

## **Appendix C**

### **Summary Comparison of Analyses**

**Table C1. Summary of the WEFA Analysis**

Parameter	1996	Reference Case in 2010	1990-7% Case in 2010	Reference Case in 2020	1990-7% Case in 2020
Carbon Price (1996 Dollars per Metric Ton)	NA	NA	265	NA	360
Gross Domestic Product (Billion 1992 Chain-Weighted Dollars)	6,928	9,314	9,013	11,478	11,245
Total Carbon Emissions (Million Metric Tons)	1,463	1,700	1,247	1,953	1,231
Per Capita Carbon Emissions (Metric Tons per Person)	5.5	5.7	4.2	6.0	3.8
Real Disposable Personal Income (Billion 1992 Dollars)	5,077	6,942	6,840	8,671	8,596
Real Investment (Billion 1992 Dollars) <sup>a</sup>	1,067	1,527	1,468	1,923	1,894
Real Consumption (Billion 1992 Dollars)	4,714	6,303	6,152	7,705	7,651
Light-Duty Vehicle Sales (Millions)	15.1	16.7	16.2	18.3	18.3
Primary Energy Intensity (Thousand Btu per 1992 Dollar of GDP)	13.57	11.08	9.30	9.98	7.50
Delivered Energy Intensity (Thousand Btu per 1992 Dollar of GDP)	10.16	8.24	7.20	7.45	6.05
World Oil Price (Refiners Acquisition Price, 1996 Dollars per Barrel)	20.48	19.77	17.58	21.38	17.57
Natural Gas Wellhead Price (1996 Dollars per Thousand Cubic Feet)	2.24	2.09	2.19	2.24	2.46
Minemouth Coal Price (1996 Dollars per Short Ton)	18.50	16.43	12.82	15.05	11.44
Carbon Intensity (Metric Tons per Thousand 1992 Dollars of GDP)	0.217	0.183	0.138	0.170	0.109
Delivered Energy Prices (1996 Dollars)					
Coal (Dollars per Million Btu to Utilities)	1.29	1.19	7.71	1.11	10.06
Natural Gas (Dollars per Thousand Cubic Feet)	4.25	3.92	7.61	3.79	8.95
Distillate (Dollars per Gallon)	1.09	1.21	1.89	1.23	2.14
Motor Gasoline (Dollars per Gallon)	1.23	1.24	1.83	1.30	2.08
Electricity (Cents per Kilowatthour)	6.9	5.9	9.8	5.6	10.3
Total Primary Energy Consumption (Quadrillion Btu)	94.0	103.2	83.9	114.5	84.4
Fossil Fuel Consumption (Quadrillion Btu)					
Natural Gas	22.6	29.9	30.1	36.4	37.0
Coal	20.9	22.8	8.4	25.8	2.7
Petroleum	36.0	40.7	35.3	45.2	37.2
Total	79.5	93.4	73.9	107.4	76.9
Total End-Use Carbon Emissions (Million Metric Tons)	1,463	1,700	1,247	1,952	1,231
Buildings (Residential/Commercial) <sup>b</sup>	170.9	—	—	—	—
Industrial <sup>c</sup>	306.9	470.3	369.1	501.1	359.6
Transportation	468.4	564.0	507.6	642.5	550.1
Electricity	516.7	665.7	370.8	809.0	321.9
Energy Consumption for Electricity Generation (Quadrillion Btu)					
Coal	18.36	20.35	7.10	23.32	1.64
Natural Gas	3.04	8.91	12.64	13.62	19.26
Nuclear	7.20	6.02	6.02	3.25	3.25
Renewables	4.47	3.79	4.00	3.81	4.22
Petroleum	0.75	0.69	0.52	0.63	0.05
Electricity Sales (Quadrillion Btu)	10.57	13.24	11.04	15.63	12.06

<sup>a</sup>Calculated as the sum of residential investment plus nonresidential fixed investment.

<sup>b</sup>Excludes emissions related to electricity generation.

<sup>c</sup>The WEFA projection provides an "other category" which combines direct emissions from the Buildings and Industrial sectors.

Sources: **1996:** Energy Information Administration, *Annual Energy Outlook 1998*, DOE/EIA-0383(98) (Washington, DC, December 1997). **2010 and 2020:** WEFA, Inc., *Global Warming: The High Cost of the Kyoto Protocol, National and State Impacts* (1998). The WEFA report did not cover analyses of alternative carbon emissions targets because they did not believe that a workable comprehensive international trading system could be implemented in time and that developing countries would not participate in the clean development mechanism.

**Table C2. Summary of the CRA Analysis of the 1990-7% Case**

Parameter	1996	Reference Case in 2010	1990-7% Case in 2010	Reference Case in 2020	1990-7% Case in 2020
Carbon Price (1996 Dollars per Metric Ton)	NA	NA	295	NA	316
Gross Domestic Product (Billion 1992 Chain-Weighted Dollars)	6,928	9,607	9,401	11,871	11,589
Total Carbon Emissions (Million Metric Tons)	1,463	1,806	1,252	1,955	1,252
Per Capita Carbon Emissions (Metric Tons per Person)	5.5	6.0	4.2	6.0	3.9
Real Investment (Billion 1992 Dollars)	1,067	2,472	2,342	2,999	2,890
Real Consumption (Billion 1992 Dollars)	4,714	6,872	6,805	8,666	8,543
Carbon Intensity (Metric Tons per Thousand 1992 Dollars of GDP)	0.22	0.19	0.13	0.16	0.11
Delivered Energy Prices (1996 Dollars per Million Btu)					
Electricity (Cents per Kilowatthour, National Average)	6.9	5.9	8.3	5.5	7.7
Natural Gas (Dollars per Thousand Cubic Feet)	4.25	3.19	8.74	4.12	11.82
Petroleum Prices (Average Dollars per Gallon)	1.03	1.20	3.26	1.64	4.00
Fossil Fuel Consumption (Quadrillion Btu)					
Natural Gas	22.6	26.9	18.5	29.9	18.9
Coal	20.9	20.7	12.6	23.5	11.5
Petroleum	36.0	43.2	32.2	44.9	33.4
Total	79.5	90.8	63.3	98.2	63.7

Sources: **1996:** Energy Information Administration, *Annual Energy Outlook 1998*, DOE/EIA-0383(98) (Washington, DC, December 1997). **2010 and 2020:** Paul M. Bernstein, Charles River Associates, e-mail communications, August 24, 1998.

**Table C3. Summary of the CRA Analysis of the Kyoto Protocol With Annex I Trading**

Parameter	1996	Reference Case in 2010	Annex I Trading Case in 2010	Reference Case in 2020	Annex I Trading Case in 2020
Carbon Price (1996 Dollars per Metric Ton)	NA	NA	109	NA	175
Gross Domestic Product (Billion 1992 Chain-Weighted Dollars)	6,928	9,607	9,486	11,871	11,666
Total Carbon Emissions (Million Metric Tons)	1,463	1,806	1,540	1,955	1,480
Per Capita Carbon Emissions (Metric Tons per Person)	5.5	6.0	4.2	6.0	3.9
Real Investment (Billion 1992 Dollars)	1,067	2,472	2,342	2,999	2,923
Real Consumption (Billion 1992 Dollars)	4,714	6,872	6,838	8,666	8,591
Carbon Intensity (Metric Tons per Thousand 1992 Dollars of GDP)	0.217	0.19	0.16	0.16	0.13
Delivered Energy Prices (1996 Dollars)					
Electricity (Cents per Kilowatthour, National Average)	6.9	5.9	6.6	5.5	6.6
Natural Gas (Dollars per Thousand Cubic Feet)	4.25	3.19	5.17	4.12	8.03
Petroleum Prices (Average, Dollars per Gallon)	1.03	1.20	1.94	1.64	2.92
Fossil Fuel Consumption (Quadrillion Btu)					
Natural Gas	22.6	26.9	22.7	29.9	23.2
Coal	20.9	20.7	16.8	23.5	14.7
Petroleum	36.0	43.2	38.0	44.9	37.4
Total	79.5	90.8	77.6	98.2	75.3

Sources: **1996:** Energy Information Administration, *Annual Energy Outlook 1998*, DOE/EIA-0383(98) (Washington, DC, December 1997). **2010 and 2020:** Paul M. Bernstein, Charles River Associates, e-mail communications, August 24, 1998.

**Table C4. Summary of the EPRI Analysis of the 1990-7% Case**

Parameter	1996	Reference Case in 2010	1990-7% Case in 2010	Reference Case in 2020	1990-7% Case in 2020
Carbon Price (1996 Dollars per Metric Ton) <sup>a</sup> . . . . .	NA	0	280	0	251
Gross Domestic Product (Billion 1992 Chain-Weighted Dollars) . . .	6,928	9,296	9,203	11,389	11,280
Total Carbon Emissions (Million Metric Tons) . . . . .	1,463	1,827	1,305	1,947	1,305
Per Capita Carbon Emissions (Metric Tons per Person) . . . . .	5.5	6.1	4.4	6.0	4.0
Primary Energy Intensity (Thousand Btu per 1992 Dollar of GDP) . .	13.57	10.86	9.13	9.48	7.54
World Oil Price (Refiners Acquisition Price, 1996 Dollars per Barrel)	20.48	23.56	20.03	28.27	24.74
Carbon Intensity (Metric Tons per Thousand 1992 Dollars of GDP) (Calculated) . . . . .	0.217	0.197	0.142	0.171	0.116
Total Primary Energy Consumption (Quadrillion Btu). . . . .	94	101	84	108	85
Total Fossil Fuel Consumption (Quadrillion Btu) . . . . .	79.51	87.31	—	94.74	—

<sup>a</sup>All dollars values were given in 1990 dollars by R. Richels, EPRI. To convert from 1990 to 1992 dollars, a deflator of 1.068 was used. To convert from 1990 to 1996 dollars, a deflator of 1.178 was used.

<sup>b</sup>Calculated by dividing total primary energy by value of GDP.

Sources: **1996:** Energy Information Administration, *Annual Energy Outlook 1998*, DOE/EIA-0383(98) (Washington, DC, December 1997). **2010 and 2020:** R. Richels, EPRI, e-mail communications, July 6, 1998.

**Table C5. Summary of the EPRI Analysis of the Kyoto Protocol With Annex I Trading**

Parameter	1996	Reference Case in 2010	Annex I Trading Case in 2010	Reference Case in 2020	Annex I Trading Case in 2020
Carbon Price (1996 Dollars per Metric Ton) . . . . .	NA	0	114	0	188
Gross Domestic Product (Billion 1992 Chain-Weighted Dollars) . . .	6,928	9,296	9,245	11,389	11,199
Total Carbon Emissions (Million Metric Tons) . . . . .	1,463	1,827	1,535	1,947	1,483
Per Capita Carbon Emissions (Metric Tons per Person) . . . . .	5.5	6.1	5.14	6.0	4.58
Primary Energy Intensity (Thousand Btu per 1992 Dollar of GDP) (Calculated) . . . . .	13.57	10.86	9.73	9.48	8.13
World Oil Price (Refiners Acquisition Price, 1996 Dollars per Barrel)	20.48	23.56	21.20	28.27	24.74
Carbon Intensity (Metric Tons per Thousand 1992 Dollars of GDP) (Calculated) . . . . .	0.217	0.197	0.166	0.171	0.132
Total Primary Energy Consumption (Quadrillion Btu). . . . .	94.0	101.0	90.0	108.0	91.0
Total Fossil Fuel Consumption (Quadrillion Btu) . . . . .	79.51	87.31	75.78	94.74	77.01

Sources: **1996:** Energy Information Administration, *Annual Energy Outlook 1998*, DOE/EIA-0383(98) (Washington, DC, December 1997). **2010 and 2020:** R. Richels, EPRI, e-mail communications, July 6, 1998.

**Table C6. Summary of the PNNL Analysis of the 1990-7% Case**

Parameter	1996	Reference Case in 2010	1990-7% Case in 2010	Reference Case in 2020	1990-7% Case in 2020
Carbon Price (1996 Dollars per Metric Ton)	NA	—	221	—	286
Gross Domestic Product (Billion 1992 Chain-Weighted Dollars)	6,928	9,416	9,357 <sup>a</sup>	10,875	10,775
Total Carbon Emissions (Million Metric Tons)	1,463	1,853	1,267	2,035	1,267
Per Capita Carbon Emissions (Metric Tons per Person)	5.5	6.0	4.3	6.1	4.0
Primary Energy Intensity (Thousand Btu per 1992 Dollar of GDP)	13.57	12.5	10.0	11.6	8.7
Carbon Intensity (Metric Tons per Thousand 1992 Dollars of GDP)	0.217	0.197	0.135	0.187	0.118
Total Primary Energy Consumption (Quadrillion Btu)	94.0	117.7	93.9	125.7	93.5
Fossil Fuel Consumption (Quadrillion Btu)					
Natural Gas	22.6	33.3	33.5	38.4	38.5
Coal	20.9	24.5	5.8	26.6	2.9
Petroleum	36.0	44.5	38.0	47.9	38.0
Total	79.5	102.3	77.3	112.9	79.4
Energy Consumption for Electricity Generation (Quadrillion Btu)					
Coal	18.4	20.7	3.0	22.2	0.5
Natural Gas	3.0	5.0	9.3	6.8	11.8
Nuclear <sup>b</sup>	7.2	8.8	9.9	5.7	6.7
Renewables	4.5	4.5	4.6	4.5	4.8
Petroleum	0.8	0.1	0.1	0.2	0.0
Electricity Sales (Quadrillion Btu)	10.6	13.1	10.2	13.6	9.8

<sup>a</sup>The GDP values provided are equal to reference level GDP minus the domestic direct cost of meeting the required commitment level. This direct cost may be different from the welfare loss to the economy.

<sup>b</sup>For nuclear and renewable resources, estimated using 1995 benchmark for nuclear resources and corresponding PNNL generation.

Note: The PNL analysis includes a provision for the abatement costs of non-CO<sub>2</sub> gases. Abatement costs for the non-CO<sub>2</sub> gases are set such that the same percentage reduction per dollar of carbon price for those gases is obtained as for CO<sub>2</sub>. No credits are included for sinks.

Sources: **1996:** Energy Information Administration, *Annual Energy Outlook 1998*, DOE/EIA-0383(98) (Washington, DC, December 1997). **2010 and 2020:** Ronald Sands, PNNL, e-mail communication, August 26, 1998.

**Table C7. Summary of the PNNL Analysis of the Kyoto Protocol With Annex I Trading**

Parameter	1996	Reference Case in 2010	Annex I Trading Case in 2010	Reference Case in 2020	Annex I Trading Case in 2020
Carbon Price (1996 Dollars per Metric Ton)	NA	—	100	—	142
Gross Domestic Product (Billion 1992 Chain-Weighted Dollars)	6,928	9,416	9,381 <sup>a</sup>	10,875	10,811
Total Carbon Emissions (Million Metric Tons)	1,463	1,853	1,439	2,035	1,486
Per Capita Carbon Emissions (Metric Tons per Person)	5.5	6.0	4.9	6.1	4.5
Primary Energy Intensity (Thousand Btu per 1992 Dollar of GDP)	13.6	12.5	10.8	11.6	9.6
Carbon Intensity (Metric Tons per Thousand 1992 Dollars of GDP)	0.217	0.197	0.153	0.187	0.137
Total Primary Energy Consumption (Quadrillion Btu)	94.0	117.7	101.5	125.7	103.3
Fossil Fuel Consumption (Quadrillion Btu)					
Natural Gas	22.6	33.3	33.6	38.4	39.2
Coal	20.9	24.5	10.4	26.6	8.6
Petroleum	36.0	44.5	41.0	47.9	41.8
Total	79.5	102.3	85.0	112.9	89.6
Energy Consumption for Electricity Generation (Quadrillion Btu)					
Coal	18.4	20.7	7.3	22.2	5.6
Natural Gas	3.0	5.0	8.2	6.8	10.5
Nuclear <sup>b</sup>	7.2	8.8	9.6	5.7	6.4
Renewables	4.5	4.5	4.5	4.5	4.7
Petroleum	0.8	0.1	0.1	0.2	0.1
Electricity Sales (Quadrillion Btu)	10.6	13.1	11.0	13.6	10.9

<sup>a</sup>The GDP values provided are equal to reference level GDP minus the domestic direct cost of meeting the required commitment level. This direct cost may be different from the welfare loss to the economy.

<sup>b</sup>For nuclear and renewable resources, estimated using 1995 benchmark for nuclear resources and corresponding PNNL generation.

Note: The PNL analysis includes a provision for the abatement costs of non-CO<sub>2</sub> gases. Abatement costs for the non-CO<sub>2</sub> gases are set such that the same percentage reduction per dollar of carbon price for those gases is obtained as for CO<sub>2</sub>. No credits are included for sinks.

Sources: **1996:** Energy Information Administration, *Annual Energy Outlook 1998*, DOE/EIA-0383(98) (Washington, DC, December 1997). **2010 and 2020:** Ronald Sands, PNNL, e-mail communication, August 26, 1998.

**Table C8. Summary of the EIA Analysis of the 1990-7% Case**

Parameter	1996	Reference Case in 2010	1990-7% Case in 2010	Reference Case in 2020	1990-7% Case in 2020
Carbon Price (1996 Dollars per Metric Ton)	NA	NA	348	NA	305
Gross Domestic Product (Billion 1992 Chain-Weighted Dollars)	6,928	9,429	9,032	10,865	10,782
Total Carbon Emissions (Million Metric Tons)	1,463	1,791	1,243	1,929	1,251
Per Capita Carbon Emissions (Metric Tons per Person)	5.5	6.0	4.2	6.0	3.9
Real Disposable Personal Income (Billion 1992 Dollars)	5,077	6,891	6,719	8,192	8,214
Real Investment (Billion 1992 Dollars)	1,067	1,745	1,662	2,100	2,095
Real Consumption (Billion 1992 Dollars)	4,714	6,347	6,160	7,599	7,636
Light-Duty Vehicle Sales (Millions)	15.1	16.6	15.2	17.0	16.5
Primary Energy Intensity (Thousand Btu per 1992 Dollar of GDP)	13.57	11.80	10.16	10.78	9.17
Delivered Energy Intensity (Thousand Btu per 1992 Dollar of GDP)	10.16	8.98	8.08	8.31	7.36
World Oil Price (Refiners Acquisition Price, 1996 Dollars per Barrel)	20.48	20.77	17.54	21.69	18.38
Natural Gas Wellhead Price (1996 Dollars per Thousand Cubic Feet)	2.24	2.33	3.03	2.62	3.53
Minemouth Coal Price (1996 Dollars per Short Ton)	18.50	14.29	18.29	12.53	20.50
Carbon Intensity (Metric Tons per Thousand 1992 Dollars of GDP)	0.22	0.19	0.14	0.18	0.11
Delivered Energy Prices (1996 Dollars)					
Coal (Dollars per Million Btu to Utilities)	1.29	1.11	9.95	1.00	8.80
Natural Gas (Dollars per Thousand Cubic Feet)	4.25	3.87	9.57	4.07	9.35
Distillate (Dollars per Gallon)	1.09	1.08	1.90	1.06	1.77
Motor Gasoline (Dollars per Gallon)	1.23	1.25	1.91	1.24	1.80
Electricity (Cents per Kilowatthour)	6.9	5.9	11.0	5.6	9.3
Total Primary Energy Consumption (Quadrillion Btu)	94.0	111.2	91.7	117.0	98.8
Fossil Fuel Consumption (Quadrillion Btu)					
Natural Gas	22.6	29.0	32.1	32.7	34.5
Coal	20.9	24.1	5.4	25.3	2.0
Petroleum	36.0	43.8	38.1	46.9	41.7
Total	79.5	96.9	75.6	104.9	78.2
Total End-Use Carbon Emissions (Million Metric Tons) <sup>a</sup>	1,463	1,791	1,243	1,929	1,251
Buildings (Residential/Commercial)	170.9	176.6	135.1	181.0	139.3
Industrial	306.9	345.1	308.7	355.0	322.9
Transportation	468.4	611.6	514.7	668.8	569.9
Electricity	516.7	657.4	285.0	726.0	218.6
Energy Consumption for Electricity Generation (Quadrillion Btu)					
Coal	18.4	21.4	3.7	22.5	0.3
Natural Gas	3.0	6.9	12.7	9.6	14.3
Nuclear	7.2	6.2	7.4	3.8	7.4
Renewables	4.5	4.3	5.5	4.5	9.7
Petroleum	0.8	0.4	0.4	0.3	0.3
Electricity Sales (Quadrillion Btu)	10.57	13.19	10.98	14.47	12.51

<sup>a</sup>Excludes emissions related to electricity generation.

Sources: **1996:** Energy Information Administration, *Annual Energy Outlook 1998*, DOE/EIA-0383(98) (Washington, DC, December 1997). **2010 and 2020:** Office of Integrated Analysis and Forecasting, National Energy Modeling System runs KYBASE.D080398A and FD07BLW.D080398B.

**Table C9. Summary of the EIA Analysis of the 1990+9% and 1990+14% Cases**

Parameter	1996	Reference Case in 2010	1990+9% Case in 2010	1990+14% Case in 2010	Reference Case in 2020	1990+9% Case in 2020	1990+14% Case in 2020
Carbon Price (1996 Dollars per Metric Ton) . . . . .	NA	NA	163	129	NA	141	123
Gross Domestic Product (Billion 1992 Chain-Weighted Dollars) . . . . .	6,928	9,429	9,241	9,268	10,865	10,796	10,808
Total Carbon Emissions (Million Metric Tons). . . . .	1,463	1,791	1,462	1,535	1,929	1,468	1,536
Per Capita Carbon Emissions (Metric Tons per Person) . . . . .	5.5	6.0	4.9	5.1	6.0	4.5	4.7
Real Disposable Personal Income (Billion 1992 Dollars) . . . . .	5,077	6,891	6,783	6,794	8,192	8,153	8,151
Real Investment (Billion 1992 Dollars) . . . . .	1,067	1,745	1,719	1,716	2,100	2,098	2,099
Real Consumption (Billion 1992 Dollars) . . . . .	4,714	6,347	6,248	6,258	7,599	7,583	7,582
Light-Duty Vehicle Sales (Millions) . . . . .	15.1	16.6	16.0	16.0	17.0	16.7	16.7
Primary Energy Intensity (Thousand Btu per 1992 Dollar of GDP). . . . .	13.57	11.80	10.78	11.0	10.78	9.62	9.78
Delivered Energy Intensity (Thousand Btu per 1992 Dollar of GDP). . . . .	10.16	8.98	8.54	8.63	8.31	7.79	7.87
World Oil Price (Refiners Acquisition Price, 1996 Dollars per Barrel) . . . . .	20.48	20.77	18.72	19.15	21.69	19.73	19.81
Natural Gas Wellhead Price (1996 Dollars per Thousand Cubic Feet). . . . .	2.24	2.33	2.78	2.62	2.62	3.71	3.50
Minemouth Coal Price (1996 Dollars per Short Ton)	18.50	14.29	16.42	15.81	12.53	16.24	15.51
Carbon Intensity (Metric Tons per Thousand 1992 Dollars of GDP) . . . . .	0.22	0.19	0.16	0.17	0.18	0.14	0.14
Delivered Energy Prices (1996 Dollars)							
Coal (Dollars per Million Btu to Utilities) . . . . .	1.29	1.11	5.23	4.37	1.00	4.52	4.07
Natural Gas (Dollars per Thousand Cubic Feet) . . . . .	4.25	3.87	6.63	5.96	4.07	7.14	6.66
Distillate (Dollars per Gallon) . . . . .	1.09	1.08	1.46	1.39	1.06	1.36	1.32
Motor Gasoline (Dollars per Gallon) . . . . .	1.23	1.25	1.55	1.50	1.24	1.49	1.45
Electricity (Cents per Kilowatthour) . . . . .	6.9	5.9	8.8	8.2	5.6	8.1	7.8
Total Primary Energy Consumption (Quadrillion Btu)	94.0	111.2	99.6	101.9	117.0	103.8	105.6
Fossil Fuel Consumption (Quadrillion Btu)							
Natural Gas . . . . .	22.6	29.0	31.8	30.7	32.7	36.0	35.4
Coal . . . . .	20.9	24.1	11.7	14.8	25.3	7.1	10.0
Petroleum . . . . .	36.0	43.8	41.1	41.6	46.9	44.8	44.9
Total . . . . .	79.5	96.9	84.6	87.1	104.9	87.9	90.3
Total End-Use Carbon Emissions (Million Metric Tons) <sup>a</sup> . . . . .	1,463	1,791	1,462	1,535	1,929	1,468	1,536
Buildings (Residential/Commercial) . . . . .	170.9	176.6	154.2	159.1	181.0	155.2	159.0
Industrial . . . . .	306.9	345.1	325.9	326.9	355.0	338.2	339.2
Transportation . . . . .	468.4	611.6	572.2	580.7	666.8	623.0	630.5
Electricity. . . . .	516.7	657.4	409.1	468.3	726.0	351.3	407.5
Energy Consumption for Electricity Generation (Quadrillion Btu)							
Coal . . . . .	18.4	21.4	9.7	12.7	22.5	5.0	7.9
Natural Gas . . . . .	3.0	6.9	10.9	9.5	9.6	14.9	14.0
Nuclear. . . . .	7.2	6.2	7.0	6.9	3.8	5.9	5.6
Renewables . . . . .	4.5	4.3	4.7	4.6	4.5	6.6	6.2
Petroleum . . . . .	0.8	0.4	0.2	0.2	0.3	0.5	0.2
Electricity Sales (Quadrillion Btu) . . . . .	10.57	13.19	11.92	12.15	14.47	13.09	13.28

<sup>a</sup>Excludes emissions related to electricity generation.

Sources: **1996:** Energy Information Administration, *Annual Energy Outlook 1998*, DOE/EIA-0383(98) (Washington, DC, December 1997). **2010 and 2020:** Office of Integrated Analysis and Forecasting, National Energy Modeling System runs KYBASE.D080398A, FD09ABV.D080398B, and FD1998.D080398B.

**Table C10. DRI Case Summary**

Parameter	1996	Reference Case in 2010	Case 1 in 2010	Case 2 in 2010	Case 3 in 2010	Reference Case in 2020	Case 1 in 2020	Case 2 in 2020	Case 3 in 2020
Carbon Price (1996 Dollars per Metric Ton) . . . . .	NA	NA	174	110	37	NA	190	131	70
GDP (Billion 1992 Chain-Weighted Dollars) . . . . .	6,928	9,428	9,273	9,321	9,366	10,865	10,836	10,828	10,813
Total Carbon Emissions (Million Metric Tons) . . . . .	1,463	1,740	1,354	1,452	1,593	1,886	1,297	1,416	1,589
Per Capita Carbon Emissions (Metric Tons per Person) . . . . .	5.5	5.8	4.5	4.9	5.3	5.8	4.0	4.4	4.9
Real Disposable Personal Income (Billion 1992 Dollars) . . . . .	5,077	6,891	6,724	6,769	6,819	8,193	8,092	8,104	8,108
Real Investment (Billion 1992 Dollars) . . . . .	1,067	1,746	1,780	1,762	1,738	2,150	2,225	2,199	2,181
Real Consumption (Billion 1992 Dollars) . . . . .	4,714	6,346	6,203	6,246	6,289	7,599	7,555	7,550	7,535
Light-Duty Vehicle Sales (Millions) . . . . .	15.1	16.6	15.9	16.1	16.3	17.0	16.8	16.8	17.1
Primary Energy Intensity (Thousand Btu per 1992 Dollar of GDP) . . . . .	13.57	11.63	9.79	10.28	10.99	10.43	7.79	8.42	9.27
Delivered Energy Intensity (Thousand Btu per 1992 Dollar of GDP) . . . . .	10.16	8.36	7.06	7.42	7.96	7.64	5.79	6.25	6.90
Carbon Intensity (Metric Tons per Thousand 1992 Dollars of GDP) . . . . .	0.22	0.19	0.15	0.16	0.17	0.17	0.12	0.13	0.15
Delivered Energy Prices (1996 Dollars)									
Coal (Dollars per Million Btu to Utilities) . . . . .	1.29	1.16	5.89	4.16	2.15	1.09	12.34	4.62	2.98
Natural Gas to Utilities (Dollars per Thousand Cubic Feet) . . . . .	2.70	2.47	5.20	4.15	3.10	2.96	5.64	4.77	4.01
Motor Gasoline (Dollars per Gallon) . . . . .	1.23	1.31	1.70	1.56	1.41	1.48	1.89	1.76	1.64
Electricity (Cents per Kilowatthour) . . . . .	6.9	5.4	8.4	7.5	6.3	5.3	8.2	7.3	6.5
Total Primary Energy Consumption (Quadrillion Btu) . . . . .	94.0	108.1	91.0	95.4	102.9	112.9	84.4	91.1	100.2
Fossil Fuel Consumption (Quadrillion Btu)									
Natural Gas . . . . .	22.6	28.5	25.3	26.1	29.1	31.5	21.1	24.3	29.4
Coal . . . . .	20.9	24.5	13.9	16.5	18.7	26.3	13.9	15.4	17.4
Petroleum . . . . .	36.0	42.1	38.4	39.6	41.8	44.7	38.5	40.3	42.7
Total . . . . .	79.5	95.1	77.7	82.2	89.6	102.5	73.5	80.0	89.5
Total End-Use Carbon Emissions (Million Metric Tons) <sup>a</sup> . . . . .	1,463	1,740	1,354	1,452	1,593	1,886	1,297	1,416	1,589
Buildings (Residential/Commercial) . . . . .	170.9	176.7	149.1	157.6	170.8	181.9	131.0	145.0	163.4
Industrial . . . . .	306.9	344.0	267.6	286.4	323.5	357.6	225.8	255.4	306.0
Transportation . . . . .	468.4	558.1	485.1	507.7	542.3	600.0	513.1	537.6	564.7
Electricity . . . . .	516.7	661.6	452.4	500.7	556.7	746.8	426.9	477.8	555.1
Electricity Sales (Quadrillion Btu) . . . . .	10.6	13.2	11.1	11.5	12.4	14.9	10.4	11.3	12.6

<sup>a</sup>Excludes emissions related to electricity generation.

Sources: **1996:** Energy Information Administration, *Annual Energy Outlook 1998*, DOE/EIA-0383(98) (Washington, DC, December 1997). **2010 and 2020:** Standard and Poors DRI, *The Impact of Meeting the Kyoto Protocol on Energy Markets and the Economy*, Appendix I: National Impacts (July 1998).