



# Energy and Food

## *The history of food*

### Key terms

*Agriculture*

*Industrial Revolution*

*Fertiliser*

*Nitrogen*

*Phosphorus*

*Potassium*

Early humans were known as hunter-gatherers. This means that part of their diet was hunting and eating animals and the other part was gathering fruits and vegetables to eat. Around 10,000 years ago, humans began to grow their own crops rather than finding them in the wild. This human intervention into food production is known as agriculture.

**Agriculture** continued in its original form for the most part of ten thousand years. Communities would grow their own food to share between themselves and they would depend on their climate, seasons, and geographical conditions to grow appropriate food. This

would mean that different foods would only be available in specific parts of the world and only during specific seasons.

In modern times, most of the food on our plates has been grown, transported, processed, chilled and stored, using vast quantities of fossil energy. It takes approximately 10 calories of fossil energy to produce a single calorie of food energy.

The **industrial revolution** of the 18<sup>th</sup> and 19<sup>th</sup> centuries where fossil fuels were first used in industry, changed agriculture for ever. When previously all food was produced by manual labour or



using animals to pull ploughs through the soil, the industrial revolution saw all of this replaced by machines. In the 1800s in the United States, around 70-80% of the population was employed in agriculture, but in the last few years the numbers are more like 2-3%. The industrial revolution meant that more food could be produced with less manual work.

### Did you know:

- One of the reasons that societies and empires in history have failed is that they have been so detrimental to their environment that it can no longer sustain them.

## *Resources for food: Water*

There are many resources that go into producing food, from growing food, to harvesting food, to food ending up in your local supermarket. First and foremost, we are talking about water.

All of the food we eat comes originally from crops, that is,

from fruits, vegetables and grains. Obviously these crops need water to grow, but the further you get along the food scale, the more water is required.

For example, to make one kilogram of beef, around 20,000 litres of water is

needed. From watering the grain that feeds the cow, to the water that the cow itself drinks, to all of the water used in each process along the way.



## Resources for food: Fertiliser



The second big resource that is used in mass production of food is fertiliser. Fertiliser is made from a few different chemicals, mainly nitrogen, phosphorus and potassium. Their purpose is to give crops more nutrients in order to make them grow bigger and faster.

Nitrogen makes up the largest percentage of what fertiliser is made of. It is mainly present in derivatives from a chemical called ammonia, which is produced by an energy intensive process that

combines nitrogen molecules with hydrogen molecules. As 70% of our atmosphere is made of nitrogen, the first part is not hard to come by, but making hydrogen is again another process that requires a lot of energy.

In the past it has been relatively cheap to undertake these processes, as fossil fuels were thought to be abundant. However, as we begin to run out of fossil fuels in the next couple of hundred years, their cost will increase exponentially. As the process

of making fertiliser depends on the use of fossil fuels, the price of fertiliser is directly related to the price of fossil fuels.

Although fertiliser is great at giving plants more nutrients so that they can grow bigger and faster, it is not great for soil. Over the long term, fertilisers destroy soil structure and fertility. When this happens, the only way farmers can grow crops in this “dead” soil is to use more fertiliser.

## Resources for food: Transport

### Did you know:

In 2009 there were just under 16 million registered vehicles in Australia. Almost 20% of these were trucks.

The third big resource that is used in food production is transport. Transport is used in every stage of food production and all transport currently runs on fossil fuels. Crops are harvested by huge machines powered by petrol, they are processed in factories that use a huge amount of energy, and then they need to

be delivered to every corner of the world so that people have easy access to food.

International transport of oil, food and fertiliser through shipping is akin to a huge conveyor belt connecting countries and spanning oceans. If international shipping was a country, it would be the 6th largest

carbon dioxide emitter.

Unfortunately in Australia, we have developed what is referred to as urban sprawl. This means that instead of living in cities where proximity to supermarkets is very small, more and more people are living on large blocks of land further and further away from cities.

## Over to you

1. Make a list of all the food you ate yesterday. Divide the items into two groups; foods that would have been eaten by hunter-gatherers (natural) and foods that would not have been eaten by hunter-gatherers (processed).
2. Suggest some differences in daily life before and after the industrial revolution.
3. Name the three important resources involved in producing food in modern times. For each one, name a benefit and a problem associated with the resource.
4. For each of the problems you listed in question 3, suggest a possible solution.
5. Homework task: Find out how many of your neighbours and/or extended family use fertilizer on their gardens. Express your findings as a percentage.

