UT Extension

E³A: Understanding Energy

SP 757-H

Carbon and Energy in the United States

For more energy information, go to http://energy.tennessee.edu.

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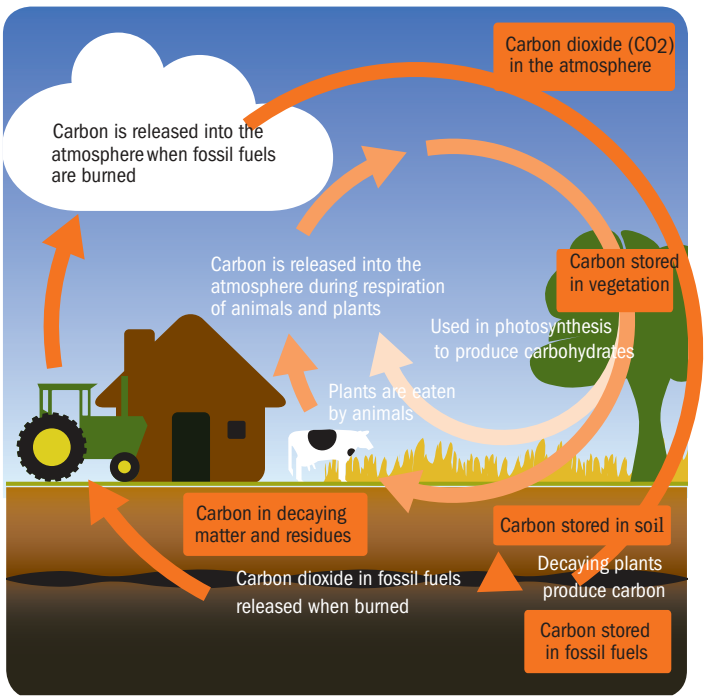
The study of greenhouse gases (GHG) began in the late 19th century when scientists began to understand that the Earth's atmosphere contains gases that help to warm the planet and support life by absorbing and emitting radiation (greenhouse effect). Without these naturally occurring gases, the Earth's temperature would be about -2 degrees Fahrenheit, as opposed to the +57 degrees Fahrenheit that we currently experience (EIA, 2011). One of these gases is carbon dioxide.

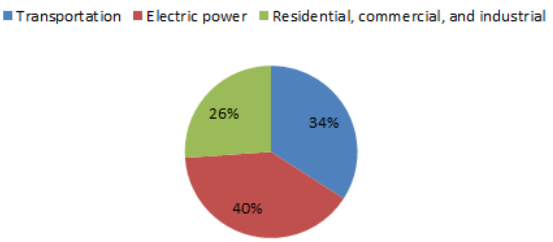


All living things are based on the carbon atom. Carbon can exist as a solid, liquid or gas, and carbon molecules are constantly being exchanged. Whether through plants and animals decaying and evolving into mineral carbon (fossil fuels) or plants completing photosynthesis, carbon is an essential element of our world. In a completely natural world, the levels of carbon dioxide are balanced by natural processes; for example, the relationship between plants and animals. Plants absorb carbon dioxide and produce oxygen - while animals use oxygen and produce carbon dioxide.

However, we do not live in a completely natural world. Over 150 years ago when large-scale industrialization began, humans began burning fossil fuels for energy. As fossil fuels (mineral carbons) are burned, additional carbon dioxide is released into the atmosphere. The amount released is more than what can be naturally balanced and the concentration of several important GHGs have increased by about 40 percent since industrialization began (EIA, 2011).

In addition to carbon dioxide, other GHGs considered important are methane, nitrous oxide, hydroflorocarbons, perflurocarbons and sulfur hexafluoride (EIA, 2011). Scientists have been concerned for many decades that these higher concentrations of GHG will enhance the greenhouse effect, contributing to increased temperatures and changed climates on Earth. The topic of climate change and global warming is extremely controversial. However, we do know that GHGs help to warm the planet and that human activities, such as burning fossil fuels, do create additional greenhouse gases. Therefore, many public policies have been enacted in an attempt to reduce the net amount of additional carbon released into the atmosphere.

U.S. Energy-Related Carbon Dioxide Emissions by Sector, 2009



Source: U.S. Energy Information Administration, Emissions of Greenhouse Gases in the United States, 2009 (March 2011)

How is the Topic of Carbon Related to Energy?

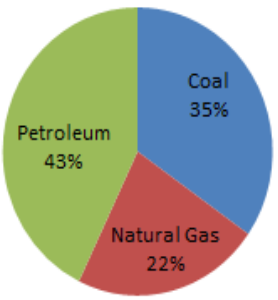
The reason that carbon is so heavily discussed with energy is that fossil fuels supply 84 percent of the primary energy sources consumed in the United States, and they produce 99 percent of carbon dioxide emissions (EIA, 2011). If total GHGs are considered, about 87 percent of 2009 emissions in the U.S. came from energy-related sources (EIA, 2011).

Electricity generation and transportation are the two largest sources of energy-related greenhouse gas emissions. According to EIA, the electrical power industry currently emits the most greenhouse gas. However, petroleum is the fossil fuel that emits the most carbon dioxide (EIA, 2011).

Determining Your Carbon Contributions

Because energy is used in homes, vehicles and manufacturing products, almost all U.S. consumers are associated with GHG emissions. Recently, many organizations have tried to help consumers understand the extent to which they contribute to the emission of GHGs (especially carbon) by estimating the "footprint," or carbon impact, of each consumer. These calculations are often referred to as "carbon footprints." An example of a calculator developed by the U.S. Environmental Protection Agency can be found at www.epa.gov/climatechange/emissions/ind_calculator.html.

U.S. Energy-Related Carbon Dioxide Emissions by Major Fuel, 2009



Source: U.S. Energy Information Administration, Emissions of Greenhouse Gases in the United States 2009 (March, 2011)

Considerations in Using Carbon Footprint Calculators

The concept behind carbon footprint calculators is to help consumers understand how decisions made by individuals contribute to the larger world issue of carbon emissions. Some retail chains have even started to label products with carbon footprint indicators so that consumers can be more aware of their purchasing decisions as they relate to the environment. However, there are no defined standards for calculations. Consumers who use the Internet to find carbon footprint calculators may find that the size of their "footprint" is different from website to website. The differences are usually attributed to the assumptions being made in the calculation. For example, one calculator might look at the carbon footprint of a product at the point of manufacturing to the end purchase. Another might look at the same product but consider everything from harvesting the raw materials and transporting those materials to the manufacturer through disposal of any packaging.

The assumptions made in calculations and the recommended "offsets" (or actions people can take to reduce their own footprint) remain a controversial topic. The calculators can, however, help you to better understand where you are most impacting carbon emissions. If your primary objective in making changes to your energy use is to reduce fossil fuel consumption, these calculators can help you to better understand where your actions will have the greatest impact (changing transportation choices, reducing electricity consumption, etc.). You can then use information in the E3A toolkit to determine the course of action that is right for you.

References

EIA. (2011, May 9). *US Energy Information Administration*. Retrieved August 3, 2011, from What are greenhouse gases and how much are emitted by the United States? http://www.eia.gov/energy_in_brief/greenhouse_gas.cfm

EIA. (2011, April 12). *US Energy Information Administration*. Retrieved August 3, 2011, from Energy and the Environment Explained: http://www.eia.gov/energyexplained/index.cfm?page=environment_how_ghg_affect_climate

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