

State Energy-related Carbon Dioxide Emissions Estimates

Although energy-related carbon dioxide (CO₂) emissions do not encompass a full greenhouse gas inventory, the state energy-related carbon dioxide emissions do give a good indicator of the relative importance of individual states to the national greenhouse gas inventory as energy-related carbon dioxide emissions represent over 80 percent of total U.S. greenhouse gas emissions.

EIA emissions estimates at the state level for energy-related carbon dioxide emissions are based on data contained in the State Energy Data System (SEDS) for the years 1990 to 2008.¹ The state-level emissions estimates include energy consumption data for the following fuel categories: coal, natural gas, and ten petroleum products, including asphalt and road oil, aviation gasoline, distillate fuel (including some kerosene jet fuel), jet fuel, kerosene, LPG, lubricants, motor gasoline, residual fuel, and other petroleum products.

The data are presented in three summary tables and in detailed state tables.

Table 1. 2008 State Energy-related Carbon Dioxide Emissions by Fuel – The fuel-based estimates are developed from primary fuel inputs of coal, natural gas and petroleum for 2008. State-level energy consumption levels (denominated in British thermal units or Btu) are multiplied by national-level carbon emission factors (denominated in CO₂ per Btu) used by EIA in compiling national estimates of energy-related carbon dioxide emissions. No attempt is made to adjust national carbon dioxide emission factors by state. As indicated in Table 1, most of the balancing item is in petroleum. This is because the national-level inventory is based on the Monthly Energy Review data (MER) series and there are differences in how the MER and SEDS data systems aggregate certain petroleum products.

Table 2. 2008 State Energy-related Carbon Dioxide Emissions by Energy Sectors – Emissions from primary fuel inputs are estimated by end-use sector, as well as the electric power sector for 2008. At the national level, EIA shares out electric power sector emissions to the end-use sectors via the amount of electricity sales consumed by that sector.² At the state level, electric power sector emissions are not shared out to the other sectors but are represented independently. This avoids complicated trans-boundary issues between states that are not encountered when doing a national-level emissions estimate. In other words, regardless of where the electricity is consumed, the emissions from the primary energy consumed to generate the electricity are attributed to the state in which the generation occurred. The industrial sector contains the greatest discrepancy between national and state inventories. This is based primarily on the aggregation differences between the MER and SEDS data systems.

¹ See EIA website http://www.eia.doe.gov/emeu/states/_seds.html.

² The electric power sector consists of NAICS-22 generators whose primary business is to produce electricity. Emissions from generators in the industrial and commercial sectors whose primary business is not the generation of electricity remain in those respective end-use sectors.

Table 3. Summary of State Energy-related Carbon Dioxide Emissions, 1990 - 2008 – A time series presents emissions estimates by state for 1990 to 2008. This table utilizes the fuel-based estimates to produce state totals.

Carbon Sequestered by Nonfuel Uses of Energy – All three summary tables net out carbon, and hence carbon dioxide emissions, that is sequestered due to the fact that a small portion of energy consumption is not combusted because it is used for nonfuel purposes. At the national level, carbon sequestered in nonfuel products is subtracted through a relatively complex process from total national-level emissions. Because of state-level data constraints, a more simplified process is used to allocate the national-level nonfuel sequestration values to the individual states. Three separate methods are used, depending on the nonfuel source.

1. For petroleum products, such as asphalt and road oil and lubricants, where all uses are nonfuel and the sequestration rates are straightforward, the amount of nonfuel sequestered was directly calculated based on state-level activity data and the related national-level carbon coefficients for the particular product.
2. For liquefied petroleum gases (LPG), industry data were used to apportion the total national-level nonfuel sequestration amounts for LPGs to the states.³
3. For petroleum products other than the above (petroleum coke, residual fuel, and distillate fuel), natural gas, and coal, value added at the NAICS 3251 Basic Chemicals level was used to apportion the total national-level nonfuel sequestration to the individual States.⁴

Municipal Solid Waste, Geothermal Power Generation and Net Coke Imports - A line item for Municipal Solid Waste (MSW) and geothermal power generation is not apportioned to any state because it is not part of the SEDS database. This value fluctuates between 6.3 and 13.1 million metric tons during the 1990 to 2008 time frame. As such, this source ranges from 0.1 to 0.2 percent of total U.S. energy-related carbon dioxide emissions. Beginning with the 2007 data, net coke imports are added to the coal category of the state inventory total to better match the national-level inventory.

Balancing Item - The balancing item accounts for aggregation differences between the national-level inventory and state-level emissions calculations totals. The balancing item is not attributed to any one state. The balancing item ranges from 1.5 million metric tons to 18.3 million metric tons. In percentage terms, the balancing item ranges from 0.0 to 0.3 percent of total U.S. carbon dioxide emissions.

Detailed Tables by State – Detailed state tables show emissions by fuels within sectors.

³ American Petroleum Institute, *Sales of Natural Gas Liquids and Liquefied Refinery Gases*. (various years). Data were aggregated and averaged in order to avoid disclosure of proprietary material.

⁴U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau, Annual survey of Manufactures, Geographic Area Statistics. <http://www.census.gov/prod/2002pubs/m00as-3.pdf>
Note: The data for nonfuel estimates are highly aggregate. States entering into regional emissions trading or other trading programs should rely on more detailed state-level data.