



# E<sup>3</sup>A: Understanding Energy

## Understanding Energy

Energy Pyramid

Net Metering

Off-Grid Living

Green Building

Understanding Your Energy Consumption

Sources and Uses

**Carbon and Energy**

Importance Scale Survey

## Carbon and energy in the United States

The study of greenhouse gases (GHGs) began in the late 19th century when scientists began to understand that Earth's atmosphere contains gases that warm the planet and support life by absorbing and emitting radiation, now known as the greenhouse effect. Without naturally occurring gases such as carbon dioxide, Earth's average temperature would be about minus 2 degrees F; far colder than the 57 degrees we're accustomed to (EIA, May 2011).

All life is carbon-based. The cycle of carbon changing from one state to another includes processes such as living things decaying into fossil fuels and plants completing photosynthesis. In a completely natural world, processes such as respiration and photosynthesis would balance carbon dioxide levels. However, we do not live in a completely natural world.

More than 150 years ago when large-scale industrialization began to spread, people started burning fossil fuels for energy. Burning fossil fuels releases additional carbon dioxide into the atmosphere, and the amount released is greater than what can be naturally balanced. The concentration of several GHGs — methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride and carbon dioxide — has increased by about 40 percent since industrialization began (EIA, April 2011). Scientists have been concerned for decades that higher concentrations of GHGs increase the greenhouse effect, contributing to higher temperatures and climate change.

The topic of climate change and global warming is extremely controversial. However, we know GHGs help warm the planet and human activities, such as burning fossil fuels, create additional greenhouse gases. Many public policies have endeavored to reduce the net amount of additional carbon released into the atmosphere.

## How is carbon related to energy?

Carbon is so heavily discussed in energy because fossil fuels are responsible for 84 percent of the energy consumed in the United States and 99 percent of carbon dioxide emissions (EIA, May 2011). The majority of emissions in the U.S. came from energy-related sources.

Electricity generation and transportation are the two largest sources of energy-related greenhouse gas emissions. The electrical power industry currently emits the most greenhouse gas, and petroleum is the leading producer of carbon dioxide (EIA, May 2011).

## Determine your carbon contributions

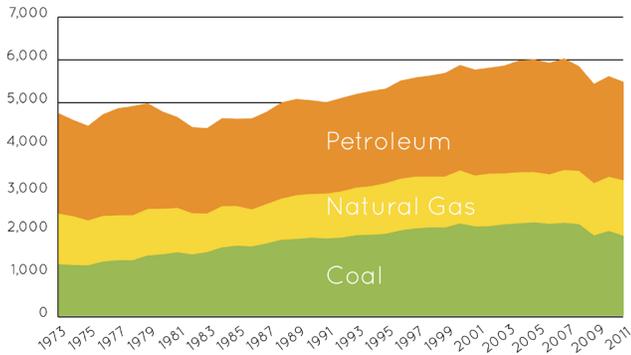
Homes, vehicles and manufacturing all consume energy, so almost all U.S. consumers contribute in some way to GHG emissions. Many organizations have tried to help consumers understand the extent of their contribution to GHG emissions — especially carbon — by calculating each consumer's carbon impact, or carbon footprint. You can calculate your carbon footprint using an online calculator created by the Environmental Protection Agency at [http://www.epa.gov/climatechange/emissions/ind\\_calculator.html](http://www.epa.gov/climatechange/emissions/ind_calculator.html).

## Considerations in using carbon footprint calculators

Carbon footprint calculators are designed to help consumers better understand how decisions made by individuals contribute to the larger issue of carbon emissions. Some retail chains have started to label products with carbon footprint indicators to increase awareness of how purchasing decisions affect the environment.

## Carbon Dioxide Emissions from Fossil Fuels

(million metric tons)



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Source: Energy Information Administration, Monthly Energy Review, Table 12.1  
[http://www.eia.gov/totalenergy/data/monthly/pdf/sec12\\_3.pdf](http://www.eia.gov/totalenergy/data/monthly/pdf/sec12_3.pdf)

However, there are no defined standards for calculations. Consumers who use the Internet to find carbon footprint calculators may find that their carbon footprint differs from website to website. Differences are usually attributed to the assumptions being made in the calculation. For example, one calculator might limit its scope to the manufacturer of a product through the point of sale. Another might look at the same product, but include everything from harvesting the raw materials all the way to the disposal of any packaging.

The assumptions made in calculations and recommended offsets, or actions taken to reduce one's carbon footprint, remain a controversial topic. However, calculators can help you better understand the effects your decisions have on carbon emissions. If your goal in changing your energy use habits is to reduce fossil fuel consumption, these calculators can help you better understand where your actions will make the biggest difference, such as changing transportation choices or reducing electricity consumption. Information in the E<sup>3</sup>A toolkit can help you determine the course of action that best suits your goals.

## References

- U.S. Energy Information Administration (EIA). (2011, May 9). What are greenhouse gases and how much are emitted by the United States? *Energy in Brief*. Retrieved August 3, 2011 from [http://www.eia.gov/energy\\_in\\_brief/greenhouse\\_gas.cfm](http://www.eia.gov/energy_in_brief/greenhouse_gas.cfm)
- (2011, April 12). Energy and the Environment Explained. *Energy Explained*. Retrieved August 3, 2011 from [http://www.eia.gov/energyexplained/index.cfm?page=environment\\_how\\_ghg\\_affect\\_climate](http://www.eia.gov/energyexplained/index.cfm?page=environment_how_ghg_affect_climate)

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