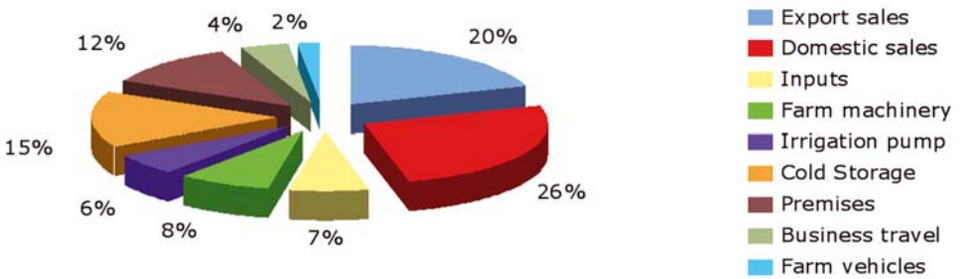
Examples of Carbon Dioxide emissions from a farm



While it is true that organic farming in comparison to conventional farming already goes a long way to reducing agriculture's contribution to greenhouse gas emissions, it does have its weaknesses and, as with any system, there is room for improvement.

Carbon neutral farming

Carbon neutral farming is a relatively new concept and is something that the more innovative farmers are heading towards. The idea of carbon neutral or even carbon positive farming is that the amount of carbon produced into the atmosphere, through inputs, machinery use, packaging, transport and so on, is offset with practices that store in the soil at least the amount of carbon being emitted from the farm, thus making the operation carbon neutral or even carbon positive.

Energy audits

Many industries have done a full life cycle analysis (LCA) of their business, which is an assessment of the environmental impact of a given product throughout its lifespan. The goal of a life cycle analysis is to compare the environmental performance of products and services to enable businesses to choose the most environmentally friendly one.

Farming however is a long way behind, and an energy audit is something that should be introduced on both organic and non-organic farms. This would entail looking at all aspects of the farming operation and calculating how much energy is used during each process. Farmers could then assess areas of their business that emit large quantities of carbon dioxide and look at alternative methods that would reduce emissions.

Carbon credits

There are already rapidly expanding 'carbon-trading' markets around the world and, based on an energy audit, farmers could in the future receive a carbon payment for their production as well as receiving a payment for their produce.

A payment could be received if carbon was being stored in the soil or a tax could be paid if carbon dioxide was being emitted. A national carbon-trading scheme for the farm sector could deliver, even at the conservative prices of $6–10 per tonne of carbon dioxide, between $360–400 million in revenue over five years.

We are all responsible

Climate change is happening and even the most powerful governments in the world have finally accepted this. However if we want to try and prevent the potential catastrophic effects of climate change it is up to us as both consumers and farmers to make a conscious decision when buying and growing our food. We have seen that agriculture and the way our food is produced, packaged and transported has a significant effect on the climate, so for the sake of our planet and future generations let's do something about it.

Back to the future

Climate change and carbon neutral farming

» Food production and distribution is the major contributor to climate change, responsible for 30 per cent of all greenhouse gas omissions. Organic agriculture offers tangible solutions to this crisis and, as **Alasdair Smithson** points out, it's possible for organic producers to earn additional income in the future through a national carbon-trading scheme.

The Intergovernmental Panel on Climate Change (IPCC) released figures in June 2007 showing that emissions of carbon dioxide have been rising three times faster than in the 1990s.

The extent of Arctic sea ice has declined by 7.8 per cent a decade over the past 50 years, compared with an average estimate by IPCC computer models of 2.5 per cent. The Arctic ice cap is melting three times as fast as originally predicted and as a consequence sea levels are rising at double the rate they did previously.

Modern food production and distribution systems are largely responsible for this, as they emit approximately 30 per cent of greenhouse gas emissions into the atmosphere every year. We have to make radical changes to the ways in which food is produced and distributed to meet the increasing challenges of climate change.

Agriculture's contribution to climate change

Compared to other industries agriculture is the single largest consumer of petroleum-based products. In the UK alone the equivalent of over 4 barrels (636 litres) of oil a year are needed to feed each person.

Over time the globalised food production and distribution system has become reliant on cheap fossil fuels. Table 1 shows the large quantities of fossil fuels that are used in agriculture – mainly for irrigation pumps, chemicals and fertiliser, mechanisation, maintenance of animal operations, crop storage and drying, transportation of farm inputs and food distribution.

Australian agriculture uses a petroleum-based transport system, which relies on agrochemical and feed inputs, much of which is imported. Australian food production and processing is increasingly concentrated, involving longer distribution chains beyond the farm gate and, increasingly, more of the food we consume has undergone further processing. There is also a growing demand for cheap food, much of which is imported, adding to food miles.

As the cost of oil increases, farm input prices will increase – especially nitrogen fertiliser. These price increases are going to make industrial farms more expensive to run, which in turn means that industrial food is going to cost the end consumer more.

Nitrogen fertiliser is agriculture's single biggest contributor to greenhouse gas emissions. Production of 1 tonne of nitrogen fertiliser releases the equivalent of 6.7 tonnes of carbon dioxide into the atmosphere. Nitrogen fertiliser accounts for 30 per cent of agriculture's energy use and is accountable for production of roughly 20 million tons (approximately 8–10 per cent) of the planet's carbon dioxide per annum. Also, a large quantity of fertiliser is imported, which adds to the burning of fossil fuels and adds carbon dioxide into the atmosphere through what might be called 'fertiliser miles'.

Methane and nitrous oxide

Although globally carbon dioxide is the main greenhouse gas, it is only one of the gasses emitted that contributes to climate change. Others, such as methane and nitrous oxide, are also emitted from agricultural production.

Nitrous oxide over a 100-year period is 310 times as powerful as carbon dioxide. Agriculture accounts for 61 per cent of the planet's nitrous oxide emissions. An additional nine per cent of all the nitrous oxide that is emitted occurs during the production of nitric acid, which is mainly used for fertiliser.

Methane over a 100-year period is 23 times as powerful as carbon dioxide and contributes to 37 per cent of agriculture's greenhouse gas emissions. On farms it is mainly emitted from ruminant animals and will increase at an even more rapid rate as developing countries convert to more westernised diets.

'Nitrogen fertiliser is agriculture's single biggest contributor to greenhouse gas emissions'

Alternative energy sources

As we know, farms generally use lots of energy to operate. There are however cleaner energy options that can be used, which would reduce greenhouse gas emissions.

Solar energy is one option that farmers could use to generate electricity. Australia has plenty of sunlight and the technology of solar panels is very advanced today. It would not take long, through the savings made in power bills alone, for the average farm to cover the cost of getting a solar system installed.

Wind turbines are another efficient converter of nature's energy into electricity, and the cost of installation can also soon be recovered through savings in power bills. Wind turbines are a bit more restrictive in that the farm has to have a windy area for the turbine to be effective, and it can be difficult to get planning permission to erect them.

Biofuel is being hailed as the answer to our dependency on fossil fuels, though there is a lot of skepticism surrounding their use. One valid argument is that crops grown for biofuels, such as canola, sequester very little carbon in the soil and use lots of fossil fuels to plant, fertilise, harvest and process.

Competition between food and fuel uses for land will increase the cost of basic foods such as bread, which will result in higher food prices for the consumer. This sacrifices food security for an illusion of energy security. A study by the Organisation of Economic Co-operation & Development (OECD) estimates that the EU would need to use 72 per cent of broadacre land for biofuel production to provide just 10 per cent of the fuel used in the EU.

Is the answer beneath us?

Soil holds about twice as much carbon as the atmosphere but, over recent times, the carbon levels in soil have reduced to lower than natural levels. This is mainly due to the widespread areas of land that are now cultivated in a way that does not protect the soil, for example mono-cropping large areas of cotton or wheat.

Table 1: Annual energy use to supply food in the UK (Hines and Lucas 2006)

UK	UK Total (barrels of oil equivalent)	Per capita (barrels of oil equivalent)	Per household (barrels of oil equivalent)
Retailing	16 003 432	0.27	0.64
Packaging	18 793 921	0.32	0.75
Catering	24 677 235	0.41	0.99
Food transport and distribution centres	46 095 723	0.78	1.84
Home preparation	57 198 889	0.96	2.29
Agriculture and food processing	85 798 333	1.44	3.43
Total	248 567 532	4.18	9.94

BAUERS ORGANIC FARM

Organic farming traps more carbon in the soil.

The Kyoto Protocol talks about agriculture and forestry as carbon sinks, or places to capture carbon from the atmosphere, but fails to distinguish between the effects of different types of agriculture, for example organic and industrial.

The British Royal Society has estimated the potential of carbon dioxide sequestration on the world's 2.5 billion acres of agricultural soils at 6.1 to 10.1 billion US tons per year for the next 50 years. Soils have the potential to store 140 tons of carbon per acre compared to trees, which take 25 years to grow and store only 50 tons of carbon per acre. Agricultural soils may also be a more secure sink for atmospheric carbon, since they are not vulnerable to logging and bushfires.

The storage of carbon in agricultural soils can vary by climate, soil type and farming method. In a 23-year trial at the US Rodale Institute, there has been a 15 to 28 per cent increase in soil carbon in organic farming systems, with virtually no increase in non-organic systems. This is because organic farmers tend to incorporate cover crops and animal manures into the soil and use compost with the aim of building the soil humus level. It is clear that if managed correctly agricultural soils have a large role to play in combating climate change.

Organic farming produces fewer greenhouse gases

David Miliband, Secretary of State for Environment, Food and Rural Affairs, UK, said recently that organic farming 'in many, but not all cases, produces fewer greenhouse gases' than conventional or industrial farming. Numerous studies have shown that carbon dioxide emissions from organic farming are 40–60 per cent lower per hectare than from conventional farming systems.

While the use of energy intensive chemicals and synthetic fertilisers that conventional farmers use are banned in organic farming, naturally based inputs are still used. Due to their manufacturing, packaging and transportation, these natural inputs still require the use of fossil fuels, which add to the carbon dioxide emissions in the atmosphere.

A large proportion of organic food is sold through supermarkets, which means produce is often transported vast distances from the original point of production, by road, air and sea before it gets to the consumer. This adds food miles to the product and is responsible for the emission of carbon dioxide into the atmosphere.

Organic food is often also heavily packaged in plastic, which requires a lot of energy to produce, with one of the by-products being carbon dioxide.