Institute for Agriculture and Trade Policy

Identifying Our Climate Foodprint*

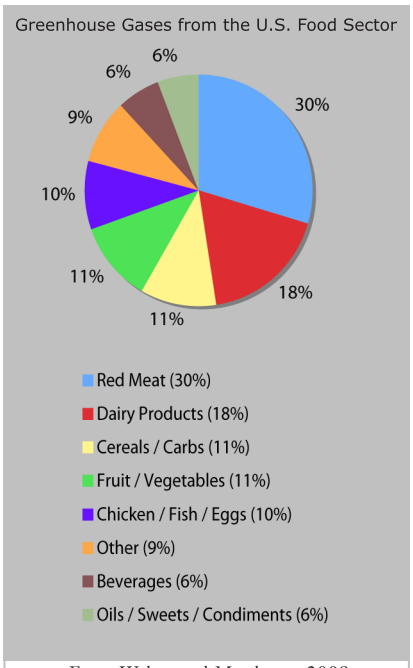
As governments move toward negotiating the next international agreement on climate change and Congress considers greenhouse gas (GHG) emission reduction targets, what is the role of agriculture and food systems? According to several recent estimates, these sectors are significant contributors to global climate change, both in the U.S. and worldwide.[1] The GHG contributions come from agricultural land conversion and degradation, and the industrialized farming systems that depend on massive resource inputs to produce crops and livestock. These industrialized systems also produce carbon dioxide (CO_2) emissions from fossil fuel use and soil respiration, nitrous oxide (N_2O) emissions from fertilizers and soils, and methane from livestock, all of which contribute to global warming.

But it doesn't have to be this way. By shifting to agricultural systems that increase carbon sequestration in soils, farming can both reduce its own GHG emissions and help reduce overall greenhouse gases. As a sector especially vulnerable to climate change, our agricultural systems must integrate mitigation and adaptation. Our food and agricultural systems must be diverse, decentralized, resilient and synergistic.

A climate-friendly food system:

- Adapts to more dramatic temperature and water cycles;
- Employs ecological closed-loop principles where the waste from one process feeds another;
- Relies on perennials, crop rotations and cover crops to rebuild and protect the soil, store carbon and absorb water;
- Supports locally relevant practices and technologies; and
- Incorporates experience-based knowledge, adaptive management and feedback into farm management.

To make this transition, we need to reduce the major GHG emissions in our agricultural systems, while still meeting our food needs.



From Weber and Matthews, 2008.

Key agriculture GHG contributors

- Nitrogen oxide (N_2O) emissions from synthetic fertilizers, which reach the atmosphere through soil emissions, water runoff and poor manure management;
- Methane emissions from ruminant animals, released during digestion and manure decomposition;
- CO_2 emissions from the fueling and manufacture of on-farm machinery; and
- CO_2 emissions from soil and the energy used for the manufacture and transport of fertilizers.

Among different foods, there is a large variation in the typical American household's climate footprint. For conventionally grown food, production constitutes more than half of food's life cycle GHG emissions, primarily because of the high global warming potential of N_2O (from synthetic fertilizers) and methane (from livestock production). Red meat and dairy together make up almost half of a typical U.S. household's food-based GHG emissions.[2] Here are strategies for a more climate-friendly food chain:

Agricultural production: *Between 50 and 70 percent of GHGs from livestock; about 50 percent of GHGs from fruits, vegetables and grains*

Climate-friendly:

- Reduce external inputs—especially synthetic and fossil-fuel based chemicals—by mimicking natural systems and using integrated practices to close waste loops
- Minimize on-farm energy requirements through efficient practices; use renewable energy sources for heat, electricity or other services

Processing: *Ten percent of GHGs from food*[3]

Climate-friendly:

- Minimize packaging overall. If needed, use reusable, certified biodegradable or recyclable packaging
- Use energy-efficient practices at processing facilities
- Minimize the energy consumption of food preservation methods over the lifetime of the product
- Develop more small processing facilities to reduce long distances between the farm and facilities

Transportation: *Between five and 15 percent of GHGs from food*

Climate-friendly:

- Minimize the total distance by prioritizing local sales, sourcing and consumption
- Create regional distribution systems
- Choose transportation modes with the lowest possible carbon footprint
- Use transportation to close a waste loop (e.g., biodiesel trucks fueled by discarded cooking oil)
- Make information on food transportation available to consumers

Food consumption and disposal: *Food shopping, less than five percent of GHGs from food; Cooking, less than five to 30 percent of GHGs from food;*[4] *Refrigeration, 10 percent of GHGs from perishables; Landfill decomposition, five percent of GHGs from food*

Climate-friendly:

- Construct diets around low-impact food options
- Reduce the energy intensity of refrigeration and cooking methods
- Avoid food waste and spoilage
- Use backyard composting for food waste; support organics curbside collection in cities

Fortunately, climate-friendly practices can create healthier, more sustainable, and resilient food and agricultural systems.

*This fact sheet is based on the full report *Identifying our Climate "Foodprint": Assessing and Reducing the Global Warming Impacts of Agriculture and Food in the U.S.* by Jennifer Edwards, Jim Kleinschmit and Heather Schoonover. Available at: http://www.iatp.org/iatp/publications.cfm?accountID=258&refID=105667

Notes

[1]H. Steinfeld et al., *Livestock's Long Shadow: Environmental Issues and Options. Livestock, Environment, and Development Initiative*, Published by the UN Food and Agriculture Organization, 2006.

[2]Christopher Weber and H. Scott Matthews, "Food Miles and the Relative Climate Impacts of Food Choices in the United States," *Environmental Science and Technology* 42, no. 10 (2008): 3508-3513.

[3]David Pimental et al., "Reducing Energy Inputs in the U.S. Food System," *Human Ecology* 36 (2008): 459-471.

[4]Annika Carlsson-Kanyama, Marianne Pipping Ekstrom, and Helena Shanahan, "Food and Life Cycle Energy Inputs: Consequences of Diet and Ways to Increase Efficiency," *Ecological Economics* 44 (2003): 293-307.

2105 First Avenue South | Minneapolis Minnesota 55404 | USA | 612.870.0453 | Fax 612.870.4846 | iatp.org