



Thinking About the Future of Food

The Chatham House Food Supply Scenarios

Chatham House Food Supply Project | May 2008 | CH BP 08/03

Summary points

- Demand for food is increasing because the global population is rising and major developing economies are expanding. Global supply capacity, meanwhile, is struggling to keep up with changing requirements.
- Four global food supply scenarios have been developed by the Chatham House Food Supply Project to consider the challenges created and their impact on the EU/UK:
 - 'Just a Blip': *what if the present high price of food proves to be a brief spike with a return to cheap food at some point soon?*
 - 'Food Inflation': *what if food prices remain high for a decade or more?*
 - 'Into a New Era': *what if today's food system has reached its limits and must change?*
 - 'Food in Crisis': *what if a major world food crisis develops?*
- Across the world the responses to change will be conditioned by uncertainties surrounding the availability of sufficient energy, water, land and skills. EU/UK stakeholders need to start planning now to develop new food supply systems that are up to the task.

Introduction

This briefing paper continues the Food Supply Project's work on the strategic influences and factors that are changing the world's food supply (see Box). It explains four scenarios that have been developed in order to understand the conditions being created and their possible effects on the EU/UK. Based on publicly available information and statistics, the scenarios illustrate a range of circumstances that food supply actors in both developed and developing countries must expect to face in the years to come.

These are not predictions of the future. But they are reasoned depictions that are being used to provoke thinking and engage stakeholders in debate. They are already helping to highlight a need for all

the sectors involved to be ready to respond to significant change.

Global food supply scenarios

The scenarios are medium-term and designed to play out over differing time-scales – a five-year period or less for *Just a Blip* and *Food in Crisis*, but perhaps ten years or more for *Food Inflation* and *Into a New Era*. The supporting programme of research is considering the implications of each individual set of circumstances as well as its significance within a continuously developing broader picture. This allows different pathways through the future to be identified and recognizes, for example, that *Into a New Era* could result from either *Food Inflation* or *Food in Crisis*.

Scenarios: their role in this research

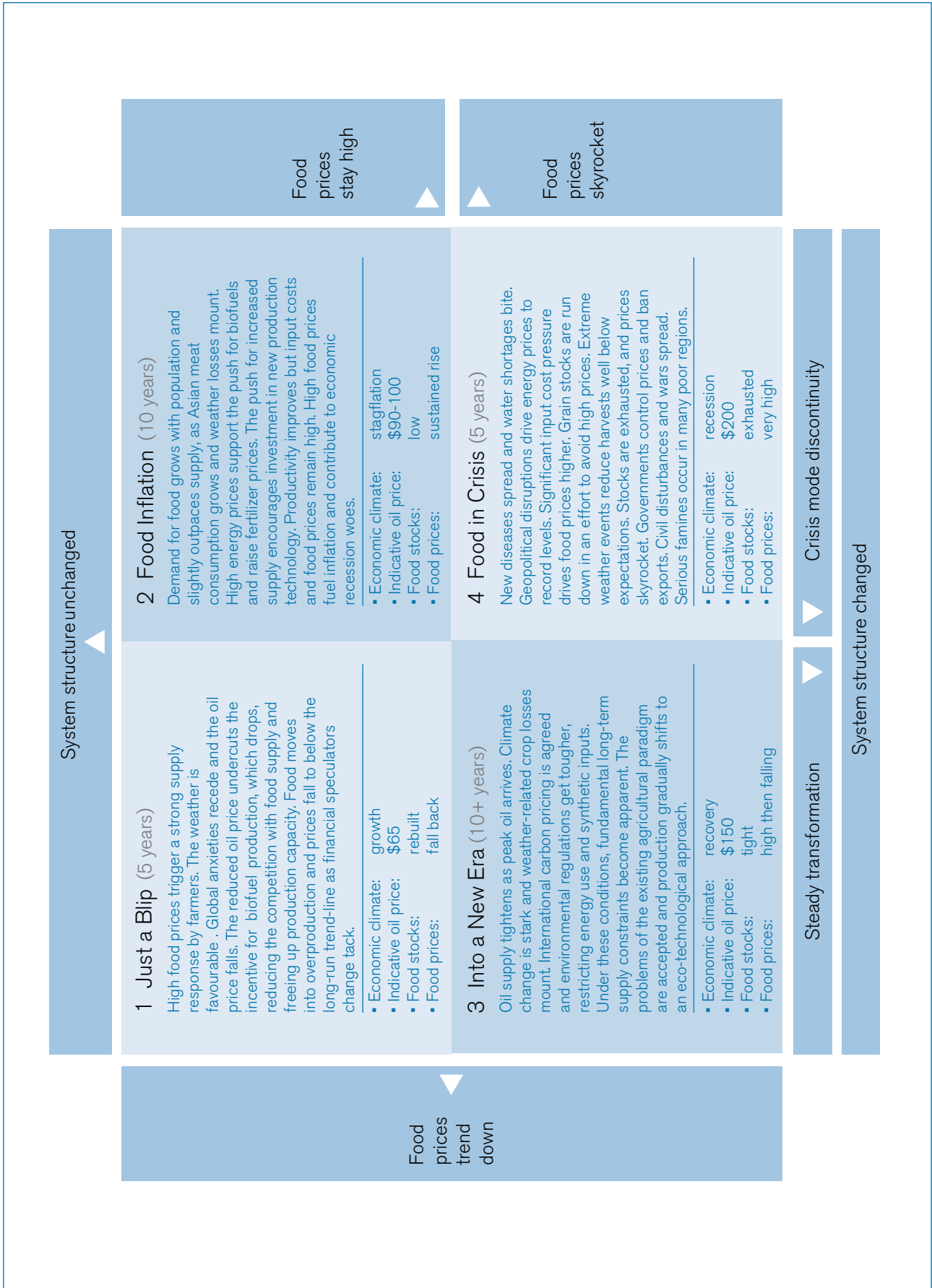
The Chatham House Food Supply Project has created the scenarios as a means of engaging the UK's wheat and dairy supply networks in a debate about strategic developments and future food supply prospects. As constructed, they depict a range of global circumstances in which the UK may be placed in the years ahead. Although the global situation itself reflects varying conditions in different parts of the world, these scenarios do not attempt to describe that level of detail. They aim instead to summarize the range of overall conditions that could form a backdrop to UK decisions about government food policy and food industry strategy.

The scenarios are based on the data and research referred to in earlier project publications.¹ From that pool of information, a subset of the project's research team identified the driving forces that, separately or in combination, will continue to exercise significant influence on political, economic and social developments. These break down broadly into four categories: the changing oil price, the growth of global demand for food, issues around current supply capacity (with a focus on the expansion of global production) and the global political and economic responses to change. Key uncertainties were subsequently identified around the main drivers, and the interdependencies between them were mapped. Story-lines were then developed from the resulting models and considered in three plenary research team discussions and bilateral consultations with expert sources on specific points.

Two one-day workshops involving stakeholders from around the UK's wheat and dairy supply networks were held in January 2008. The level of understanding and experience represented by participants allowed the global scenarios to be further refined. The workshops also delivered an initial understanding of the UK interests that would come into play in each set of global circumstances proposed. The project's Stakeholder Panel made a valuable contribution to the scenario development in two discussions held in January and March 2008.

A further set of (two-day) stakeholder workshops in March 2008 encouraged the UK wheat and dairy networks' participants to focus on the effects of the global scenarios on the UK's own food supply arrangements. The UK-related findings reported in this paper reflect the initial views to emerge both from those events and from the understanding created at each stage of the research undertaken so far. The next phase of the research will examine the implications for the UK in more depth.

1. See Food Project web page – http://www.chathamhouse.org.uk/research/global_trends/, and the two publications available there: UK Food Supply in the 21st Century: The New Dynamic (CH BP 07/01) and UK Food Supply: Storm Clouds on the Horizon? (CH BP 08/01).



The story lines in more detail

Scenario 1: Just a Blip

High food prices prove to be a temporary blip and soon return to the long-term trend-line. There is a possibility, however, that if food prices fall back sharply, financial speculation in commodities will operate in reverse and lead to exaggerated food price volatility.

COMMENTARY: this outlook is considered by many in the UK food supply industry to be too complacent; they believe that even if some easing back in commodity prices is experienced (as the Food and Agriculture Organization is currently suggesting) something more akin to structural change is occurring.

High food prices trigger a major investment in increased production. Over a two- to three-year period, marginal land and spare capacity are brought back into production, double-cropping is more widely adopted and food production surges.

In spite of climate change fears, the weather proves remarkably favourable. There are almost no major crop losses affecting feed or food, and sustained rainfall in Australia breaks the long-running drought, bringing harvests back to normal levels.

Geopolitical stability in oil-producing regions is seen as improving following the 2008 US election, and oil supply concerns ease. As a result of receding global fears and a jump in energy efficiency investment, the oil price returns to levels around \$65 per barrel and below. Food input costs decline.

The reduced oil price undercuts the economic competitiveness of crop-based bio-fuels, and ethical pressure from NGOs builds. Bio-fuel production falls, freeing up food production capacity.

The combination of a strong supply response and favourable conditions moves food into overproduction and prices fall. Financial speculation, which had been a significant factor in driving up prices, then shifts sharply. This causes the food price to plunge further, ending up well below the previous long-run trend-line.

Farmers reel from the dramatic collapse of food prices. This paves the way for volatility around the trend-line in the years that follow.

Scenario 2: Food Inflation

Food prices stay high for a protracted period. They contribute significantly to inflation, but the economy adapts and the existing food system copes.

COMMENTARY: the economic logic of this scenario is currently a topic of debate among investors. The world economy appears to be heading for a recession and normally, under these conditions, commodity prices would be falling in expectation of reduced economic activity. Yet they remain high. The scenario depicts technological innovations that increase production, but the bio-technologies involved would not be restricted to those involving controversial transgenic crops. The scenario is plausible but, to be realized, requires the contributing factors to be in a critical balance.

Demand for food continues to grow in step with increases in world population. Higher meat consumption in Asia and further bad weather and climate-related crop losses ensure that demand persistently outpaces production growth, albeit by a narrow margin.

Oil prices stabilize at around \$90–100 per barrel, high enough to maintain the push for bio-fuels, and high gas prices and capacity constraints keep fertilizer costs high. The imperative to increase food production leads to widespread deployment of new technologies; these include a range of bio-technologies, and methods for improving the efficiency of water consumption and nitrogen application. Continuing efforts are made to reduce food waste in the system. Improvements in practices push up production but come at a price, with input costs rising overall. Production struggles to keep pace with demand and global grain stocks are not rebuilt.

Following the investments in new food production technology, the widely feared fundamental limit to global food production is avoided or at least delayed. The struc-

ture of the global food production system remains largely unchanged, but the new intensification adds to environmental pressures.

In Europe, even as the supply of non-GM crops shrinks worldwide, consumers continue to resist imports of GM food and feed. EU policy requires reduced use of fertilizers and pesticides for environmental reasons, further adding to feed price pressure by constraining local output.

Persistently high food prices contribute to the woes of a recession that hits developed countries along with high energy prices. High food prices add to pressure for wage increases in emerging markets, where expenditure on food represents a relatively large percentage of average income; this translates into higher export prices and contributes to inflation in developed markets.

The world is ultimately judged to be experiencing a 15-year 'long-wave' upswing in commodity prices. The sustained high food prices, combined with the difficult economic conditions, cause a rise in the proportion of personal income spent on food, ending the previous long-run downward trend.

Scenario 3: Into a New Era

Input prices initially stay high as per capita production falls steadily. In response, the system of food production is required to shift dramatically so that increased yields are delivered efficiently through 'regenerative' rather than purely 'extractive' uses of resources.

COMMENTARY: current debate recognizes that high commodity prices may be due in part to the possibility that we are hitting long-run capacity constraints in resources across the board. Whether sufficiently high yields can be achieved through an alternative production paradigm is certainly controversial, particularly as the whole concept runs counter to the existing approach of industrialized agriculture. But many observers maintain that a new approach is feasible and that numerous pockets of innovation are already pushing in this direction

Global oil production stays flat and begins to tighten. The view spreads that 'peak oil' has arrived. The oil price rises above \$150 per barrel but is held in check by reductions in energy consumption and the widespread deployment of energy efficiency technologies. Oil prices sustained at a high level support a continuing emphasis on bio-fuel production.

The effects of climate change become starkly obvious, with weather-related losses reaching higher levels every year. Developed countries agree on carbon pricing, and developing countries sign up over time. Many countries introduce water pricing in response to serious drought conditions. Tougher environmental limits on pesticides and fertilizers are introduced, and nitrogen pricing is debated.

Food production per person is in decline, food shortages are more frequent and prices are climbing. Under these conditions, it becomes clear that food production is hitting fundamental long-term constraints. The media refer to this as 'peak food'. Social values and preferences shift decisively towards what are broadly viewed as 'sustainable' methods, and wherever there are affluent consumers, the demand for local, seasonal, increasingly vegetarian, fairly traded and organic food continues to rise.

At the same time, high food prices permit investment in new agricultural technologies aimed at increasing production while addressing environmental issues – soil degradation, water contamination, pest resistance, biodiversity loss and greenhouse gas emissions. Over a period of ten years and beyond, a new eco-technological production approach emerges that includes: crop rotation, cover cropping, agro-forestry, 'green' fertilizers derived from agricultural and food waste, new varieties (that have resilient, pest-resistant, nitrogen-fixing qualities), more efficient use of inputs through advanced information technology, and reduced water use.

The new approach has a smaller environmental footprint, fewer synthetic inputs, better health outcomes and higher yields. It starts in pockets, coexisting with the old approach, and gradually takes hold as more

farmers adopt the new methods. The old approach gives way and the international food industry and trading rules gradually restructure around the new production paradigm, lifting the environmental and production constraints of the old system. Per capita food production rises as the new approach spreads and food prices finally begin to fall.

Scenario 4: Food in Crisis

Multiple shocks disrupt food production and supply. Prices skyrocket as stocks plummet, triggering food shortages, famine and civil panic.

COMMENTARY: some of these things are already happening: food prices are soaring across the world, stocks are low, and serious shortages are developing.

Two serious global disturbances hit agriculture in short order: the rapid spread of crop/animal disease, and sharply worsening water shortages. These come on top of new geopolitical disruptions that affect energy supply. There are also continuing problems in financial markets. The oil price surges to record levels, well above \$200. The increase puts significant pressure on food input costs, and food prices are driven even higher by financial speculation. Very high gas prices discourage inorganic fertilizer use, further tightening the food and feed supply situation.

Grain stocks are run down to new lows around the world in an effort to sidestep high prices, merely delaying the unavoidable impact of contracting supply. A succession of extreme weather events then reduces world harvests to well below the already lowered levels, and stocks are not rebuilt. Prices skyrocket as the true supply situation becomes apparent.

Sudden and extreme food price rises prompt many more governments to introduce price controls, subsidies and export bans which further worsen the overall supply situation. Farmers are penalized by not being allowed to benefit from the high prices and food is taken off the world market. Other countries, particu-

larly China, scramble to tie up bilateral food supply deals. In many parts of the world farming is seriously disrupted, exacerbating the overall supply position even more.

Serious food shortages develop which cause universal public shock and growing political panic. Severe famines, for which no food aid is available, occur in the poorest and least resilient regions. The shortages trigger serious civil disruptions and outbreaks of conflict. Directly and indirectly the food shortfalls cause millions of deaths, mostly in the developing world.

There is turmoil in the food industry, with some firms making vast windfall profits and others going to the wall. New policies enacted on an emergency basis have their own unintended consequences. A completely untested set of supply arrangements is forged in crisis mode. The struggle, even in the developed world, is to keep people fed, disregarding where necessary any ideas of consumer choice.

Early indications of the impact on the EU/UK

In workshops held in the first quarter of 2008, the Food Supply Project used the global scenarios to clarify the implications of changing global circumstances for the EU/UK. Participants included representatives from the production, processing, retail, government and wider civil society sectors that make up the UK's wheat and dairy food supply networks. A number of points surfaced in discussion, and provisional implications are outlined below.

Just a Blip

- This scenario will have the least impact on existing UK food supply arrangements, but it is also the least credible.
- It amounts to a fragile 'peace' which could be broken by further global supply-and-demand imbalances.

Food Inflation

- Albeit with varying impacts for different product lines, the conditions described in this scenario are with us now.

- Sustained food inflation, driven primarily by rising inputs costs along with further pressures on consumers' disposable income, will create a number of difficult challenges on the domestic front:
 - *production*: further intensification of crops and livestock practices;
 - *manufacturing/processing*: increasing pressures for economies of scale leading to more consolidation and a possible migration of UK capacity to EU regions with lower costs. A more divided market with a growing polarization between highly differentiated or premium products and basic commodities;
 - *consumer purchasing*: an overriding focus on price that will edge out other values such as sustainability and animal welfare. A reduction in consumer choice as product ranges are simplified;
 - *societal change*: a developing UK economic and social divide, with the poor being hit hardest by price rises.
 - All UK sectors may find it difficult to access the capital investment necessary to meet raised productivity targets.
 - As prices rise and consumers feel poorer, the government's pursuit of policy-led objectives (health, the environment) will become more difficult.
 - The EU may find it increasingly hard to maintain its current asynchronous approach on the approval of GM products.
 - Long-term, sustained inflation has the potential to create effects more usually associated with a disruptive shock-type scenario such as *Food in Crisis*.
- transformational, necessitating the development of new supply concepts, policies and structures.
- Increasing weather-related events and effects will see the EU and UK starting to experience constraints on land, water and energy. That in turn will lead to:
 - increasing awareness of food and its wider societal and environmental significance;
 - greater willingness to adapt on the part of consumers with an increasing preference for local or regionally based solutions;
 - a desire for greater transparency of environmental, welfare and ethical standards across the whole supply system.
 - The drive for technological innovation and the need for significant levels of agricultural investment will be seen as converging interests.
 - Significant tensions will develop between those advocating agro-ecological-based production and the pull towards an even more intensive and industrialized approach.
 - Securing the necessary raw materials and the better use of resources will drive supply chain arrangements and their supporting business models.
 - A new competition model will need to be developed, one that takes account of environmental, welfare and ethical standards. Supply systems will also need to be conducted within a new 'framework of integrity' founded on the need for a partnership-based approach.
 - Governments will need to decide whether they are to be the drivers or facilitators of the new supply system's development. Potentially important areas of policy-making include: waste – the promotion of better resource management; the expansion of agricultural and food system capacity; and investment in science and technology.
 - Trade will be a major issue. The UK government may need to review the country's access to resources in the face of increasing global competition.

Into a New Era

The circumstances reflected in the scenarios, many of which are already in place, will have a range of implications for the EU/UK's food supply systems. Most can ultimately be contained within current frameworks and processes, though with some adaptation of systems. *Into a New Era* is the exception. This scenario is truly

Table 1: Implications and questions for the UK's food system

	Implications of the scenarios	Priorities	Key debates/questions
Agriculture	The sector's importance increases as it faces growing pressures on input costs.	Raising yields and productivity. Promoting an efficient and resilient use of inputs (land, water and energy).	The industrial approach versus agro-ecological-based systems. The capability of the sector to meet future challenges (skills, investment levels).
Industry	Pressures on input costs combine with increasing competition for resources and raw materials.	Developing new competitive strengths based on more sustainable models. Improving resource utilization. Strengthening trading partnerships. Planning strategically and over a longer term.	The competences needed in the new competitive environment. The restructuring that may be required, including new partnerships and accountability arrangements.
Government	Food costs contribute increasingly to inflation and a developing social divide. The global competition for resources sets new economic and geo-political challenges.	Balancing food demand and supply realities with environmental and health objectives.	The reshaping of food and agriculture policies in the EU/UK. Government's domestic role – facilitator or driver? Resources as a strategic issue; the changing focus of foreign and trade policies.
Civil society	High prices increase the importance of food. Levels of concern are raised as the availability of some foods is affected and consumer choice narrows.	Developing a more broadly conceived strategy for UK food production and supply, one reflecting its wider economic, social and environmental role.	Tensions between price and values-based purchasing behaviours. Changes in consumption patterns.
All	Development of a more regenerative food system capable of supporting changing demand.	Adapting to life after 'cheap food'. Accepting that working together will move from being a theoretically desirable approach to one that becomes a basic business requirement.	The shaping and acceptance of new systems. The recognition of investment priorities reflecting a key role for technologies including bio-technology.

Food in Crisis

- Given its agility, it will fall to industry to deliver the *first* response to crisis, although reactions will then need to be coordinated efficiently across the whole supply network to prevent any escalation.
- The success or failure of businesses will depend critically on their ability to secure supplies and the strength of their trading partnerships.
- Governments will face a series of difficult decisions on when and how far to intervene. In more strategic policy terms, there may be implications for the UK's trade and international relationships. Conflicts of interest between national and EU priorities may become a particular focus of interest.

The future of food

The global scenarios reveal significant points of debate and questions for all stakeholders across the EU/UK food supply system (see Table 1).

The expected impacts of the circumstances presented provide a stark warning that 'business as usual' models could at worst fail, and at best be poor preparation for the coming period. On a more positive note, the challenging transformation in prospect offers exciting opportunities for the UK to develop new competitive strengths.

Research suggests that the ability to secure raw materials and the effective utilization of resources will become key influences in the structuring of alternative food supply arrangements. In this regard, there may

need to be some reconsideration of the current division of responsibilities between the EU and UK in a number of areas affecting food supply.

Any temptation to focus on the UK agricultural sector in isolation must be resisted; part of the solution lies in developing the capability of the food supply system as a whole. This will require a set of related initiatives including ones built round new frameworks for technological innovation, waste reduction, partnership-led approaches and acceptance of possible changes in consumption patterns. The need for increased investment in scientific and technological research and development, and how such efforts should be funded, will come significantly to the fore.

Long-term planning needs to start now. A first step might be the establishment of a consortium that would juxtapose the expertise and evidence of government,

supply network interests, and a range of societal groups (media, NGOs, universities). The partnership would need to undertake a proactive review of current arrangements, developing and delivering a fresh, concept-based demand-and-supply strategy for food. The current level of engagement and interest in these issues is encouraging.

Next steps

The Food Supply Project's research will now focus in more detail on the response options available to EU/UK government and industry and the specific actions likely to be required. By exploring a series of futures, we are looking to encourage the better planning of food systems and to avoid short-term responses that might serve to exacerbate rather than resolve current pressures in the system.

'UK Food Supply in the 21st Century: The New Dynamic'

The project is an important line of research that was given its public launch in 2007 following 18 months of evaluation. It is future-focused, examining the effects of global trends on the networks that supply two staples, wheat and dairy, to the UK market. Its aim is to shed light on the factors that will shape 'the new normality' – the next generation's experience of food demand and supply. The work is built around a core panel of stakeholders with research expertise drawn from centres of excellence around the country. Highlighting the challenges to be faced, it is giving participants a system-wide perspective and will develop, through scenario-based analysis, the options open to professionals across each supply network.

Research Team Contact Details

	PROFESSOR ROBERT LEE Centre for Business Relationships, Accountability, Sustainability and Society (Cardiff University)
SUSAN AMBLER-EDWARDS Chatham House	Leerg@cardiff.ac.uk, (Office) (0) 29 2087 4352
(Office) (0) 20 7314 2795, (Mob) 07793 209428	
	PROFESSOR TERRY MARSDEN Centre for Business Relationships, Accountability, Sustainability and Society (Cardiff University)
KATE BAILEY Cardiff Business School	baileyk2@cf.ac.uk, (Office) 01782 646082, (Mob) 07766675059
baileyk2@cf.ac.uk, (Office) 01782 646082, (Mob) 07766675059	marsdentk@cardiff.ac.uk, (Office) (0)29 2087 6562
	DAVID SIMONS Cardiff Business School
ALEXANDRA KIFF Cardiff Business School	alexandra.kiff@hotmail.co.uk, (Mob) 07928 059967
alexandra.kiff@hotmail.co.uk, (Mob) 07928 059967	simonsdw@cardiff.ac.uk, (Office) (0) 29 2089 2155, (Mob) 07812153663
	HARDIN TIBBS Saïd Business School, Oxford University
PROFESSOR TIM LANG City University	t.lang@city.ac.uk, (Mob) 07812570579
t.lang@city.ac.uk, (Mob) 07812570579	htibbs@well.com, (Office) (0) 20 7435 8808

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Chatham House
10 St James's Square
London SW1Y 4LE
www.chathamhouse.org.uk

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