	3.1	3.1	3.0	3.0	2.9	2.9	2.9	2.8	2.7
Industrial Sector Electricity Bill	48.4	47.8	47.7	46.9	47.0	47.0	47.2	47.5	48.1	48.0	47.7	47.7	47.7	47.5	47.8	47.9	47.3	46.9	46.8	46.7	46.8	46.5
Industrial Sector Total Bill	95.5	106.2	105.2	92.2	94.9	95.6	97.7	99.7	101.7	103.2	104.6	106.5	107.9	107.7	108.6	109.3	109.1	109.3	109.9	110.7	111.3	115.0
Transportation Sector Petroleum Bill	193.2	211.1	205.9	178.0	183.9	195.7	205.6	214.7	225.4	237.2	247.0	256.6	264.4	271.4	274.8	280.0	280.1	285.2	289.4	291.2	294.4	309.6
Transportation Sector Gas Bill	4.0	4.5	4.6	4.8	5.0	5.2	5.5	5.8	6.1	6.4	6.7	7.1	7.4	7.6	7.9	8.2	8.3	8.5	8.6	8.8	9.0	9.5
Transportation Sector Other Bill	0.0	0.0	0.0	0.1	0.2	0.3	0.4	0.6	0.8	1.0	1.1	1.3	1.5	1.6	1.8	1.9	1.9	2.1	2.2	2.2	2.5	2.7
Transportation Sector Electricity Bill	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	1.2	1.4	1.5	1.6	1.8	1.9	2.0	2.2	2.3	2.4	2.4	2.5	2.6	2.9
Transportation Sector Total Bill	198.2	216.6	211.4	183.9	190.2	202.2	212.4	222.0	233.6	245.9	256.3	266.6	275.0	282.5	286.4	292.2	292.6	298.2	302.6	304.7	308.5	324.7
Total Energy Bill	515.8	555.8	552.5	502.2	519.6	533.7	546.9	558.3	574.6	590.8	603.7	617.4	628.9	637.3	642.6	650.7	651.2	657.3	662.9	666.8	671.9	693.9

(1) The energy bill calculation is the sum of the product of energy consumption and energy price for each major fuel type within a sector (consumption and prices taken from Table 2 and 3 of fort.20.)

(2) The following fuels bills are not accounted for in tr energy bill calculations:

residential sector	kerosene, coal, and "renewable energy"
commercial sector	kerosene, LPG, motor gasoline, coal, and "renewable energy"
industrial sector	petrochemical feedstocks, motor gasoline, other petroleum, coal coke imports, and renewable energy
transportation sector	other petroleum, and liquid hydrogen

Electricity Sector Forecast Summary

CEF-NEMS Moderate Scenario (991213)

demand side efficiency	*Mod*	*Mod*	*Mod*	*Mod*	*Mod*	*Mod*
carbon charge ($/t)	*0*	*0*	*0*	*0*	*0*	*0*
supply side efficiency	*Mod*	*Mod*	*Mod*	*Mod*	*Mod*	*Mod*
	1997	*2000*	*2005*	*2010*	*2015*	*2020*
Electricity Generation (TWh) (no cogeneration)						
Coal	1796	1916	1908	1939	1980	1997
Petroleum	82	97	22	17	16	15
Natural Gas	299	346	541	683	733	830
Nuclear Power	629	660	633	579	531	463
Renewables	389	386	439	463	489	498
Hydro	351	322	323	323	323	323
Wind	3	7	29	37	48	51
Biomass	4	18	36	37	34	26
Geothermal	16	15	25	37	54	67
Other	15	24	26	28	30	31
Other	-3	-1	-1	-1	-1	-1
Total	3192	3402	3541	3679	3748	3801
Net Imports	32	43	33	30	28	28
Electricity Cogeneration (TWh)						
Coal	60	58	57	56	56	56
Petroleum	10	8	7	7	7	7
Natural Gas	210	212	225	243	266	290
Other Gaseous Fuels	4	5	5	5	5	5
Renewables	41	48	52	56	58	60
Biomass	33	41	45	48	51	53
MSW	2	2	2	2	2	2
Hydro	6	5	5	5	5	5
Other	4	4	4	4	4	4
Total	328	336	350	372	397	422
Sales to Utilities	183	178	180	184	188	192
Generation for Own Use	146	158	170	188	210	230
Generation Capacity (GW) (no cogeneration)						
Coal Steam	305	305	304	303	304	305
Other Fossil Steam	139	138	99	76	66	56
Combined Cycle	16	28	85	107	119	134
Combustion Turbine/Diesel	77	100	135	142	144	145
Nuclear Power	99	95	87	78	72	64
Renewable	88	90	99	103	108	111
Hydro	78	78	78	79	79	79
Wind	2	3	10	12	15	15
Biomass	2	2	3	3	3	3
Geothermal	3	3	4	5	7	9
Other	4	4	4	5	5	5
Other	20	22	22	22	22	22
Total	744	778	831	831	835	837
Cogeneration Capacity (GW)						
Coal	9	10	10	10	10	10
Petroleum	1	1	2	2	2	2
Natural Gas	33	35	37	39	42	46
Other Gaseous Fuels	1	1	1	1	1	1
Renewables	7	8	8	8	9	9
Biomass	5	6	6	7	7	7
MSW	0	0	0	0	0	0
Hydro	1	1	1	1	1	1
Other	0	0	0	0	0	0
Total	52	55	57	60	63	67
Cumulative Retirements (GW)	15	20	73	109	128	150
Cumulative Additions (GW)	23	62	168	203	228	251

Electricity Sector Forecast Summary

CEF-NEMS Moderate Scenario (991213)

demand side efficiency	*Mod*	*Mod*	*Mod*	*Mod*	*Mod*	*Mod*
carbon charge ($/t)	*0*	*0*	*0*	*0*	*0*	*0*
supply side efficiency	*Mod*	*Mod*	*Mod*	*Mod*	*Mod*	*Mod*
	1997	*2000*	*2005*	*2010*	*2015*	*2020*
Capacity Factor (excludes cogeneration)						
Coal	67%	72%	72%	73%	74%	75%
Natural Gas and Petroleum	19%	19%	20%	25%	26%	29%
Nuclear Power	72%	79%	83%	85%	84%	82%
Renewables	51%	49%	51%	51%	52%	51%
Hydro	52%	47%	47%	47%	47%	47%
Wind	21%	25%	34%	35%	37%	37%
Biomass	29%	116%	161%	154%	134%	101%
Geothermal	62%	56%	71%	80%	86%	88%
Other	46%	70%	69%	68%	67%	66%
Total	49%	50%	49%	51%	51%	52%
Fuel Consumption (Quadrillion Btu) (no cogeneration)						
Coal	18.6	20.0	20.0	20.2	20.6	20.7
Natural Gas	3.4	3.3	4.1	5.0	5.3	5.9
Distillate	0.1	0.1	0.0	0.0	0.0	0.0
Residual	0.8	1.0	0.2	0.1	0.1	0.1
Nuclear	6.7	7.1	6.8	6.2	5.7	4.9
Renewable	4.4	4.3	5.1	5.6	6.2	6.6
Electricity Imports	0.3	0.4	0.3	0.3	0.3	0.3
Total	34.3	36.1	36.4	37.5	38.3	38.6
Electricity Prices (1997¢/kWh)						
Residential	8.5	7.8	7.2	7.2	7.1	6.9
Commercial	7.6	7.1	6.3	5.8	5.6	5.4
Industrial	4.6	4.5	4	3.6	3.5	3.4
Transportation	5.6	5.3	4.9	4.8	4.7	4.5
Average	6.9	6.5	5.9	5.6	5.5	5.3
Price Components (1997¢/kWh)						
Capital Component	3.6	3.3	2.9	2.6	2.6	2.5
Fuel Component	1.1	1.1	1	1	1	1
O&M Component	2	1.9	1.9	1.8	1.7	1.7
Wholesale Power Cost	0.2	0.2	0.2	0.1	0.1	0.1
Total	6.9	6.5	5.9	5.6	5.5	5.3
Carbon Emissions (MtC)						
Petroleum	17.6	21.4	4.5	3.4	3.4	3
Natural Gas	43.8	47.9	59.2	72.3	76.5	85
Coal	471	514.2	513.3	521	531.1	534.5
Total	532.4	583.5	577	596.7	611	622.5
SO2 Emissions (MtSO2)	11.7	10.4	9.5	8.3	8.2	8.2
SO2 Allowance Price	43.24	127	107.1	211	107	96.44
NOx Emissions (MtNOx)	5.3	4.2	3.4	3.5	3.5	3.5
Electricity Generation Shares by Fuel Type						
Coal	56%	56%	54%	53%	53%	53%
Petroleum	3%	3%	1%	0%	0%	0%
Natural Gas	9%	10%	15%	19%	20%	22%
Nuclear Power	20%	19%	18%	16%	14%	12%
Renewables	12%	11%	12%	13%	13%	13%
Hydro	11%	9%	9%	9%	9%	9%
Wind	0%	0%	1%	1%	1%	1%
Biomass	0%	1%	1%	1%	1%	1%
Geothermal	0%	0%	1%	1%	1%	2%
Other	0%	1%	1%	1%	1%	1%
Other	0%	0%	0%	0%	0%	0%

Electricity Sector Forecast Summary

CEF-NEMS Moderate Scenario (991213)

demand side efficiency	*Mod*	*Mod*	*Mod*	*Mod*	*Mod*	*Mod*
carbon charge ($/t)	*0*	*0*	*0*	*0*	*0*	*0*
supply side efficiency	*Mod*	*Mod*	*Mod*	*Mod*	*Mod*	*Mod*
	1997	*2000*	*2005*	*2010*	*2015*	*2020*
Cumulative Planned Additions (GW)						
Advanced Coal	0.0	0.0	0.0	0.0	0.0	0.0
Conventional Coal	0.1	0.9	1.4	1.4	1.4	1.4
Other Fossil Steam	0.1	0.1	0.1	0.1	0.1	0.1
Advanced Combined Cycle	0.0	0.0	0.0	0.0	0.0	0.0
Conventional Combined Cycle	0.7	2.0	5.3	5.3	5.3	5.3
Advanced Combustion Turbine/Diesel	0.0	0.0	0.0	0.0	0.0	0.0
Conventional Combustion Turbine/Diesel	1.5	6.7	18.6	18.6	18.6	18.6
Nuclear Power	0.0	0.0	0.0	0.0	0.0	0.0
Pumped Storage	0.0	2.0	2.0	2.0	2.0	2.0
Fuel Cells	0.0	0.0	0.0	0.0	0.0	0.0
Renewable Sources	0.1	1.6	2.5	2.8	2.8	2.8
Total	2.5	13.3	29.8	30.1	30.2	30.2
Cumulative Unplanned Additions (GW)						
Advanced Coal	0.0	0.0	1.1	3.2	5.4	7.0
Conventional Coal	0.0	0.0	0.2	0.2	0.2	0.2
Other Fossil Steam	0.0	0.0	0.0	0.0	0.0	0.0
Advanced Combined Cycle	0.0	9.0	62.8	84.4	96.9	111.9
Conventional Combined Cycle	0.0	1.0	1.2	1.2	1.2	1.2
Advanced Combustion Turbine/Diesel	0.0	4.5	28.9	36.2	40.5	45.0
Conventional Combustion Turbine/Diesel	19.5	32.7	34.0	34.2	34.4	34.5
Nuclear Power	0.0	0.0	0.0	0.0	0.0	0.0
Pumped Storage	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Cells	0.0	0.0	0.0	0.0	0.0	0.0
Renewable Sources	0.8	1.0	9.5	13.6	18.8	21.5
Total	20.3	48.3	137.7	173.1	197.4	221.3
Cumulative Retirements (GW)						
Advanced Coal	0.0	0.0	0.0	0.0	0.0	0.0
Conventional Coal	1.6	1.7	5.1	8.0	9.3	9.9
Other Fossil Steam	7.2	7.5	46.7	69.5	78.6	88.6
Advanced Combined Cycle	0.0	0.0	0.0	0.0	0.0	0.0
Conventional Combined Cycle	0.1	0.1	0.1	0.1	0.1	0.1
Advanced Combustion Turbine/Diesel	0.0	0.0	0.0	0.0	0.0	0.0
Conventional Combustion Turbine/Diesel	0.8	0.8	4.2	4.6	6.6	10.2
Nuclear Power	5.1	9.3	16.8	26.1	32.3	40.1
Pumped Storage	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Cells	0.0	0.0	0.0	0.0	0.0	0.0
Renewable Sources	0.3	0.3	0.6	0.8	1.1	1.2
Total	15.0	19.7	73.4	109.1	128.0	150.0

Energy Bill Estimate (1)

CEF-NEMS Moderate Scenario (991213)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Energy Bill (Billion 1997$) (2)																										
Residential Sector Petroleum Bill	9.9	11.7	11.6	9.5	9.9	10.2	10.4	10.6	10.7	10.9	11.1	11.0	11.1	11.0	10.9	10.9	10.7	10.6	10.5	10.6	10.3	10.3	10.3	10.1	10.0	10.1
Residential Sector Gas Bill	30.4	33.8	35.0	30.7	34.3	34.0	33.6	33.3	32.9	32.6	32.4	32.3	32.2	32.0	31.8	31.7	31.6	31.6	31.5	31.5	31.3	31.4	31.3	31.4	31.4	31.5
Residential Sector Other Bill																										
Residential Sector Electricity Bill	89.6	91.8	90.8	90.4	91.3	92.1	92.4	90.8	90.4	89.9	89.1	89.2	89.1	89.5	89.8	90.7	90.6	90.1	90.3	89.8	90.6	90.8	90.0	90.8	88.9	90.2
Residential Sector Total Bill	129.9	137.4	137.4	130.6	135.5	136.4	136.3	134.7	134.1	133.4	132.6	132.5	132.4	132.5	132.5	133.3	133.0	132.4	132.3	131.8	132.3	132.5	131.6	132.3	130.3	131.8
Commercial Sector Petroleum Bill	2.6	3.0	2.8	1.7	1.7	1.8	1.9	2.0	2.0	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Commercial Sector Gas Bill	16.0	17.3	18.9	16.7	18.9	18.9	18.6	18.6	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.4	18.3	18.2	18.1	18.0	18.0	17.9	17.8	17.8	17.6
Commercial Sector Other Bill																										
Commercial Sector Electricity Bill	73.6	75.3	76.7	77.1	77.3	76.9	75.1	73.2	72.2	70.7	70.0	69.6	68.5	66.9	66.4	68.4	67.1	66.4	68.1	65.9	67.7	66.5	65.2	68.0	63.2	65.6
Commercial Sector Total Bill	92.1	95.7	98.4	95.5	98.0	97.6	95.6	93.7	92.7	91.3	90.6	90.3	89.2	87.6	87.1	89.0	87.7	86.9	88.6	86.2	87.8	86.6	85.3	88.0	83.1	85.4
Industrial Sector Petroleum Bill	19.6	24.5	24.5	15.3	16.0	16.7	17.5	18.4	19.4	20.4	21.4	22.3	22.8	22.9	22.7	22.8	23.0	23.2	23.5	23.7	23.6	23.9	24.5	24.5	24.4	24.6
Industrial Sector Gas Bill	23.9	30.1	29.4	26.5	28.3	28.3	28.9	29.1	28.8	28.7	28.6	29.0	29.2	29.1	29.2	29.3	29.3	29.3	29.3	29.2	29.4	29.5	29.3	29.4	29.3	29.4
Industrial Sector Other Bill	3.6	3.8	3.6	3.5	3.5	3.5	3.4	3.4	3.2	3.2	3.1	3.1	3.0	3.0	2.9	2.9	2.8	2.8	2.7	2.7	2.7	2.6	2.6	2.6	2.5	2.4
Industrial Sector Electricity Bill	48.4	47.8	47.7	46.9	47.4	47.2	47.6	47.6	46.9	45.3	43.3	42.0	40.9	40.0	40.2	40.8	40.6	40.0	40.0	39.4	40.2	40.0	39.5	40.3	38.6	39.3
Industrial Sector Total Bill	95.5	106.2	105.2	92.2	95.3	95.7	97.5	98.5	98.4	97.6	96.5	96.4	96.0	95.1	95.1	95.9	95.7	95.2	95.6	95.1	95.9	96.1	95.9	96.8	94.8	95.7
Transportation Sector Petroleum Bill	193.2	211.1	205.9	178.0	183.8	195.4	205.4	214.1	224.1	234.4	243.6	251.7	258.2	262.4	262.5	264.5	263.7	263.3	262.7	262.2	261.5	262.9	262.3	263.4	263.2	263.6
Transportation Sector Gas Bill	4.0	4.5	4.6	4.6	4.7	4.8	5.0	5.2	5.4	5.6	5.8	6.0	6.3	6.4	6.6	6.7	6.8	6.9	7.0	7.0	7.1	7.1	7.2	7.2	7.2	7.3
Transportation Sector Other Bill	0.0	0.0	0.0	0.0	0.1	0.1	0.4	0.5	0.8	1.2	1.6	2.1	2.4	2.9	3.3	3.7	4.0	4.4	4.8	5.1	5.5	5.6	5.9	6.3	6.4	6.7
Transportation Sector Electricity Bill	1.0	1.0	1.0	1.0	1.0	0.9	0.9	1.1	1.2	1.5	1.6	1.7	1.8	2.0	2.1	2.2	2.4	2.5	2.6	2.6	2.7	2.9	3.0	3.1	3.0	3.2
Transportation Sector Total Bill	198.2	216.6	211.4	183.5	189.6	201.3	211.7	220.8	231.5	242.6	252.7	261.6	268.7	273.7	274.5	277.2	276.8	277.1	277.1	276.9	276.8	278.5	278.4	280.0	279.8	280.7
Total Energy Bill	515.8	555.8	552.4	501.8	518.4	530.9	541.0	547.7	556.6	564.9	572.4	580.7	586.3	588.8	589.2	595.4	593.2	591.6	593.5	589.9	592.9	593.7	591.2	597.1	587.9	593.6

(1) The energy bill calculation is the sum of the product of energy consumption and energy price for each major fuel type within a sector (consumption and prices taken from Table 2 and 3 of fort.20.)

(2) The following fuels bills are not accounted for in tr energy bill calculations:

residential sector	kerosene, coal, and "renewable energy"
commercial sector	kerosene, LPG, motor gasoline, coal, and "renewable energy"
industrial sector	petrochemical feedstocks, motor gasoline, other petroleum, coal coke imports, and renewable energy
transportation sector	other petroleum, and liquid hydrogen

Electricity Sector Forecast Summary

CEF_NEMS Advanced Scenario (991213)

demand side efficiency	*Adv*	*Adv*	*Adv*	*Adv*	*Adv*	*Adv*
carbon charge ($/t)	*0*	*0*	*50*	*50*	*50*	*50*
supply side efficiency	*Adv*	*Adv*	*Adv*	*Adv*	*Adv*	*Adv*
	1997	*2000*	*2005*	*2010*	*2015*	*2020*
Electricity Generation (TWh) (no cogeneration)						
Coal	1796	1866	1478	1400	1299	1065
Petroleum	82	93	15	14	12	11
Natural Gas	299	406	832	884	953	1139
Nuclear Power	629	664	645	630	614	600
Renewables	389	386	468	592	622	629
Hydro	351	322	323	323	323	323
Wind	3	7	49	143	155	159
Biomass	4	18	41	47	52	48
Geothermal	16	15	28	50	62	67
Other	15	24	26	28	30	31
Other	-3	-1	-1	-1	-1	-1
Total	3192	3414	3435	3518	3497	3442
Net Imports	32	31	35	32	27	27
Electricity Cogeneration (TWh)						
Coal	60	58	49	47	45	45
Petroleum	10	8	6	6	6	6
Natural Gas	210	213	219	239	265	293
Other Gaseous Fuels	4	5	5	5	5	5
Renewables	41	48	54	61	67	70
Biomass	33	41	47	54	59	63
MSW	2	2	2	2	2	2
Hydro	6	5	5	5	5	5
Other	4	4	4	4	4	4
Total	328	336	337	363	392	423
Sales to Utilities	183	178	164	168	171	175
Generation for Own Use	146	158	173	195	221	248
Generation Capacity (GW) (no cogeneration)						
Coal Steam	305	305	291	262	253	225
Other Fossil Steam	139	138	93	56	43	33
Combined Cycle	16	36	114	122	133	149
Combustion Turbine/Diesel	78	106	130	135	139	133
Nuclear Power	99	96	91	87	85	83
Renewable	88	90	106	136	142	145
Hydro	78	78	78	79	79	79
Wind	2	3	16	43	46	47
Biomass	2	2	3	4	5	5
Geothermal	3	3	4	7	8	9
Other	4	4	4	5	5	5
Other	20	22	22	22	22	22
Total	744	792	846	819	817	789
Cogeneration Capacity (GW)						
Coal	9	10	10	10	10	10
Petroleum	1	1	2	2	2	2
Natural Gas	33	35	37	40	43	47
Other Gaseous Fuels	1	1	1	1	1	1
Renewables	7	8	8	9	9	10
Biomass	5	6	7	7	8	8
MSW	0	0	0	0	0	0
Hydro	1	1	1	1	1	1
Other	0	0	0	0	0	0
Total	52	55	57	61	65	69
Cumulative Retirements (GW)	15	19	87	162	186	234
Cumulative Additions (GW)	23	75	196	244	268	300

Electricity Sector Forecast Summary

CEF_NEMS Advanced Scenario (991213)

demand side efficiency	*Adv*	*Adv*	*Adv*	*Adv*	*Adv*	*Adv*
carbon charge ($/t)	*0*	*0*	*50*	*50*	*50*	*50*
supply side efficiency	*Adv*	*Adv*	*Adv*	*Adv*	*Adv*	*Adv*
	1997	*2000*	*2005*	*2010*	*2015*	*2020*
Capacity Factor (excludes cogeneration)						
Coal	67%	70%	58%	61%	59%	54%
Natural Gas and Petroleum	19%	20%	29%	33%	35%	42%
Nuclear Power	72%	79%	81%	83%	83%	82%
Renewables	51%	49%	51%	49%	50%	50%
Hydro	52%	47%	47%	47%	47%	47%
Wind	21%	26%	36%	38%	39%	39%
Biomass	29%	116%	169%	143%	125%	108%
Geothermal	62%	56%	73%	83%	87%	88%
Other	46%	70%	69%	68%	67%	66%
Total	49%	49%	46%	49%	49%	50%
Fuel Consumption (Quadrillion Btu) (no cogeneration)						
Coal	18.6	19.5	15.2	14.4	13.3	10.9
Natural Gas	3.4	3.5	5.8	6.1	6.4	7.2
Distillate	0.1	0.1	0.0	0.0	0.0	0.0
Residual	0.8	0.9	0.1	0.1	0.1	0.1
Nuclear	6.7	7.1	6.9	6.7	6.6	6.4
Renewable	4.4	4.3	5.4	7.2	7.7	7.9
Electricity Imports	0.3	0.3	0.4	0.3	0.3	0.3
Total	34.3	35.7	33.8	34.8	34.3	32.8
Electricity Prices (1997¢/kWh)						
Residential	8.5	7.8	8.1	8.0	7.8	7.6
Commercial	7.6	7.1	7.4	6.9	6.5	6.4
Industrial	4.6	4.5	5	4.7	4.4	4.3
Transportation	5.6	5.3	5.5	5.4	5.2	5
Average	6.9	6.5	6.9	6.6	6.3	6.1
Price Components (1997¢/kWh)						
Capital Component	3.6	3.4	3.1	2.9	2.8	2.8
Fuel Component	1.1	1.1	1.7	1.6	1.6	1.5
O&M Component	2	1.9	1.9	1.9	1.7	1.7
Wholesale Power Cost	0.2	0.2	0.2	0.2	0.2	0.2
Total	6.9	6.5	6.9	6.6	6.3	6.1
Carbon Emissions (MtC)						
Petroleum	17.6	20.6	3	2.9	2.4	2.1
Natural Gas	43.8	51	82.9	87.1	91.2	98.2
Coal	471	500.3	391.6	369.5	342.7	282
Total	532.4	571.9	477.5	459.5	436.3	382.3
SO2 Emissions (MtSO2)	11.5	10.4	9.6	8.5	6.8	4.3
SO2 Allowance Price	69.15	144.3	51.92	98.4	90.51	160.7
NOx Emissions (MtNOx)	5.3	4.1	2.9	2.7	2.6	2.2
Electricity Generation Shares by Fuel Type						
Coal	56%	55%	43%	40%	37%	31%
Petroleum	3%	3%	0%	0%	0%	0%
Natural Gas	9%	12%	24%	25%	27%	33%
Nuclear Power	20%	19%	19%	18%	18%	17%
Renewables	12%	11%	14%	17%	18%	18%
Hydro	11%	9%	9%	9%	9%	9%
Wind	0%	0%	1%	4%	4%	5%
Biomass	0%	1%	1%	1%	1%	1%
Geothermal	0%	0%	1%	1%	2%	2%
Other	0%	1%	1%	1%	1%	1%
Other	0%	0%	0%	0%	0%	0%

Electricity Sector Forecast Summary

CEF_NEMS Advanced Scenario (991213)

demand side efficiency	*Adv*	*Adv*	*Adv*	*Adv*	*Adv*	*Adv*
carbon charge ($/t)	*0*	*0*	*50*	*50*	*50*	*50*
supply side efficiency	*Adv*	*Adv*	*Adv*	*Adv*	*Adv*	*Adv*
	1997	*2000*	*2005*	*2010*	*2015*	*2020*
Cumulative Planned Additions (GW)						
Advanced Coal	0.0	0.0	0.0	0.0	0.0	0.0
Conventional Coal	0.1	0.9	1.4	1.4	1.4	1.4
Other Fossil Steam	0.1	0.1	0.1	0.1	0.1	0.1
Advanced Combined Cycle	0.0	0.0	0.0	0.0	0.0	0.0
Conventional Combined Cycle	0.7	2.0	5.3	5.3	5.3	5.3
Advanced Combustion Turbine/Diesel	0.0	0.0	0.0	0.0	0.0	0.0
Conventional Combustion Turbine/Diesel	1.5	6.7	18.6	18.6	18.6	18.6
Nuclear Power	0.0	0.0	0.0	0.0	0.0	0.0
Pumped Storage	0.0	2.0	2.0	2.0	2.0	2.0
Fuel Cells	0.0	0.0	0.0	0.0	0.0	0.0
Renewable Sources	0.1	1.6	2.5	2.8	2.8	2.8
Total	2.5	13.3	29.8	30.1	30.2	30.2
Cumulative Unplanned Additions (GW)						
Advanced Coal	0.0	0.0	0.0	0.0	0.0	0.0
Conventional Coal	0.0	0.0	0.0	0.0	0.0	0.0
Other Fossil Steam	0.0	0.0	0.0	0.0	0.0	0.0
Advanced Combined Cycle	0.0	17.9	92.8	100.9	112.1	127.6
Conventional Combined Cycle	0.0	0.1	0.1	0.1	0.1	0.1
Advanced Combustion Turbine/Diesel	0.0	6.8	21.4	29.4	35.3	38.0
Conventional Combustion Turbine/Diesel	19.7	35.6	36.2	36.6	36.7	36.9
Nuclear Power	0.0	0.0	0.0	0.0	0.0	0.0
Pumped Storage	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Cells	0.0	0.0	0.0	0.0	0.0	0.0
Renewable Sources	0.8	1.2	16.0	46.7	52.8	55.3
Total	20.5	61.7	166.5	213.7	238.1	270.1
Cumulative Retirements (GW)						
Advanced Coal	0.0	0.0	0.0	0.0	0.0	0.0
Conventional Coal	1.6	1.7	16.7	46.3	54.6	83.1
Other Fossil Steam	7.2	7.5	52.8	90.4	102.4	111.9
Advanced Combined Cycle	0.0	0.0	0.0	0.0	0.0	0.0
Conventional Combined Cycle	0.1	0.1	0.1	0.1	0.1	0.1
Advanced Combustion Turbine/Diesel	0.0	0.0	0.0	0.0	0.0	0.0
Conventional Combustion Turbine/Diesel	0.8	0.8	3.4	6.4	8.6	17.5
Nuclear Power	5.1	8.7	13.7	17.5	19.5	20.7
Pumped Storage	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Cells	0.0	0.0	0.0	0.0	0.0	0.0
Renewable Sources	0.3	0.3	0.6	0.8	1.1	1.2
Total	15.0	19.0	87.3	161.5	186.3	234.4

Energy Bill Estimate (1)

CEF_NEMS Advanced Scenario (991213)

	1995	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*
Energy Bill (Billion 1997$) (2)																										
Residential Sector Petroleum Bill	9.9	11.7	11.6	9.5	9.9	10.2	10.4	10.8	11.2	11.5	11.7	11.8	11.7	11.6	11.5	11.5	11.2	11.2	11.0	10.9	10.8	10.8	10.6	10.5	10.4	10.3
Residential Sector Gas Bill	30.4	33.8	35.0	30.7	34.3	34.1	33.7	34.0	34.4	35.0	35.7	35.7	35.6	35.5	35.2	35.1	34.9	34.8	34.5	34.4	34.1	34.1	34.0	33.9	34.0	34.0
Residential Sector Other Bill																										
Residential Sector Electricity Bill	89.6	91.8	90.9	90.6	91.5	92.3	92.4	93.0	94.7	96.0	97.6	96.6	95.3	94.9	95.5	96.6	95.7	93.9	92.7	91.8	90.8	90.5	88.7	89.0	86.5	86.6
Residential Sector Total Bill	129.9	137.4	137.5	130.7	135.7	136.6	136.4	137.8	140.3	142.4	145.1	144.1	142.6	142.0	142.3	143.1	141.8	139.9	138.2	137.0	135.7	135.4	133.3	133.4	130.9	131.0
Commercial Sector Petroleum Bill	2.6	3.0	2.8	1.7	1.7	1.8	2.0	2.1	2.2	2.3	2.4	2.4	2.4	2.4	2.3	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.1
Commercial Sector Gas Bill	16.0	17.3	18.9	16.7	18.9	18.9	18.8	19.2	19.6	20.2	20.8	21.0	21.1	21.1	21.1	21.1	21.0	20.7	20.5	20.4	20.2	20.1	20.0	19.9	19.8	19.8
Commercial Sector Other Bill																										
Commercial Sector Electricity Bill	73.6	75.3	76.7	77.2	77.4	76.9	75.1	75.1	76.1	76.8	79.3	78.9	77.4	76.1	76.0	79.0	76.9	75.7	77.0	74.9	75.9	74.7	73.2	76.3	71.5	73.1
Commercial Sector Total Bill	92.1	95.7	98.4	95.5	98.1	97.6	95.8	96.5	98.0	99.3	102.6	102.3	100.9	99.7	99.5	102.5	100.2	98.7	99.8	97.5	98.3	97.0	95.4	98.3	93.4	95.0
Industrial Sector Petroleum Bill	19.6	24.5	24.5	15.3	16.0	16.6	17.4	19.1	20.9	22.1	23.8	24.9	25.5	25.2	25.2	25.6	25.2	25.1	24.7	25.0	25.0	24.8	24.9	24.9	24.6	24.9
Industrial Sector Gas Bill	23.9	30.1	29.4	26.5	28.3	28.3	28.8	30.4	31.9	33.7	36.0	36.0	36.0	35.8	35.4	35.4	35.1	34.7	34.4	34.4	34.0	34.0	33.9	33.8	33.8	33.6
Industrial Sector Other Bill	3.6	3.8	3.6	3.5	3.5	3.6	3.5	4.1	4.5	4.9	5.3	5.3	5.2	5.1	5.0	4.8	4.7	4.7	4.6	4.5	4.5	4.4	4.3	4.3	4.2	4.2
Industrial Sector Electricity Bill	48.4	47.8	47.7	47.0	47.5	47.2	47.1	48.6	49.4	49.9	51.7	50.3	48.9	48.1	48.2	48.9	48.2	47.1	46.8	46.1	45.9	46.0	45.3	46.0	44.2	44.3
Industrial Sector Total Bill	95.5	106.2	105.2	92.3	95.4	95.6	96.9	102.1	106.7	110.6	116.8	116.4	115.5	114.2	113.9	114.7	113.3	111.6	110.5	110.0	109.4	109.3	108.4	108.9	106.8	106.9
Transportation Sector Petroleum Bill	193.2	211.1	205.9	178.0	183.7	195.0	204.5	219.2	233.1	245.5	258.7	263.1	266.4	264.7	262.9	262.0	258.8	255.9	247.0	238.8	236.3	234.5	231.1	229.2	226.1	225.0
Transportation Sector Gas Bill	4.0	4.5	4.6	4.6	4.7	4.9	5.0	5.3	5.8	6.3	6.8	7.0	7.2	7.3	7.4	7.6	7.5	7.6	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.8
Transportation Sector Other Bill	0.0	0.0	0.0	0.0	0.1	0.1	0.4	0.5	0.5	0.7	1.1	1.2	1.5	1.6	1.8	1.9	2.2	2.3	2.3	2.2	2.4	2.5	2.5	2.6	2.8	2.9
Transportation Sector Electricity Bill	1.0	1.0	1.0	1.0	1.0	0.9	1.1	1.1	1.2	1.6	1.8	1.9	2.1	2.2	2.4	2.5	2.6	2.8	2.8	2.9	3.0	3.1	3.2	3.3	3.3	3.4
Transportation Sector Total Bill	198.2	216.6	211.4	183.5	189.5	200.9	211.0	226.1	240.6	254.0	268.5	273.2	277.2	275.9	274.5	274.0	271.1	268.6	259.7	251.6	249.3	247.8	244.5	242.8	239.9	239.1
Total Energy Bill	515.8	555.8	552.5	502.0	518.7	530.7	540.1	562.6	585.5	606.3	632.9	636.0	636.2	631.7	630.1	634.3	626.5	618.7	608.2	596.1	592.7	589.5	581.6	583.4	571.1	572.0

(1) The energy bill calculation is the sum of the product of energy consumption and energy price for each major fuel type within a sector (consumption and prices taken from Table 2 and 3 of fort.20.)

(2) The following fuels bills are not accounted for in tr energy bill calculations:

residential sector	kerosene, coal, and "renewable energy"
commercial sector	kerosene, LPG, motor gasoline, coal, and "renewable energy"
industrial sector	petrochemical feedstocks, motor gasoline, other petroleum, coal coke imports, and renewable energy
transportation sector	other petroleum, and liquid hydrogen

Carbon emissions by fuel, in MtC per quad

	adj. Emm. Fc	% combusted	1997 emissions at full combustion		
Motor gasoline	19.16	0.99	19.35		
LPG	16.79	0.995	**16.87**		
jet fuel	19.14	0.99	19.33		
Distillate oil	19.75	0.99	19.95		
Residual fuel	21.28	0.99	21.49		
Aviation gas	18.68	0.99	18.87		
kerosene	19.52	0.99	19.72		
Coal					
Res/comml	25.66	0.99	25.92		
Industrial coking	25.29	0.99	25.55		
Other industrial	25.35	0.99	25.61		
electric utility	25.48	0.99	25.74		
Natural gas	14.40	0.995	14.47		
Crude oil	0.00		20.24		
lubricants	12.14	0.6	**20.24**		
compressed nat ga	14.25	0.99	14.40	0%	compressed nat gas assumed to have a C burden of natural gas, with no additional penalty for compression (as per EIA's assumptions)
Renewables (E85)	0.00	0.99	0		Ethanol assumed to generated renewably, so C burden is zero
Methanol	17.45	0.99	17.63	0%	methanol assumed to have a carbon burden of 17.45, as per EIA assumptions (Pers. Comm. With Dan Skelly, 990420). We assume % combusted of 0.99 and fiddle with emisions at full combustion until adjusted emissions factor is 17.45.
Liquid Hydrogen	0.00	0.995	0		liquid hydrogen assumed to generated renewably, so C burden is zero
Feedstocks					
LPG	3.42	0.2	17.11		
Petrochemicals	3.87	0.2	19.37		
Natural gas	11.20	0.774	14.47		

Source: *Emissions of Greenhouse Gases in the United States, 1997* , Table E 2 except for bolded numbers, which are from the AEO99 documentation, Table

Implicit Price Deflators	
1992	100
1995	107.6
1996	110.21
1997	112.4

short tons to metric 0.907185

kg.C/ton.Clinker 125.4