



# Why calculating your company's carbon footprint matters<sup>1</sup>

**August 2020**

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Company environmental, social and governance (ESG) policy and reporting has become increasingly important. Investors are weighing ESG considerations when making investment decisions, and consumers and employees seek additional engagement and transparency on these issues. Climate change and climate risk have taken center stage in these discussions, and companies need to understand their carbon footprint to allow them to appropriately disclose risks and opportunities.

This article examines the sources of carbon dioxide (CO<sub>2</sub>) emissions throughout the US economy and highlights issues companies need to think about when determining their carbon footprint. It uses the EY Carbon Modeling Tool to show how a close examination of both direct and indirect carbon emissions embedded in a company's supply chain can help companies measure and understand their carbon footprint.

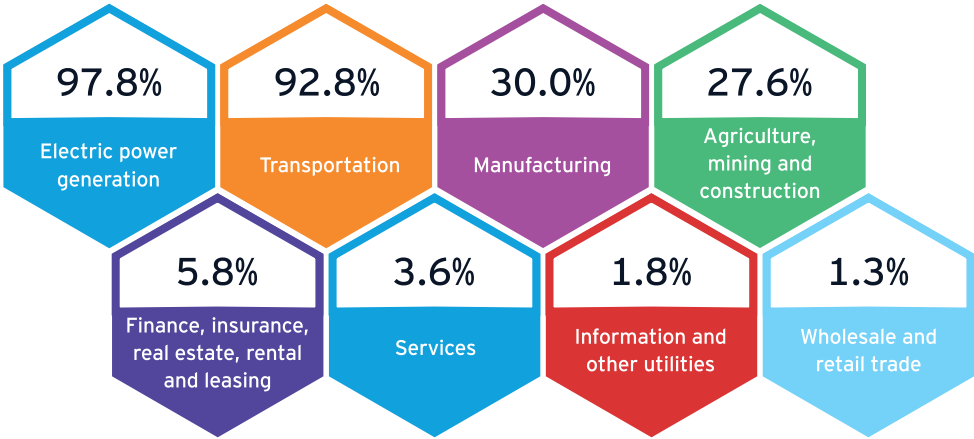
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<sup>1</sup> The views reflected in this article are the views of the author and do not necessarily reflect the views of the global EY organization or its member firms.

# Direct vs. indirect carbon emissions

Included in a company's carbon footprint are both its direct and indirect carbon emissions. Direct carbon emissions are emissions incurred directly by the company via heating/cooling, company-owned vehicles, etc. Indirect carbon emissions are those emissions embedded in a company's supply chain.

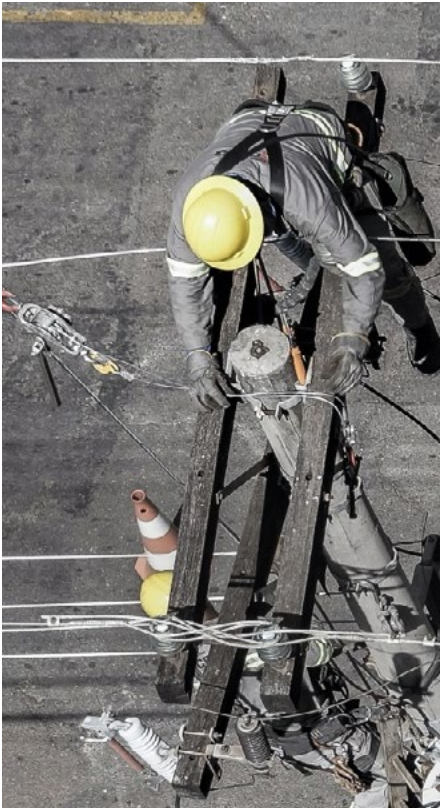
Direct carbon emissions as a share of a company's total carbon footprint (i.e., the sum of its direct and indirect emissions) can vary significantly across industries:



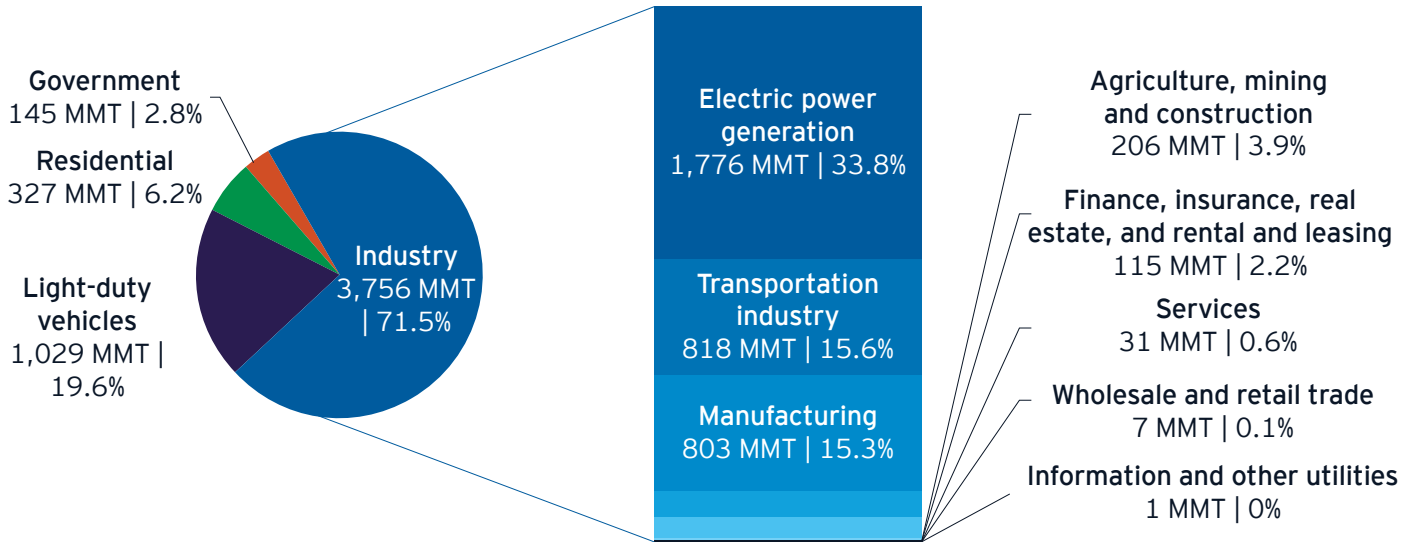
For example, while the average carbon footprint for a company in electric power generation is 97.8% direct emissions (and 2.2% indirect emissions), the average carbon footprint for a company in wholesale and retail trade is only 1.3% direct emissions (and 98.7% indirect emissions).

### Emissions sources – the hot spots

While concentrated more heavily in some industries, carbon emissions occur throughout the US economy. **Figure 1** displays the breakdown of US energy-related carbon emissions. Industry is responsible for 71% of these emissions, while residential petroleum and natural gas emissions, light-duty vehicles and government functions are responsible for the remaining 29%. Electric power generation accounts for nearly half of industry emissions, or 1,776 of the total 3,756 million metric tons (MMT) of industry emissions. Transportation and manufacturing each account for nearly a quarter of industry emissions.



**Figure 1. Household and industry US energy-related CO2 emissions**



Note: MMT: Million metric tons. Data are for 2018. Figures may not sum due to rounding.  
 Source: U.S. Energy Information Administration; EY analysis.

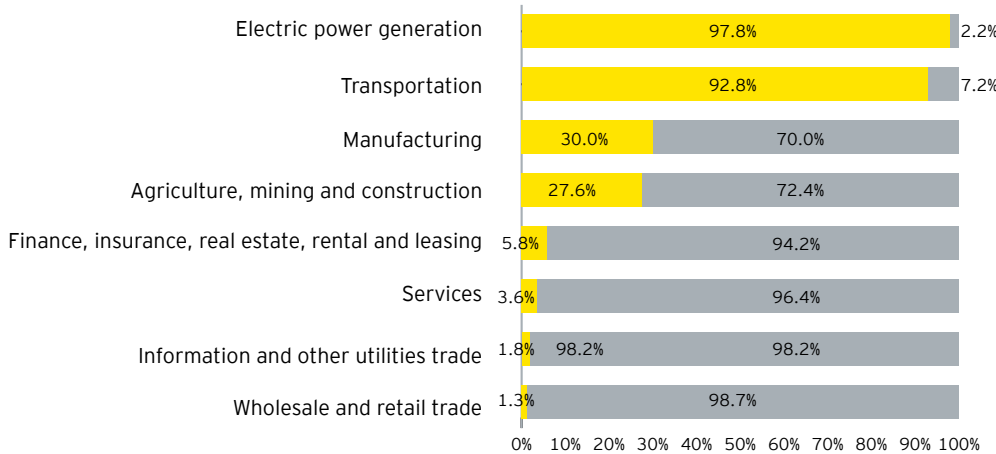
The carbon footprint of some industries stems primarily from their use of fossil fuels. For other industries, it arises primarily from carbon embedded in the goods and services they purchase from other businesses. Carbon is embedded in the goods and services a company purchases when its suppliers use fossil fuels in the production of those goods and services.



Figure 2 displays the share of industries' carbon footprints attributable to their direct emissions vs. those embedded in their supply chain. The industry categories of electric power generation, transportation, manufacturing, agriculture, mining and construction have the highest direct emissions share. For the electric power generation and transportation industries,

more than 90% of their carbon footprints result from their use of fossil fuels. In contrast, all of the other industry categories have a majority of their carbon footprint embedded in their supply chains. Within each industry, carbon footprints vary from company to company.

**Figure 2. Direct emissions and carbon embedded in supply chains (US energy-related CO2 emissions)**



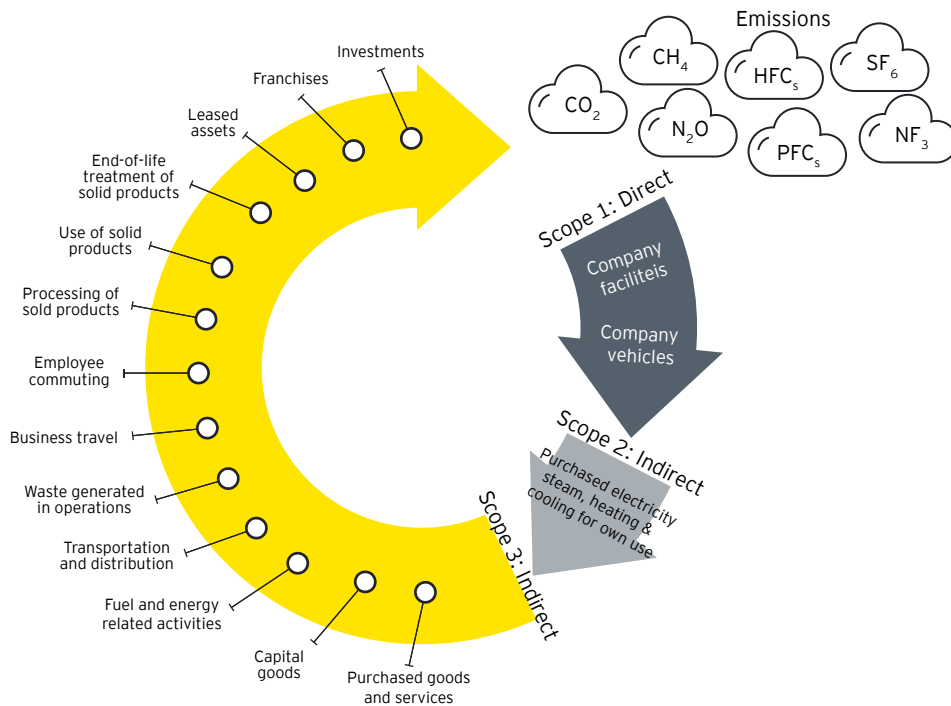
Note: Figures may not sum due to rounding.  
Source: EY analysis.

Comparing different industries that contribute similar overall amounts of emissions to the economy reveals how varied emissions sources can be. It also illustrates why strategies for addressing emissions need to be tailored to the specifics of each industry and company. For example, while the transportation and manufacturing industries account for similar overall shares of emissions in the economy, Figure 2 shows that their breakdown of direct vs. embedded supply-chain emissions is very different, with transportation incurring 92.8% of its carbon footprint directly and manufacturing only incurring 30% directly.

Notably, the carbon footprint of a company is often segmented into Scope 1, Scope 2 and Scope 3 emissions. This segmentation follows the Greenhouse Gas (GHG) Protocol typically used in ESG reporting. As summarized in Figure 3, Scope 1 emissions are direct emissions and Scope 2 and Scope 3 are indirect emissions. Specifically, Scope 1 emissions are those that occur from sources owned or controlled by a company. Scope 2 emissions are supply-chain emissions related to purchased electricity, steam, heating and cooling for the industry's own use. Scope 3 emissions are all other supply-chain emissions.



**Figure 3. Scope 1, Scope 2 and Scope 3 emissions**



## Case studies – two hypothetical companies

An examination of two hypothetical companies of the same size (\$1 billion in annual sales) but in different industries – the truck transportation industry and the aluminum refining and production industry – further illustrates how greatly carbon footprints can vary based on specific company characteristics.

These two hypothetical companies have economic characteristics and carbon emissions representing the average of their respective industries. The estimates are derived from the EY Carbon Modeling Tool, which includes data and modeling of the economic characteristics and carbon emissions of more than 400 industries, as well as supply-chain modeling. (See the appendix for more details.)

### Hypothetical truck transportation company

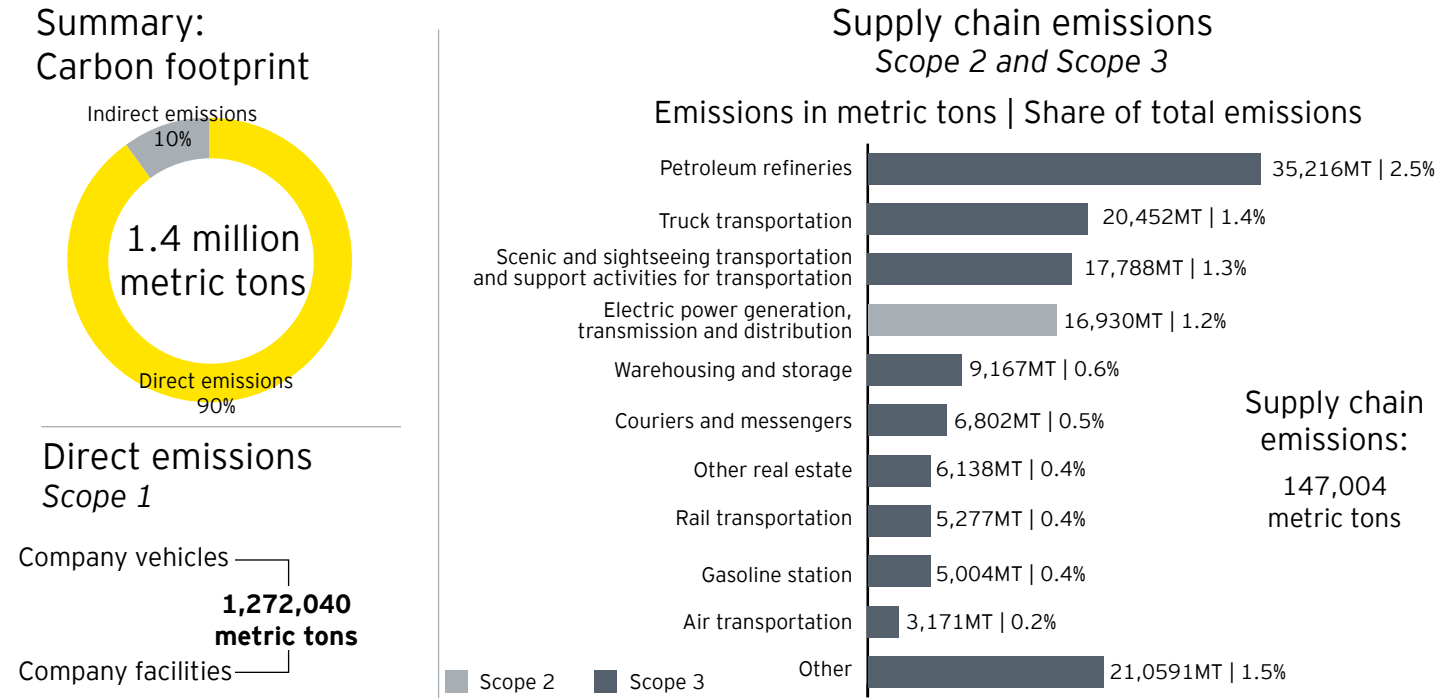
**Figure 4** shows that the vast majority (90%) of the carbon footprint of the hypothetical truck transportation company results from direct emissions that fall within Scope 1. These direct emissions occur, for example, through combustion of fossil fuels in the company's vehicles and at the company's facilities. The remaining 10% of the carbon footprint is from carbon embedded in the company's supply chain, or Scope 2 and Scope 3 emissions.

The right panel of **Figure 4** breaks down the supply chain-related emissions by type of input. By breaking down the overall carbon footprint into specific components, a carbon footprint analysis can provide companies with a better understanding of where they have the most carbon and how best to target their mitigation efforts.



### Figure 4. Hypothetical truck transportation company

(\$1 billion in annual sales)



Note: Figures may not sum due to rounding.  
Source: EY Carbon Modeling Tool.

### Hypothetical aluminum refining and production company

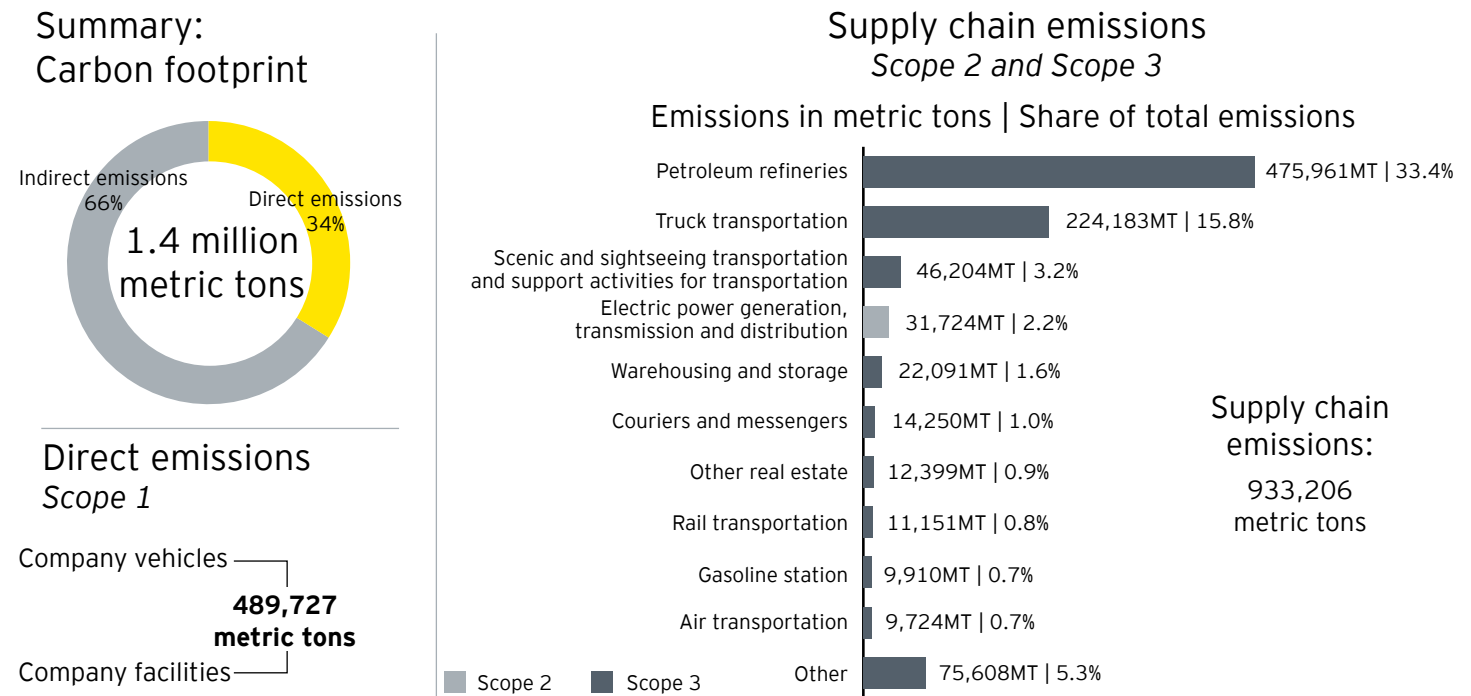
The hypothetical aluminum refining and production company, like the hypothetical truck transportation company, is also assumed to have \$1 billion in annual sales, and the two companies have similar carbon footprints – both approximately 1.4 million metric tons. However, upon closer examination, the two companies have very different carbon footprints. In particular, carbon embedded within the supply chain for the aluminum refining and production company (66% of emissions) is a much greater percentage of the company's carbon emissions than is the case for the hypothetical truck transportation company (10% of emissions).

The right panel of **Figure 5** breaks down the specific supply chain emissions for the hypothetical aluminum refining and production company. Not surprisingly, there are significant sources of carbon embedded in purchases from electric power generation, transmission and distribution. These Scope 2 emissions (i.e., supply-chain emissions related to purchased electricity, steam, heating and cooling for own use) are approximately one-third of the company's total carbon footprint. Thus, the company's carbon emissions are split almost evenly between Scope 1, Scope 2 and Scope 3 emissions.



**Figure 5. Hypothetical aluminum refining and production company**

(\$1 billion in annual sales)



Note: Figures may not sum due to rounding.  
Source: EY Carbon Modeling Tool.

## Next steps

The increasing importance of ESG to consumers, employees and investors, as well as the increasing attention policymakers are paying to carbon mitigation policies, makes it more vital than ever for companies to understand their carbon footprint.<sup>2</sup>

Knowing the size of a company's carbon footprint and its composition helps quantify its exposure from ESG reporting and carbon-related policy changes as well as identify potential focus areas for mitigation strategies. Company-specific financial modeling and scenario planning can be a helpful tool as companies work through these issues, engage with consumers, employees, investors and policymakers and prepare for a world with rapidly developing ESG reporting, carbon mitigation policies and environmental challenges.

## About these estimates

The analysis of the two hypothetical companies was conducted using the EY Carbon Modeling Tool. Both companies are assumed to reflect the average characteristics of a company in their industry. The EY Carbon Modeling Tool is an input-output model (i.e., a quantitative economic model representing the interdependencies of different sectors in the economy). The model shows how the output of one industry may become an input to another through an inter-industry matrix, illustrating how dependent each industry is on the outputs of other industries. To determine an industry's carbon footprint, this analysis relied on data on emissions by type and source from the U.S. Energy Information Administration. These data were mapped at a detailed level to industries defined by the Bureau of Economic Analysis and distributed with data on the degree to which each industry uses the source emission product in its production process.

<sup>2</sup>For an industry analysis of the impact of potential carbon pricing policies in the United States, see Cathy Koch, Brandon Pizzola and Nick Hallmark, "How key industries would fare under a carbon tax: An illustrative analysis," EY, February 2020.

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