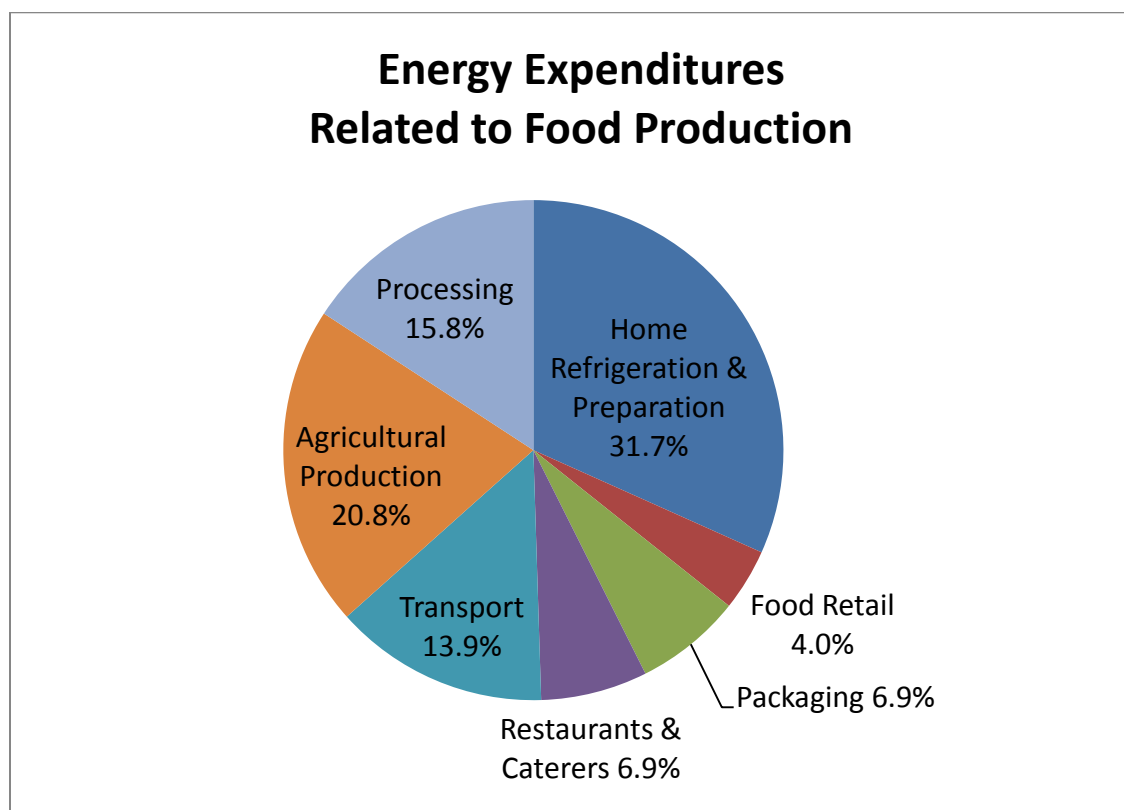


## Energy and food production

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The American food supply is driven almost entirely by non-renewable energy sources and accounts for approximately 19% of the total use of fossil fuels in the United States. It takes about 7.3 units of (primarily) fossil energy to produce one unit of food energy in the U.S. food system.



Source: University of Michigan, Center for Sustainable Systems (<http://www.umich.edu/~css>)

This pie chart represents **energy expenditures related to food production** in the United States: home refrigeration and preparation is responsible for about 30%; agricultural production, 20%; transport, 13% percent; and packaging, 6%.

- One tomato can travel over 2,500 miles to end up in the produce aisle at your nearest grocery store. If you buy from local farmers that tomato may only travel about 60 miles.
- By purchasing locally, you can reduce the energy required for transportation.

### Fossil fuels and industrial farming

A 2002 study from the John Hopkins Bloomberg School of Public Health estimated that, using our current system, an *average* of three calories of energy were needed to create one calorie of edible food. Some foods require far more, such as grain-fed beef, which requires 35 calories for every calorie of beef produced.<sup>1</sup> However, the study did not include the energy used in

processing and transporting food. Studies that do include such factors estimate that it takes an average of 7 to 10 calories of input energy to produce one calorie of food.<sup>2</sup>

Accounting for most of this wasteful equation are the industrial practices upon which our food system is built. These include inefficient growing practices, food processing and storage, as well as our system of transporting food thousands of miles between the field and the end consumer.

### **Growing practices**

The biggest culprit of fossil fuel usage in industrial farming is not transporting food or fueling machinery; it is the production of chemicals for fertilizers. As much as 40% of energy used in the food system goes towards the production of artificial fertilizers and pesticides.<sup>1</sup> Fertilizers are synthesized from atmospheric nitrogen and natural gas, a process that takes a significant amount of energy. Producing and distributing them requires an average of 5.5 gallons of fossil fuels per acre.<sup>3</sup> Nitrogen-based fertilizers contribute directly to global warming. Making and transporting one kilogram of nitrogen in a fertilizer releases 3.7 kg of carbon dioxide into the atmosphere.<sup>4</sup>

### **Packaging, processing, and storing food**

Approximately 23% of the energy used in our food production system is allocated to processing and packaging food.<sup>4</sup> Another 32% is burned in home refrigeration and cooking.<sup>4</sup> While no study has quantified the potential energy savings of buying locally, the practice of eating whole foods generally decreases the use of fossil fuels for processing, packaging, and storing foods. For example, compare all the energy and packaging behind a can of tomato sauce to simply buying some tomatoes, basil, and garlic, and making it oneself.

### **Food transportation**

As a result of industrial farming, our food is increasingly grown in concentration in specific areas of the country. This is so common that it has shaped much of our country's geographic identities—the western Plains are wheat country, the Midwest is the Corn Belt—but it has reached extremes. For instance, approximately 90% of all the fresh vegetables consumed in the United States are grown in California's San Joaquin Valley.<sup>3</sup>

This national-scale system is possible only because it uses large quantities of fossil fuels to transport food products to the consumer. It is now common practice to ship food not just around the country, but around the world. As a result, the average American food travels an estimated 1,500 miles before being consumed.<sup>1</sup>

### **Energy inputs in the food production system<sup>5</sup>**

The three main purposes for which oil is used worldwide are food, transport, and heating. Agriculture is almost entirely dependent on reliable supplies of oil for cultivation and for pumping water, and on gas for its fertilizers. For every calorie of energy used by agriculture itself, five more are used for processing, storage and distribution.

- Oil refined for gasoline and diesel is critical to run the tractors, combines and other farm vehicles and equipment that plant, spray the herbicides and pesticides, as well as harvest and transport food and seed
- Food processors rely on the just-in-time (gasoline-based) delivery of fresh or refrigerated food

- Food processors rely on the production and delivery of food additives, including vitamins and minerals, emulsifiers, preservatives, coloring agents, etc. Many are oil-based. Delivery is oil-based.
- Food processors rely on the production and delivery of boxes, metal cans, printed paper labels, plastic trays, cellophane for microwave/convenience foods, glass jars, plastic and metal lids with sealing compounds. Many of these are essentially oil-based.
- Delivery of finished food products to distribution centers in refrigerated trucks. Oil-based, daily, just-in-time shipment of food to grocery stores, restaurants, hospitals, schools, etc., all oil-based; customer drives to grocery store to shop for supplies, often several times a week

### What you can do<sup>6</sup>

- [Buy foods grown locally](#). The equation is simple: the closer the farm is to you, the less fuel is needed to transport its food to your table. You can find local foods through our [Eat Well Guide](#), by visiting a local [farmers market](#), or by joining a [food co-op](#) or [Community Supported Agriculture](#) (CSA) group. Ask your grocery store to supply locally grown produce.
- Want to have lettuce that is truly local? Plant a garden and grow your own fresh produce!
- Avoid purchasing processed foods. These foods take more energy to produce and have less nutritional value than whole foods. In addition, choose foods with minimal packaging. This reduces the energy used to produce the packaging and eliminates these materials from the waste stream.
- Cut back on meat. As much as Americans love to eat it, meat is the least fuel-efficient food we have. Large quantities of energy are required to cultivate, harvest, and ship animal feed, house, transport and slaughter animals, process and package their meat, and refrigerate it until it is cooked.

*Daphne Norton for the Sustainable Food Committee at Emory University*

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<sup>1</sup> Heller, Martin C., and Gregory A. Keoleian. *Life Cycle-Based Sustainability Indicators for Assessment of the U.S. Food System*. Ann Arbor, MI: Center for Sustainable Systems, University of Michigan, 2000: 42.

<sup>2</sup> Horrigan, Leo, Robert S. Lawrence, and Polly Walker. "How Sustainable Agriculture Can Address the Environmental and Human Health Harms of Industrial Agriculture." *Environmental Health Perspectives* 110, no. 5 (May 5, 2002) (accessed August 29, 2006).

<sup>3</sup> Heeter, Chad, "The Oil in Your Oatmeal: A Lot of Fossil Fuel Goes into Producing, Packaging and Shipping Our Breakfast," *San Francisco Chronicle*, March 26, 2006.

<sup>4</sup> Murray, Danielle. *Oil and Food: A Rising Security Challenge*, May 9, 2005

<sup>5</sup> <[www.energybulletin.net/node/5045](http://www.energybulletin.net/node/5045)>

<sup>6</sup> <<http://www.sustainabletable.org/issues/energy/#>>