

ANTHROPOMORPHIC ARTIFICIAL INTELLIGENCE

 **Foresight**

FORESIGHT

ADVISES GOVERNMENT
ABOUT HOW TO ENSURE
TODAY'S DECISIONS
ARE ROBUST TO AN
UNCERTAIN FUTURE.

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HIGHLIGHTS

HIGHLIGHTS

JANUARY 2010

- Foresight Horizon Scanning Centre event on **International Futures** at Wilton Park
- Joint Foresight and Science Innovation Network seminar on Ageing
- Foresight in Africa – FAN Club meeting 'African Futures'

FEBRUARY 2010

- Launch of the Foresight project on **Land Use Futures**
- **Global Environmental Migration: International Modelling workshop** held in London, with senior international economists and modellers
- Infrastructure UK: Vision for 2050 – Foresight Horizon Scanning Centre workshop
- Seminar on horizon scanning with the **German Institute for International and Security Affairs (SWP)**, Berlin

MARCH 2010

- African Union announce creation of the Eastern African Centre for Infectious Disease Surveillance (EACIDS) Kampala, Uganda
- Joint Foresight and Cabinet Office workshop for Strategy Unit's Strategic Challenges
- Seminar with **Shell** on futures analysis

APRIL 2010

- Launch of the online version of the **Strategic Futures Training** by the Foresight Horizon Scanning Centre
- **Global Environmental Migration: Drivers of Migration** workshop held in London, with the project's 'driver review' authors, and lead experts
- Presentation to the **Smith School** about the Foresight Programme, Oxford

MAY 2010

- Visionary Thinking – **Land Use Futures** featured in Geographical magazine

JUNE 2010

- Foresight Horizon Scanning Centre workshop on Future of Demography in the UK
- Foresight at the Cheltenham Science Festival – panel debates on 'Climate Change and Population' and 'A Carnivore's Dilemma'

JULY 2010

- Foresight at the **UK Science Journalists conference**
- Workshop on **Global Food and Farming Futures** with **Forum for Agricultural Research in Africa (FARA)** Burkina Faso

HIGHLIGHTS

SEPTEMBER 2010

- Feeding the world in 2050 – Driver reviews from *Global Food and Farming Futures* published in Philosophical Transactions of the Royal Society
- National Infrastructure Plan scenarios – Foresight Horizon Scanning Centre workshop
- Presentation to the **New Synthesis Project** on how countries can prepare for the future, Singapore

OCTOBER 2010

- Presentation to the **British Ecological Society** on the Foresight Programme
- Presentation to the **Korea Institute for Science and Technology Evaluation and Planning (KISTEP)** forum, Seoul

NOVEMBER 2010

- New Foresight project announced – *Computer Trading in Financial Markets* sponsored by Her Majesty's Treasury
- *Technology and Innovation Futures* published by the Foresight Horizon Scanning Centre project
- Foresight and **Living with Environmental Change** workshop on The Land Use Data Challenge and Modelling the Land Use System
- Feeding the world: top 100 questions for policy makers published for *Global Food and Farming Futures*
- Presentation to the **High-Level Steering Group for the Prioritisation of Publicly-Funded Research**, Ireland
- Evidence provided to **All-Party Parliamentary Group on Food, Agriculture and International Development**, London

DECEMBER 2010

- Launch of the report **Obesity Training for Health Care Professionals** published by the Royal College of Physicians

JANUARY 2011

- Launch of the Foresight project on *Global Food and Farming Futures*

FEBRUARY 2011

- International workshops for the Foresight project on *Global Environmental Migration*
- Presentation on Global Food and Farming Futures at the **American Association for the Advancement of Science**

- Dame Clara Furse appointed as Chair to the Lead Expert Group of the Foresight project on *Computer Trading in Financial Markets*

MARCH 2011

- Academic workshop for the Foresight project on *Computer Trading in Financial Markets*
- How can science support food security? – Foresight workshop at **Joint Research Centre**, Brussels
- Foresight presentation on Global Food and Farming Futures to **British Chamber of Commerce**, Brussels
- Joint workshop on ecosystems services with the **Science Innovation Network**, Foreign and Commonwealth Office

APRIL 2011

- How will international climate change affect the UK? – **International Dimensions of Climate Change** final workshop

ABOUT FORESIGHT

ABOUT FORESIGHT

Since its creation in 1994 the Foresight Programme has helped Government to think systematically about the future.

The Foresight Programme advises Government and others about how to ensure today's decisions are robust to an uncertain future. We do this by combining the latest scientific and other evidence with futures analysis to help policy makers tackle complex issues. While the future is uncertain, our work can help to identify potential opportunities and risks. Foresight brings together different Government departments to stimulate and inform the development of strategies, policies and priorities that are more resilient and robust across a range of possible futures.

Foresight is headed by the Government Chief Scientific Adviser, Professor Sir John Beddington, who reports directly to the Prime Minister and Cabinet. It is a part of the **Government Office for Science** within the **Department for Business, Innovation & Skills**.

More information about Foresight and the impact it has made in Government can be found on the Foresight website at www.bis.gov.uk/foresight

FOREWORD

GOVERNMENT CHIEF SCIENTIFIC ADVISER'S FOREWORD



Professor Sir John Beddington CMG FRS
Government Chief Scientific Adviser
and Head of the Government Office
for Science

The Foresight Project on **Global Food and Farming Futures** published in January 2011 sought to address what I consider is one of the most important global challenges: how to feed a global population that is projected to rise to 9 billion or more by 2050. This project was a major endeavor involving over 400 leading experts and stakeholders from 35 countries, including key international organisations such as the UN's High-Level Task Force on Global Food Security and the OECD. Since publication the report has been launched in collaboration with the Joint Research Centre of the European Commission to the European policy community, and presented at the UN's Food and Agricultural Organization.

The project has benefited considerably from engagement with our sponsor departments through Secretary of States Caroline Spelman MP at the Department for Environment, Food and Rural Affairs and Andrew Mitchell MP at the Department for International Development. These strong levels of engagement have continued across Whitehall since publication as the report informs a range of initiatives.

Global Food and Farming Futures calls for urgent action to redesign the food system to address the increasing demands placed upon it. It argues that the global food system must become sustainable, whilst adapting to climate change and substantially contributing to climate change mitigation. Furthermore, with almost one billion of the most vulnerable people still suffering from hunger and a further billion lacking sufficient micronutrients and vitamins, there is a compelling need to redouble efforts to address hunger.

Over the past year we have also tackled two other projects on key areas of government policy. **Global Environmental Migration** is examining the patterns and impacts of human migration over the next 50 years and how these could change due to climate change and other environmental factors. **International Dimensions of Climate Change** has identified the risk and opportunities posed by climate change impacts overseas for the UK and the evidence base will inform the UK's first Climate Change Risk Assessment (as required by law

through the 2008 Climate Change Act) to ensure that the Government's policy on adaptation to climate change takes appropriate account of international impacts. Both projects report in 2011.

Foresight's role in tackling difficult but critical issues is further exemplified in our latest project: **Computer Trading in Financial Markets**. Sponsored by Mark Hoban MP, the Financial Secretary to Her Majesty's Treasury, this project will study how financial markets are being transformed by fast-paced technological progress, and evaluate the risks and opportunities that will arise in the future.

As ever, my sincere thanks goes to the many hundreds of experts and stakeholders, both in the UK and abroad, who have contributed to Foresight's growing impact.

FORESIGHT REPORT

HEAD OF FORESIGHT'S REPORT



Professor Sandy Thomas
Head of Foresight, Government Office
for Science

Last year was pivotal for Foresight with the publication of our most ambitious report to date, and the first to be commissioned by Sir John Beddington. **Global Food and Farming Futures** entailed extensive collaboration with international research and policy communities. It highlighted Foresight's role in tackling critical, complex issues, and analysed a wealth of evidence before concluding that the global food system is failing and that sustainability needs to be brought centre stage. The report describes five broad strategies that can help address this global challenge. Foresight will be following up this report with its sponsor departments, the Department for Environment, Food and Rural Affairs and the Department for International Development, and a wide range of national and international organisations to help catalyse action throughout 2011.

The Foresight Horizon Scanning Centre's report **Technology and Innovation Futures** was welcomed by the Science Minister David Willets and offers a forward look at a range of potential developments over the next 20 years to support sustained economic growth in the UK. Its messages were reflected in the National Infrastructure Plan

developed by Infrastructure UK; it is currently informing the Department of Energy and Climate Change's Green Deal and will contribute to the recently announced Research and Innovation Strategy led by the Department for Business, Innovation and Skills.

Our project on **Global Environmental Migration** held four international workshops examining the implications of global environmental change on migration patterns in different eco-regions. By involving international academics, international and regional agencies, and local government, these events enabled the project to draw upon innovative ideas and local perspectives for the final report. The project will report in autumn 2011.

The new Foresight project on **Computer in Financial Markets** has made substantial progress. Announced in the latter half of 2010, this project has assembled a distinguished lead expert group, chaired by Dame Clara Furse, former CEO of the London Stock Exchange, to lead the technical work. The project is already engaging substantially with important international policy developments.

International Dimensions of Climate Change is the first of a new shorter type of Foresight project which has examined how climate change impacts in other parts of the world could affect the UK. Commissioned by Defra to inform the Climate Change Risk assessment, it has stimulated interest across government in the security implications of climate change.

In 2010, Foresight also worked closely with Living With Environmental Change and Defra to ensure that its **Land Use Futures** report informed the recently published the Natural Environment White Paper, and the National Ecosystems Assessment. Also, I am pleased to note the influence that the **Mental Capital and Wellbeing** report's emphasis on positive wellbeing continues to have on important aspects of Government's thinking, such as the new cross-Government mental health strategy *No health without mental health*.

I am deeply grateful to the many people who have contributed to Foresight's work over the past year.

COMPLETED WORK

GLOBAL FOOD AND FARMING FUTURES

The Foresight project Global Food and Farming Futures explored how a future global population of 9 billion people can all be fed healthily and sustainably.

The report emphasises that we are at a unique moment in history as diverse factors such as changes in the climate; competition for resources, for example water supply and energy; and changing consumption patterns converge and provide considerable challenges to sustaining the world's food supply. Whilst the global food system currently delivers for many, it is failing in two critical ways; consuming the world's natural resources at an unsustainable rate; and failing the very poorest, with almost one billion of the least advantaged and most vulnerable people still suffering from hunger and malnutrition.

The report, published in January 2011, argues that urgent action is needed to redesign the food system to feed the world's growing population.



COMPLETED WORK

How we did the project

The two year project has commissioned over 80 scientific reviews; involved over 400 leading experts and stakeholders from 35 countries. The project has been guided by a high level steering group of international experts from the UN, EU, World Bank, industry and civil society; and draws on other well regarded international reports. Strategic direction for the project was provided by the High-Level Stakeholder Group which was co-chaired by **Jim Paice MP**, Minister of State for Agriculture and Food, Department for Environment, Food and Rural Affairs (Defra) and **Stephen O'Brien MP**, Parliamentary Under Secretary of State for International Development, Department for International Development (Dfid). The Lead Expert Group, chaired by Professor Charles Godfray, Oxford University, ensured that the project used the best evidence available. The project's diverse evidence base was published in three peer-reviewed journals including the **Royal Society Philosophical Transactions B** and the **Journal of Agricultural Science**. A wide range of subjects from food policy to gender issues were covered in the project. The papers are also available free of charge on the Foresight website.

Project conclusions

The Foresight report argues that the food system must become sustainable, whilst adapting to climate change and substantially contributing to climate change mitigation. There is also a need to redouble efforts to address hunger. The project has identified and analysed the following five key challenges for the future: see page opposite for a summary.

Foresight will work closely with the Departments for Environmental, Food and Rural Affairs and International Development and the project's High-Level Stakeholder Group over the next year to ensure the report's findings and evidence base inform future policies. Visit the **'our impact'** section to see what immediate influence the Foresight project Global Food and Farming Futures has already made.

Top Five Challenges – Global Food And Farming Futures**1. Balancing future demand and supply sustainably to ensure that food supplies are affordable.**

The food system is currently consuming resources faster than they are being naturally replenished and renewed. It consumes 70% of total global water withdrawals from rivers and aquifers and directly contributes 10-12% of greenhouse gas (GHG) emissions. The global food system has to be redesigned to bring sustainability centre stage. Supply must be increased without bringing in substantially new land for agriculture. The report argues that more food can be delivered by using existing knowledge and innovation better to increase production; moderating demand; managing waste; improving governance; and raising the political profile of food.

2. Ensuring that there is adequate stability in food supplies and protecting the most vulnerable from the volatility that does occur.

While the amount of volatility remains uncertain, price spikes in the future are inevitable. While volatility has been lower over the past 20 years, price spikes in 2007/8 had a profound impact increasing hunger and the risks of political and social instability. Although predicting the future is complex, there are clear actions that can be taken to manage volatility. They include: creating reliable rules-based liberalised international trade; investigating modern commodity trading; caution on calls for a global system of grain reserves; appropriate insurance for poor farmers; and targeting food reserves and safety nets. As prices in early 2011 exceed the high of 2008, protection of the most vulnerable groups from the worst effects of food price volatility must be prioritised.

3. Achieving global access to food and ending hunger.

The food system is failing to address hunger. In addition to the 925 million people currently experiencing hunger, another billion are thought to suffer from 'hidden hunger'. In contrast, a billion people are over-consuming. Efforts to end hunger internationally are already stalling, and without decisive action food prices could rise substantially over the next 40 years making the situation worse. A stronger constituency for hunger reduction needs to be built. The benefits of agriculture to support women and small-holder farming, and improve nutrition and health must be recognised. Efforts must be focused on rebuilding infrastructure; creating better monitoring and evaluation, for example, using hunger maps to target hunger hot-spots; and building anti-hunger momentum so hunger is harder to ignore.

4. Managing the contribution of the food system to the mitigation of climate change.

Agriculture's contribution of 10-12% of GHG emissions rises to 30% or more when land conversion and costs beyond the farm gate are added. Addressing climate change and achieving sustainability in the global food system need to be recognised as dual imperatives. Ambitious, and in some cases legally binding targets for reducing emissions have been set which cannot be achieved without the food system playing an important part. There is a clear case for substantially integrating and improving agriculture and food production in negotiations on global emissions reductions.

5. Maintaining biodiversity and ecosystem services while feeding the world.

Decisions taken now will affect the diversity of plant and animal species for future generations. Food supply will need to increase without the use of substantially more land and with diminishing impact on the environment: sustainable intensification is a necessity. The report argues that policies for food production and maintaining biodiversity and ecosystem services need to be developed and properly connected at both global and national levels.

COMPLETED WORK

Key messages from the report

- **Waste must be minimised in all areas of the food chain:** An amount of food equivalent to about a quarter of today's annual production could potentially be saved by 2050 if the current estimate of global food waste is halved.
- **Focus on sustainability:** the application of existing knowledge and technology could increase average yields by two to threefold in many parts of Africa, and twofold in the Russian Federation. Similarly, global productivity in aquaculture could, with limited changes to inputs, be raised by around 40%.
- **Improving governance of the global food system:** It is important to reduce subsidies and trade barriers that disadvantage poor countries. The project's economic modelling shows how trade restrictions can amplify shocks in the food system, raising prices further.
- **Knowledge is power:** Investment in new science and technology to raise the limits of sustainable production and address new threats will be essential. No one technology or type of research will be a silver bullet for addressing sustainable production. We will need to increase our understanding of animals to improve yields while still increasing water, nutrient and other efficiencies. Also, we will need to prioritise research on climate change adaptation and mitigation in the food system, for example, producing crops that are drought and flood resistant.

Media Coverage

The project Global Food and Farming Futures held a press briefing for science, environment and farming correspondents at the Science Media Centre and another for international correspondents based in London through the Foreign and Commonwealth Office on Monday 24 January 2011. The report received extensive print and broadcast coverage in both the national and international press. A full list of media impact can be found on the Foresight website but a selection of media coverage can be found below:

Welcome for report on food security

The Scotsman

'No easy solution' to global hunger

The Today Programme

Global food stocks face crisis, says chief scientist

BBC Breakfast

Global food system must be transformed 'on industrial revolution scale'

The Guardian

Era of low-cost food is over, study warns

The Financial Times

Food prices to rocket by 50% as global hunger epidemic causes riots and famines

Daily Mail

People 'should be discouraged from eating meat'

The Times

GM crops 'could feed the world'

Press Association

Experts warn of spikes in global food prices

Toronto Star

Groundbreaking food security report calls for urgent action

Malaysia Sun

Scientists and Ministers call for new agricultural revolution

Farmer's Guardian

Linking policy on climate and food

Science Magazine

Farming needs 'sustainable intensification' says report

SciDev Net

COMPLETED WORK

Comments on the report

“We need a global, integrated approach to food security, one that looks beyond the food system to the inseparable goals of reducing poverty, tackling climate change and reducing biodiversity loss – and the UK Government is determined to show the international leadership needed to make that happen. We can unlock an agricultural revolution in the developing world, which would benefit the poorest the most, simply by improving access to knowledge and technology, creating better access to markets and investing in infrastructure. To fuel this revolution, we must open up global markets, boost global trade and make reforms that help the poorest. Trade restrictions must be avoided, especially at times of scarcity. And we must manage price volatility by building trust and cooperation – and in particular by creating greater transparency around the true levels of food stocks.”

Environment Secretary Caroline Spelman

“With one seventh of the world’s population still hungry, this report is a clarion call to arms. The food price crisis in 2008 increased the number of people suffering from hunger by 150 million. Today reports of increasing food prices once again fill the news – and it’s clear from this new study that price volatility is only set to increase in the future making further food price spikes inevitable. Internationally, those with the least spend the largest proportion of their income on food, so food price shocks hit the poorest hardest and can have long term impacts on their health. Britain is already working to tackle malnutrition, improve agriculture, and get new research into the hands of the poorest people. Steps taken now and pushed through over the next few decades to stabilise global markets, reduce volatility and prioritise agriculture will have a disproportionate effect on ensuring food security for a predicted nine billion people by 2050.”

International Development Secretary Andrew Mitchell

COMPLETED WORK

TECHNOLOGY AND INNOVATION FUTURES

Technological developments have the ability to transform our economy.

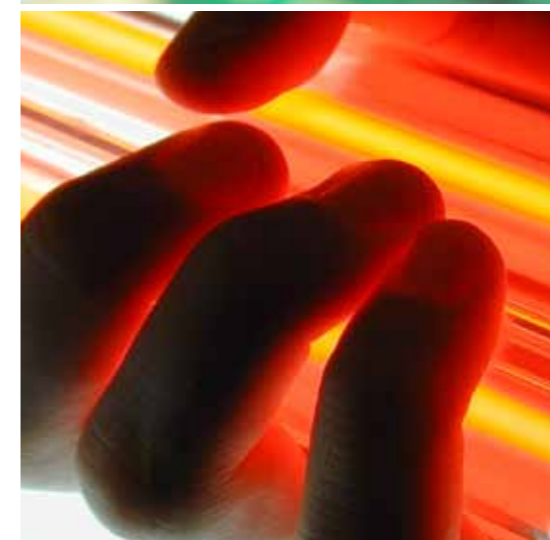
Technology and Innovation Futures is a forward look at a range of developments which have the potential over the next 20 years to support sustained economic growth in the UK. As the UK comes out of the economic downturn, it seems likely that future economic prosperity will derive in large part from seizing opportunities offered by technologies such as these.

Published in November 2010, the report concludes that there are strong opportunities for growth in the UK economy through the 2020s if businesses can harness scientific and industrial capabilities to take advantage of technology developments. It identifies three potential areas of growth which could be transformative: manufacturing, infrastructure and the internet. Other areas highlighted by the report are the energy transition which the UK will undergo during the next 10-20 years, the UK's R&D efforts in new materials which could help realise the move to a low carbon economy, the potential of the market for regenerative medicine and the increasing importance of intellectual property, all of which offer opportunities for UK companies.

The evidence used in the Technology and Innovation Futures project was gathered by deskwork, and interviews with 25 leading figures from research and business, and five workshops involving 150 academics, industrialists, and experts from the private sector and Government. The workshops used futures techniques to provoke and structure discussions.

The report was welcomed by Minister for Universities and Science, David Willets who said:

"This timely report looks at how we can benefit from the growth opportunities of the next 20 years in manufacturing, health, communications and energy. It calls for more active cooperation between large companies, small and medium enterprises and researchers to plan ambitious strategies for the benefit of their sectors. Developments in this area will help strengthen our economy and enable us to lead the way for innovation."



CURRENT WORK

GLOBAL ENVIRONMENTAL MIGRATION

Foresight's latest project will examine how environmental change could affect human migration around the world, out to 2060.

The Foresight project on **Global Environmental Migration** was commissioned by Sir John Beddington in October 2009, and will be published in autumn 2011.

The project will consider global migration which occurs in the context of future environmental change, with a focus on those who move and those who stay behind, and the policy implications for all involved.

It will explore:

- Global patterns of migration and how they may be affected by environmental change over the next 50 years;
- The challenges and opportunities that could result from changing migration patterns; and
- How these may be addressed, using the most up-to-date science and knowledge in a range of areas of which overlap with environmental change and migration policy.

Part of the research commissioned by the project focuses on the drivers of migration, including social, political, environmental, economic and demographic

factors, and the impact of environmental change upon these. These commissioned pieces will be published in a special edition of the journal **Global Environmental Change** in the autumn.

The project held four international workshops in Dhaka (Bangladesh), Istanbul (Turkey), Kathmandu (Nepal) and Johannesburg (South Africa) to deepen its analysis and understanding. The locations reflect the project's key 'eco-regions', areas of significant human habitation which are acutely vulnerable to environmental change, including low elevation coastal zones and small island states, drylands and mountainous regions. The Mediterranean is also a focus as it contains elements of all three regions.

The workshops brought together experts from across the globe to consider the future of global environmental migration. Workshop attendees focused specifically on future challenges and opportunities presented within each region, and identified both general and region-specific policy options.

Through structured discussion and workshop questions, the attendees of each workshop tested the project's emerging findings and conceptual frameworks. The workshop reports will contribute directly to the project, to ensure the final Foresight report is relevant to international policy makers within the four regions.



CURRENT WORK

COMPUTER TRADING IN FINANCIAL MARKETS

Financial markets have been transformed by fast-paced technological progress.

Foresight's most recent project will examine the challenges and opportunities presented by technological advances in financial markets worldwide. In recent years the ways in which financial markets operate have been transformed by fast-paced technological progress. For example, the volume of financial products traded through computer automated trading, taking place at high speed and with little human involvement, has increased substantially in the past few years. Today, over one-third of the UK's equity trading volume is generated through high frequency automated computer trading while in the US this figure is closer to three-quarters.

This Foresight project Computer Trading in Financial Markets, is sponsored by **Her Majesty's Treasury** and led by the Government's Chief Scientific Adviser, Professor Sir John Beddington, and aims to make a significant contribution to the efficiency, integrity and resilience of financial markets, by identifying options for policy makers in the UK and internationally.

It will explore how computer generated trading in financial markets might evolve over the next decade or more, and how this will affect:

- Financial stability;
- Integrity of financial markets, including price information and liquidity;
- Competition;
- Market efficiency in allocating capital;
- Transaction costs on access to finance; and
- Future role and location of capital markets.

It will also assess policy options and consider how the opportunities offered by advancements in computer technologies could be capitalised upon by the financial sector.

The project is due to publish in autumn 2012.



CURRENT WORK

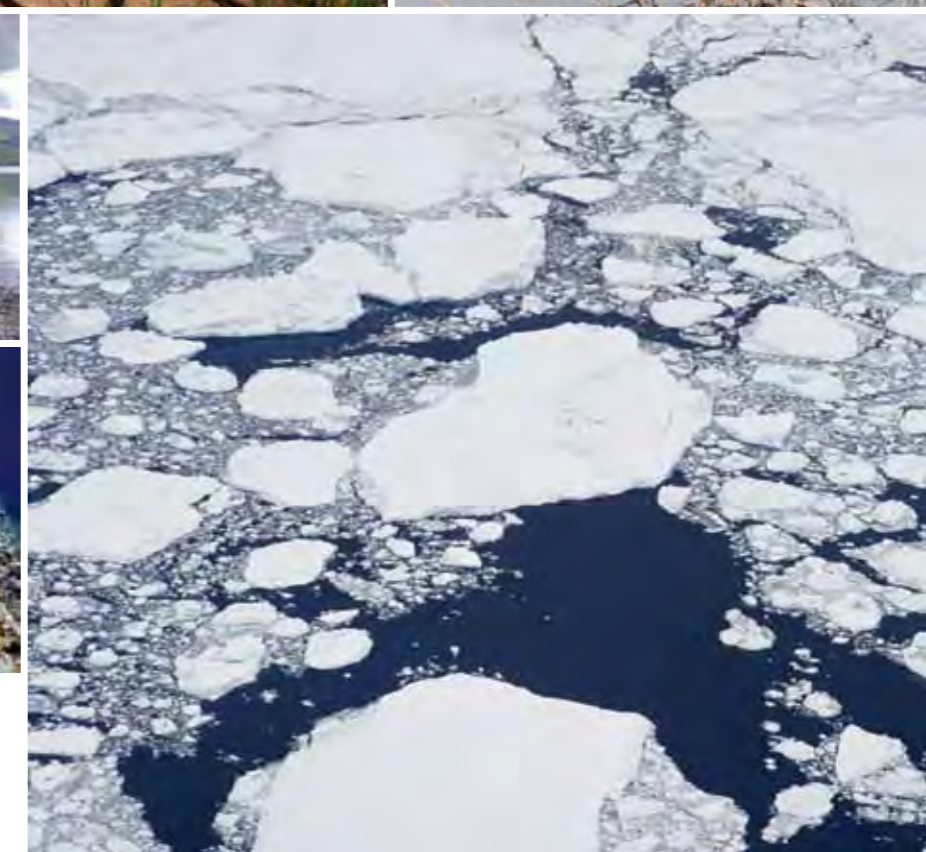
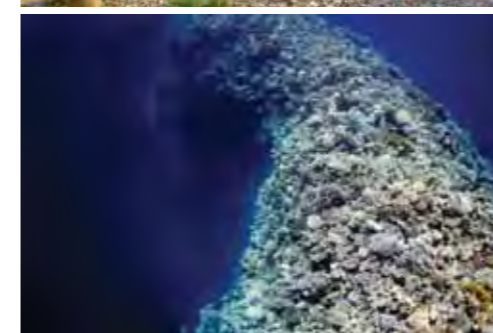
INTERNATIONAL DIMENSIONS OF CLIMATE CHANGE

This Foresight project aims to improve our understanding of how climate change impacts in other parts of the world could affect the UK.

The project combines the best features from the large cross-cutting Foresight studies and the shorter projects from the Foresight Horizon Scanning Centre.

The Climate Change Act requires Government to undertake a Climate Change Risk Assessment for the UK, the first of which will be laid in Parliament by January 2012. The Climate Change Risk Assessment is the primary evidence source that will inform the national adaptation policy programme, which the Climate Change Act requires the Department for Environment Food and Rural Affairs (Defra) to create. This project, co-funded by Defra and the Department for Energy and Climate Change (Decc), will enhance the evidence base of the Climate Change Risk Assessment to ensure that the Government's policy on adaptation takes appropriate account of international impacts.

The project will report in summer 2011. A broad range of impacts that climate change could have on the UK, including possible opportunities and threats have been identified. These include implications for diplomacy and foreign policy, security, resources and commodities, finance and trade, human health and social values.



OUR IMPACT

GLOBAL FOOD AND FARMING FUTURES

Foresight has a dedicated team that works across government to catalyse action and to help departments and other stakeholders to take up the findings of our reports.

The Foresight project on **Global Food and Farming Futures** has attracted the immediate attention of multiple UK and international stakeholders, and has already begun to make an impact on the international policy and research community. The UK Government plans to work closely with Foresight and the project's lead experts to facilitate the report's impact on several areas of policy development; for example, in trade reform and markets, sustainable intensification, biodiversity, and ending hunger. A wide range of international stakeholders commented on the report at the time of publication. For example, the **UN High-Level Task Force on Global Food Security** welcomed the report and anticipated that the UN organisations would draw on its evidence and analyses as they pursue the policy options outlined in their Updated Comprehensive Framework for Action. The **OECD** commented that the findings will assist in the development of the OECD's Green Growth Strategy for Food and Agriculture and the OECD Agriculture Knowledge Systems Conference in June 2011.

Shortly after publication of the report, Foresight held a special panel event at the **American Association for the Advancement of Science (AAAS)** annual meeting in Washington D.C. Professor Sir John Beddington and Professor Charles Godfray, chair of the Lead Expert Group, were invited to speak about the report in a session titled 'How can the world feed 9 billion people by 2050 sustainably and equitably?'

Foresight shared some of the emerging findings with African stakeholders at the 5th African Agriculture Science Week in Burkina Faso in 2010. Foresight is now working with the **African Union** and the **Comprehensive African Agriculture Development Programme (CAADP)** to explore how the report might inform and support the delivery of the African Union and CAADP priorities. For example, this strand aims to deepen understanding of the factors impacting Africa and inform decisions and influence policy on economic and social development and regional and international trade at a range of geo-political levels.



OUR IMPACT

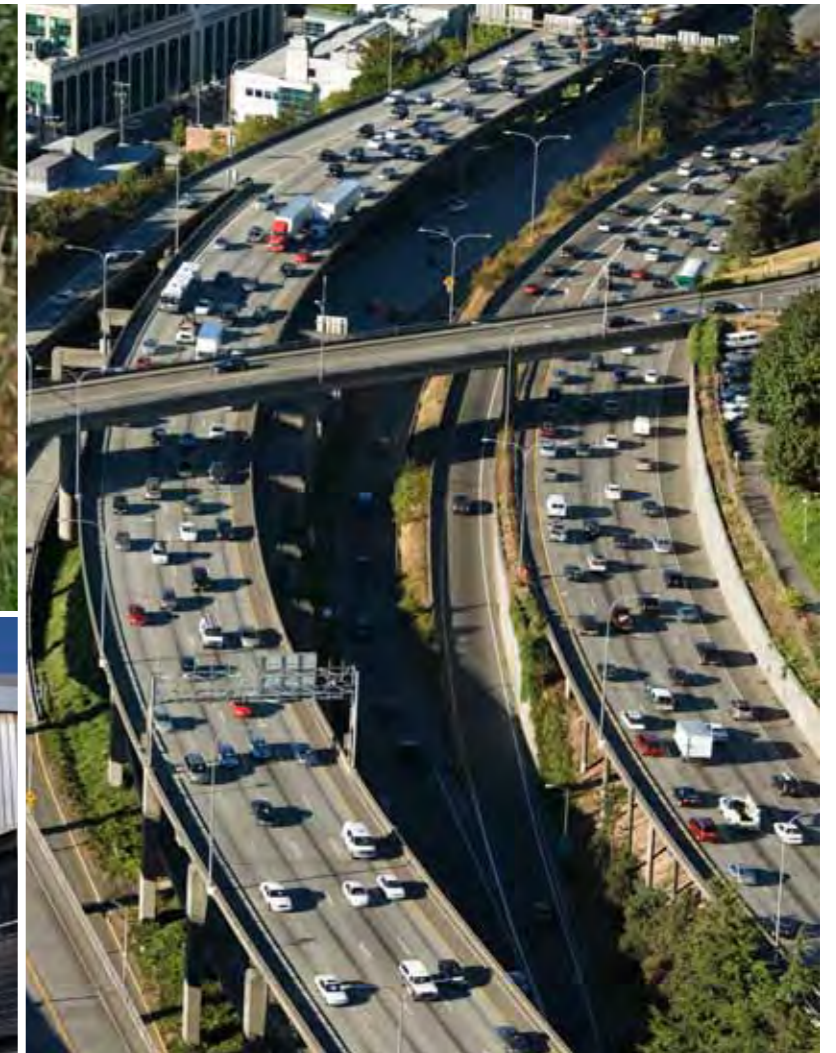
LAND USE FUTURES

The Foresight project on **Land Use Futures**, published in February 2010, argues for strategic objectives to guide future land use change as the UK's land system comes under new pressures in the decades ahead. Since publication, Foresight has worked with Government departments and other stakeholders to explore how the evidence base laid out in the report might be used to inform policy and strategic thinking. For example, Defra has used the report in developing the consultation exercise for the **Natural Environment White Paper** and in taking forward the **National Ecosystem Assessment**, which is the first analysis of the UK's natural environment in terms of the benefits it provides to society and future economic prosperity.

How land is used provides a wide range of benefits to a broad section of the UK population. It also has the propensity to impose costs, such as pollution or congestion, on an equally wide range of people. Costs and benefits regularly extend beyond the immediate users of land, but prices for land in different uses do not fully reflect this. Defra's **Natural Value Programme** aims to integrate the value of the natural environment and use of an ecosystems approach in Defra, other Government Departments, at a local level, and in business and the Foresight report provides the evidence for the programme.

The findings from the Foresight projects on Land Use Futures and Global Food and Farming Futures are reflected in **Natural England's Corporate Plan 2011-2015**. The plan sets out its new approach to safeguarding the natural environment, an approach which focuses on reconnecting people with nature; on protecting natural assets and on the opportunities offered by the greener economy.

Land Use Futures highlights an important challenge: the need for accessible, high-quality data to inform policy and research. Meeting this 'data challenge' will be an essential step in making progress in sustainable future land use and has struck a chord with a wide range of stakeholders. Many organisations, in particular the partnership **Living With Environmental Change (LWEC)**, share a common interest in the data challenge and also in reviewing its pivotal role in supporting the development of an integrated land use model. Foresight has worked with LWEC and other organisations to explore how best to respond to the need for accessible, high-quality data from which to build the evidence base to inform policy and research, particularly, the demand and supply of land use data, and to explore ways to develop and improve it.



OUR IMPACT

SUSTAINABLE ENERGY MANAGEMENT AND THE BUILT ENVIRONMENT

The one-year review of the **Sustainable Energy Management and Built Environment** report, published in 2010 highlights how the project has informed the actions Government has taken in meeting the Climate Change Act's target of 80% decarbonisation by 2050. The report was also used to inform the development of local scale initiatives in building and retrofitting technologies and energy systems which will provide important contributions to making the built environment more sustainable.

For example, the **Technology Strategy Board's** Building Performance Evaluation programme, which addresses energy efficiency of existing and new build in the commercial and domestic environments, draws on the Foresight project and complements and supports the **Department for Energy and Climate Change's** (DECC) priorities such as the development of the National Energy Efficiency Database.

The Foresight report proved to be valuable in moving the DECC's work forward in developing policy proposals for distributed energy solutions. It had particular influence on three critical pieces of work in 2009: the Heat and Energy Savings Strategy, the Low Carbon Community Challenge, and the Low Carbon Transition Plan.

The lead authors of the report **Powering our Lives** are working together on an **Engineering and Physical Sciences Research Council** funded project: 'Challenging lock-in through urban energy systems' (CLUES) which is taking forward some of this report's findings. The CLUES project will assess the contribution of decentralised urban systems in achieving national decarbonisation goals and deepen our understanding of how the barriers and drivers of urban energy initiatives have implications for energy systems at different scales. The project will make use of the 2050 scenarios developed by the Foresight study to help understand the potential

variety in future pathways to sustainability in the face of key uncertainties.

The Foresight report has been used to promote the exchange of international perspectives and knowledge. For example, the UCL Environment Institute co-hosted a symposium with Foresight and the Foreign and Commonwealth Office for leading UK and US experts. This event '**Sustainable Energy Management and the Built Environment**' Foresight Report: **Sharing Anglo-American Best Practice** focused on energy in cities and tested the applicability of the Foresight scenarios in a US context. It allowed experts from academia, industry and government to share insights on the themes from the report and stimulated discussion on an international research agenda on energy and cities, and new networks of collaboration.



OUR IMPACT

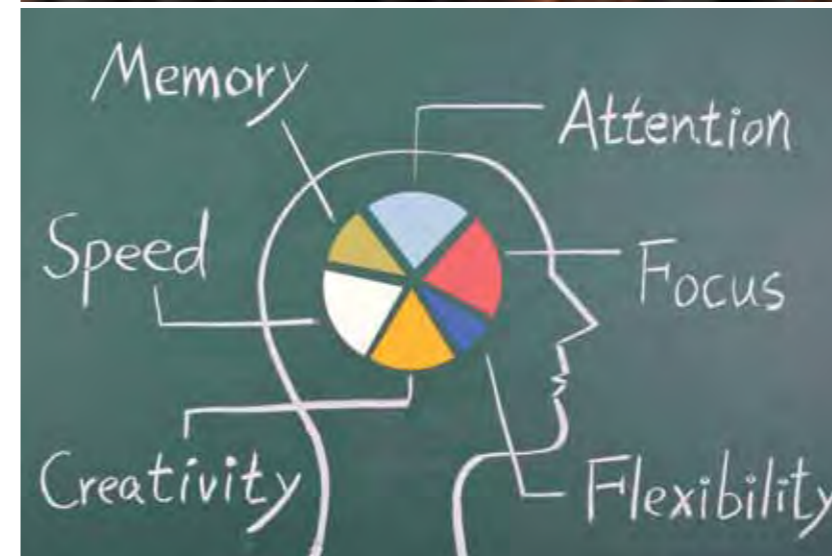
MENTAL CAPITAL AND WELLBEING

In 2010, Foresight published the one-year review of impact of its **Mental Capital and Wellbeing** report which set out where the report has played a significant part in helping shape several key government policies which reflect the growing recognition and importance of positive mental health and wellbeing.

The UK Government's **Mental Health Strategy**, published in February 2010, reflects some of the key conclusions from the Foresight report, in particular the call for an integrated, cross-government strategy to deliver mental health and wellbeing. Also, by linking departmental responses, government investment can be better directed and more effectively co-ordinated in delivering the 'lifecourse approach' to Mental Capital and Wellbeing as set out in the study. The adoption of the Foresight report's **Five ways to wellbeing** sets out a valuable and accessible strategy by which individuals can play an important part in developing their own mental wellbeing.

The Mental Capital and Wellbeing project has received international exposure. In January 2010 the Foresight Programme and the **Foreign and Commonwealth Office's Science and Innovation Network** hosted a workshop entitled 'Unlocking and utilising the mental capital of the ageing population: international perspectives and opportunities'. The event brought together over 20 of Europe's key policy makers and academics to discuss the findings of the report and to review the scientific evidence base on mental capital and the ageing population, to share best practice, to explore the barriers to progress, and to identify the synergies and opportunities for future European collaboration.

The Chinese Government's Ministry of Education has shown interest in the Mental Capital and Wellbeing report. Since publication in 2009, it has organised a group to study how to apply it to the national education strategy up to 2020. Also, a new research initiative (c£1.5 million) funded by the Chinese Government, involving Chinese and UK academics will explore children's learning difficulties and relating to social withdrawal behaviour.



OUR IMPACT

TACKLING OBESITIES

In 2010, Foresight partnered with the **Royal College of Physicians (RCP)** to produce a report to guide health professionals on treating obesity. The report **'Training of health professionals for the prevention and treatment of overweight and obesity'** highlights the core competencies that will give professionals the knowledge and skills they need to contribute to effective strategies for prevention and treatment of obesity.

The Foresight report on **Tackling Obesity**, published in 2007, acknowledges the importance of any comprehensive long-term strategy addressing both prevention and treatment. The RCP report complements existing evidence to emphasise that in future, every health professional will need to be trained to identify people at risk from increasing body weight, and be skilled at managing obesity.

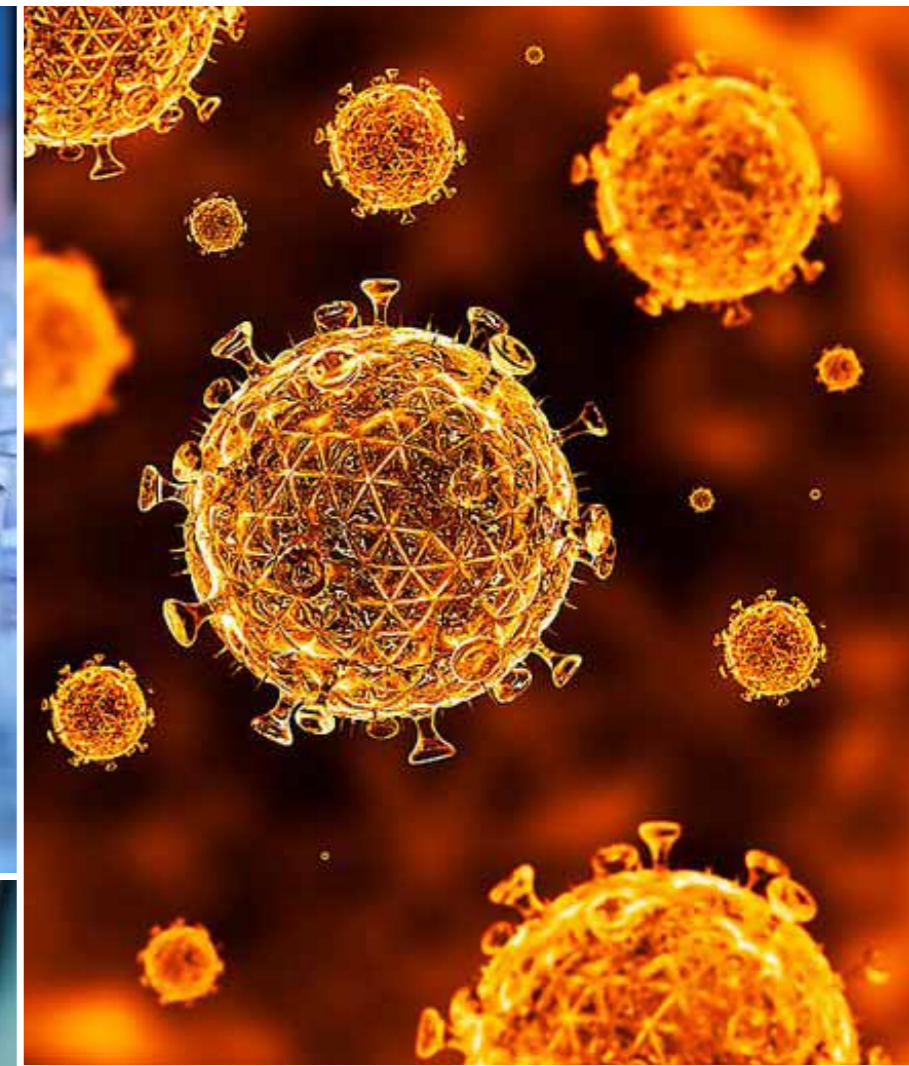
The dramatic increase in the prevalence of overweight and obesity in the UK in the last 20 years has not been matched by a similar expansion of education and training in how to care for obese patients. At present there is limited information provided in both under- and post-graduate training, and very little focus on weight management in specialist medical training. Consequently, many health professionals either do not realise the medical consequences of obesity or lack confidence and the ability to help. The RCP report, which is endorsed by the Royal College of General Practitioners, the Royal College of Nursing and the Royal College of Paediatrics and Child Health, emphasises the importance of educating health professionals and lists in detail the knowledge and skills needed to be able to diagnose, manage and treat overweight and obese people.



OUR IMPACT

DETECTION AND IDENTIFICATION OF INFECTIOUS DISEASES

The Foresight Programme supported the development of the **African Union Science and Technology Framework for the Detection, Identification and Monitoring of Infectious Diseases in Africa**, which was based on the findings of the Foresight study published in 2006. The framework will link scientists and institutions involved with the surveillance and research on infectious diseases of humans, animals and plants. Specifically, Foresight co-hosted a workshop in Kampala, Uganda with African stakeholders from Uganda, Rwanda, Burundi, Kenya, Sudan, Ethiopia and the African Union to explore the creation of the **Eastern Africa Centre for Infectious Disease Surveillance**. This builds on the experience of the **Southern African Centre for Infectious Disease Surveillance** developed on the principles in line with the vision set out in the Foresight report **Infectious Diseases: Preparing for the Future – Africa**.



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Many academics, other experts and policy makers contribute to Foresight's work. Foresight projects involve leading experts from a wide range of scientific and other disciplines to ensure that our work is of the highest technical standard, and relevant to policy. A High-Level Stakeholder Group (HLSG) of relevant organisations in the public sector, research community and business advise Foresight on the strategic direction of projects, and the actions that should result from the work. Membership of the Lead Expert Groups and HLSG are published in this section.

Advisory Board for Foresight

The Advisory Board for Foresight advises the Government Chief Scientific Adviser on the overall strategic direction of the Foresight Programme. Its members in 2010 were:

- **Sir William Castell LVO**, Chairman of the Wellcome Trust. Previously President and CEO of General Electric Healthcare and Vice-Chairman of the General Electric Company (GE).
- **Professor Brian Collins**, Chief Scientific Adviser at the Department for Transport and Professor of Information Systems at Cranfield University.
- **Clive Cookson**, Science Editor of the Financial Times since 1991, with a career in journalism covering science, technology and pharmaceuticals.
- **Professor Ian Diamond**, Chief Executive of the Economic and Social Research Council (ESRC) and Chairman of the Executive Group of Research Councils UK, the strategic partnership of the UK's seven Research Councils.
- **Professor David Hendry**, Professor of Economics and a Fellow of Nuffield College Oxford.
- **Dr Mike Howse OBE FEng**, Technical Adviser to Rolls-Royce plc, and previously Director, Engineering and Technology at Rolls-Royce plc. Member of the Defence Scientific Advisory Council. Visiting Professor at Cranfield University.
- **Professor Sally Macintyre**, Director of Medical Research Council's Social and Public Health Sciences Unit, Glasgow, and a member of the Working Party of the Nuffield Council on the ethics of public health.
- **Professor Robert Watson**, Chief Scientific Adviser at the Department for Environment, Food and Rural Affairs (Defra) and chair of Environmental Science and Science Director of the Tyndall Centre at the University of East Anglia. Former Chief Scientist at the World Bank and Chair of the Intergovernmental Panel on Climate Change.

High-Level Stakeholder Group for Global Food and Farming Futures

- **Chair** – Jim Paice MP, Minister of State for Agriculture and Food, Department for Environment, Food and Rural Affairs
- **Chair** – Stephen O'Brien MP, Parliamentary Under-Secretary of State for International Development, Department for International Development
- Professor Sir John Beddington, Government Chief Scientific Adviser, Government Office for Science
- Dr Pedro Arcuri, Coordinator, EMBRAPA Labex Europe Empresa Brasileira de Pesquisa Agropecuária
- Dr Tariq Banuri, Director, Division for Sustainable Development, UN
- Dr John Barrett, Deputy Director, Policy and Research Division, DFID
- John Bensted-Smith, Director, Directorate-General for Agriculture, European Commission
- Sam Bickersteth, Head of programme policy team, Oxfam
- Prof. Joachim von Braun, Director General, International Food Policy Research Institute (IFPRI)
- Eckhard Deutscher, represented by Stephen Groff, Deputy-Director, Development Co-operation Directorate OECD
- Dr Nina Fedoroff, Special Advisor on Science and Technology to the US Department of State
- Iain Ferguson CBE, Chief Executive, Tate & Lyle PLC
- Anne Guttridge, Supply Chain Manager, Grain and Oilseeds, Europe, Cargill
- Brian Harding, Director, Food and Farming Group, DEFRA
- Patrick Holden, Director, Soil Association
- Michael Jacobs, Senior Policy Adviser to the Prime Minister
- Prof. Doug Kell, Chief Executive, BBSRC and RCUK
- Peter Kendall, President, NFU
- Laurie Lee, Director, Agricultural Development, Global Development Program, Bill and Melinda Gates Foundation
- Dr Will Martin, Acting Research Manager, Development Research Group, Trade, World Bank
- Dr Jeff McNeely, Chief Scientist, International Union for Conservation of Nature (IUCN)
- Professor Richard Mkandawire, Head of the Comprehensive African Agriculture Development Programme, New Partnership for Africa's Development (NEPAD)
- Alexander Mueller, Assistant Director, General Sustainable Development Department, Food and Agricultural Organisation (FAO)
- Dr Namanga Ngongi, Director, Committee on Agriculture and Rural Development (AGRA)
- Nancy Roman, Head of Public Policy and Communications, World Food Programme
- Professor Andrew Rosenberg, Director, Ocean Process Analysis Laboratory, University of New Hampshire
- Dr Harsha Vardhana Singh, Deputy Director-General, World Trade Organisation (WTO)

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- Achim Steiner, Executive Director, United Nations Environmental Programme (UNEP)
- Ajay Vashee, President, International Federation of Agricultural Producers
- Jan Kees Vis, Director Sustainable Agriculture, Unilever
- Ross Warburton, President, Food and Drink Federation

Lead Expert Group for Global Food and Farming Futures

- **Chair** – Professor Charles Godfray FRS, Hope Professor, Oxford University
- Professor Lawrence Haddad, Director of the Institute of Development Studies, University of Sussex
- Professor Ian Crute, Director of Rothamsted Research
- Professor Jules Pretty, Environment & Society, University of Essex
- Dr David Lawrence, Head of Research and Development, Syngenta
- Dr Camilla Toulmin, Director of International Institute for Environment and Development
- Professor Sherman Robinson, University of Sussex

High-Level Stakeholder Group for Global Environmental Migration

- **Chair** – Professor Sir John Beddington, Government Chief Scientific Adviser, Government Office for Science
- Adrian Alsop, Director of Research and International Strategy, Economic and Social Research Council (ESRC)

- Andy Bearpark, Trustee, Care International UK
- Paul Boyle, Chief Executive, Economic and Social Research Council (ESRC)
- Heike Buss, Deputy Head of Unit International Affairs, European Commission
- Diarmid Campbell-Lendrum, Environmental Epidemiologist, World Health Organisation (WHO)
- David Clary, Chief Scientific Adviser, Foreign and Commonwealth Office (FCO)
- Kris Ebi, Executive Director, Intergovernmental Panel on Climate Change (IPCC)
- Richard Edwards, Alternate Executive Director, Asian Development Bank
- John Elliott, Director of Social Science and Chief Economist, Home Office
- Chris Field, Co-Chair Working Group, Intergovernmental Panel on Climate Change (IPCC)
- Julien Frey, Thematic Officer Migration-Asylum, European Commission
- Paul de Guchteneire, Chief, International Migration and Multicultural Policies Section, United Nations Educational, Scientific and Cultural Organization (UNESCO)
- Madeleen Helmer, Director, Policies and Communication, Red Cross
- Frank Laczko, Chief of Research and Publications, International Organization for Migration (IOM)

- Mehari Maru, Program Head, African Conflict Prevention Program
- Robin Mearns, Lead Social Development Specialist, World Bank
- Marc Richir, Directorate-General External Relations, European Commission
- Dan Osborn, Acting Head of Knowledge Exchange, Natural Environment Research Council (NERC)
- Mark Robinson, Head of Profession for Government & Conflict Department for International Development (DFID)
- Aurelie Sgro, International Affairs, European Commission
- Agata Sobiech, Directorate General for Justice, Freedom and Security – Immigration and Asylum Unit, European Commission
- Bernard Silverman, Chief Scientific Adviser, Home Office
- Barrie Stevens, Deputy Director, Advisory Unit, Organisation for Economic Co-operation and Development (OECD)
- Goran Svilanovic, Co-ordinator of OSCE Economic and Environmental Activities, Organization for Security & Co-operation in Europe
- Veerle Vandeweerd, Director – Environment & Energy, United Nations Development Programme (UNDP)
- Margareta Wahlstrom, Commission on Climate Change and Development, Swedish Government
- Andrew Watkinson, Director, Living with Environmental Change
- Professor Robert Watson, Chief Scientific Adviser, Department for the Environment, Food and Rural Affairs (DEFRA)

- David Warrilow, Head of Climate Science and International Evidence, Department of Energy and Climate Change (DECC)
- Steven Wilson, Interim Chief Executive, Natural Environment Research Council (NERC)
- Alan Winters, Chief Economist, Department for International Development (DFID)

Lead Expert Group for Global Environmental Migration

- **Chair** – Professor Richard Black, Head of the School of Global Studies at the University of Sussex
- Professor Neil Adger, Environmental Economics, School of Environmental Sciences, University of East Anglia and Programme Leader at Tyndall Centre for Climate Change Research
- Professor Nigel Arnell, Director, Walker Institute for Climate System Research, University of Reading
- Professor Stefan Dercon, Developmental Economics, Oxford University
- Professor David Thomas, Head of School of Geography and the Environment, Oxford University and Deputy Leader Tyndall Centre for Climate Change Research
- Professor Andrew Geddes, Department of Politics, Sheffield University

Lead Expert Group for Computer Trading in Financial Markets

- **Chair** – Dame Clara Furse DBE, former CEO of London Stock Exchange and a non-executive Director of Legal & General Plc, Amadeus IT Holding SA, Nomura Holdings Inc
- Professor Philip Bond, Oxford Centre for Industrial and

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Applied Mathematics

- Professor Dave Cliff,
Professor of Computer Science,
University of Bristol
- Professor Charles Goodhart,
Professor of Finance, London School of Economics
- Andy Haldane,
Executive Director Financial Stability, Bank of England
- Kevin Houston,
Chairman, Rapid Addition; co-Chair,
Global Technical Committee, FIX Protocol Limited
- Professor Oliver Linton,
Professor of Econometrics,
London School of Economics
- Dr Jean-Pierre Zigrand,
Reader in Finance, London School of Economics



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