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Friends of the Earth

Planting Prejudice

How UK Government support for GM undermines sustainable farming policies

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Introduction

In June 2007, the Prime Minister, Gordon Brown, announced the formation of a new Department for Innovation, Universities and Skills (DIUS). The objective of the new department is to drive forward the delivery of the Government's long-term vision to make Britain one of the best places in the world for science, research and innovation, and to deliver the ambition of a world-class skills base able to compete in the global economy.[1]

The DIUS will assume responsibility from the Department of Trade and Industry (DTI) for science and innovation and will oversee the science budget.

The change in institutional governance for science and innovation in Britain also coincides with the Science Review commissioned by Gordon Brown (as Chancellor of the Exchequer) to Lord Sainsbury as a way of assessing "*the response of the UK's Science and Innovation System to the challenges and opportunities of globalisation, and to take a forward look at what needs to be done to ensure the UK's continued success in wealth creation and scientific policy-making.*"[2] The review made its recommendations in October 2007 and fed into the 2007 Comprehensive Spending Review.

This report commissioned by Friends of the Earth, examines the role of the UK Government's science and innovation policies in promoting the competitiveness of agriculture, with particular focus on organic farming[i] and agricultural biotechnology, ie genetically modified (GM) crops and food. It exposes contradictions between Government policy to promote agriculture that contributes to economic growth, social cohesion and environmental sustainability[ii] and its funding and policy support for GM, which has failed to deliver on every count.

The study draws from the findings of a recent analysis produced by Friends of the Earth Europe on the contribution of agricultural biotechnology to Europe's competitiveness agenda (ie the Lisbon Agenda) - see Box 1.

Chapter 1 compares science and innovation policies that have defined research and development (R&D) for GM and organic farming. It evaluates the Government's approaches to the funding of these two areas of research against its objectives of competitiveness and sustainable agriculture including economic growth, industrial development, job creation, social cohesion and environment protection, as defined in its Strategy for Sustainable Farming and the 'One Planet Farming' vision.

Chapter 2 provides a comparative assessment of the socio-economic and environmental benefits of GM and organic farming. It assesses the performance of GM and organic farming in terms of market-share, sales, industry growth, employment, and environmental impacts.

Chapter 3 provides an overview of the institutional dynamics that have characterised science and innovation policy over the last decade or so. It explores the ties that have brought Government and business closer together and the ways in which this closeness has influenced the direction of public funding for agricultural research. The chapter illustrates how the close relationship between Government and business has compromised the independence of Government bodies causing an inherent bias towards business interests in the policy-making process.

Chapter 4 lists a set of recommendations and key demands from Friends of the Earth to redress this incongruous Government policy.

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[i] Consistent data on sustainable farming are difficult to find because the sector is not clearly defined, Organic farming is taken as point of reference because consistent data is available.

[ii] These are outlined in Government policy documents - Strategy for Sustainable Farming and Food: Facing the Future, report of the Policy Commission on the Future of Farming and Food, and in One Planet Farming Speech at the Royal Agricultural Show.

Box 1 – The EU biotech strategy: mid term review or mid-life crisis?

As an input to the recent mid-term review of the EU's strategy on biotechnology, Friends of the Earth Europe published a study assessing the contribution of agricultural biotechnology to the EU's objectives of competitiveness, job creation and social cohesion - key elements of the Lisbon Agenda. The report, based on industry and Government figures, found that agricultural biotechnology, including the development of GM crops and foods, has failed to live up to expectations and to deliver on the socio-economic and environmental targets set in Lisbon. In particular, the study:

- Found that policies on biotechnology have been created in a European political climate under pressure to ensure job creation and competitiveness which is masking the reality of the poor performance of agricultural biotechnology;
- Exposed the discrepancy between the European Commission's promises on how agricultural biotechnology will achieve economic growth and the lack of data to back up these claims;
- Analysed how political and economic decisions that approach biotechnology as one homogeneous sector, rather than acknowledging its diverse trajectories, is resulting in confused and economically unjustified policies supporting the development of GM crops and foods;
- Assessed EU research funding priorities and showed how the political push for agricultural biotechnology is side-lining agri-environmental farming sectors that are already delivering economically, socially and environmentally. Twenty five years of EU public research funds have resulted in just two types of GM crops being commercialised (herbicide resistant and insecticide tolerant varieties);
- Found that even in the US, which has a different regulatory framework and public awareness than in the EU, the agricultural-biotechnology sector's performance has been poor. Consolidation of the sector is hindering market competition and only two traits are being grown to any extent, despite the US Department of Agriculture having approved 70 distinct biotech products for commercial use;
- Scrutinised the technical and financial risks involved in GM farming due to GMO contamination, such as the recent contamination of US rice with an unapproved GM rice variety found in 17 EU countries, resulting in rice prices dropping by 65 per cent below the price forecasted prior to the contamination.

The study provides an additional comparison between the economic performance of agricultural biotechnology and research results from studies into agri-environmental measures such as organic farming schemes.

It concludes that the EU is promoting the application of biotechnology in the agricultural sector over more competitive and socially, economically and environmentally sound agricultural practices. This is despite biotechnology having failed so far to contribute to the EU's competitiveness objective, and regardless of the threat it poses due to the risk of contamination.

http://www.foeeurope.org/publications/2007/FoEE_biotech_MTR_midlifecrisis_March07.pdf

Chapter 1. Science and innovation policy for agriculture

"*The new role of Government must be carefully defined: to work with the grain of markets. To use our regulatory powers to promote competition as the most important spur to innovation.* […] *From today we are going to do things differently. Government and business in partnership*." [3]

Peter Mandelson, 1998
Former Secretary of State for Trade and Industry

1.1. Science and innovation policy as a strategy for competitiveness

Science and innovation policy in the UK has, up to 2006, been developed and implemented by the Office of Science and Innovation (OSI) within the Government's Department for Trade and Industry (DTI). These activities have been taken over by the DIUS. The Office of Science and Innovation has been responsible for the allocation of the Science Budget – currently over £3 billion per annum.[4]

The aims of successive Governments over the past 20 years or so, whether Conservative or Labour, have been explicit: to generate wealth and competitiveness through the development of the nation's science and technology base.[5]

In order to achieve this, OSI works with Government departments to ensure science and scientific advice are fully reflected in planning and policy issues across Government. In 2004, the Government published a Ten Year Science and Innovation Investment Framework, which set out how to improve and monitor delivery of high quality science and research. The focus of the framework was to capitalise on opportunities for business and industry from research agendas and remove barriers to business and research collaboration. The review of Science and Innovation Policy by Lord Sainsbury is to help improve on the delivery of the 10-year Investment Framework vis-à-vis the "Grand Challenges" faced by the UK in today's global economy, including trade competition from emerging economies, such as China and India, and increasing pressure on natural resources.[6]

The Government's policy for science and technology (S&T) has therefore been driven by the deeply entrenched assumption that commercialisation of the public sector research base can generate greater national economic competitiveness in the global marketplace and more national wealth.[7] The result has been a Government policy that seeks to harness the potential of public sector research for industry – leading to an increase of private-public partnerships in research and research funding.

This is rooted in the Government's overall policy objective of pursuing competitiveness outlined in the 1998 White Paper on Competitiveness. The aim of this political choice has been for science and innovation to become active contributors to the competitiveness of British economy in each and every sector, including agriculture.

1.2. The need to innovate British agriculture

"…farming is at the heart of our society, our economy and our cultural heritage. It's about people, food, landscape and the environment. It touches every member of society every day. In a phrase I used in my first week that runs through everything I will have to say today, farming is important not just for the countryside but for the whole country." [8]

David Miliband, 2006
Former Secretary of State for Environment, Food and Rural Affairs

The need to innovate British agriculture has been based on the realisation of the role that agriculture plays in British economy and that the last 50 years have seen a significant reduction in the contribution of the agricultural sector to the competitiveness of the British economy.

At the beginning of the 1950s agriculture accounted for 5 per cent of the UK's GDP and broadly 6 per cent of employment. Today the figures stand at 0.7 per cent and 2 per cent respectively.[9]

In the mid 1970s UK productivity in the agricultural sector was above the EU average (for the then EU10), although still behind the leading EU countries and the United States. By the early 1990s the UK had fallen back to around the EU average level of performance and now, according to the National Farmers Union, agricultural productivity in the UK appears to be below the top performing EU countries in all the main farming sectors.[10]

The devaluation of agricultural jobs in the UK has also driven 78 per cent of farm workers from the land in the last half a century.[11] This has created a vicious circle, with younger people increasingly displaced into the cities, leaving a smaller pool of new people in rural areas to fill the positions needed to keep the remaining farms viable.[12]

In an attempt to address this crisis, especially following the BSE and Foot and Mouth incidents, the Government launched a number of initiatives and policy commitments.

1.3. Agricultural policy reforms – fostering the competitiveness of British agriculture

"Our key message, then, is reconnection. Reconnection of farmers and the public through the marketplace, in sensitive stewardship of the countryside, and through dialogue about how to provide for the needs and aspirations of society"
Report of Policy Commission on Future of Food and Farming, January 2002 [13]

The **2002 Policy Commission on the Future of Farming and Food in England** identified a number of key elements for reform, including the need to:

- Reconnect farmers with their markets;
- Strengthen links in the food chain through greater collaboration and co-operation to create a more profitable farming sector that can compete successfully in increasingly open markets;
- Address the twin challenges of reducing environmental damage while enhancing the positive impacts of farm practices.

Based on these recommendations, the **Strategy for Sustainable Farming and Food (SFFS)** was published in December 2002. At the heart of the Strategy remained the desire to pursue the competitiveness of the agricultural sector whilst moving towards patterns of production and consumption that would minimise their impact on the environment.

This set of objectives crystallised into the 'One Planet Farming' vision outlining a number of goals for agricultural policy in the UK (emphasis added):

- To build a profitable, innovative and competitive industry meeting the *needs of consumers*;
- To fulfil its unique role in the countryside by making a *net positive contribution to the environment* and *managing its risks*, especially animal health risks, effectively; and
- To contribute to the *long-term sustainability of rural communities*.

These elements were reiterated in the July 2006 "**Forward Look**" of the Department for the Environment, Food and Rural Affairs (DEFRA). With respect to the SFFS and One Planet Farming vision a strong focus was placed on the "*inter-dependence of the economic, social and environmental pillars of sustainability.*"[14]

1.4. The role of science and innovation for agriculture

Government research funding initiatives for agriculture have mostly been aimed at improving its economic competitiveness and have therefore been predominantly directed towards end user agricultural research. See Box 1.1 for an historical overview of agricultural research in the UK.

The coordination of these activities has been split between the Department for the Environment, Food and Rural Affairs (DEFRA) and the Office for Science and Innovation (OSI), under the former Department for Trade and Industry (DTI), now the DIUS. DEFRA is responsible for the country's overall agricultural policy. OSI bears responsibility for science and innovation policy coordination through the various Research Councils. For agricultural research, this is the **Biotechnology and Biological Sciences Research Council** (**BBSRC**), which replaced the Agriculture and Food Research Council (AFRC) in 1994.

Funding is largely through DEFRA's Farming and Food Science Programme, the various research councils and through directly managed projects by the former DTI. A key method of providing competitive research is the Government wide LINK research scheme. [iii]

The LINK initiative is aimed at promoting academic and industrial research collaboration in pre-competitive[iv] research areas. It stimulates collaboration by providing up to 50 per cent of the funding for projects in collaboration with industry in key scientific areas. LINK resources are concentrated in a series of programmes, addressing particular areas of science and technology. [15]

R&D for GM technology and organic farming fall within the remit of the different initiatives outlined above. The following section assesses the extent to which these R&D programmes are aligned with the Government's policy commitment to sustainable agriculture and economic competitiveness.

Box 1.1 – The progressive commercialisation of UK agricultural research [16]

The Agricultural Research Council was one of the first Research Councils to be established, in 1934. It operated mainly though its own institutes and under the 1918 Haldane principle, which stated that decisions on scientific research should be taken by scientists, at arm's length from Government.

This system continued largely unchanged until the 1971 Rothschild report, which established a 'customer-contractor' relationship – with Government as customer and Research Councils as contractor – eroding the scientific autonomy of the Haldane principle. In the 1980s, the interventionist trend of Government science policy was maintained, and increased emphasis was placed on industrial relevance and directed research programmes. The 1980s were also characterised by heavy cuts in funding. The focus of the ARC throughout the 1970s and 1980s was mainly on what would today be categorised as strategic and applied research.

The late 1980s and 1990s also saw a move from public to private sector control of research establishments. In 1987, the Ministry of Agriculture, Fisheries and Food (MAFF), the National Seed Development Organisation, and a large part of the then ARC (renamed Agriculture and Food Research Council, AFRC, in 1984) were sold to Unilever to create the Plant Breeding International Corporation, resulting in the loss of almost all publicly owned capability to generate new finished plant varieties. In addition, Government research laboratories such as the MAFF Central Science Laboratory became financially self-sufficient executive agencies, charging a

[iii] For a complete set of programmes and initiatives see the DEFRA website on Farming and Food Science: http://defrafarmingandfoodscience.csl.gov.uk/

[iv] Pre-competitive research is the area of research that follows after 'fundamental research' (where the primary aim being a greater knowledge or understanding of the subject under study). It is research to develop new knowledge with a specific application in view and just prior to final company-specific product development.

variety of customers for their services.

The Office of Science and Innovation was established in 1992, further increasing Government control over the research it funded. OSI was moved from the Cabinet Office to the Department of Trade and Industry in 1995, with the aim of improving links between Government, industry and the science and engineering base. In 1993, the Government's Realising Our Potential report placed a new emphasis on "wealth creation and quality of life" and on scientists working closely with the 'end users' of their research in setting their priorities. This emphasis was behind the launch of the Foresight programme. The report also led to a reorganisation of the Research Councils, with the creation of a Biotechnology and Biological Sciences Research Council in place of the AFRC at a time of growing prominence of biotechnology and genetic modification techniques and following the suggested focus on the commercial exploitation of research of the Spinks Report.[v]

In recent years, the explicit focus on the economic benefits of a strong science and technology base has increased. Particularly in biotechnology, commercialisation of research and partnerships between the public and private sectors have been encouraged, for example through the LINK scheme.

1.5. Organic and GM agricultural research – contributing to the competitiveness of British agriculture

"[Genetic modification] *has the potential to offer enormous opportunities for improving the competitiveness of the economy and the quality of life in terms of health, agriculture, food and environmental protection*." [17]

Jack Cunningham, 1998
Minister for the Cabinet Office 1997 - 98

"*In respect of organics* […] *it does make a major contribution to the sustainable food and farming objectives, there's no question about that* […].[18]

Lord Rooker, 2006
Minister of State for Sustainable Farming and Food, DEFRA

1.5.1. Funding for agricultural biotechnology research

As a "new technology"[vi], agricultural biotechnology is identified as a potential contributor to the Government's objective on competitiveness.

Over the years, GM food and crop research, as a part of agricultural biotechnology research, has benefited from a wide range of public sector financial support via a variety of research councils, research institutes and Government departments:

- the Biotechnology and Biological Sciences Research Council (BBSRC), and the research institutes supported by it, such as the John Innes Centre and the Sainsbury Laboratory, the

[v] The Spinks report was published in 1980 by Alfred Spinks, of the Advisory Council on Applied Research and Development [ACARD] in the UK. Its policy recommendations for development of biotech provided the first real spark of globalised interest and investment in biotechnology in the UK. It was at at time when there was much euphoria for the new technology.

[vi] The issue of whether biotechnology is a new or old technology is controversial and variously used by the GM industry

Institute of Arable Crops Research, the Institute of Food Research, and the Institute of Grassland and Environmental Research;
- the Natural Environment Research Council (NERC);
- the Department for Environment Food and Rural affairs (DEFRA);
- the Scottish Office Agriculture Environment and Fisheries Department (SOAEFD);
- the Food Standards Agency (FSA); and
- the Department for International Development (DFID);
- the Department for Trade and Industry (now Department for Business, Enterprise and Regulatory Reform)

The BBSRC is the main research body conducting agricultural research and receives funding from the Science and Innovation Group within the DIUS.

In the years 2006-2007 and 2005-2006 the BBSRC spent £39.3 million and £37.7 million respectively on agricultural biotechnology research funding through the BBSRC sponsored research councils alone. This does not include possible funding for agricultural biotechnology research through direct responsive grants[vii] awarded to universities and research institutes in response to funding applications. Data is not available for responsive grants from 2004.[19]

Data on funding before 2005 shows that total BBSRC funding has steadily increased from £42.2 million between 1997-98 to £57.1 million between 2003 and 2004. [20]

DEFRA also funds agricultural biotechnology research through contracts to research institutions.

Between 2001 and 2008, DEFRA funding for agricultural biotechnology was on average £10.6 million a year,[21] although it is unclear if this includes funding under LINK schemes.

The table below provides a breakdown of the main Government funding for agricultural biotechnology from the data available.

Year	**Total Funding (from available data)**	**Funding per Govt Department**		**Omissions and additions**
		DTI	DEFRA	
2006-2007	£49.3 million	£39.3	£10	Excludes possible funding through responsive grants from BBSRC
2005-2006	£50.3 million	£37.7	£12.6	Excludes possible funding through responsive grants from BBSRC
2004-2005	Not available	Not available	£13.2	DEFRA figures only
2003-2004	£73.2	£57.1	£16.1	Includes all grants through BBSRC and DEFRA
2002-2003	£75.7	£57.1	£18.6	Includes all grants through BBSRC and DEFRA
2001-2002	£72.7	£55.1	£17.6	Includes all grants through BBSRC and DEFRA

Source: Freedom of Information Documents received from BBSRC (22 Oct 2007, 20 Sep 2007) and DEFRA (23 Oct 2007). Answers to Parliamentary Questions (10 July 2007)

[vii] Researchers can apply for responsive funding at any time for research which is within a Research Committee's remit.

Prior research on Government funding has shown it to be consistently high. The Thames Valley University estimate that between 1998-99 and 1999-2000 the UK Government spent £52 Million and £39 Million respectively on agricultural biotechnology. The European Commission has estimated that between 2000 and 2001 the UK Government spent about £30 Million.[22]

These figures are not comparable but give an indication of the significant Government investment into agricultural biotechnology.

In addition, the Department for International Development (DFID) has also spent on average, up to the year 2000, £600,000 per annum on funding research into GM technologies for developing countries.[23]

Finally, figures from the Scottish Executive show an average spending of about £7.5 million every year from 2001-2006. After April 2006 Scottish funding has been focussed on outcomes with individual organisations responsible for achieving this. After this date the Government does not have precise data on the costs of agricultural biotechnology related research.[24]

1.5.2. Funding for organic farming research

Until the mid 1980s, organic farming R&D in the UK was led by the private sector, notably the Soil Association (founded in 1946), the Henry Doubleday Research Association (now Garden Organic, founded in 1954) and the Organic Research Centre Elm Farm (founded in 1981).

In the mid 80s the UK Register of Organic Food Standards was created after the need was identified in a report on the development of the organic sector by the then Ministry of Agriculture Fisheries and Food (MAFF, now part of DEFRA). Currently, The Advisory Committee on Organic Standards (ACOS) advises Ministers on matters related to organic standards including R&D issues and priorities.

The DEFRA programme for organic farming covers research needs of England and Wales. It began in 1991 with an annual budget of about £440,000. [25]

In 2000, an alliance of over 50 organisations, including Friends of the Earth launched a campaign for the Government to support an Organic Food and Farming Targets Bill along with an Action Plan to achieve this. In 2002, the DEFRA minister announced a target for the UK to source 70 per cent of its demand for organic products nationally, and Action Plan to achieve this. The report of the Policy Commission for Food and Farming also recommended the development of a strategy for organic food production addressing all parts of the food chain. This Plan was reviewed by the Organic Action Plan Group in 2004 with the publication of an “Action Plan to Develop Organic Food and Farming in England - Two Years On” which reiterated the environmental benefits of organic farming and the widespread demand from consumers to have locally produced organic food.

Yet public spending on organic farming remains low. DEFRA spending on research and development directly related to organic farming was only £1.6 million between 2006 and 2007.[26] Available evidence indicates public spending on straight organic farming research has been around £2.2 million per year from 1997 to 2006. [27]

Although elements of other areas of Government funded basic research, such as soil science, could be beneficial for organic farming, funding directed at organic farming research remains low.

The Scottish Executive Environment & Rural Affairs Department (SEERAD) has also funded research on organic farming and co-ordinates its activity with DEFRA. SEERAD has co-funded research on organic farming (mostly in conjunction with DEFRA) with a yearly budget of about £480,000. [28]

Individual organic action plans developed for England, Wales and Scotland,[viii] all aim at ensuring the UK market share for indigenous organic food supplied by home producers will increase to the equivalent of non-organic produce (i.e., 70 per cent)[29]. Their main target is to help domestic organic producers meet more of the increasing UK demand for organic food (see Chapter 2).

A small number of separate projects have also been funded by the Research Councils, the Department of Agriculture and Rural Affairs (DARD) of Northern Ireland, Research Councils, the Food Standards Agency and the Environment Agency. [30]

DEFRA's research projects are of four main types :

(i) Open Competition for project specifications;
(ii) Negotiated projects for specific contractors;
(iii) Concept Notes, in which contractors suggest specific pieces of research to DEFRA;
(iv) LINK scheme, in which projects are co-funded by Government and the industry. [31]

In recent years the tendency has been to place more focus on funding organic research under the LINK scheme. Prior to the 2002 Action Plan, the LINK scheme complemented other funds made available by MAFF/DEFRA for organic R&D. In 2002, the Action Plan for England had set aside £5 million to be disbursed under the Organic LINK scheme. Since then DEFRA has reorganised its budget, with the organic R&D having to compete for a single pot within the overall budget for sustainable farming R&D under the existing LINK programmes. [32]

This places organic farming at a distinct disadvantage, since it does not benefit from a strong enough institutional backing to ensure its fare share of the funding

1.6. Flawed rationale for GM and organic agricultural R&D

A major share of the funding for organic and GM R&D has been provided under the Government's LINK scheme. These programmes originated in earlier Conservative Government policy when it was believed that industries benefiting from public funded research should contribute directly to that research. Currently the LINK scheme provides up to 50 per cent of the total funding of industry-led research programmes.[33]

The principle behind the LINK programmes has advantages for agricultural-businesses and industries that directly profit from the research and are also able to fund research programmes. The LINK scheme has been applied to industrialised agriculture and has been relatively successful for a number of years, and it is certainly the case for the biotechnology industry.

The adoption of the LINK scheme approach to research on organic agriculture presents a number of limitations due to the low access of organic farmers to industry funds. Much of the R&D that is needed to improve the efficiency of production is not competitive research but basic research, unsuited for funding under the LINK programmes.[34] Additionally there is inadequate organic business-backing to take-up funds available under the current DEFRA/LINK schemes. At present 30 per cent of funding for organic research comes from non-public sources.[35]

For organic farming, which seeks to limit external inputs as much as possible, improvements must

[viii] Wales was the first region in the UK to set an explicit target and led the way by establishing the Agri-food Partnership Organic Strategy Group, responsible for publishing the action plan for Wales, and the Organic Centre Wales (OCW) to help implement the strategy and to provide a centre of expert knowledge and advice. In Scotland, the Scottish Executive works closely with the organic sector through the Organic Stakeholders Group (OSG) - involved in the delivery of the Organic Action Plan for Scotland and in setting up the Organic Stakeholders Marketing Group to help the industry exploit key market opportunities through contributing to policy solutions. In England, the Organic Action Plan Group was set up following the Prime Minister's Seminar on Sustainable Food and Farming on 26 March 2002, which is chaired by Elliot Morley MP, Parliamentary Under Secretary of State for Environment Food and Rural Affairs,

come from research into farming systems. This means that there are no 'input' industries other than the farmers themselves and, as a result, the need to formulate project proposals based on the existing LINK system causes farmers' consortia to continually try to find the "industrial partners" necessary to provide the required "industrial" share of the funding.

The rational behind the LINK scheme is therefore ill-suited for the organic context as the research needs of the sector cannot be optimally addressed by the industry itself.

This fundamental misunderstanding of organic research needs is illustrated in the BBSRC position statement on its lack of funding for organic farming.

"BBSRC does not fund applied work on entire farming systems. It funds basic and strategic research, some at a systems level, the results of which are applicable in a range of situations. For example, results from GM technology that reveal the identity of genes that confer resistance to fungal and bacterial diseases of plants, could be used in organic, conventional and GM systems." [36]

The LINK scheme approach for agricultural research can be seen as a way for the Government to expand farming through industry pull rather than by consumer demand and policy and subsidy push. This is resulting in an inherent bias within the research agenda for agriculture in favour of GM research, whilst placing R&D for organic farming in a disadvantageous position.

Interestingly, biotechnology and the application of genetic manipulation to agriculture, are nowhere mentioned in the One Planet Farming vision. The first SFFS discussed the potential of GM to contribute to sustainability depending on the evidence of its effects on environment and biodiversity from field trials in 2003. The forward look of the SFFS in 2006 makes no mention of GM at all.

The critical benefits for the environment and society provided by organic agriculture are currently not supported by adequate funding or strong Government policy on research and development. There is therefore a need to investigate the conflict between the needs of organic research funding and the objectives and approaches of LINK programmes and critically a need to address the incoherence between the Government's substantial funding for GM research and how it fits into food and farming policy on a sustainable agricultural system.

Chapter 2. Incompatible policy commitments: GM *vs* organic farming

This chapter looks at the delivery of GM and organic farming practices in the context of key policy objectives set out by Government to improve competitiveness in the agricultural sector. These include:

- the Government's 2002 Strategy for Sustainable Farming and Food
- its subsequent Forward Look of 2006, and the One Planet Farming vision
- DEFRA's "triple bottom-line performance" – businesses that meet environmental, social and economic objectives in line with the Government's overall strategy on competitiveness.

It shows that the current approach of the Government is flawed and will not deliver results on any of these counts.

2.1. Economic performance

According to its own assessment the agricultural-biotechnology industry appears to have done poorly in terms of economic performance. Although consistent data for successive years appears to be lacking, a comprehensive analysis conducted by Critical I in 2003, the most recent analytical work of this kind, reveals that agricultural biotechnology sales were down by 2 per cent in 2003 in Europe,[37] with losses reaching 5 per cent in the case of the UK. As a result, many agricultural-biotechnology companies have relocated abroad or, alternatively, have been swallowed up by larger companies through acquisitions and mergers, causing a critical market concentration in the industry.

In 2003 the UK lost 75 biotech companies through mergers and acquisitions. There were similar trends throughout Europe, where the rate of the formation of new companies fell from around 12.5 per cent in 2001 to around 6-7 per cent in 2004. Since 1998 through a series of mergers and acquisitions, the number of major agricultural-biotechnology companies in the UK has been reduced to just 4.[ix] Far from being exclusive to the UK, these trends have occurred in Europe and in the United States where to date, just 10 firms account for almost half of the observed mergers, acquisitions, joint ventures, and strategic alliances.[38]

In contrast, sales of organic food increased by 22 per cent from 2005 to 2006, and sales are now touching the £2 billion mark. The retail market for organic products has grown by an average of 27 per cent a year over the last decade while annual growth for all UK food and drink sales is around 3 per cent.[39]

Supermarkets are responsible for sourcing the majority of organic primary produce in the UK. However, direct retail sales of organic products through organic box, mail order schemes etc increased by 53 per cent from 2005 to 2006[40] contributing to a vibrant local food economy.

Labelling requirements have also enabled consumers in UK, as well as in Europe, to exert their

[ix] In 2000, Rhone-Poulenc merged with Hoechst to form the Aventis Group, now Bayer CropScience whilst in 2000 Monsanto merged with Pharmacia and Upjohn to form the Pharmacia Corporation.. In 1998 Zeneca and Astra merged to form AstraZeneca. In 1997, DuPont global purchased Pioneer Hi-Bred. By summer 2004 Syngenta, one of the few major firms still working on GM agriculture in the UK, announced it was moving all its GM-related operations to the United States.
See http://news.bbc.co.uk/1/hi/business/the_company_file/231213.stm
http://www.agbioforum.org/v5n1/v5n1a04-king.htm
http://www.monsanto.co.uk/news/2000/january2000/27012000_monsanto.html
http://www.sanofi-aventis.com.sg/live/sg/en/layout.jsp?scat=E84D9EC1-029F-4A62-A3A0-655E56DFC09E
http://www.foe.co.uk/resource/press_releases/syngenta_quits_gm_research_01072004.html

right to chose what they eat. And they have consistently exerted their right to choose non-GM food. As the most recent Euro-barometer survey has shown, although most Europeans – including Britons – appear to be supportive of biotechnology in general, 58 per cent still oppose the idea of its application to crops and foods.[41] These findings confirm the outcome of a similar survey conducted by the University of Manchester in 2004[42] – which found Britons questioning the purpose of GM food, albeit not opposing biotechnology in itself – and the results of the 2003 "*GM Nation?*" public debate – which reported a general unease amongst the British public about GM crops and foods and their commercialisation.[43]

To date, benefits for UK farmers from GM crops have also been non-existent. The cost-benefit analysis conducted by the UK Government's Strategy Unit, "*Field Work: Weighing up the Costs and Benefits of GM crops*", published in 2003 found that the GM crops currently available on the market would offer, at best, only some small benefits to UK farmers.[44] A recent cost-benefit analysis carried out by the European Commission's Joint Research Centre, (JRC) "*Biotechnology for Europe*", assessed the agronomic and economic performance of Bt maize in comparison with conventional maize in Spain. They found that value benefits from GM Maize were extremely limited with a large share of any profits taken by seed companies.[45] See Box 2.

This is the story of GM all over the world; even countries that have adopted the technology on a large scale have found social, environmental and economic costs have far outweighed any benefits. In most cases GM crops have not resulted in higher yields and for herbicide tolerant crops, pesticide use has increased[46].

In the US only two GM traits (herbicide tolerance and insect resistance) have been commercialised with any success although 71 different varieties of GM have been approved. [47]

In South America, GM soy producers have been plagued by lawsuits and royalty claims from Monsanto. Soy yields have been decreasing since 2002 and pesticide use has increased. The introduction of Bt Cotton in China and India has been a disaster with declining yields and massive royalty payments that have precipitated a crisis in the cotton sector contributing to mass suicides by small farmers. [48]

In Europe, the JRC report found the overall balance of future costs and benefits would depend on public attitudes, and on the ability of the regulatory system to manage uncertainties. Furthermore, any economic benefits from the commercial cultivation of current GM crops would be outweighed by other developments and changes to national and EU agricultural policy such as the reform of the Common Agricultural Policy rather than any smaller-scale cost savings arising from the use of GM crops.

For these reasons, European farmers have only adopted the technology on a limited scale; only 55,000 hectares of GM crops are grown in Europe – the overwhelming majority in Spain – with none currently being grown commercially in the UK.

In contrast, the number of farmers converting from conventional to organic farming is increasing. In 2006, the area of land in-conversion to organic in the UK increased by 40 per cent, with all countries seeing substantial growth – Scotland (110 per cent), England (24 per cent), Wales (20 per cent) and Northern Ireland (25 per cent). [49] This increase in land conversion area along with the growth in organic sales shows that organic farming is meeting the needs of farmers and expectations of consumers. The main recommendation of the 2002 Policy Commission on Farming and Food was the fact that farmers needed to reconnect with their markets, and the market is unambiguously calling for organic products and simultaneously rejecting GM foods.

The popularity of organic food has run ahead so fast that despite the rapid increases in organic production, demand has outstripped supply, with imports needed to fill the gap – most of which are sourced from Asia. [50]

Box 2 – GM - failed delivery to farmers and consumers

According to the industry's own estimates, and published on the Food Standards Agency's website, by 2004-2005 the market should have seen the commercialisation of GM crops such as Golden Rice, salt-tolerant tomatoes, sunflowers resistant to white mould, and the publishing of the complete human genome.[51] Decaffeinated coffee and tea plants, disease-resistant grapes, and plant-based vaccines (that is food crops genetically engineered to produce edible vaccines) would be ready for commercialisation by the end of the decade.[52]

To date, however, these expectations have not been met, partly because the traits researchers want to enhance involve several genes and complex interactions between the plant and its environment. Regardless of this failure to bring such products onto the market, there is still little evidence to support the role of functional foods, whether genetically modified or not, in reducing diet-related diseases and improving public health.[53]

Despite the industry's promises, the only GM crops that have made it on to the market worldwide are still "first generation" crops. 73 per cent contain herbicide-tolerant traits, 18 per cent pest-resistant traits, 8 per cent contain both traits, and just 0.1 per cent yield-improvement traits.[54] Moreover, of those few traits developed, most have failed to provide any evidence of the advantages they offer over conventional crops.

First-generation genetic modifications address production conditions (insect and weed control), and have not been modified to increase yield. Yields of both GM and conventional varieties vary depending on growing conditions, such as degree of infestation with insects or weeds, weather, and region of production. A 2003 report published in the journal Science found that "in the United States and Argentina, average yield effects [of GM crops] are negligible and in some cases even slightly negative"[55]. The National Institute of Agricultural Botany in the UK found that yields of GM winter oilseed rape and sugar beet grown experimentally were 5-8 per cent lower than for conventional varieties.[56]

The recent cost-benefit analysis carried out by the European Commission's Joint Research Centre, "*Biotechnology for Europe*" compared the agronomic and economic performance of Bt maize (which produces a toxin, poisonous to certain insect pests) and conventional maize grown in Spain – the only country in Europe where farmers have adopted the technology on a significant scale. The study found that between 2002 and 2004 farmers using Bt maize obtained an average increase in their gross margin of €85 (£57) per hectare and growing season compared with farmers growing conventional maize. This represents an increase of 12 per cent over the average gross margin obtained by maize farmers in Spain. These benefits, however, vary widely in the three regions studied, ranging from €125 (£84) per hectare to just €7 (£4) per hectare. Moreover, higher GM seed prices (on average €30 (£20) more per hectare than conventional seed) reduced considerably the GM farmers' net margins.

Therefore, not only is the degree of innovation and new product development very limited, and far from the industry's initial claims and promises, but the achievements of the products that have made it into the market so far have been poor, if not counter-productive.

2.2. Implications for employment

With reference to the biotech companies as a whole, the industry admits that, "*company managements have been forced to focus on cash burn rates and conserving cash resources.*[x] *The*

[x] Burn rate refers to the rate at which a company uses up its supply of cash over time. It's the rate of negative cash flow, usually quoted as a monthly rate, but in some crisis situations, it might be measured in weeks or even days. Burn rate is mainly an issue for newer, unprofitable companies in exciting growth industries. As it takes a while for

result was approximately one in four companies laying off significant numbers of staff, […] *in the past three years* [2001-2003]*, with smaller and less mature companies faring worse*."[57] With reference to the agricultural biotech industry, it is estimated that the sector experienced the "*largest proportional decline in employment*" out of all biotech sectors, in the EU and the UK.[58]

It is difficult to quantify the employment status with reference to agricultural-biotechnolgy companies alone, however, the large number of mergers in both the seed and agro-chemical sectors in the last decade provide some indication. As an example, the 1999 merger of Rhone-Poulenc and AgrEvo to form Aventis (now Bayer CropScience) reduced employment by 3000–4000 jobs, with the closure of an R&D centre in the UK and a European agro-chemical manufacturing plant.[59]

The employment implications of GM for agriculture in the farming and processing industry, have also been found to be negative. A study of several industry sources by the Economic and Social Research centre on Innovation and Technology of the University of Maastricht found that GM farming practices generally decrease the overall labour required on the farm and in processing firms. [60]

The reduction in employment will have a negative effect on an already existing trend that has seen rural areas in Britain becoming deserted as people desert the countryside in search of work in towns and cities. Like the devaluation of agricultural jobs in the UK, which has driven 78 per cent of farm workers from the land in the last half a century alone.[61] As a diverse network of mixed, smaller farms is displaced by fewer, larger commodity producers, many rural areas no longer have the population densities to support local services – for example, four out of ten parishes in rural England have no shop or post office, six out of ten have no primary school and three-quarters lack a bus service or health clinic.[62]

In contrast, the labour-intensive nature of organic farming demands additional employment on the farm, contributing to job-creation in the farming sector. Organic agriculture is helping address wider employment needs across the UK. To fill employment gaps many UK organic farms are employing workers from abroad. The UK's Home Office statistics show that 36,600 applications (12 per cent) for the Worker Register Scheme between May 2004 and September 2005 were for agricultural jobs.[63]

A study by the University of Essex for the Soil Association found that organic farms provide on average **32 per cent more jobs per farm** than non-organic farms. It also found that organic farming is attracting more young people and new entrants into farming. [64]

On average, organic farmers in the UK are seven years younger than non-organic farmers, whose average age is 56. 31 per cent of organic farmers had entered agriculture as an entirely new career and did not come from a farming family, compared to 21 per cent of the non-organic sample. [65]

A significant proportion (39 per cent) of organic farms also engage in cutting edge business innovation such as "on-farm processing" and direct marketing enterprises. These innovations increase employment by 64 per cent on organic farms.[66] Organic farmers are therefore at the vanguard of revitalising local and regional food economies and are helping to strengthen the social cohesion of rural communities.

2.3. Implications for the environment

Organic farming has environmental benefits over a range of factors such as soil health, biodiversity and benefits resulting from the absence of synthetic pesticides, herbicides and fertilisers.[67] A

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many young firms to generate cash from operations, their survival depends on having an adequate supply of cash on hand to meet expenses.

comprehensive review by DEFRA on studies assessing the environmental implications of organic farming concluded that, on average, there is a positive benefit to wildlife conservation on organic farms.[68]

While some practices that favour biodiversity are used on a few conventional farms, on organic farms environmental management is routinely and systematically carried out. For example, a fundamental tenet of organic farming is to "feed the soil" to maintain organic matter content and to keep it in good condition. Pesticide use in organic farming is very restricted, if not completely absent, reducing the chances of pesticide pollution. Organic farming also produces low fossil fuel emissions, and does not rely on artificial fertilizers resulting in a more energy efficient system. [69]

On the other hand, whilst the GM industry has promoted its crops as benefiting the environment, farmers and consumers from reduced pesticide use, higher yields and cheaper food, there is no consistent data to support these claims. In fact, evidence has shown that pesticide use has increased for GM herbicide tolerant crops to deal with the emergence of resistant weeds. [70] As shown in previous chapters, GM has not provided higher yields..

The Government sponsored Farm Scale Evaluations of GM herbicide tolerant crops in the UK found that there was a reduction of food and habitats for farmland wildlife from growing GM beet crops and oilseed rape crops compared to the conventionally grown crops[71]. As around 70 per cent of the UK land area is farmland and much of the wildlife is found there, these findings prove alarming.

Farmland biodiversity in the UK has been in catastrophic decline for the last thirty years. Since 1970, skylark populations have fallen by 54 per cent, grey partridges by 86 per cent, corn buntings by 89 per cent and tree sparrows by 94 per cent. Similar fates have been met by mammals, such as the brown hare, as well as insects and farmland plants, many of which are now endangered species[72]. There is evidence that these declines are related to the loss of food and habitats within agricultural areas as farming systems have intensified.[73] In its Strategy for Sustainable Farming and Food the Government has committed to reversing the decline in farmland wildlife.

2.4. Coexistence of GM and organic farming - socio-economic and environmental costs

"A long term framework also means consistency in policy making, helped by structures for discussion and engagement that command confidence. It means clear principles underpinning the Government's financial and regulatory engagement with farmers." [74]

David Miliband, 2006
Former Secretary of State for Environment

One of the most significant socio-economic and environmental impacts of GM crops is the contamination they can cause to conventional and organic crops. As a recent report by the European Parliament concluded, "*it is unlikely that, if GM crops were to be grown in any European country on a large scale, cross-pollination or seed dispersal from GM-crops can be prevented.*"[75]

According to the GM Contamination Register, set up by GenewatchUK and Greenpeace, since 1997 149 contamination cases have been recorded worldwide, with 24 incidents of GM contamination in 2006 alone[76]. Those incidents affecting the UK are outlined in Box 2.1.

The StarLink corn incident in 2000, where a GM maize unauthorised for human consumption contaminated the food chain in the US is estimated to have cost Government agencies and the developer Aventis (now Bayer CropScience) between half a billion and one billion US dollars. [77] This incident seriously affected US corn exports to the EU, costing American farmers an estimated US $200 million a year in export losses[78].

The contamination of worldwide rice supplies from unapproved experimental GM varieties in the US in 2006 had a devastating impact on the rice industry. Rice futures prices plummeted $150 million - the sharpest one-day decline in years. Experts predicted that US rice exports may decline by as much as 16 per cent in 2006/2007. Rice millers, traders and retailers around the globe faced significant costs, including testing and recall costs, cancelled orders, import bans, brand damage and consumer distrust as at least 30 countries were affected[79]. US farmers, who have suffered severe financial losses, have filed several multi-million dollar class action lawsuits against Bayer, the company responsible for the GM crops.

Box 2.1: overview of GM contamination cases affecting the UK

- On 17th May 2000, the UK Government admitted that Advanta Seeds had imported the seed of an oilseed rape variety known as Hyola, which was contaminated with around 1 per cent of GM glyphosate and glufosinate tolerant seed. This had been sown on approximately 4,700 hectares in the UK.

- In 1999, Friends of the Earth tested 24 samples (21 food and 3 animal feed) for the presence of GM contamination. The results revealed that 2 out of 6 samples of food ingredients contained GM soya. Neither company was aware and both have since changed supplier.

- In 2000, Aventis reported to the UK authorities that some of its field trials with glufosinate herbicide tolerant GM sugar beet contained approximately 0.5 per cent of a second, and unauthorized, line of GM beet. Aventis indicated that the unauthorized GM event was likely to be present due to cross-pollination during the production of the beet seed in Germany.

- In 2000, Laboratory tests commissioned by Friends of the Earth in the UK found that Phileas Fogg Tortilla Chips and own-brand tortilla chips sold by Asda and Safeway contained GM maize not licensed for sale in the UK. Illegal traces of GM maize were also found in Tesco and Sainsbury tortilla chips.

- In 2001, trading standards officers sampled a range of foods and found low levels of contamination in around 10 per cent of the processed foods sampled.

- In 2002, Aventis (now Bayer), revealed that oilseed rape seed used at twelve sites in the UK's farm scale trials with GM crops, was contaminated with an unapproved GM variety. The seed had been used at a total of 25 British trials dating back to 1999.

- In 2002, the Food Standard Agency surveyed food and food ingredients in the UK and found GM soya at levels less than 0.1 per cent in some foods including several that were labelled as non-GM.

- In 2002, the Soil Association discovered that GM soya imported from Italy had contaminated organic animal feed.

- In 2004, sampling by Greenpeace revealed that 4 unapproved varieties of GM maize (GA21, NK603, GA21, MaxGard) were found in shipments coming into the UK.

- In 2004, 10 out of 25 samples of health or organic foods that contained whole soya were found to have GM soybean contamination at levels below 1 per cent. 8 of the 10 positive samples were labelled as 'non-GM' or organic.

- In 2005, an experimental GM rice from China not approved for human consumption contaminated foods exported to Europe. The rice had already contaminated foods in China including Heinz baby food. Friends of the Earth and Greenpeace found the GM rice in speciality foods such as rice noodles in the UK, France and Germany.

- In August 2006 US regulators announced that an unapproved GM rice (Bayer's LL601) had contaminated commercial long-grain rice supplies. The rice had been grown experimentally from 1998 to 2001 and was not approved anywhere in the world. Contaminated rice was found in at least 30 countries. Many countries introduced testing requirements on US long grain rice imports, or import bans. In October 2007 US Authorities revealed that although a year-long investigation had taken place, they were unable to find out how the illegal rice, along with another unapproved variety, LL604, got into the food chain. As a result, the authorities took no enforcement action against Bayer.

GM Contamination Register Report 2006.
http://www.gmcontaminationregister.org/index.php?content=nw_detail1

Chapter 3. Competitiveness: industry ties or regulatory capture?

The previous chapter has illustrated how agricultural biotechnology has failed, so far, to provide any evidence of how it will help the UK Government reach its objective of creating a competitive and sustainable agricultural system. It has also shown that Government support for GM poses a serious threat to other more competitive and sustainable agricultural practices,such as organic farming.

The drive for commercially relevant research, at the heart of the Government's science and innovation policy (see Chapter 1) has resulted in a significant penetration by industry of public sector research institutions and policy-making committees:

- Institutionally, the most evident expression of this approach was the move of the Office for Science and Innovation (OSI) from the Cabinet to the former Department of Trade and Industry (DTI) in 1995 as a way of developing Science and Technology policies closer to the needs of the industry;

- Policy-wise, the LINK scheme has also enabled Government to gear public funds for research & development in science & technology closer to the needs of the industry;

- Politically, the appointment of Lord Sainsbury as Science Minister in 1998 also confirmed the Government's decision to strengthen its ties with the industry.

This chapter explores further the connections between senior UK Government officials and bodies and the GM industry over a number of years. These relationships have resulted in over-representation of the interests of the GM industry and an inherent industry bias in key policy processes and decisions.

3.1. Strengthening ties with industry and compromising institutional independence

3.1.1. The UK Science Minister

Lord Sainsbury was Science Minister in Tony Blair's Government from 1998-2007. He was also a member of the cabinet biotechnology committee, Sci-Bio – responsible for national policy on GM crops and foods – and as such was a key adviser to the Prime Minister on GM technology.

However, Lord Sainsbury also had key interests in biotech companies and research institutes. He was regularly accused of conflict of interests due to his personal financial interests in the agricultural-biotechnology business including:

- His ownership of two biotech companies, Diatech and Innotech
- His founding of the Sainsbury Laboratory of the John Innes Centre – a key research institute in agricultural biotechnology in the UK
- His founding role in the Gatsby Charitable Foundation, whose main beneficiaries has been the Sainsbury Laboratory.

Through the Gatsby Charitable Foundation, Lord Sainsbury has invested millions into the research of plant genetics. The foundation has provided the Sainsbury Laboratory of the John Innes Centre with approximately £2 million per annum on GM research.[80]

Lord Sainsbury has also been a keen supporter of the Science Media Centre, an organisation positioned as a source of independent scientific information for the media, although 70 per cent of its funding comes from business. One of the original advisors to the Science Media Centre was Mike Wilson, also a consultant for Lord Sainsbury's biotech company, Diatech.

Lord Sainsbury has also promoted agricultural biotechnology, and biotechnology at large, though the Biotechnology and Biological Sciences Research Council (BBSRC) whose annual funding increased by £50 million since his appointment as Science Minister. Since then the BBSRC's grant disbursement to the Sainsbury Laboratory has also increased by 300 per cent. [81]

3.1.2. The Biotechnology Science Research Council (BBSRC)

The Biotechnology and Biological Sciences Research Council (BBSRC) is the UK's public funding body for research and training in the "non-medical life sciences", and one of the seven Research Councils sponsored through the UK Government's Office of Science and Innovation. It is the main funding body for agricultural biotechnology.

Despite the BBSRC being a public funding body, its chairman until January 2002 was Peter Doyle, a director of biotech giant Syngenta and the former executive director of GM company Zeneca (now part of Syngenta). Doyle originally took up his BBSRC post while still Zeneca's Chief Executive. His replacement at Zeneca was Julia Goodfellow, wife of geneticist Peter Goodfellow, head of discovery research at biotech/pharmaceutical GlaxoSmithKline. Representatives of GlaxoSmithKline, Syngenta and Zeneca sat on different BBSRC boards during Peter Doyle's chairmanship at the BBSRC.

Research scientists funded under the BBSRC were also found to operate under particular restrictions. In 1999 a leaked BBSRC employee's contract revealed, a clause that stated: "*As the* [place of work] *is supported from public funds and in view of the nature of its work, there are certain restrictions on employees wishing to engage in political activities. Staff should not become involved in political controversy in matters affecting research in biotechnology and biological sciences*."[82] The clause effectively covers UK scientists under the BBSRC by the same "gagging order" that for a long time stopped Dr. Arpad Pusztai of the Rowett Institute disclosing or discussing his negative research findings on the safety of GM potatoes. Dr Pusztai had his reputation destroyed and his research suppressed, and was unable to make any further comment on his research under a BBSRC staff code.

The BBSRC code applies to all publicly funded research scientists operating in 98 UK research establishments and universities, including key institutes operating with a clear focus on GM food/crops research, such as the John Innes Centre – the UK's leading plant biotech institute – the Roslin Institute – responsible for cloning Dolly the sheep – the Institute of Food Research and the Institute of Arable Crops Research – also involved in GM research.

3.1.3 Pro-GM Government Stance

In 2004, leaked Cabinet Office committee meeting minutes revealed Government plans to support the introduction of GM maize into the UK. Because "*the public was unlikely to be receptive*" the committee recommended that the Government develop a coherent strategy to promote the effectiveness of the biotechnology industry in Europe, with a Whitehall steering group, and Lord Sainsbury in charge of making the public aware of the "*clearly beneficial aspects of biotechnology".*[83] An official had stated that: "*opposition* [to GM] *might eventually be worn down by solid, authoritative scientific argument.*"[84]

3.2. Compromising the independence of regulatory bodies

An illustration of the industry bias in the Government's approach to the regulation of GM technology is provided by several recent examples, involving those regulatory bodies responsible for the safety of GMOs outlined below.

3.2.1. DEFRA's legally flawed 'coexistence' proposals

Defra's proposals for measures for the 'coexistence' of GM, conventional and organic crops in England show a clear bias towards the GM industry - designed to pave the way for GM crops to be grown in England rather than protect consumers, farmers and the environment from GM contamination. The proposals, published in July 2006[85], include inadequate separation distances between GM and non-GM crops – just 35 metres for oilseed rape, despite the fact that cross pollination routinely takes place at well over this distance – and no separation distance at all for beet. They also propose no public register of sites showing where GM crops are grown, despite the fact that this is required by EU law. They envisage the industry putting in place a voluntary code to deal with compensation to farmers for economic damage caused by contamination, instead of strict legislation to ensure the biotechnology industry is liable. The entire proposal is based on ensuring that any contamination from GM crops is kept below the threshold set in the GM labelling regulations of 0.9 per cent. However, an independent legal opinion produced for Friends of the Earth, the Soil Association and GM Freeze, by leading European lawyers, found this approach legally flawed in seven key areas.[86]

The lax approach of the Government towards contamination by GMOs was already evident back in 2004, when the leaked minutes from a Cabinet Office committee meeting revealed that, when Margaret Beckett stated that the GM industry should bear responsibility for ensuring that GM crops do not contaminate non-GM crops above the legal maximum threshold of 0.9 per cent, the Committee dismissed the concern about contamination of organic crops as "*there was currently very little production of organic equivalents of the GM crops likely to be grown in the short term*".[87]

It is interesting to note that it was with the GM industry that the Government primarily consulted in 2006 over its coexistence proposals. During the consultation period Government officials met with a number of GM companies – including AstraZeneca, BASF Plant Science, Bayer CropScience, Dow AgroSciences, Du Pont (UK) Ltd, Monsanto UK Ltd, and Syngenta Ltd – but not a single organic business, meeting only with the main organic certification body, the Soil Association. [88]

3.2.2. ACRE's frustrations with 'unfair' GM regulations

The Advisory Committee on Releases to the Environment (ACRE) is responsible for advising Government ministers on the release of GM crops into the environment. The Committee recently released a report exploring the implications of the Farm Scale Evaluations of GM herbicide crops. The report, "Managing the Footprint of Agriculture: Towards a Comparative Assessment of Risks and Benefits for Novel Agricultural Systems", calls for a lighter-touch system that concentrates on

the claimed benefits of GM farming. In ACRE's view, the current regulatory system is unfair to GM crops for it only addresses the risks of the technology.[89]

This pro-industry stance was highlighted in the press invitation for the launch of the report, where a number of questions where raised as to whether society was "*losing out on the environmental benefits of new agricultural technologies because regulators are only interested in the potential harm?*", or whether it was "*sensible to have exhaustive environmental risk assessments for some new crops while others with similar characteristics are introduced with no equivalent tests?*". It was the Science Media Centre who organised the press conference on behalf of ACRE.[90]

This could indicate the beginnings of an attempt to weaken GM regulations in order to bring new crops to the market more quickly at the expense of thorough safety assessments. Given that the assessment over whether GM crops and foods are safe for the environment and health is governed by European legislation, it is worrying that the UK Government's official GM advisory body takes such a view.

3.2.3. The failure of the FSA to act upon contamination of the food chain with Bayer's unauthorised GM rice

The UK's Food Standards Agency (FSA) describes itself as "*an independent food safety watchdog set up by an Act of Parliament in 2000 to protect the public's health and consumer interests in relation to food*."[91] However, it is also the competent authority for applications to approve GM foods and crops under the EU Food and Feed Regulation and takes overall responsibility in the UK for food safety issues.

Friends of the Earth recently took the FSA to a Judicial Review over its failure to take adequate action over illegal GM rice that entered the UK food chain in 2006. The case was based on the contamination of US long grain rice (LLRICE601) with an experimental GM strain grown in the US. It was the most significant illegal GM food contamination incident to affect the UK to date, causing contamination of rice on a massive scale across the UK and around the world.

Although the judge did not find the FSA had acted illegally, he faulted the agency for making a number of mistakes. This included its decision not to issue a food alerts and the late provision of advice to local authorities on testing for GM rice – despite the EU having issued an Emergency Decision asking member states to take action to "verify the absence" of LLRICE601 from rice that was already on the market. The FSA had announced there were no food safety issues associated with LLRICE601, despite not having sufficient evidence to back this claim. The European Food Safety Authority later published a much more reserved statement admitting that a full safety assessment could not be made because of a lack of data.

Minutes of private meetings between the food industry and FSA showed that the FSA were advising companies that it did not "*expect contaminated products already in the food supply chain to be removed from sale*" and did "*not expect companies to trace products and remove them from sale.*"[92] The FSA was effectively telling food businesses to carry on as normal and not to worry about taking steps to test their rice for contamination or to withdraw contaminated rice that they found, even though its presence in the food chain was illegal.

As Box 3 illustrates, it is not the first time that the FSA has come under criticism for its pro-GM (and anti-organic) stance.

Box 3 – The Food Standard Agency - biased in favour of GM?

The FSA was set up in 2000 as an independent body, at arms length from Government with the objective of ensuring the safety of foods. However, on the day that John Krebs was appointed as the first head of the FSA, he publicly endorsed GM food in a radio interview claiming that all GM products approved for sale in the UK "*were as safe as their non-GM counterparts*".

While Krebs was not prepared to reconsider the issue of approved GM foods, despite the high level of public concern, he showed a willingness to tackle the issue of organic food – which enjoyed a considerable degree of public confidence – by appearing on BBC TV in August 2000 and announcing that consumers who were buying organic food were "*not getting value for money, in my opinion and in the opinion of the FSA, if they think they are buying extra nutritional quality or extra nutritional safety, because we don't have the evidence.*"

The independence of the FSA came under criticism in 2003 during the UK's GM Public Debate, *GM Nation?* In particular, debate materials developed by the FSA were widely condemned as biased. "Attack on food safety chief for GM crop bias" ran a headline in The Daily Telegraph, reporting that the chairman of the Food Standards Agency had been accused of "*manipulating the Government's public debate on genetically modified foods and failing to be objective in his role as independent scientific adviser on GM crops*."[93] Nine organisations, including the National Federation of Women's Institutes and Unison, the UK's biggest trade union, had written to John Krebs, accusing him of bias and of misrepresenting the views of the public. A review of the FSA's performance under Krebs concluded that the vast majority of people consulted felt that the FSA had "*deviated from its normal stance of making statements based solely on scientific evidence*", when "*speaking against organic food and for GM food*".[94]

In May 2003, the FSA's Consumer Committee reviewed the work the Agency had done around the GM public debate, including holding a citizens' jury. The review was critical of the FSA's approach and claimed that: "*the information provided in the booklet and on the web-site was useful but incomplete and therefore biased, as it ignored existing concerns about GM food*."[95]

During the GM rice judicial review it also became known that the FSA's head of Novel Foods, with responsibility for GM foods, worked for Syngenta for 7 years.

3.3 – Political Backing

3.3.1 - The UK Government's systematic support to agricultural-biotechnology at EU level

The Government's political support for GM, driven by DEFRA, with minimal input by the devolved administrations, is evident. Since 1997, six EU countries – Austria, Belgium, France, Germany, Italy and Luxembourg – have introduced national bans on a number of GM crops on safety grounds although they had been approved. The European Commission has attempted on numerous occasions, to get these countries to lift these national bans but each time member states have voted overwhelmingly in support of allowing these bans to remain. UK ministers however, have consistently voted in favour of lifting the national bans – the only country to do so for every vote.[96] The UK has also consistently voted in favour of all new GM food and feed applications, despite the safety concerns raised by other member states[xi]. This pro-GM position is also at odds with public opinion and the commercial realities for the technology in the UK.

[xi] The one exception to this is approval for Monsanto's oilseed rape GT73 in 2004, where the UK abstained in one vote, but later switched to supporting the application.

3.3.2 DEFRAs consultation with BASF on Potato trials

In the England, DEFRA is responsible for regulating the release of GM crops into the environment. In December 2006 approval was granted for the experimental planting of BASF's blight resistant potatoes for a period of five years in two sites in Cambridge and Derbyshire. In an unusual step, the consent for the field trials was personally signed by Secretary of State David Miliband instead of a senior civil servant. The conditions on the consent were much more relaxed than conditions set by the Irish Government in 2005 after BASF applied to trial its GM potatoes there. BASF abandoned their plans to trial the same GM potatoes in Ireland due to the 'onerous monitoring requirements' imposed by the Irish government.[97] By putting in place weaker conditions, DEFRA effectively made it easier and cheaper for BASF to carry out its trials in England.

Correspondence between DEFRA and BASF, obtained through a Freedom of Information request by GM Freeze, reveal that DEFRA discussed and amended the trial conditions with BASF in advance, including asking BASF whether the proposed conditions were "agreeable to BASF". [98]

Chapter 4. Conclusions & Recommendations

"*What should the role of the Government be in improving the interaction between science and society? Are there areas where Government could improve the promotion of science in society? How can we improve public confidence in the Government's use of science?*"[99]

DTI, March 2004.

In January 2004, the Chancellor of the Exchequer announced that the Government would develop, as part of the 2004 Spending Review, a ten-year investment framework for public and private investment in UK science and innovation to provide a secure medium-term platform for innovation and productivity growth.

The investment framework states that: "*The Government will continue to make decisions on the basis of the best available scientific evidence, while recognising that people need to have confidence in the way Government does this, and confident that the Government is willing to discuss their interests and concerns* […]"

It is difficult to imagine how confidence could be placed in the Government's ability to manage science and innovation given evidence of industry bias that currently dictates the public research agenda in the UK with reference to agricultural R&D.

This report shows that GM has not delivered in the UK on the governments own goals and benchmarking on the future of food and farming. It exposes the contrast between the UK policy approach to ensuring agriculture contributes to an environmentally and economically sustainable future and its actions in terms of policy and funding support for agricultural-biotechnology. It illustrates that GM agriculture and sustainable farming practices, such as organic agriculture, are incompatible elements of disparate policy areas that cannot coexist within science and innovation policy. Not only do agricultural biotechnology and sustainable farming compete for research funds, but ultimately the risk of contamination posed by the release of GM crops poses a significant threat to the success of non-GM farming, with organic farming and other sustainable farming practices being left particularly vulnerable to major economic losses.

Despite the Government's policy commitment to a sustainable agricultural system, as outlined in its Strategy for Sustainable Farming and Food and its One Planet Farming vision, its financial and political support for sustainable farming practices, such as organic, has been minimal, whilst its support for GM crops and foods has been disproportionate to the technology's delivery.

To date, the agricultural-biotechnology industry has failed to deliver any products of interest to UK farmers and consumers. Jobs are being lost, negative environmental impacts have been recorded, and economically the sector is performing poorly. Many companies have merged, or relocated abroad, leaving the sector to be dominate by an oligopoly of big agricultural-biotechnology giants.

Despite this, the Government supported the technology with research funding of at least £49 million between 2006 and 2007 and £50 million between 2005 and 2006. And an average of £73.8 million funding every year between 2001 and 2002 and 2003 and 2004.

In contrast, organic farming has grown exponentially in the UK – as it has in the rest of Europe – with thousands of jobs being created, rural communities being reinvigorated, environmental conditions being improved and sales tripling over the last years – the market has experienced expansion as farmers convert to organic as the result of the high consumer demand. Despite the success of the sector, the current domestic production of organic produce fails to meet the market demand, requiring greater political and financial support from the Government to exploit the economic potential of domestic organic production – a commitment the Government made in its Action Plan for organic farming.

However, to date, R&D for the innovation of organic farming has been inadequate both quantitatively and qualitatively. DEFRA spending on research and development related to organic farming was £1.6 million between 2006 and 2007. Public expenditure on R&D for organic farming in the UK has been about £2.2 million per annum from 1997 to 2006 and currently there is no defined budged allocation for organic farming within DEFRA. Moreover, much of the funding has been deployed under the LINK scheme, itself ill-suited to address the research needs of the organic sector, causing the potential of the limited research funds to be under-exploited.

The strong ties that link Government to the agricultural-biotechnology industry within key Government institutions could provide an explanation for the mismatch between the Government's policy commitments on sustainable farming and its research agenda. As the report reveals, a number of elements bring into question the ability of Government to manage this proximity given the strong bias currently noticeable in the Government's stance on GMOs, particularly with reference to their co-existence with non-GM crops, and organic crops.

The recent Science Review by Lord Sainsbury, 'A Race to the Top' acknowledges that the Government must provide the essential public goods required for success in a dynamic and innovative knowledge economy but recommends a continued focus on user-driven collaborative Research and Development. Although the review does not focus on agricultural research and development, its recommendations further embed the Government stance that the industrialisation of research and deeper involvement of business in defining the research agendas will have benefits for UK science and innovation across the board. [100]

Friends of the Earth urges the Government to recognise that agricultural biotechnology has failed to deliver the industry's promised benefits and is unlikely to help the UK compete in a global economy given the trends observed so far. Organic farming is an example of a farming system already delivering social, economic and environmental benefits and is supported by the public. The Government should take the opportunity of the creation of the DIUS to re-evaluate UK science policy and realign funding priorities to support a thriving and sustainable farming industry.

Specifically, Friends of the Earth calls upon the Government to:

- Halt its political and financial support for GM food and farming given its negative socio-economic and environmental impacts, failure to deliver, and lack of public support.

- Shift the current funds destined to agricultural biotechnology R&D to encourage innovation in sustainable and popular agricultural practices such as organic farming.

- Set up a Sustainable Agricultural Research Council replacing the BBSRC to provide an appropriate and well-funded institutional setting for the innovation of sustainable farming practices.

- Address the excessive industry influence on the Government's policy for science and innovation, particularly with reference to GM crops and foods, to close the gap between Government policy commitments to a sustainable and competitive agricultural system its research agenda.

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