

# Estimating Environmental Impacts

An Introduction to Trucost's Environmentally  
Extended Input-Output Model (EEIO)



# Overview

Environmental impacts attributable to a business are calculated by Trucost using environmental intensities expressed as emissions or resource use per unit of revenue. These are calculated by obtaining emissions or resource data by sector, and using this data in conjunction with financial data to create environmental intensities. The intensities are applied to financial information gained from ‘make and use’ tables provided by the United States Bureau of Economic Analysis to enable Trucost to calculate the environmental impacts of a company’s supply chain. Trucost has adapted these tables so that it can calculate the operational and supply chain emissions or resource use of 464 business sectors.

Trucost has been collecting environmental data since 2000, and is able to test this model against many years of data on quantitative environmental disclosures from thousands of companies. The table below outlines the key methodological steps in this process as well as giving some examples at each of these stages.

## Exhibit 1: Steps taken in Trucost’s estimation of environmental impacts

Methodological Steps	Examples
<b>Selection of the sector(s) of interest from a list of 464 sectors</b>	Cotton farming; natural gas extraction; coal power generation; plastic bottle manufacturing
<b>Definition of the functional unit to be used</b>	1 metric ton of cotton; 1 million cubic feet of natural gas; 1000 MWh; US\$1 million revenue
<b>Calculation of environmental intensities</b>	<p>The environmental intensities are calculated in terms of metric tons, cubic meters, or square meters per unit of revenue. Data is utilized from a wide array of supra-national, international, national, and industry bodies across a wide range of sectors and geographies. Impacts are calculated in one of seven categories including:</p> <ul style="list-style-type: none"><li>– Greenhouse gas emissions</li><li>– Air pollutants</li><li>– Land pollutants</li><li>– Water pollutants</li><li>– Waste production</li><li>– Water consumption</li><li>– Land use</li></ul>
<b>Modelling of operational environmental impacts</b>	Calculated using industry-specific environmental intensity factors for each of the sectors in which a company operates.
<b>Modelling of supply chain environmental impacts</b>	By adapting ‘make and use’ tables from the United States Bureau of Economic Analysis, Trucost estimates the environmental impacts of sectors within supply chains by applying environmental intensities to the flows of monetary transactions. The US economy is therefore used as the benchmark for national economies around the world.

## Environmental Intensities

Each of the 464 sectors have average environmental intensities associated with their operation, expressed in terms of emissions or resource use per dollar of output. These are calculated for over 100 impacts, which are derived from a wide array of national, international and industry databases. Trucost tests this data against the many thousands of disclosures it collects from companies during its annual engagement program. Where available, Trucost uses country-specific information to inform global average intensity factors, which are weighted by production value. This approach allows Trucost to take into account differences in the emissions profiles of different sectors within its global model. Exhibit 2 below provides some typical sources of data that Trucost uses to calculate environmental intensities.

## Exhibit 2: Typical data sources for production quantities, prices, resource use, and emissions in trucost's io model impacts

Data Category	Examples Sources
<b>Sector production quantities and prices</b>	<ul style="list-style-type: none"> <li>– Food and Agriculture Organization of the United Nations</li> <li>– International Energy Agency (IEA)</li> <li>– United States Energy Information Agency (EIA)</li> <li>– United States Geological Survey (USGS)</li> <li>– Mining Congress</li> </ul>
<b>Resource use – Energy, water, and land</b>	<ul style="list-style-type: none"> <li>– Industry and academic reports</li> <li>– AQUASTAT</li> <li>– Water Footprint Organization</li> <li>– United States Department of Energy (DOE)</li> <li>– Eurostat</li> <li>– Company annual reports, Security and Exchange Commission (SEC) filings</li> <li>– Direct disclosures</li> </ul>
<b>Emissions – greenhouse gases, air pollutants, land pollutants, and water pollutants</b>	<ul style="list-style-type: none"> <li>– Intergovernmental Panel on Climate Change (IPCC)</li> <li>– Agrifootprint and Ecoinvent life-cycle analysis (LCA) databases</li> <li>– Toxic Release Inventories</li> <li>– Food and Agriculture Organization of the United Nations</li> <li>– United States Energy Information Agency (EIA)</li> <li>– Direct disclosures</li> </ul>

## Supply Chain

Supply chain impacts are calculated from ‘make and use’ tables published by the United States Department of Commerce, Bureau of Economic Analysis. The Bureau of Economic Analysis compiles data from a wide range of sources including its Economic Census (conducted every five years) and annual surveys for specific industries including agriculture, mining, manufacturing, wholesale trade, retail trade, transportation, communications, utilities, finance, insurance and real estate. Data is collated and homogenized so that each industry’s inputs reflect, as far as possible, a unique set of inputs from around 400 industries.

Input-output (IO) tables are created detailing the ratio of expenditure from one sector with every other sector of the economy, termed “intermediate demands”. It is largely due to this level of detail that Trucost has chosen to use the US economy as a proxy for the world economy as a starting point for the creation of its supply chain model. Additionally, the US economy has the advantage of being highly diversified, so major commodities can be included.

However, some sectors which are important from an environmental perspective, such as power generation, are highly aggregated, and the Bureau of Economic Analysis has insufficient detail on sectors within the mining, wholesale trade and retail trade industries. In these cases, Trucost has disaggregated the IO tables proportionally. For example, power generation is represented by twelve separate sectors within the Trucost model. Trucost has further extended the supply chain model to create entries for an additional 50 sectors.

By combining these extended IO tables with the industry-specific environmental intensity factors described above, Trucost is able to assess the environmental impacts of companies across their own operations and their entire supply chains, including primary resource extraction secondary processing and final product assembly. Finally, the supply chain model is refined by using disclosures made directly to Trucost from over 15,000 companies, which are collected through an annual engagement program.

## About Trucost

Trucost is part of S&P Global. A leader in carbon and environmental data and risk analysis, Trucost assesses risks relating to climate change, natural resource constraints, and broader environmental, social, and governance factors. Companies and financial institutions use Trucost intelligence to understand their ESG exposure to these factors, inform resilience and identify transformative solutions for a more sustainable global economy. S&P Global's commitment to environmental analysis and product innovation allows us to deliver essential ESG investment-related information to the global marketplace. For more information, visit [www.trucost.com](http://www.trucost.com).

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