

Calculating the carbon footprint of California's products

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Now that California's greenhouse gas cap-and-trade policy is law, attention is shifting to recognizing industry efficiency.

Driven by that goal, a team of researchers from Northwestern University, the University of California, Berkeley and the international consulting company Ecofys has spent the last year and a half developing science-based methods to determine the amount of free allowances California facilities are eligible to receive based on the products they manufacture.

The research team was hired by the state to assist with cap-and-trade design for several key California industries. The team submitted its final report to the Air Resources Board of the California Environmental Protection Agency June 30.

Requiring a near-unprecedented level of [industry](#) cooperation and large amounts of data, the project will help the Air Resources Board implement the cap-and-trade regulations in California and also can serve as a model for the rest of the nation.

The international team is the first in the world to develop product-level emissions benchmarks for the food processing industry, huge both in California and the United States and one that has great economic importance to many small towns around the state and country.

"The goal is to reduce emissions in a way that is economically feasible, and our analysis methods will provide California policymakers with valuable tools to do so," said Eric Masanet, associate professor of mechanical engineering and of chemical and [biological engineering](#) at Northwestern's McCormick School of Engineering and Applied Science.

The insights from the report will be useful not only to California but to other states, the federal government and a wide range of industries.

The methods to calculate the carbon intensity of individual products—from tomato paste and milk to beer and wine—will help California more accurately determine the number of allowances allocated to these manufacturing facilities.

The project focused on the cap-and-trade regulation's eight covered food industries (tomato canning and dairy processing being particularly challenging for the researchers) and the industries of petroleum refining and glass manufacturing.

The Northwestern group, led by Masanet, worked on the tomato canning, dairy processing, snack foods and wine industries. The UC Berkeley group, led by Margot Hutchins in the Laboratory for Manufacturing and Sustainability, worked on the seasonings, brewery, poultry processing and sugar industries. Ecofys focused on petroleum refining and glass manufacturing. Ecofys also designed benchmarks for the emissions trading system for industry in Europe.

"Leveraging technical expertise within industry and academia, we aim to create a transparent, fair way of benchmarking that provides incentives to reduce [greenhouse gas](#) emissions, while not undermining industrial competitiveness," said Paul Blinde, project leader at Ecofys. "Our experience with European policymaking certainly helps with this, and we have found great partners in Northwestern and UC Berkeley."

The work proved to be anything but straightforward, stressed Masanet, the team's senior expert on energy use and emissions in the food industry. He worked for many years with the industry through the U.S. Environmental Protection Agency's Energy Star for Industry Program.

"The challenge has been to design a system that allows for fair comparisons across plants that produce many different products and to do so in a way that accurately traces a plant's emissions back

to each individual product," he said.

Even in the same plant, such as a tomato canning plant, different products are responsible for different amounts of emissions. For example, manufacturing one can of tomato paste produces more emissions than one can of diced tomatoes.

"A one-size-fits-all approach can't be applied to the food industry," said Michael Walker, a postdoctoral fellow in Masanet's group and a researcher on the cap-and-trade project. "Our team's product-based approaches reflect that reality."

The team's final report includes a recommended method for collecting data from individual manufacturing plants. Policymakers will decide if they want to use the independent team's recommendations to calculate how cap-and-trade allowances should be assigned.

Provided by Northwestern University

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