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zFacts on ethanol

See yellow highlights on the following page(s).

Fact: **Gasoline produces 8228 grams CO2 / gallon**

Source: US Department of Energy (DOE) Alternative Fuels Data Center. (Google this title to find the full document.)

Notes: **See "Motor Gasoline" on p. 187 (PDF p.3) below.**
Page 187 says:
Motor Gasoline => 19.33 Million Metric Tons Carbon per Quadrillion Btu

A metric ton is a million grams and a Quad is a thousand million million Btu, so this all boils down to:

Motor Gasoline = 19.33 grams carbon / 1000 Btu.

Gasoline has 116,090 Btu / gallon.
19.33 x 116.09 = 2244 g C / gallon.

CO2 is 44/12 times heavier than carbon,

so gasoline has 8228 g CO2 / gallon.

Documentation for Emissions of Greenhouse Gases in the United States 2004

December 2006

Energy Information Administration
Office of Integrated Analysis and Forecasting
U.S. Department of Energy
Washington, D.C. 20585

Table 6-1. Carbon Coefficients Used in *Emissions of Greenhouse Gases in the United States 2004*, selected years (Million Metric Tons Carbon per Quadrillion Btu)

Fuel Type	1990...	2000	2001	2002	2003	2004
Coal						
Coal (Residential)	26.23	26.04	26.04	26.04	26.04	26.04
Coal (Commercial)	26.23	26.04	26.04	26.04	26.04	26.04
Coal (Industrial Coking)	25.55	25.63	25.63	25.63	25.63	25.63
Coal (Industrial Other)	25.82	25.74	25.74	25.74	25.74	25.74
Coal (Electric Utility)	25.95	25.98	25.98	25.98	25.98	25.98
Natural Gas						
Natural Gas (Pipeline)	14.47	14.47	14.47	14.47	14.47	14.47
Natural Gas (Flared)	14.92	14.92	14.92	14.92	14.92	14.92
Petroleum						
Asphalt and Road Oil	20.62	20.62	20.62	20.62	20.62	20.62
Aviation Gasoline	18.87	18.87	18.87	18.87	18.87	18.87
Crude Oil	20.16	20.23	20.29	20.30	20.28	20.33
Distillate Fuel	19.95	19.95	19.95	19.95	19.95	19.95
Jet Fuel	19.40	19.33	19.33	19.33	19.33	19.33
Kerosene	19.72	19.72	19.72	19.72	19.72	19.72
LPG	16.99	16.98	16.99	16.99	16.99	16.99
Lubricants	20.24	20.24	20.24	20.24	20.24	20.24
Motor Gasoline	19.41	19.34	19.34	19.35	19.33	19.33
Petrochemical Feed.	19.37	19.37	19.37	19.37	19.37	19.37
Petroleum Coke	27.85	27.85	27.85	27.85	27.85	27.85
Residual Fuel	21.49	21.49	21.49	21.49	21.49	21.49
Waxes	19.81	19.81	19.81	19.81	19.81	19.81

Note: All coefficients based on Higher Heating (Gross Calorific) Value and assume 100 percent combustion
p=Preliminary

Sources: Carbon coefficients for coal from U.S. Geological Survey, U.S. Coal Quality Database Version 2.0 (1998) and analysis prepared by Science Applications International Corporation (SAIC) for the U.S. Environmental Protection Agency, Office of Air and Radiation, Market Policies Branch, October 2002. Carbon coefficients for natural gas from *Emissions of Greenhouse Gases in the United States 1987-1992*, DOE/EIA 0573 (Washington, D.C., November, 1994,) Appendix A based on Gas Technology Institute (formerly Gas Research Institute) database as documented in W.E. Liss, W.H. Thrasher, G.F. Steinmetz, P. Chowdiah, and A. Atari, *Variability of Natural Gas Composition in Select Major Metropolitan Areas of the United States.* Carbon coefficients for petroleum products from *Emissions of Greenhouse Gases in the United States 1987-1992*, DOE/EIA 0573 (Washington, D.C., November, 1994,) Appendix A with coefficients for Motor Gasoline updated annually by Science Applications International Corporation.

6.1 Coal

Approximately one-third of all U.S. carbon dioxide emissions from fossil fuel combustion are associated with coal consumption. Because EIA collects coal consumption data by consuming sector, EIA adopted carbon coefficients by consuming sector. Because the carbon content of coal varies by the state in which it was mined and by coal rank, and the sources of coal for each consuming sector vary by year, the weighted average carbon coefficient for coal combusted in each consuming sector also varies over time. A time-series of carbon coefficients by coal rank and consuming sector appears in Table 6-2. Since the IPCC guidelines provide carbon coefficients by rank, EIA also adopted carbon coefficients by rank for comparison with other nations' carbon coefficients.

Table 6-2. Carbon Coefficients for Coal by Consuming Sector and Coal Rank, Selected Years (Million Metric Tons per Quadrillion Btu)

	1990...	2000	2001	P2002	P2003	P2004
Consuming Sector						
Electric Power	25.95	25.98	25.98	25.98	25.98	25.98
Industrial Coking	25.55	25.63	25.63	25.63	25.63	25.63
Other Industrial	25.82	25.74	25.74	25.74	25.74	25.74
Residential/Commercial	26.23	26.04	26.04	26.04	26.04	26.04
Coal Rank						
Anthracite	28.26	28.26	28.26	28.26	28.26	28.26
Bituminous	25.43	25.49	25.49	25.49	25.49	25.49
Sub-bituminous	26.50	26.48	26.48	26.48	26.48	26.48
Lignite	26.19	26.30	26.30	26.30	26.30	26.30

P = Preliminary
Note: All coefficients based on Higher Heating (Gross Calorific) Value and assume 100 percent combustion.

Sources: U.S. Geological Survey, U.S Coal Quality Database Version 2.0 (1998) and analysis prepared by Science Applications International Corporation (SAIC) for the U.S. Environmental Protection Agency, Office of Air and Radiation, Market Policies Branch, October 2002.

Estimation Methods

Carbon coefficients are estimated on the basis of 6,588 coal samples collected by the U.S. Geological Survey between 1973 and 1989. These coal samples are classified according to rank and state of origin. For each rank in each state, the average heat content and carbon content of the coal samples are calculated. Dividing the carbon content (reported in pounds carbon dioxide) by the heat content (reported in million Btu) yields an average carbon coefficient. This coefficient is then converted into units of million metric tons per quadrillion Btu.

U.S. energy statistics provide data on the origin of coal used in four areas: 1) the electric power industry 2) industrial coking, 3) all other industrial uses, and 4) the residential and commercial end-use sectors. Because U.S. energy statistics do not provide the distribution of coal rank consumed by each consuming sector, it is assumed that each sector consumes a representative