

Carbon Footprint and Climate Change

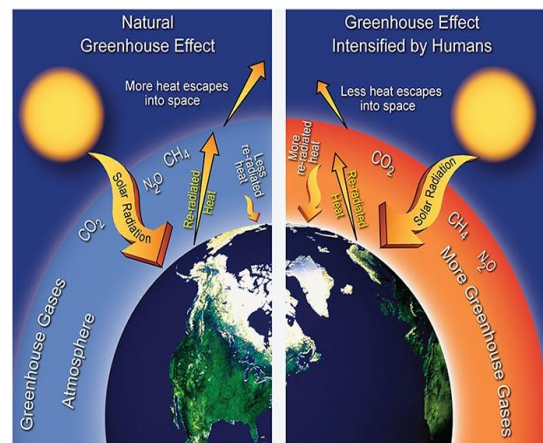
Understanding carbon footprints is critical to reducing carbon emissions.

A carbon footprint is a measure of the amount of greenhouse gases produced from human activities, usually measured in units of carbon dioxide (CO₂). A carbon footprint quantifies the amount of emissions released by routine activities, such as generating electricity, driving, farming, and manufacturing. Calculating carbon footprints for individuals and businesses is critical to making informed decisions on how to reduce carbon emissions.

Explaining the Greenhouse Gas Effect

The greenhouse gas effect results from the presence of carbon dioxide, methane, nitrous oxide, and other greenhouse gases in our atmosphere. The presence of atmospheric CO₂ and other greenhouse gases is essential for life on earth, as these gases trap reflected solar radiation from the sun to insulate the earth and stabilize atmospheric temperatures. However, increasing concentration of greenhouse gases from human activities has intensified the effect, resulting in more heat being trapped, higher average global temperatures, and climate destabilization. The use of fossil fuels as an energy source is one known cause of increasing concentrations of greenhouse gases, which has resulted in the amount of CO₂ emissions reaching double the capacity of carbon able to be naturally sequestered by trees and oceans.

Human Influence on the Greenhouse Effect



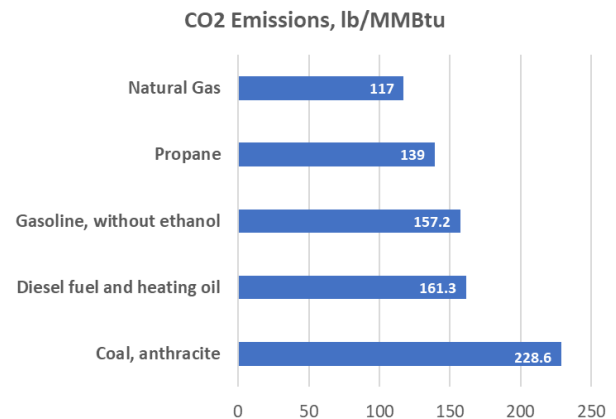
Source: [2014 National Climate Assessment](#)



Two times more CO₂ is being emitted than can be naturally sequestered

Carbon Content of Different Fuel Sources

The amount of greenhouse gas emissions produced depends on the type of fuel. For example, the combustion of natural gas produces much less carbon dioxide than the combustion of coal. The carbon intensity (i.e., the amount of CO₂ emitted per unit of energy consumed) of natural gas is lower than all other fossil fuels.¹ The fact that natural gas has replaced coal as the top fuel in the U.S. electricity sector is one of the main reasons why this sector has been able to reduce its emissions over the last 10 years.² Natural gas vehicles have also reduced carbon emissions in the transportation sector.



Source: [EIA, Carbon Dioxide Emissions Coefficients](#)

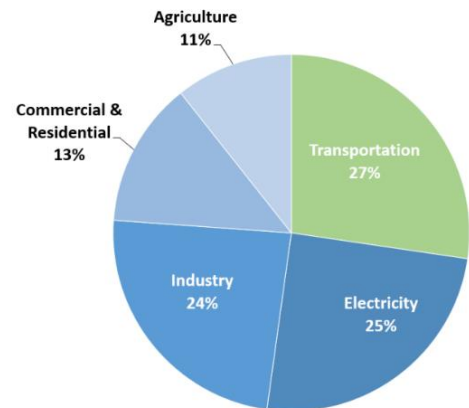
¹ U.S. EIA, [Carbon Dioxide Emissions Coefficient, 2021](#)

² U.S. EPA, [Sources of Greenhouse Gas Emissions, 2022](#)

Greenhouse Gas Emissions by Sector

Human activities are responsible for nearly all of the greenhouse gas emissions over the last 150 years.³ Over three fourths of greenhouse gas emissions in the United States comes from the transportation, electricity generation, and industrial sectors, with the rest coming from commercial and residential buildings and agricultural operations.

Total U.S. Greenhouse Gas Emissions by Economic Sector in 2020



Source: [U.S. EPA, Sources of GHG Emissions](#)

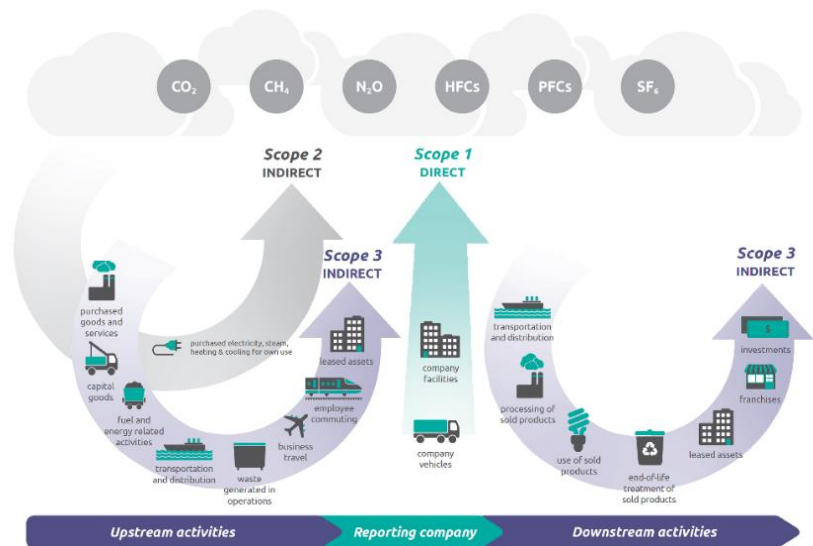
Energy Use in Households

Over half of energy consumption in U.S. households is used for space heating and cooling.⁴ When considering source emissions and electricity system losses, households with natural gas appliances may produce fewer greenhouse gas emissions than those with all-electric appliances.

GHG Emission Categories

Greenhouse gas emissions can be categorized into three different groups based on when and where they are emitted across the value chain of a good or service. These categories include:⁵

- Scope 1-Direct Emissions:** Scope 1 emissions are any direct emissions from the activities of an organization. This includes burning fossil fuels for heat or burning gasoline to power a vehicle
- Scope 2-Indirect Emissions:** Scope 2 emissions are indirect emissions associated with the production of electricity, heat, and steam purchased by an organization. These emissions are indirectly released as a result of the organization's operations.
- Scope 3-Other Indirect Emissions:** Scope 3 emissions refer to any other indirect emissions throughout the value chain. This includes emissions released when purchasing, transporting, and disposing of materials, goods, and services.



Source: [WRI/WBCSD Corporate Value Chain \(Scope 3\) Accounting and Reporting Standard](#)

A full accounting of GHG emissions must consider the full impacts of Scope 1, Scope 2, and Scope 3 emissions from their operations.

³ U.S. EPA, [Sources of Greenhouse Gas Emissions, 2022](#)

⁴ U.S. EIA, [Use of Energy Explained, 2021](#)

⁵ U.S. EPA, [Scope 1 and Scope 2 Inventory Guidance, 2021](#)