

## Activity 5.2: Group D Food Handout

Have you ever thought about the how much energy and carbon emissions are required to produce and transport the food you eat every day? Most of us go to the store and buy and eat our food without ever thinking about energy and carbon emissions. If you take a little time to learn about what goes in to producing and transporting what you eat, you may be surprised how your food choices affect the amount of CO<sub>2</sub> that goes into the air.

### Energy and Carbon in Our Food



The average person requires about 2000 calories worth of food a day. While you might think it doesn't make much difference if you eat 2000 calories of mostly vegetables and grains versus 2000 calories of mostly meat, it actually makes a huge difference in terms of energy use and CO<sub>2</sub> emissions.

A meat-based diet requires about 10 times as much energy and land area to produce and creates about 10 times more carbon emissions than a primarily vegetable-based diet. This means an area of farmland that could feed about 10 people who eat mostly vegetables could only feed about one person who eats mostly meat. This difference can be explained based on the way food chains work.

During photosynthesis plants transform solar energy into chemical energy in the form of high-energy C-C and C-H bonds in organic molecules (such as sugars, starches, and fats) that make up the bodies of the plants. When animals eat plants:

- Some organic matter is not digested and leaves the animal as feces;
- Some organic matter is used for in cellular respiration, changing chemical energy into heat energy and motion energy.
- Only a small amount (about 10%) is of the organic materials that animals eat is used for biosynthesis, adding to the biomass of the animals.

So about 90% of the organic carbon in the plant is released into the atmosphere through cellular respiration (by animals and decomposers) and only about 10% is incorporated into the body of the animal as organic carbon. This story can be told in



About **6 acres of corn** are needed to feed one beef cow. In turn, one beef cow can provide about **1000 servings of protein** in the form of beef.

In comparison, about **6 acres of soybeans** can provide over **10,000 servings of protein** in the form of tofu.

terms of carbon emissions. Most of the organic carbon in plants that animals eat is changed into CO<sub>2</sub> and water and released into the atmosphere. Only about 10% of the organic carbon in the cow is passed on to the people that eat animals.

Learning about food chains can help us understand why eating meat leads to more CO<sub>2</sub> emissions than eating grains and vegetables. A study done by the United Nations Food and Agricultural Organization found that livestock, like cows and pigs, create more greenhouse gases than transportation—18% of the world's entire greenhouse gas emissions! The rise in human population since the 1800s has led to more cows being raised for dairy and meat purposes, leading to an increase in greenhouse gas emissions. Livestock are often fed grains, which take a substantial amount of land and water to grow.



### Tracing Energy and Carbon in the Transportation of Our Food

The average American meal travels 1500 miles before it gets to a diner's plate! Most grocery stores use large trucks to import food items from around the country. These trucks emit a lot of carbon, for two reasons:

- The first reason is that the trucks are usually air conditioned or refrigerated to keep the food fresh. This refrigeration produces a lot of greenhouse gas emissions.
- The second reason is that trucks emit carbon dioxide when they burn fuels. Combustion combines the organic carbon molecules in fuels with oxygen to produce carbon dioxide and water. Remember that millions and millions of years ago the carbon atoms in the gasoline were part of the biomass of ancient plants which, over geological time, were converted into fossil fuels.



According to the Environmental Protection Agency, the burning of fossil fuels such as gasoline accounts for approximately 47 percent of all carbon dioxide emissions. By buying locally grown food or by growing your own food, you can reduce the amount of carbon dioxide emissions associated with transporting your food over long distances.