



UK Food Supply

Storm Clouds on the Horizon?

Summary of preliminary findings from Chatham House research project 'UK Food Supply in the 21st Century: The New Dynamic'

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Summary points

- In an environment of increasing uncertainty, the ability of global food production to meet rising demand is becoming recognized as an issue of fundamental importance. Constraints on the availability of energy, water and land are identified as being of particular significance.
- The Chatham House Food Supply Project is studying the effects of global trends on the networks that supply two staples, wheat and dairy products, to the UK market. The issues addressed in this paper featured in a series of interviews and discussions undertaken in 2007 with leading players within and around Britain's wheat and dairy supply networks. They are presented in six sections: global demand, global supply, rises in commodity prices, supply network opinion on implications for the EU/UK food system, scenario development and conclusions.
- These preliminary findings will influence the development of four global scenarios that could shape the future of the UK's food supply. Some of the interactions involved would create only a limited degree of change in Britain's food supply arrangements; others could indicate a shift to a quite different UK supply dynamic.
- Britain as a society will need to make the right policy choices if it is to secure the kind of food supply that best supports its interests.

Overview

Global food production is under pressure to meet existing supply requirements while demands are set to grow. The political, social and economic effects of the increasing strains will be felt differently around the world. Europe, even if fortunate enough to escape the worst, is likely to experience changes and British food and drink industries will need to adapt. Britain, as a society, will need to make policy choices to secure the kind of food supply that best supports its interests.

6 Society will need to decide the value to be placed on food and how . . . market forces can be reconciled with domestic policy objectives 9

Throughout 2008, Chatham House's work on food supply will be testing the responses of the UK's food supply professionals to the changing circumstances. In a first series of interviews and discussions undertaken around Britain's wheat and dairy supply networks, a degree of consensus is emerging on a number of key points:

- *The recent rise in global food commodity prices is more than just a short-term blip.*
- *Competing global demands on land – and the energy, water and skills needed to farm it – create potentially tough challenges. What some identify as market opportunities, others view as moral choices, for example, the use of land for energy production.*
- *The European Union's policies on genetically modified material could change with GM commodities and products inevitably becoming accepted into the mainstream of EU food production and processing.*
- *The building of new relationships in response to developing circumstances could increase the influence of producers in Britain's supply networks.*

- *Society will need to decide the value to be placed on food and how, through commercial, public and consumer interests acting together, market forces can be reconciled with domestic policy objectives of growing importance.*

Chatham House is developing four basic scenarios to assess the future of Britain's food supply. Each is constructed using factual data and existing, evidentially validated trends. On the basis of rigorous methodology and making conservative assumptions, circumstances can be identified in which, in the medium term, the current framework of global food supply will not meet global demand. In an environment of more extreme change, food supply could again become a strategic determinant for the UK. Even limited shortages could have important implications, particularly for Britain's trade and foreign policies, which will need to adapt in the face of ever increasing competition to secure food supplies.

Introduction and methodology

The Chatham House research project 'UK Food Supply in the 21st Century: The New Dynamic' is evaluating the combined effects on the UK's food supply of a range of global conditions and influences. Focusing specifically on the networks that supply wheat and dairy products to the UK consumer, the work is using scenario-based analysis to explore the strategic options open to stakeholders across the networks.

This paper reports on the findings that are shaping the early stages of the project's research and which have been drawn from a range of activities. The use of questionnaires and carefully targeted discussions involving 22 participants around the wheat and supply networks provided an initial sampling of opinion. A collective analysis of those results was then used to guide a supplementary phase based on 20 in-depth interviews with further points of contact across the sectors. The interviews used the five questions at the end of the paper, each designed to stimulate a wide-ranging response. Supporting work also included a literature review and consultation with additional expert opinion

to identify key elements of the global context and the data on which to focus research efforts.

All these investigations, conducted from March to November 2007, took care to draw views from each major area of stakeholder interest around the operational wheat and dairy supply networks – in each case, from the supplier of seed to consumer representative bodies. Opinion was also sought from those with closely allied expertise, for example those concerned with advising the food and drink industries on the management of business risk, and dealers in food commodities. The contributors were at senior management, board or corresponding levels. In each case they were selected for their authoritative position within their organization, their industry experience, their specialist knowledge, or a combination of these.

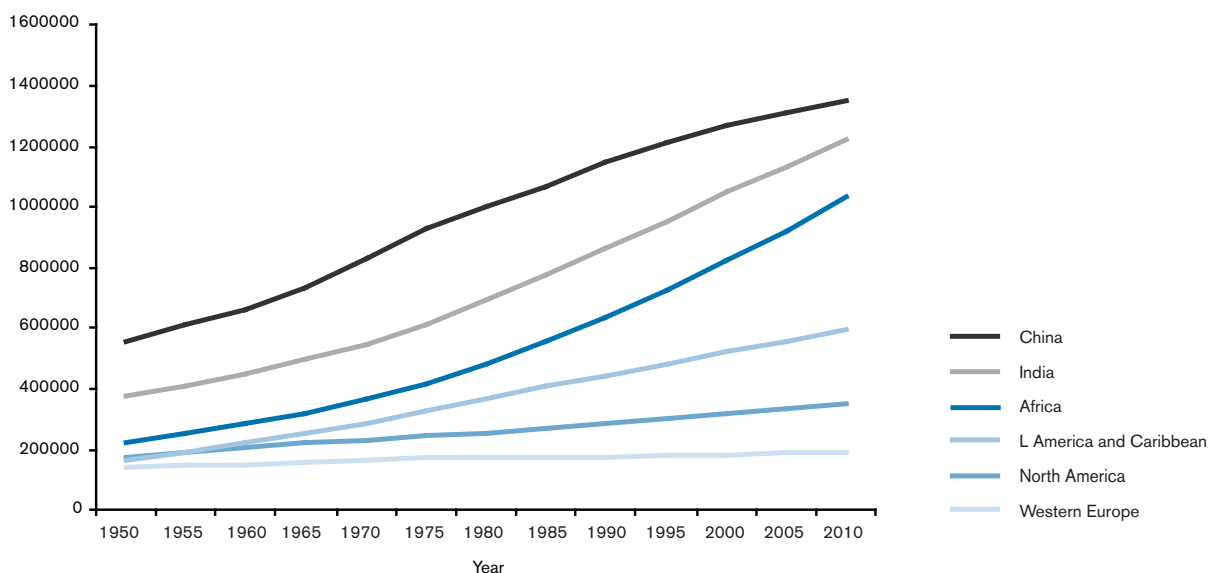
The issues presented in this paper – global demand, global supply, rises in commodity prices and supply network opinion on implications for the EU/UK food system – reflect the research team’s analysis of accumulated data. **Individual points arising are also illustrated where appropriate by direct reference to findings of the 20 in-depth supply network interviews, percentage support for the view expressed being indicated in each case in brackets.**

Global demand

While overall population growth rate is slowing – it has actually halved since 1970 and now stands at 1.17% per annum¹ – the world’s population is expected to exceed nine billion by 2050.² The greatest growth is forecast in developing countries (Figure 1). The desire of the undernourished of today to increase their share of daily

Figure 1: Regional population growth

Population: W. Europe, N. America, L. America & Caribbean, China, India and Africa (1000's), 1950-2010



Source: UN Population Division (2007), World Population Prospects Database, <http://esa.un.org/unpp/p2k0data.asp>.

1 UN World Food Programme (2007), Latest News, http://www.wfp.org/aboutwfp/introduction/index.asp?section=1&sub_section=1 (last accessed 12 December 2007).

2 (UN) Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, *World Population Prospects: The 2006 Revision and World Urbanization Prospects: The 2005 Revision*, <http://esa.un.org/unpp> (accessed 7 December 2007).

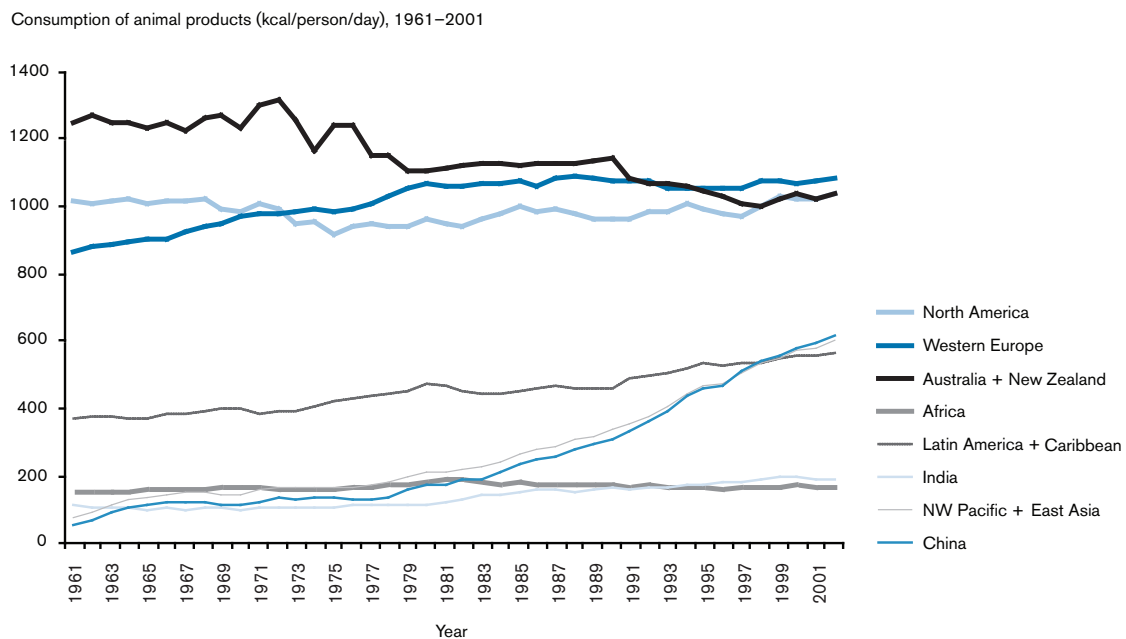
calories will also continue to rise steadily. These two factors are principal drivers of increased demand for agricultural commodities (55% of interviewees).

Supply pressures emanating from the world's major emerging economies are of particular importance (Figure 2). It is increasingly apparent that the wealthier Chinese or Indian consumer is attracted to the so-called Western basket of goods, with an increasing taste for livestock products including dairy (50%). The annual per person demand for meat in China has risen from 20 kilograms in 1985 to about 50 kilograms today.³ That has resulted in a continuing increase in the overall grain requirement – each kilogram of beef requires about eight kilograms of grain-based animal feed to produce⁴ – and mounting strain on water supplies.

Population growth and changing patterns of nutrition are a continuation of trends that have been observed over several decades. They are set to continue; and, as the world's population grows and per capita incomes rise, the Food and Agriculture Organization (FAO) predicts that food demand will grow by 55% between 1998 and 2030.⁵

Bio-fuels are a newer influence on demand (25%) but one that is increasing exponentially. Global bio-fuel production increased from 4.8 billion litres to 16.0 billion litres between 2000 and 2007.⁶ Specifically, big increases have taken place in the production of ethanol and diesel over the last five years (Figure 3) and look set to continue. The annual ethanol output of the USA is expected to double by 2016.⁷ The EU aims to meet 5.75% of its transport fuel needs through bio-fuels by 2010;

Figure 2: Regional meat consumption



Source: GAO DATA PORTAL, FAOSTAT (2004), <http://faostat.fao.org>.

3 *The Economist* (6 December 2007) Cheap no more, http://www.economist.com/displaystory.cfm?story_id=10250420 (last accessed 11 December 2007).

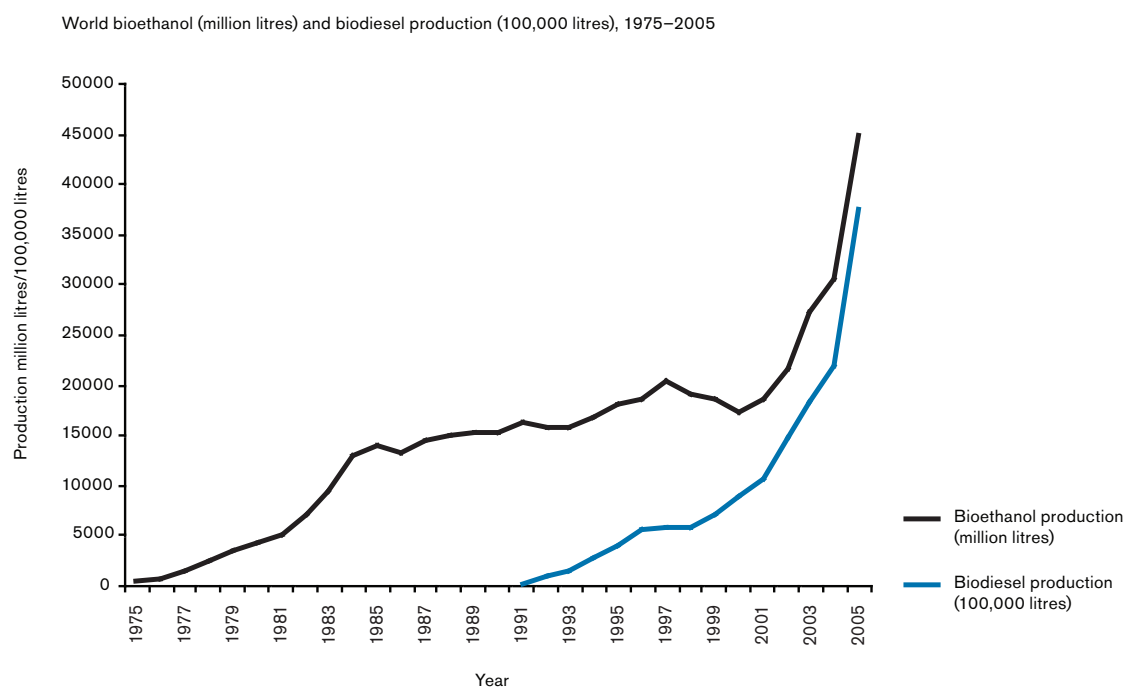
4 *Ibid.*

5 FAO cited in UNESCO (2006a), The 2nd UN World Water Development Report: 'Water, a shared responsibility', http://www.unesco.org/water/wwap/wwdr2/table_contents.shtml (last accessed 14 December 2007).

6 USDA Economic Research Service (2007) Amber waves, http://www.ers.usda.gov/Amberwaves/Nov_07/features/biofuels.htm (last accessed 12 December 2007).

7 FAO (July 2007) FAO Newsroom, 4 July 2007, www.fao.org/newsroom/en/news/2007/1000620/index.html (last accessed 7 December 2007).

Figure 3: Bio-ethanol and diesel (ethanol 10 x diesel)



Sources: Compiled by Earth Policy Institute from F.O. Licht data, cited in Suzanne Hunt and Peter Stair, 'Bio fuels Hit a Gusher', *Vital Signs 2006-2007* (Washington, DC: Worldwatch Institute, 2006), pp. 40-41, and from F.O. Licht, 'Ethanol: World Production, by Country', table, *World Ethanol and Biofuels Report*, vol. 4, no. 17 (9 May 2006), p. 395. Earth Policy Institute (July 2006) http://www.earth-policy.org/Updates/2006/Update55_data.htm#table8.

in the period up to 2016, it is expected to increase the volume of oilseed directed to bio-diesel from 10 million tonnes to 21 million tonnes.⁸ Despite some questions about the approach taken, other countries too including Canada, China, India, Thailand, Japan and Colombia are implementing measures to encourage the usage of bio-fuels.⁹

Global supply

Over the last 25 years, global food production has doubled. The expansion of agricultural land accounted for this to only a limited degree, increasing by less than 10% in the period. Improving crop volumes may be attributed mainly to higher produc-

tivity per hectare through the increased use of irrigation, the application of fertilizers, and the adoption of high-yield crop varieties.¹⁰ But for wheat, rice and whole milk, this upward trend in productivity is now levelling off or actually falling (Figure 4). Since the data exclude the volume of grain diverted for livestock feed, the decline in production per capita for wheat may in reality be more marked than actually shown. The implications of this could become more significant in the longer term as demand for food and feed continues to grow.

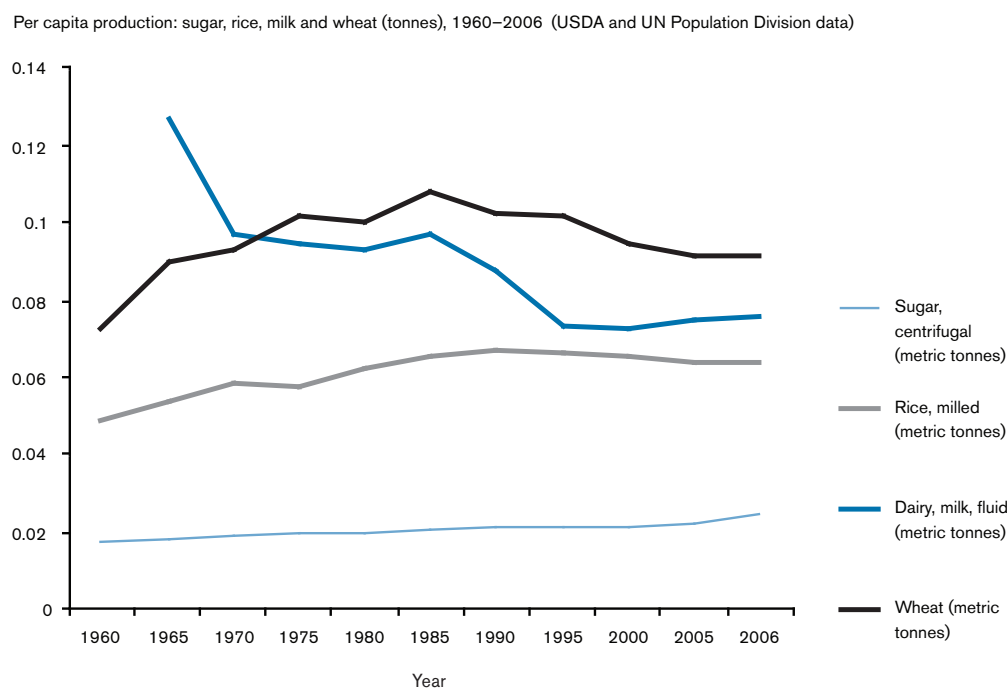
Against this broader background, a number of factors are affecting the short-term balance between the demand and supply of agricultural commodities:

⁸ Ibid.

⁹ Worldwatch (2006), Biofuels for Transportation: selected trends and facts, in 'Biofuels for Transportation: Global Potential and Implications for Sustainable Agriculture and Energy in the 21st Century', www.worldwatch.org/node/4081 (last accessed 7 December 2007).

¹⁰ Worldwatch (2006), Biofuels for Transportation: selected trends and facts, in 'Biofuels for Transportation: Global Potential and Implications for Sustainable Agriculture and Energy in the 21st Century', www.worldwatch.org/node/4081 (last accessed 7 December 2007).

Figure 4: Per capita production (sugar, rice, milk and wheat)



Sources: Production: USDA (December 2007), <http://www.fas.usda.gov/psdonline/psdResult.aspx>, Population Data: UN Population Division (2007) World Population Prospects Database, Population Medium Variant, <http://esa.un.org/unpp/p2k0data.asp>.

- poor weather conditions for food production in recent years, particularly the droughts affecting successive Australian harvests (**30% of interviewees**);
- the running down of global grain stocks in an effort to cut storage costs, because of the increased efficiency of supply chains and depressed market prices in earlier years (**10%**);
- the rise in energy prices, in part attributable to increases in stored capacity as a response to concerns about future energy availability (**10%**);
- increased interest in the trading of agricultural commodities, a process that may in itself contribute to rising prices (**15%**).

Supply network interviews reveal increasing concerns over the ability of global food supply to match expected longer-term demand growth (**75%**). Policy-led changes to the regulatory structure, to control the emissions of

greenhouse gases, are identified as one source of difficulty (**20%**). Other interviewees cite the effects of operating constraints – inefficient agricultural practices, or constraints on the use of potentially yield-boosting technologies such as GM (**15%**). Anxieties are mainly expressed, however, in terms of anticipated limitations on the future global availability of land, water and the energy required for agricultural production (**40%**).

Land availability

Of the total global land mass (excluding Antarctica), 27% is estimated to be suitable for rain-fed crop cultivation, with only 10% of it currently in use. While that appears to indicate capacity for the expansion of food production, the off-setting requirements for human settlements, forest, pasture and environmental protection measures must also be factored in.¹¹ There are additional difficulties

¹¹ Global Agroecological Zoning, FAO/International Institute for Applied Systems Analysis (IIASA) (2000), FAQ, <http://www.iiasa.ac.at/Research/LUC/GAEZ/index.htm> (last accessed 11 December 2007).

with regard to the imbalance of land to population (this being particularly acute in Asia) and the economic viability of cultivating the land. The consensus seems to be that the area of land cultivated globally is not likely to increase substantially¹² in the shorter term. However, there is potential for longer-term expansion, most notably in sub-Saharan Africa and South/Central America.¹³

In reality, rather than seeking to expand production through the exploitation of additional rain-fed land mass, increases in food output since 1990 have been achieved largely through farming measures such as the use of fertilizers, pesticides and irrigation. Land use per capita in that period has actually been falling¹⁴ (Figure 5). This fall may be attributable to the rising cost of irrigation¹⁵ and attendant problems of soil salinization and water shortage.¹⁶ There is also wide-

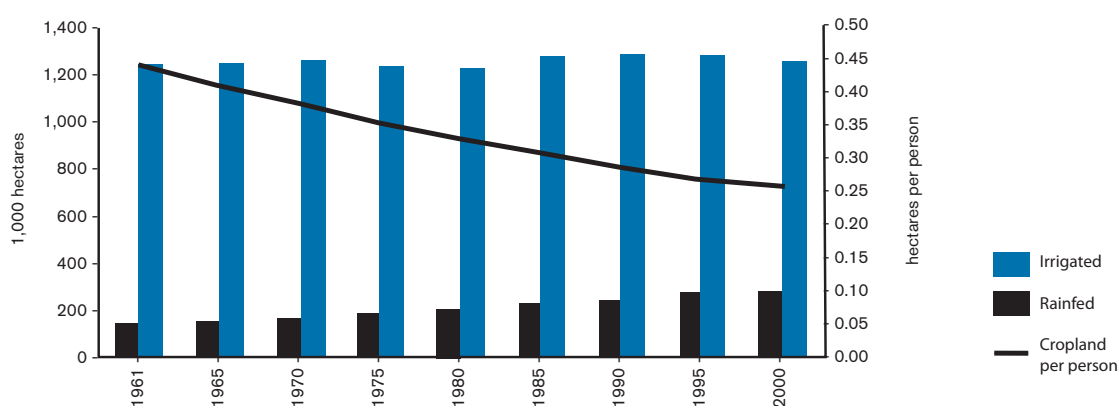
spread concern at the extent of land degradation. The amount of land classed as irreversibly destroyed for most practical purposes by land degradation is 3.05 million square kilometres; that is 2.3% of the world's total area and equivalent to 21% of the arable area currently available globally (14.6 million km sq).¹⁷

Water levels

Production of the per person/per day food requirement needs between 2,000 and 2,500 litres of fresh water,¹⁸ so the expansion of food production necessary to meet growing demand will have serious implications for the world's fresh water resources (30%).

Water shortages are already evident in many regions (Map 1), with particular concerns in Asia.¹⁹ UNESCO predicts that by 2050, at worst, seven billion people in

Figure 5: Land expansion trends



Note: In forty years, cropland has increased only slightly while population was more than doubling, leading to a sharp reduction in the amount of land needed to produce food for one person. These rapid increases in productivity were obtained through intensification of agricultural production, in which irrigation has played an important role.

Source: FAO (2005), cited in UNESCO (UN) (2006), *The 2nd UN World Water Development Report: 'Water, a shared responsibility'*, ch 7, pp. 251, 252.

12 Ibid

13 Ibid.

14 Worldwatch (2007) *Vital Signs 2007–2008: The Trends that are Shaping Our Future*, W.W. Norton & Company, Inc., New York.

15 Ibid.

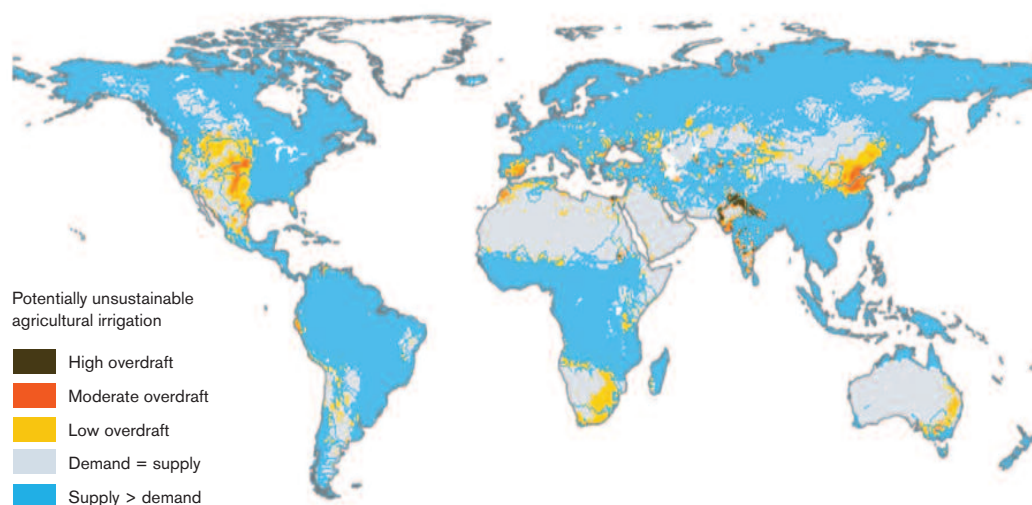
16 Ibid.

17 FAO TERRASTAT (2000), *World Soil Resources Report 90: Land Resource Potential and Constraints at Regional and Country Levels*, <ftp://ftp.fao.org/agl/agl/docs/wsr.pdf> (last accessed 8 December 2007).

18 UNESCO (2006a).

19 Ibid.

Map 1: Non-sustainable withdrawals for irrigation



Contemporary Geography of Non-sustainable Withdrawals for Irrigation. The following divisions based on calculated consumptive use by crops were used: High overdraft: 1 km³/yr; Moderate: 0.1–1 km³/yr; Low: 0–0.1 km³/yr. All estimates made on ca. 50 km x 50 km resolution grids. The map indicates where there is insufficient fresh water to fully satisfy irrigated crop demands. The imbalance in long-term water budgets necessitates diversion of surface water or the tapping of groundwater resources. The areas shown with moderate-to-high levels of non-sustainable use occur over each continent and are known to be areas of aquifer mining and/or major water transfer schemes.

Source: Millennium Ecosystem Assessment (2005), Current State & Trends Assessment, Appendix, p. 850.

60 countries will experience water scarcity; at best, it will be two billion in 48 countries.²⁰

According to the FAO, the potential for the expansion of irrigated land, particularly in arid or dry land areas, is 'extremely limited'.²¹ Such is the severity of the shortage that UNESCO predicts that some countries will be forced to 'rely increasingly on importing food to satisfy domestic demand'.²²

Oil

In 1949 Dr M. King Hubbert was the first to postulate the concept of 'peak oil' and the idea that the fossil-fuel age would be of relatively short duration. There is still no consensus on that in terms of the global position observed

today. What is clear is that, since 1980, the rate of new oil discoveries is not keeping pace with the growth in demand (Figure 6). In one application of the Hubbert model, a scenario by Colin Campbell of the Oil Depletion Analysis Centre (ODAC) predicts that production will peak between 2005 and 2010, and Figure 7 shows oil as currently going through a period of global under-supply. A further indicator may be found in Figure 8, which shows global crude expressed in 2006 prices. Since the chart was compiled in 2007, the price of oil has risen to an all-time high. The oil price hit \$100 in early January 2008, putting it at over \$80 in 2006 prices. The effects of rising oil prices have impacted on fertilizer production. Prices of some supplies have risen to a level 'not witnessed in the past 10 years'²³

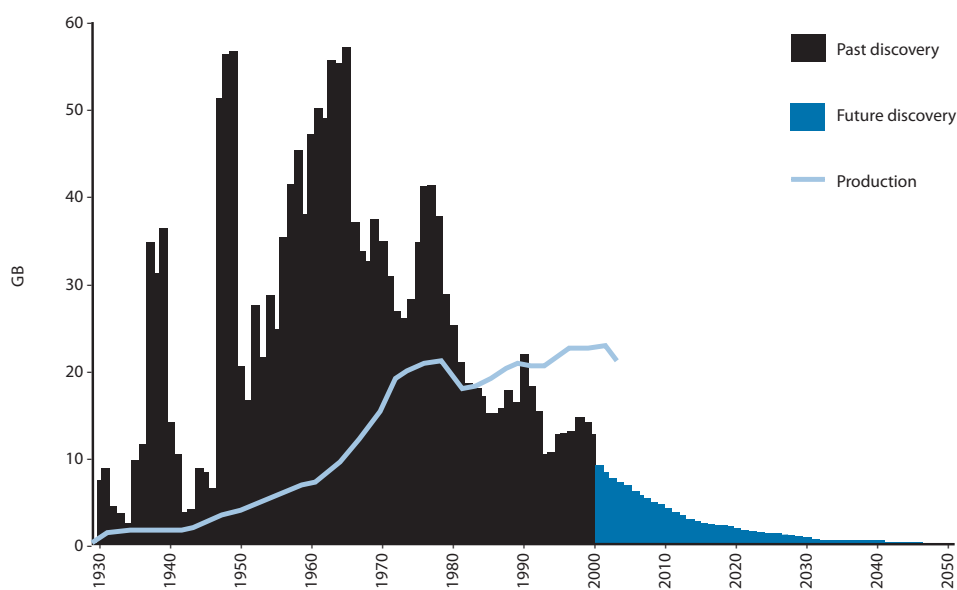
20 UNESCO (2006b), The 2nd World Water Development Report: Executive Summary, 'Water for people: Water for life', <http://unesdoc.unesco.org/images/0012/001295/129556e/pdf> (last accessed 14 December 2007).

21 FAO TERRASTAT (2000) World Soil Resources Report 90: Land Resource Potential and Constraints at Regional and Country Levels, <ftp://ftp.fao.org/agl/agll/docs/wsr.pdf> (p. 37) (last accessed 8 December 2007).

22 UNESCO (2006a: 252).

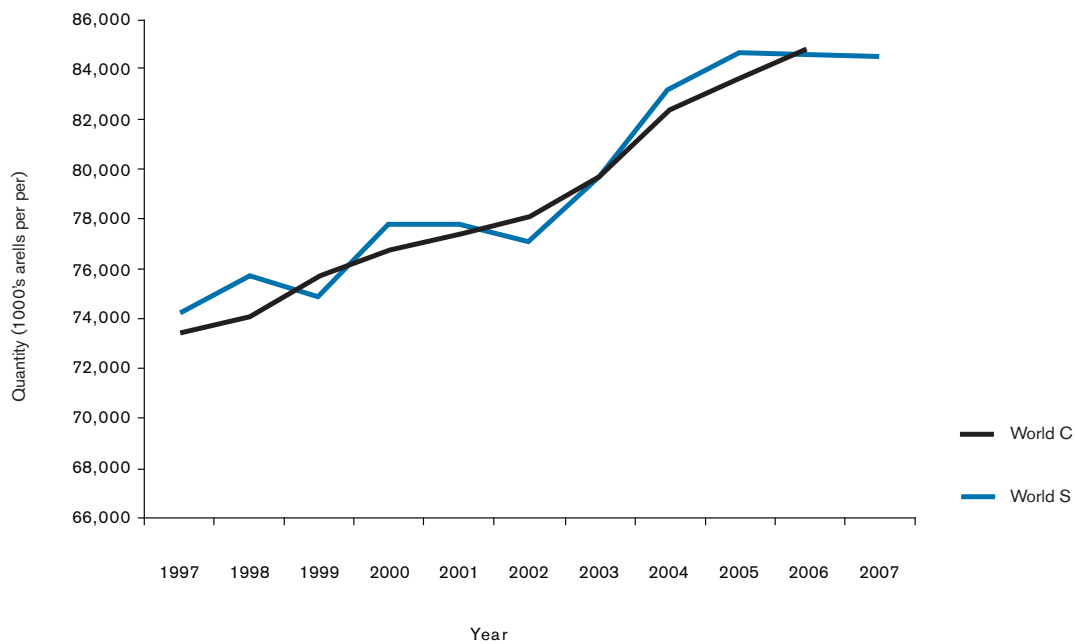
23 FAO (November 2007) FAO Food Outlook, November 2007, Main Report, <http://www.fao.org/docrep/010/ah876e/ah876e13.htm> (Last accessed 9 November 2007).

Figure 6: The growing gap between oil production and demand



Source: <http://www.oilcrisis.com/campbell/images/growinggapB.gif> - accessed 13/01/07.

Figure 7: World oil supply and consumption



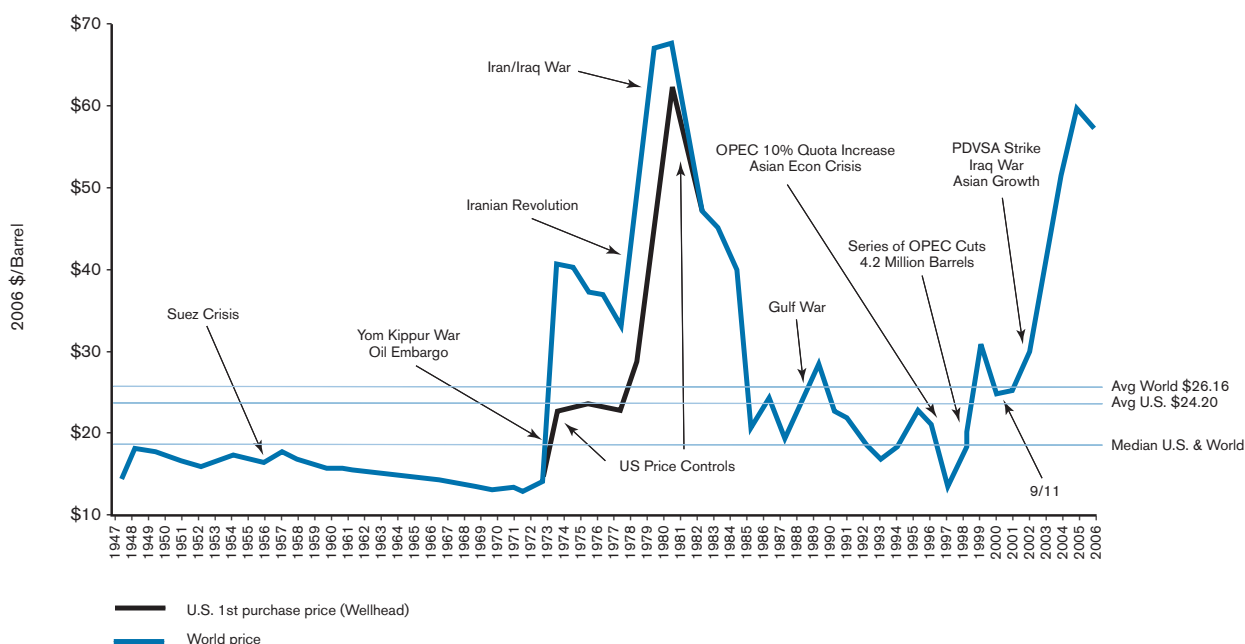
Key: C = consumption, S = supply.

Source: Energy Information Administration (12 December 2007),

<http://www.eia.doe.gov/emeu/international/RecentPetroleumConsumptionBarrelsperDay.xls> and

(11 January 2008) <http://www.eia.doe.gov/emeu/ipsr/t14.xls>.

Figure 8: Global crude price oil 1947–August 2007



Source: <http://www.wtrg.com/prices.htm>.

and are forecast to remain high, at least in the short term.

Rises in commodity prices

Prices of agricultural commodities are increasing significantly; this is in contrast to a historical trend of deflation. The FAO food price index rose 9% between 2005 and 2006. In September 2007, it stood at 172 points, a year-on-year increase of 37%. Reasons for this are varied. World grain stocks have been eroded to a 35-year low (Figure 9) and currently stand at 428 million tonnes. In addition to the drought in Australia, 2006 saw more weather-related disasters than in any of the previous three years.²⁴ The rise in use of bio-fuels, increasing the demand on grain resources, is also considered a contributory factor,²⁵ along with recent rises in the oil price.

The longer-term implications of the price rises, and particularly their significance as indicators of a longer-term imbalance between demand and supply, are as yet

difficult to assess in detail. But their general impact is viewed by supply network interviewees as considerable, with any idea that they are simply part of the routine economic cycle expressed as a minority view. There is a sense that commodity prices will remain higher over the medium term as a result of a predicted demand/supply imbalance (see Table 1).

The reform of the EU Common Agricultural Policy (CAP) and the consequent reduction in subsidies may

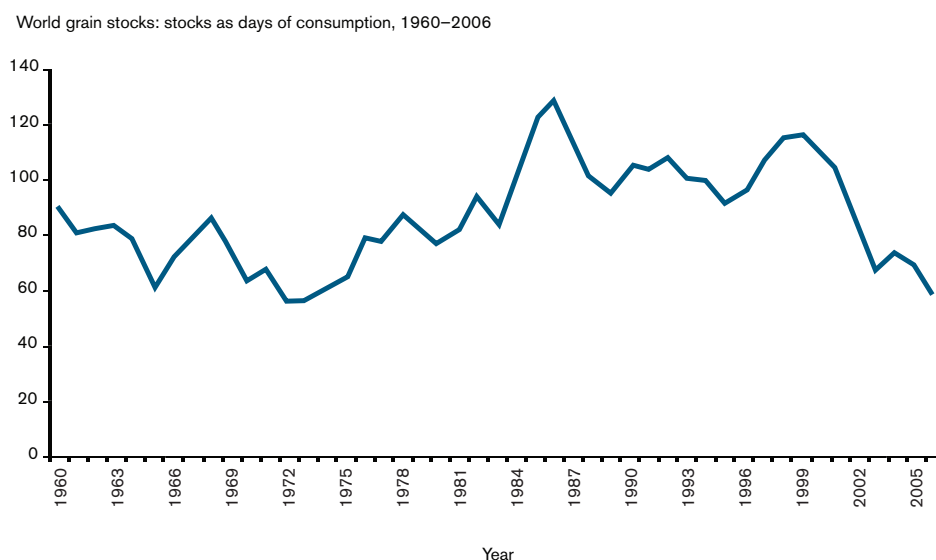
Table 1: Opinions of recent price rises and supply/demand events

Opinions	% of participants
We are entering a period of fundamental change	30
Price rises may be indicators of fundamental change	20
Sustained price rises/availability concerns	35
Price rises are part of normal market behaviour	15

²⁴ Worldwatch (2007).

²⁵ *The Economist* (6 December 2007), Cheap no more.

Figure 9: World grain stocks – days of consumption



Source: Earth Policy Institute (2006), http://www.earth-policy.org/Updates/2006/Update55_data.htm#table8.

be contributing to increased price volatility in the UK (15%). The direct impact on overall UK food prices remains a point of debate given the small percentage of the retail price, for example of bread, accounted for by commodity prices, and the tendency of UK retailers to compensate for price rises on some products by discounting heavily on others (5%).

Supply network opinion on the implications for the EU/UK food system

Supply network interviews reveal a range of opinion on the evolving shape of the UK's food supply system. But an overwhelming majority believe that a different food supply dynamic is in prospect (85% of interviewees). The UK's increasing exposure to the global market is seen as a significant catalyst for change (40%). There is a growing sense that traditional national boundaries are now becoming blurred, particularly with the increased interests of multinational food companies in the UK market – a factor also judged to be creating particular problems with the effective working of competition laws.

More specifically, a switch in the UK to a sellers'/producers' market is anticipated in the medium term,

caused by enduring constraints on supply and even a perceived potential for supply shortages (50% of interviewees). A period of tighter supply is seen as driving a reassessment of supply network relationships (25%), altering to some degree the nature of competition, mainly in favour of producers. This could lead to changes that may include:

- the development of strategic partnerships, linking different areas of the supply network;
- more integrated supply chains;
- fully costed agricultural production (to take account, for example, of the use of water);
- an increase in overseas sourcing for commodity/volume products.

The need for more sustainable practices on the part of the UK's food industry is acknowledged, mainly on the basis of the global resource constraints in prospect (20%) and the impacts of climate change (15%): 'the sustainable use of resources is now not just an ethical or moral choice for the comfortable or well off, but has become a matter of hard economics' (retail expert). The UK's supply system

could become more sustainable while remaining viable (75%). One approach may be to rely on greater centralization to allow more efficient use of the resource base. But a new production and supply approach may also now need to be considered (25%), one that will move away from industrialized, energy-dependent production methods and more towards greater diversity in the domestic market. Reconnecting the location of agricultural production to the point of consumption – in effect placing a new emphasis on locally based systems – is identified as a specific possibility. Though belief is increasing that managing the resource base better ultimately makes good business sense, a note of caution is being struck on whether environmental concerns would suddenly reduce in importance in the face of any tightening of supply (20%). The food and drink industries will need to change their mind-set to focus on longer-term supply relationships and more sustainable behaviours – implying a move away from short-term, exclusively profit-led goal (20%).

6 A greater focus on values-related requirements such as “locally produced” risks the creation of a more divided market 9

The British public needs to be made more aware of the volume, type and balance of food consumed, and specifically of the environmental impact of livestock-related consumption (20% of interviewees). Better consumer education is important in communicating the reasons underlying rising food prices (40%). But underlying the thinking is the fundamental belief in a need for greater cultural and social value to be placed on food (60%) – expressed in some cases as a reconnection between agriculture and the consumer.

Purchasing behaviour is likely to change, with more British consumers becoming interested in the quality of

the food available and its provenance (45%). Consumer pressure is increasing for greater fairness and justice throughout the food supply system (15%). The trend could limit UK retailers’ and manufacturers’ traditional scope for responding to higher prices, or to actual supply shortages, by simply switching to alternative sources of supply.

There are questions as to whether globalized supply will continue to serve both the mass market and more local requirements or, particularly with sustainability as the driver, regional and local supply could play a more major role. The rising demand for more locally produced and supplied products could highlight a mismatch between current supply arrangements (based on centralized distribution and the increasing separation of production areas from consumption areas) and those needed to serve a more disparate, locally based system (25%). A greater focus on values-related requirements such as ‘locally produced’ risks the creation of a more divided market, one characterized by higher-priced premium products for the wealthy 20% with cheap(er) commoditized products satisfying the mass market requirement (50% of interviewees).

The agriculture sector in the UK needs to become more competitive (25%) This will require a better understanding by producers of market conditions, more investment in infrastructure, better forward thinking and planning, and a creative approach to product differentiation. Attracting the necessary skills into the industry will be a major challenge.

There may be insufficient, and insufficiently imaginative, alignment of policies within the UK and the EU. For example, a better understanding of the impact of livestock on the environment could influence changes in meat consumption patterns and therefore play into efforts to reduce greenhouse gases (20%).

The long-term viability of bio-fuels as a response to either climate change or energy insecurity is open to a range of questions, ones that highlight even a moral dimension to the competing claims of food and fuel on a possibly limited production capacity: *‘Energy security will force society and its political leadership to make a*

range of moral and political judgments – are we prepared to use food production to meet energy demands? (financial analyst) (15%).

Differences between the EU's policies on GM and those of the US and Latin American food/feed sources of production create an issue of immediate concern. For a substantial minority of respondents, the difficulties of managing this asynchronous approach, and the possibility of an imbalance in the global demand and supply of food, mean that the eventual acceptance by the EU of supply-boosting GM commodities and products is inevitable (45%). Efforts to change the British public's perception of GM will need to start soon.

While it is widely recognized that food is set to become an increasingly political issue (70%), there are major differences over both the respective roles of government, industry and consumers and the mechanisms to be employed. For example, to encourage sustainable behaviours, 20% of contributors preferred economic mechanisms such as carbon costing rather than increased regulation. Other participants advocated a range of more direct interventions including:

- stronger competition laws to keep market access open for smaller-scale producers and companies (10%);
- global trade rules to reflect sustainable development objectives (5%);
- measures to influence consumer choice including legislating against unsustainable products (10%);
- the development of alternatives to industrialized production systems (15%);
- stronger planning laws (5%).

Scenario development

An important aspect of the Chatham House project is the development and use of scenarios to evaluate the potential of the UK's food supply system to respond to global changes. Analysis of the research findings so far leads to four interlinked observations:

- The absolute level of food production worldwide is rising.
- Despite this increase, the price of food has been rising for the last two years – reversing a downward trend in price in real terms over the last 30 years. This appears to be in response to three factors: a) the rising oil price, which is increasing the cost of most agricultural inputs; b) the 'nutrition transition' to increased meat consumption in China and India and other developing countries as personal incomes rise, causing a multiplier effect in the consumption of grain for animal feed; and c) the rapid rise in bio-fuel production involving the conversion of crops into ethanol, particularly maize in the US, where 25% of the 2007 maize harvest is expected to be used for bio-fuel production.²⁶
- Despite the absolute increase in food production worldwide, world population growth linked to changing consumption patterns is outstripping the increase. Per capita grain production is now flat and the per capita area of irrigated agricultural land is falling. This reveals what may be a more fundamental underlying shortfall, involving a permanent inability to meet the growth in demand for food arising from population growth. This phenomenon, if it continues, is directly comparable to the postulated notion of 'peak oil' in that it too involves an endgame inability of worldwide production to keep pace with demand growth.
- As shown in Figure 9, world grain stocks have now fallen to half the level of the mid-1980s and are lower than at any time since the early 1970s. This drop, which has been steep since 2000, gives a rough measure of how much demand is outstripping supply. If the decline continues, grain stocks will quickly reach historically low levels.

The factors revealed by these observations, some of which represent a significant departure from the 'business as usual' assumptions of the last three decades,

²⁶ Ibid.

hold the seeds of possibly disruptive geo-political outcomes. The exact shape of the future will depend on the interplay of key variables related to these factors. Chatham House is developing four scenarios that examine the potential interplay of these variables. Some of the possible interactions do not differ markedly from today's situation; others involve very high levels of risk. The most challenging insights suggest that food may be entering a period of fundamental production constraint, triggering driving forces that could go well beyond a simple question of high food prices. This possibility implies that, in response, we may see a far-reaching structural shift in the world-wide food system.

The scenarios give rise to a range of implications for food industry strategy and government food policy in the UK, which the project will be exploring in more detail during 2008.

Conclusions

In the body of supply network opinion consulted, there is a widely held view that, in the longer term, global supply may not be able to meet demand unless a different, more holistic, approach is adopted. The need for sustainable management of the global resource base emerges as an issue of fundamental importance, with constraints on the supply of oil, water and land demanding particular attention.

From a UK perspective, any imbalance could start to be felt in the medium term through further inflationary effects and increased competition to secure global supplies of agricultural inputs and commodities. The prospects of increased price volatility and/or potential shortages and disruptions are new phenomena in the developed world, more used to cheap and readily available food. This may mean a switch towards a seller's market and this, combined with the need for some sustainable practices, has potential implications for the future structure of the UK's food supply.

Some questions require further, detailed examination:

- the range of potential effects on the UK;
- possible global responses to challenges, particularly from developing nations such as China;
- the role of science and technology;
- the respective roles of government, industry and consumers and the best way to encourage desired behaviour and operating practice;
- possible weighting of the market mechanism to meet different policy objectives.

The first indicators may be emerging of a generational change in the UK's food supply. The next stage of the project will see the four global food scenarios applied to the UK situation, leading to the development of corresponding and more detailed scenarios for the future of food in and for the UK. Scenario reasoning, which avoids the trap of getting stuck in existing assumptions about the future, will be central to the project's ability to contribute substantially to the resilience of UK food strategy and policy in the years ahead. This is particularly important at a time of what may well be sudden and disruptive change, which is not likely to be picked up in advance by conventional planning and thinking in either industry or government.

Interview questions

- What do you see happening at the moment in the food markets?
- What is your view of this situation and why is this happening?
- What do you think is going to happen in the longer term?
- Where do you see the future challenges for the food system?
- What actions do you think need to be taken by the supply network, policy-makers, consumers/civil society as a whole?

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Project Research Team

- **Susan Ambler-Edwards**, Chatham House, sambler-edwards@chathamhouse.org.uk, (Office) (0) 20 7314 2795, (Mob) 07793 209428
- **Kate Bailey**, Cardiff Business School, baileyk2@cardiff.ac.uk, (Office) 01782 646082, (Mob) 07766675059
- **Alexandra Kiff**, Cardiff Business School, alexandra.kiff@hotmail.co.uk, (Mob) 07928 059967
- **Professor Tim Lang**, City University, t.lang@city.ac.uk, (Mob) 07812570579
- **Professor Robert Lee**, Centre for Business Relationships, Accountability, Sustainability and Society (Cardiff University), leerg@cardiff.ac.uk, (Office) (0) 29 2087 4352
- **Professor Terry Marsden**, Centre for Business Relationships, Accountability, Sustainability and Society (Cardiff University), marsdenk@cardiff.ac.uk, (Office) (0)29 2087 6562
- **David Simons**, Cardiff Business School, simonsdw@cardiff.ac.uk, (Office) (0) 29 2089 2155, (Mob) 07812153663
- **Hardin Tibbs**, Saïd Business School, Oxford University, htibbs@well.com, (Office) (0) 20 7435 8808

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

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