



# \$100 a Barrel of Oil

## Impacts on the sustainability of food supply in the UK

An executive summary by ADAS, with an introduction from the SDC

## Preface

This study asks a simple question: what would be the impact on food of oil prices rising to \$100 a barrel? When the SDC commissioned this research, oil was nearly half the price it is at the time of publication, and then it seemed almost fanciful to consider such Olympian price heights. Yet as I write, the price is almost there,<sup>1</sup> and petrol prices for motorists have breached the £1 a litre psychological beachhead. Oil vulnerability is the subject of mainstream political analysis and discussion.<sup>2</sup> This rapid price shift is raising issues of risk, resilience and security not just within the food sector but beyond. The UK's experience of the lorry strike in 2000 reminded planners and decision-makers how dependent the food system is upon oil.<sup>3,4</sup>

In a society where the average distance between home and the food shop is around 5 miles (beyond the distance most consumers walk, especially carrying bags), public interest about oil prices centre particularly on fuelling the car. At the SDC, we are equally concerned about how the food gets to the shops in the first place. Oil underpins both how food is produced, how consumers access it and (if they use electricity) how they cook it.

Even though this debate about oil and food is now 'hot', we would do well to remember that it has deep roots. For decades, policy analysts have pointed out that modern food systems' efficiencies have been reliant upon use of cheap fossil fuels.<sup>5</sup> But today, attention is rightly focussed on the impact of consuming fossil fuels: both the impact of climate change, and whether we are at, near or past the moment when oil supplies peak. Food and drink has emerged as one of the most significant sources of greenhouse gases in the EU, accounting for 31% of our climate change impact and 20-30% of total environmental impacts of European consumption.<sup>6</sup> There is now an important debate about which sectors within the food and drink economy have greatest impact with meat, meat products and the dairy sector identified as the most significant. Such details are becoming central to food companies' attempts to face and reduce their carbon footprint.

The impact of rising oil prices on food prices is uncertain. Cheap food has been deemed a sign of a successful economy: the less money spent

on food, the more there is to fuel other sectors of the consumer economy. Keeping food prices down has been one of the benchmarks of the post World War II production-oriented policy. By and large, this has been hugely successful. Average household expenditure on food has dropped from a quarter of disposable income in 1950 to less than a tenth by 2005. However, this trend has stalled and food prices have begun to creep up. The large food retailers who take pride in their consumer products being good value-for-money and affordable, are now under pressure. They in turn are putting pressure back down the supply chain, to logistics, processors, farmers, growers and traders.

Although the SDC commissioned this study for its modelling, we now have the benefit of seeing how the model measures up against reality. The study was conducted by ADAS, and the model's assumptions, data analysis, implications and extrapolations are ADAS'. Undoubtedly, the model used here will require modification and commentary, as events and experience unfold, and both the authors and the SDC would very much welcome feedback. In particular, we recognise there are wider sustainability issues that are not covered by this study which will have huge importance, such as greenhouse gas emissions and water. The large-scale shift to biofuels, too, will have a serious impact on supply chains and prices. Combined with normal fluctuations and climate-related shortfalls the problem of sustained and severe food price inflation will be made a great deal worse by the arrival of \$100 barrel oil. Another factor

not covered here is the cultural drive to support organic, seasonal and local foods. Price is not the only determinant of food or shopping behaviour.

Nevertheless, price is very important. A core finding of the study was that food prices are not likely to rise as dramatically as some of the more apocalyptic thinkers might suggest. The figures presented suggest rises in food prices of 5% or 10% when oil reaches \$100 a barrel. Such rises might seem comparatively small. For a food culture which has been built on assumed access to plentiful and ever cheaper food, even slight reversals can have profound effects. One possibility is that the psychological significance might be greater than the financial impact. Equally, consumers might be phlegmatic and take the upward pressures – now happening - in their stride. They might adapt and refine their spending patterns. Such issues deserve to be considered and debated, not least by health

specialists, already concerned about the impact of many cheap calories on the nation's waistlines and subsequent ill-health.<sup>7</sup> Another impact is likely to be that the food supply chain will redouble efforts to reduce energy use as part of its core business strategy for containing costs and maintaining competitiveness.

Finally, on behalf of the SDC, I offer my sincere thanks to all who have contributed to this study. Many people in and beyond Government and the food sectors gave their time, thought and energy to refining and revising the project. We are extremely grateful to them.

**Tim Lang**

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- 1 Closing price on 7 November 2007 was \$96 (<http://www.iea.org/>)
  - 2 Flood C (2007). *Oil rises with \$100 target in view*, Financial Times, 8 November [www.ft.com/cms/s/0/08075c78-8dec-11dc-8591-0000779fd2ac.html?ncklick\\_check=1](http://www.ft.com/cms/s/0/08075c78-8dec-11dc-8591-0000779fd2ac.html?ncklick_check=1)
  - 3 Defra, *Food Security and the UK: An Evidence and Analysis Paper*. Food Chain Analysis Group. 2006, Department for Environment, Food and Rural Affairs – Food Chain Analysis Group. London <http://statistics.defra.gov.uk/esg/reports/foodsecurity/foodsecurity.pdf>
  - 4 Peck, H., *Resilience in the Food Chain: A Study of Business Continuity Management in the Food and Drink Industry*. Final Report to the Department for Environment, Food and Rural Affairs. July 2006. 2007: London: Defra
  - 5 Leach, G., *Energy and food production*. 1976, Guildford: IPC Science and Technology Press for the International Institute for Environment and Development.
  - 6 Arnold Tukker, Gjalte Huppes, Jeroen Guinée et al (2006). *Environmental Impact of Products (EIPRO): Analysis of the life cycle environmental impacts related to the final consumption of the EU-25*. EUR 22284 EN. Brussels: European Commission Joint Research Centre. p.15
  - 7 Foresight (2007). *Tackling Obesities: Future Choices*. London: Government Office of Science.

## **Executive summary**

The overall objective of this study is to provoke greater debate on the potential impact of increased energy prices on the ability of UK agriculture to be a successful market-based industry. It considers the likely direct impact of an oil price of \$100/barrel of oil on UK agriculture and on the wider food supply chain. The work was undertaken by a consortium of researchers, led by ADAS; Cranfield University led the work on energy components of agriculture using Life Cycle Analysis while Queens University Belfast modelled macro-level changes in land use and reviewed the impact of biofuels.

Key findings are as follows:

- The energy component of food production is significant and when the cost of energy is doubled by moving from an oil price of \$50 to \$100 per barrel, the impact of production cost is in the order of 3-13% of farm-gate price.
  - With a total cost increase per MJ of £0.0042, this gives an increase in household food expenditure of around £3 billion if the oil price rises from \$50 to \$100 a barrel and all costs are passed on to consumers. That represents a 4% increase in household expenditure on food within a total spend of £79 billion. We might expect an increase in household expenditure of between roughly 5% to 10% if all costs are passed on to consumers and secondary impacts are allowed for.
  - The economic modelling in this research (AGMEMOD) assumes prices changes from an earlier study by Defra using Aglink, an OECD model. This forecast cereal and oilseed price increases of approx. 20-40% under \$100 barrel oil, with meat prices rising by approx. 10-20% and dairy product prices by 5-10%. It indicated that by 2015, UK cereal production for feed/food would reduce and oilseed rape would increase marginally; there was an overall fall of 4% in land use by modelled crops. Livestock sectors are forecast to decrease by up to 4%, with the exception of pigs, which showed a 3% increase. These findings reflect the relative position of costs and returns across the sectors in an EU context. These forecast price impacts do not include any impact of changes in the biofuels market resulting from an increase in the oil price to \$100 per barrel, which is beyond the modelling capability of this study.
  - When the price rise used in the AGMEMOD model was doubled, the scale of impact was changed to a small extent but the direction was largely maintained. This suggests that decisions on the production of commodities in the UK is not very sensitive to the cost or price changes which may accompany \$100 barrel oil.
  - In terms of regional impacts, Northern Ireland, Scotland and Wales will be hit most hard due to their reliance on livestock and distance from processing or markets. While Scotland could benefit from better returns from the cereal sector via growth in the biofuel sector, Northern Ireland and Wales will not. The poultry sector (notably in Northern Ireland and some England regions) and the pig sector are vulnerable to higher feed costs and competition from imported product. Eastern regions of England and Scotland may become a focus for intensive beef finishing (using biofuel by-products), reducing transport costs and allowing extensification of grassland areas.
  - With regard to competitive position, the LCA analysis of UK and international competitors for the six commodities demonstrated that higher energy prices are not necessarily detrimental to the UK when taking into consideration transport costs from exporting countries to the UK. Wheat, chicken and beef will be more
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competitive though this does not change the wider position of having higher production costs than many third countries.

- Extensive and organic production systems in the UK are less severely affected by energy prices than intensive systems but lower output per unit area means that these systems will need to continue to have low costs or secure market premiums to prosper.
  - Along the food supply chain, farmers are most vulnerable to higher energy costs, as historically, rising production costs are not rewarded from the market in the short term. Over time, this will impact on supply and in a growing market, buyers will adjust prices to encourage more supply. However, much depends on the global balance of supply and demand (and world stocks).
  - The response of farmers will depend on the net financial impact on different sectors; cereal and oilseed crops benefiting from biofuel-led price increases may not feel pressure to reduce energy use while those crop and livestock sectors which are most impacted will seek to reduce costs. This may take the form of restructuring, technology uptake and energy efficient practices. However for many it will also involve better linkages with the processing and retail sector in order to reduce waste and transport costs.
  - As energy use in food processing is generally the second highest next to agricultural production in most selected commodities, we would expect that food processors would be impacted greatly by the rising energy prices. They need to look for energy efficiencies and product innovation.
  - Food retailers have most market power, dealing directly with consumers. They are best placed to pass on the costs either upstream or downstream along the supply chain to ease the impact from higher energy costs. While this can be negative in that suppliers are forced to find cost savings and rationalise, retailers can drive positive change in the UK food supply chain and in the longer-term deliver competitiveness through efficiency and innovation. A partnership approach is essential and this is already being seen in the growth of dedicated supply chains.
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