How Households Drive Up Greenhouse Gas Emissions

Everything you eat or wear, and every time you drive, adds to global emissions

By Morteza Taiebat and Ming Xu | November 26, 2019

As the public conversation about climate change gets increasingly serious, many Americans may be wondering: How do my individual choices affect climate change?

Household consumption—food, housing, transportation, apparel, and other personal services—is an important contributor to greenhouse gas emissions. Everything you eat or wear, every time you drive, contributes to total global emissions. The typical American’s annual per capita carbon footprint is more than five times the world per capita average.

A study by our research team, including Kaihui Song, Shen Qu and Sai Liang, published on September 10, sheds light on the global carbon footprint of U.S. households.

Some activities have a bigger impact

We looked at data from 1995 to 2014 from the U.S. Consumer Expenditure Survey, as well as the World Input-Output Database. We looked at the total
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Global warming potential of all greenhouse gas emissions, not just carbon dioxide, as measured in their “carbon dioxide equivalent.”

We found that over 20% of all U.S. emissions are directly attributed to household consumption. If you consider indirect emissions, this figure is closer to 80%.

Let’s zoom in on the latest available annual numbers, mostly from 2009, which give a better sense of the impacts.

U.S. households generate 5.43 gigatons of carbon dioxide equivalent emissions every year. About 82.3% of those emissions are produced domestically.

The remaining emissions are generated outside the U.S. These emissions come from global supply chains. For instance, the family car might have been manufactured abroad. So emissions from manufacturing of the car are created outside the U.S., but emissions from the tailpipe are domestic.

Source: Environment International

Transportation and housing contribute over 60% to the total domestic carbon footprint of U.S. households. Supply chain emissions from services—such as health care, banking, and lodging—and food contribute the next largest amounts.

Food, furnishings and supplies, and clothing are the three largest drivers of overseas emissions from U.S. households.

**China bears the brunt of overseas emissions**

The overseas carbon footprint driven by U.S. households is distributed disproportionately among countries. The most considerable portion of overseas carbon footprint of U.S. households is released in China, followed by Canada, India, Russia, and Mexico.
The overseas carbon footprint from Mexico is largely driven by food consumption in the U.S., while fuel consumption in the U.S. was the main driver for overseas carbon footprint from Canada and Russia, where the U.S. got the majority of its imported oil products and natural gas in that period.

While the most substantial amount of the U.S. overseas carbon footprint is from China, it is only 3.0% of China’s domestic emissions. The majority of China’s emissions comes from the activity of its inhabitants, as well as consumption in other countries beyond the U.S.

On the other hand, Canada, Mexico, and Taiwan trace a sizeable proportion of their domestic emissions to U.S. household consumption.

Source: Environment International

**Wealthier families have a larger footprint**

A household’s carbon footprint generally increases with its income, ranging from 19.3 to 91.5 tons of CO2-equivalent annually. The average carbon footprint of the wealthiest households is over five times that of the poorest.

In 2009, households with less than $30,000 annual disposable income made up 25.7% of the total U.S. population, but were only responsible for 19.3% of U.S. households’ carbon footprint.

On the other hand, wealthy consumers with more than $100,000 annual household income accounted for 22.3% of the total population but were responsible for nearly one-third of households’ total carbon footprint.

Source: Environment International

**The Great Recession caused a dip**

U.S. households’ carbon footprint had been steadily growing from 1995 until 2005, when it began to plateau.

In 2009, the combined domestic and overseas footprint dropped by 8.5% from the previous year, mainly due to the Great Recession.
The share of overseas carbon footprint in total carbon footprint of the U.S. household consumption had been rising steadily and peaked at around 20% in 2006. After 2006, the share of overseas carbon footprint started to decrease, as imports slowed down before the recession.

Source: Environment International

**Transportation makes the biggest difference**

The variations of household carbon footprint from 1995 to 2014 were largely driven in transportation use, including emissions from vehicle manufacturing, fuel, and public transportation.

Transportation emissions, both per capita and per household, have continued to rise over time. This is despite significantly reduced tailpipe emissions from vehicles and nearly 30% improvement in fuel economy of cars in this period. Mandates and standards, such as Corporate Average Fuel Economy (CAFE) at the federal level and Zero-Emission Vehicle (ZEV) at the state level, enabled this rapid progress.

Source: Environment International

So what’s causing the emissions to keep rising? People want to travel more and are more likely to own more household vehicles. Meanwhile, vehicles have a lower average number of occupants. Mass transit and active modes of transportation, like bike riding, are growing slowly.

In 2016, for the first time in history, the emissions from the U.S. transportation sector surpassed the power sector emissions. This fact along with our observation from household carbon footprint from transportation underscore the importance of policy efforts related to emissions from the transportation sector.

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