



Food v fuel? -
A Greenenergy perspective

There has been much discussion about the potential for increased biofuel usage to affect world food supply and world food prices by creating competition for arable land. This Perspective discusses the causes of higher food prices and the availability of land to grow food and fuel.



Summary

Greenergy is a significant producer and supplier of petroleum and biofuels into the UK transport fuels market, supplying over 15% of the UK's overall petrol and diesel market and approximately one third of the biofuels market. Greenergy has extensive worldwide sourcing experience, with manufacturing operations in the UK and a blending facility in Rotterdam from which it supplies customers across Europe.

In this Perspective, Greenergy presents the following:

- Many agricultural commodity prices rose steeply during the second half of 2007 and into early 2008. However by the end of 2008 commodity prices had fallen significantly, many returning to 2007 average levels.
- There is little evidence that biofuel production was a significant contributor to rising food prices. Commodity crop prices are continuing to fall in spite of a continued increase in world biofuel production.
- A combination of factors contributed to the rising agricultural prices during 2007 and early 2008. These included speculative trading activity, rising fertilizer and other agricultural production input costs, weather induced crop failure and a weak dollar as well as increasing affluence and a growing global population.
- Increased biofuel usage has not created a shortage of land for food production and is unlikely to do so in the future. Fears that food production may not keep up with population growth are unlikely to be realised unless climate and other environmental factors have a significant impact on productivity.
- To meet increasing demand for agricultural production, both for food and for biofuel, available land needs to be used effectively to maximise yield per hectare.

1 Agricultural commodity price trends

Perspective

Many agricultural commodity prices saw sharp increases during 2007 and traded at record highs early in 2008. However by the end of 2008 commodities had fallen significantly, in some instances by more than 30%.

The first quarter of 2008 saw sharp price increases affecting a wide variety of commodities including oil, fertilisers, metal and minerals as well as agricultural products. The increase for wheat was particularly marked, with prices more than double those of a year previously. However, by the end of 2008 prices had fallen considerably. Wheat prices for example fell by 48% by the end of 2008 and it is anticipated that wheat prices may fall further still as a result of increased production (global 2008/2009 wheat production is projected at a record 684 million tons, 13% higher than the previous year¹).

The higher prices seen in 2008 were generally attributed to a range of factors including high energy prices, the weakness of the US dollar and speculative trading activity. Section three below gives for further information about the causes of rising food prices.

Table 1: Commodity price data

Commodity	Unit	Average 2007	Average Q1 2008	Average Q4 2008	% change in 2008	Average Q1 2009
Agricultural commodities						
Wheat (Canada)	\$ m/t	300.40	621.70	322.10	48% decrease	329.30
Maize (corn)	\$ m/t	163.70	220.40	168.40	23% increase	168.10
Rice (Thai)	\$ m/t	326.40	478.10	564.40	18% increase	585.10
Sugar (world)	c/kg	22.22	28.42	26.28	7% decrease	28.51
Cocoa	c/kg	195.20	247.70	244.10	11% decrease	264.50
Coffee (Arabia)	c/kg	272.50	328.50	267.80	18% decrease	284.20
Palm oil	\$ m/t	780.00	1,156.00	512.00	56% decrease	567.00
Soybean oil	\$ m/t	881.00	1,138.00	830.00	27% decrease	769.00
Bananas (EU)	\$ m/t	1,037.00	1,421.00	944.00	33% decrease	1,047.00
Other						
Crude oil (Brent)	\$/bbl	72.70	96.67	55.89	42% decrease	44.05
Urea (fertiliser)	\$/mt	70.90	357.60	292.20	18% decrease	268.30
Gold	\$/toz	696.70	926.80	795.00	14% decrease	901.00

Source: World Bank²

1 <http://www.usda.gov/oce/commodity/wasde/latest.pdf>, 11 December 2008

2 http://siteresources.worldbank.org/INTDAILYPROSPECTS/Resources/Pnk_0308R.pdf

2 Relationship between biofuels and food prices

Perspective

Given the rapid rise and fall in commodity prices during 2008 it is difficult to attribute rising food prices wholly or even significantly to biofuels. Commodity crop prices have continued to fall in spite of a continued increased in world biofuel production.

Biofuels have the potential to affect food prices in different ways:

- Biofuels can reduce the cost of food production by helping to keep fuel prices down. Energy is a significant cost of farming and food production, so higher oil prices mean higher input costs. By increasing the amount of fuel that is produced globally, biofuels mitigate against fuel supply shortages and help keep fuel prices down. For more information, read our Perspective on the relationship between biofuel and consumer fuel prices.
- Biofuels can increase food prices if they cause demand for agricultural commodities to outstrip supply. Yet the only commodity that is generally believed to have been affected to date is corn.

The extent to which biofuel has affected food prices in reality has varied depending on feedstock.

Case study: Rising corn (maize) prices and US ethanol production

Demand for corn ethanol grew very sharply in the US from 2007 to 2008, with the amount of corn used for ethanol production rising from 2 billion bushels in 2007 to 3 billion bushels in 2008.

This sudden increase in demand is believed to one the main causes of rising corn prices, which increased by more than 50% over the same period. Higher corn prices in turn affected the price of animal feed and the price of other farm commodities including soy, meat, poultry and dairy. The US Congressional Budget Office estimates that the effect of increased demand for corn ethanol accounted for between 0.5% and 0.8% of the 5.1% increase in food prices over that period*.

Even so, corn is not believed to be the only, or even the principle, cause of food price rises - the Congressional Budget Office estimates that higher energy costs had a greater effect on food prices over this period than the use of corn for ethanol production.

* Congress of the Unites Sates Congressional Budget Office, The impact of Ethanol Use on Food Prices and Greenhouse Gas Emissions, April 2009

Wheat	Sugar	Corn
<p>Wheat saw very sharp price increases during 2007 and into early 2008 (see section 1), although prices have since dropped very significantly.</p> <p>Yet the International Grains Council estimated that in 2007/08 less than 1% of wheat production was used for biofuel (in 2007/08 just 6 m tons of wheat was used for bioethanol globally and global wheat production was estimated at then a record 610m tons)³.</p>	<p>There has been no significant increase in sugar prices in spite of its importance as a bioethanol feedstock, with sugar prices relatively stable during 2008 and into 2009.</p>	<p>Demand for corn (maize) for ethanol production is more likely to have been a contributing factor to corn price increases during early 2008, since the proportion of corn being used for biofuel production is significantly greater than other food crops – see case study.</p>

3 <http://www.igc.org.uk/en/downloads/gmrsummary/gmrsumme.pdf>

3 Causes of rising food prices

Perspective

A combination of factors are believed to have contributed to rising agricultural prices, including speculative trading activity, rising fertilizer and agricultural production input costs, weather induced crop failure, a weak dollar as well as increasing affluence and a growing global population.

The following factors have contributed to rising agricultural prices:

- Speculative trading activity. Jee-hoon, quoted in the Gallagher report on the indirect effects of biofuels⁴, estimated that a combination of the weak dollar and speculative trading were responsible for 57% of commodity price rises in the first few months of 2008. The International Grains Council refers to “unprecedented price swings” in the first two months of 2008 with “erratic and often baffling developments in US wheat futures” - in the absence of any fundamental change in the supply outlook⁵. Increased trading and investment also resulted in higher prices for many other non-biofuel commodities including gold which rose by 31% in early 2008⁶. In its Food and Farming Brief in January 2008⁷, Defra concluded that high fertilizer prices are likely to have a greater impact on agricultural commodity prices than any impact through increased biofuel production⁸.
- Crop failure in some regions. Unfavourable weather conditions have led to crop failure or poor harvests in key producing regions, such as Australia and the EU.
- Increased demand for food resulting from increased affluence in countries such as China and India, which, in particular means more meat consumption and increased demand for the grains and pulses used in animal feed. One third of the expected increase in demand for food over the next 30 years is expected to come from increased affluence leading to greater numbers of people being able to afford more milk and meat⁹.

4 <http://www.dft.gov.uk/rfa/reportsandpublications/reviewoftheindirecteffectsofbiofuels.cfm>, Page 61

5 <http://www.igc.org.uk/en/downloads/gmrsummary/gmrsumme.pdf>

6 World Bank http://siteresources.worldbank.org/INTDAILYPROSPECTS/Resources/Pnk_0308R.pdf

7 <http://statistics.defra.gov.uk/esg/publications/Monthly%20brief/January%202008%20Farming%20and%20Food%20Brief.pdf>

8 <http://statistics.defra.gov.uk/esg/publications/Monthly%20brief/Annex%20A%20Implications%20of%20Oil%20Price%20for%20UK%20Agriculture.pdf>

9 UN-Energy; Sustainable Bioenergy: A Framework for Decision Makers

4 Availability of land to produce food

Perspective

There is no evidence that increased biofuel usage has created a shortage of land for food production or that it will do so in the future. There is enough land in the world to produce crops for both food and biofuel. Fears that food production may not keep up with population growth are unlikely to be realised unless climate and other environmental factors have a significant impact on productivity.

The UN's Food and Agriculture Organisation states that in 2007 only 1% of the world's arable land (14 million hectares) was used for liquid biofuel production and that this will increase to between 2.5% and 3.8% by 2030¹⁰. Even in Brazil, the world's largest producer of bioethanol, just 2.3% of arable land was used to produce sugar and 1% of arable land used to produce bioethanol in 2007¹¹.

Modelling by the European Commission forecasts that in 2020, with 10% of all transport fuels being biofuel, the EU would be using about 15% of its arable land for biofuel production¹².

There is significant scope to increase the amount of land used for arable production globally. Brazil for example has 394 million hectares of available arable land and is currently planting only 16% of that total¹³. In Mozambique 75% of arable land is currently unused and in Zambia only 14% of potential arable land is farmed¹⁴. The European Bank for Reconstruction and Development sees substantial scope to increase agricultural production in Central and Eastern Europe, with Russia, Ukraine and Kazakhstan alone having 23 million hectares of land that have not been used for food production since the collapse of communism¹⁵.

Improvements in productivity will also increase arable production. While there has been a steady increase in land used for agriculture over the last 40 years, there has been an even more significant increase in food output per unit of land.

10 Pingali P. "The current world food security situation: trends and issues", 2006 ftp://ftp.fao.org/es/esa/cfs/cfs_pres/cfs_33_pingali.pdf

11 www.unica.com.br

12 <http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/08/145&type=HTML&aged=0&language=EN&guiLanguage=en>

13 Christodoulou D. 24th October 2007 http://www.brazil.org.uk/commercial/biofuels_files/diomedeschristodoulou.pdf

14 <http://www.vso.org.uk/about/cprofiles>

15 <http://www.ebrd.com/news/stories/2008/080310.htm>

Table 2: Yield per hectare: Global trends

Yield (tonnes per hectare) for Major Food Crops		1961	1971	1981	1991	2001	2005	2007
Cereals	T/ha	1.35	1.89	2.25	2.68	3.11	3.29	3.34
Sugarcane	T/ha	50.27	52.65	58.42	61.13	64.05	65.78	70.87
Palm oil fruit	T/ha	3.77	4.93	7.60	9.78	12.17	13.46	13.85
Soybeans	T/ha	1.13	1.52	1.75	1.88	2.32	2.31	2.27
Root crops	T/ha	9.57	11.15	11.79	12.19	13.06	13.50	13.70

Source: FAOSTAT

Table 3: World food production per capita

World Production of Major Foods, Population and Product per Person						
	1961	1971	1981	1991	2001	2005¹⁶
Production	1,821	2,473	3,092	3,724	4,364	4,619
Population (billions)	3.0	3.7	4.5	5.3	6.1	6.4
Product per person (%)	77.5	82.5	86.6	90.6	100.3	104.5

(Production includes: cereals, sugarcane, palm oil, soybeans and root crops)

Source: FAOSTAT and World Resources Institute¹⁷

¹⁶ More recent data not available

¹⁷ World Resources Institute www.earthtrends.wri.org

5 Effective use of available land

Perspective

To meet increasing demand for agricultural production, both for food and for biofuel, available land needs to be used effectively to optimise yield per hectare.

To achieve this:

- Effective land use planning is needed on a global scale so that land resources are used most effectively. At its very simplest, this means growing crops in the places and in the manner where they grow best. There are many examples of inefficient or inappropriate production.

Example: Inefficient use of land

Extensive beef production in South America uses millions of hectares of very poor pasture and in many cases gives;

- little ecological value;
- very low rates of employment and few social benefits (a lot of land is owned by large - and often absent – landowners with relatively few employees per hectare); and
- extremely low levels of production (often less than 1 head per hectare).

By intensifying production on this land (for example, by planting soy and corn combined with intensive beef production), output could be massively increased without expanding the agricultural frontier.

Example: Inappropriate use of land

“Food v fags”

Tobacco is grown on over 4 million hectares of land¹⁸ (compared with 14 million hectares for of land currently used for biofuel).

The WHO cites tobacco production as a significant cause of deforestation in Korea, Uruguay, Bangladesh, Malawi, Jordan, Pakistan, Syrian Arab Republic and China.

- For biofuels, the greatest incentives need to be given to those biofuels that produce the most energy and the greatest carbon savings per hectare. The extent to which biofuels create carbon savings varies widely according to the feedstock used and the processing method. If governments promoted the use of biofuels according to their carbon reduction per hectare, limited land could be used to generate the greatest carbon benefit.

18 World Health Organisation, <http://www.who.int/tobacco/en/atlas16.pdf>

6 Are higher food prices necessarily a bad thing anyway?

Perspective

Until recently commodity prices including food staples were on a long-term downward trend, raising concerns about falling incomes for agricultural producers - often those in the poorer countries of the world. Now that agricultural commodity prices are rising, a large proportion of the world's poorer people, who rely on the sale of agricultural commodities for their income, stand to benefit.

Between 1980 and 2003, the prices of agricultural raw materials and food and beverages fell in real terms by 60% and 73% respectively (UNCTAD, 2003). In 2003, coffee and cotton prices were 17% and 33.5% of their 1980 real values. From 1997 to 2001 alone, the combined price index of all commodities fell by 53% in real terms (FAOSTAT, 2004).

As recently as 2005 the Food and Agriculture Organisation issued a report warning that “the long-term downward trend in agricultural commodity prices threatens the food security of hundreds of millions of people in some of the world's poorest developing countries where the sale of commodities is often the only source of cash.”¹⁹

Now that the trend is reversed, sharp rises in agricultural prices may cause short-term problems for the world's urban poor who spend a large proportion of their income on food. However, for the “hundreds of millions” of people in developing countries who rely on agriculture for income, higher prices will increase income and provide a spur to broader economic development.

The European Agriculture Commissioner, Mariann Fischer Boel agrees: “Higher prices can be good news for the between 70-80 per cent of the world's poorest people who live in rural areas and rely on farming for their livelihood.”²⁰

¹⁹ <http://www.fao.org/newsroom/en/news/2005/89721/index.html>

²⁰ <http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/08/145&type=HTML&aged=0&language=EN&guiLanguage=en>