Shaping a UK strategy for agri-tech: response from GM Freeze

	Business representative organisation/trade body
	Central government
	Charity or social enterprise
	Individual
	Large business (over 250 staff)
	Legal representative
	Local Government
	Medium business (50 to 250 staff)
	Micro business (up to 9 staff)
	Small business (10 to 49 staff)
	Trade union or staff association
✓	Other (campaigning organisation)

Please write here your name/ the name of your organisation and contact details if you wish to. This would help us to contact you if we have further questions.

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1. The aims and objectives of the Agri-Tech strategy are outlined above in the introduction to this call. Please give your views on:

a. The need for and potential benefits of having such a strategy.

GM Freeze is concerned that the current consultation is based on the wrong approach to agricultural development both in the UK and in the Global South. If the goal is solely to export the UK's technology and knowledge it is essential that we are sure that our R&D is aimed at developing solutions that:

- ensure the technology is safe for people;
- ensure that planetary limits are not exceeded;
- farmers around the world actually need and can afford the technology;
- farmers have been fully consulted particularly about the ethical, socio-economic and cultural impacts.

We therefore suggest that this consultation is re-issued to ensure that the full range of knowledge based agroecological solutions are also considered and the consultation makes it clear that restoration of agroecosystems to full health and function is a principle of objective of the strategy. There should to be special emphasis on the need to restore the soil to its full multi functionality.

GM Freeze agrees that developing a strategy on harnessing UK industry to support global food production could be very valuable, and we fully the support the use of public consultations in this process. However, evidence that public consultations have ever influenced policy in industry, food or farming is lacking. It would have been very helpful if the consultation document had set out clearly how public comments and ideas would be incorporated in developing the final policy and how they would be acknowledged. The public funds a great deal of agricultural R&D in the UK (£400 million), as well as supporting industrial policy, and so have every right to an explanation as to how their views will be taken into account.

If the final strategy is representative of wider range of opinions then it should receive much greater public support for the use of taxpayers' money needed to implement it. A strategy which only represents the narrow interests of corporations, technology start up companies, research institutions or large-scale international farming companies will inevitably fail.

The final strategy must reflect criticism of the aims and objectives and transparently show how these have been changed to take those comments into account. If Government fails to do this fewer and fewer people will bother to respond to consultations and the processes will be much poorer for that. Crucially technological developments will not benefit from the critical eye of the public and may therefore fail to gain their approval and fail to achieve a viable share of the market.

b. The appropriateness of the objectives proposed.

GM Freeze has a number of comments on the objectives

- **Improving agricultural efficiency whilst avoiding environmental harm.** Before stating that improved efficiency is required, BIS (with and Dfid and

Defra) needs to decide how efficiency should be assessed. It is very unlikely that one single measurement will be sufficient, particularly in the context of avoiding environmental harm. In the past Defra has relied on an economic assessment - net return on the sum invested - which is entirely inappropriate. Measurements which reflect the work on planetary limits would be far more appropriate[1].

- **Global food security whilst maintaining natural resources and biodiversity.**
  Many of the world's natural resources are already been pushed well beyond the level of exploitation which could be considered sustainable. This was clearly set out by the work on planetary limits and the International Assessment of Agricultural Knowledge Science and Technology for Development (IAASTD) report[2]. It is very regrettable that the consultation document does not appear to recognise the importance of healthy soil as the basis for a sustainable farming system nor the degraded state of many soils in the UK and around the world. We would emphasise that restoring soils to full health largely involves good management rather than technology per se. The soil is a highly complex ecosystem that can be seriously damaged by the application of poorly tested technology, for instance agro-chemicals[3 and 4] or poor application, for instance compaction caused by heavy machinery.
- **Sustainable international development and more collaboration.**
  There is no doubt that sustainable international development is an important goal and that the UK should play a part in enabling it to happen. However, models of development are being imposed on farmers in sub-Saharan Africa (SSA) that are geared to exports, growth and competitiveness rather than the needs and desires of the population. For instance Agricultural Growth Corridors in Mozambique and Tanzania[5] are being pushed by Northern governments, local elites and Northern corporations. These are in grave danger of repeating the mistakes of intensive agriculture the IASSTD report said were "not and option" for the future because they have failed to deliver a sustainable system of food production. SSA is particularly vulnerable to pollution of groundwater (on which it is very dependent) with agro-chemicals, which this type of intensive agricultural development model will surely lead to as it has in Northern countries. African farmers and their organisations have demonstrated their desire and willingness to participate in processes to identify beneficial R&D programmes and economic development projects[6] and yet they seldom influence the final decisions. Participation of farmers and rural communities is shaping R&D to meet their needs rather than those of

[1] Rockström, J., W. Steffen, K. Noone, Å. Persson, F. S. Chapin, III, E. Lambin, T. M. Lenton, M. Scheffer, C. Folke, H. Schellnhuber, B. Nykvist, C. A. De Wit, T. Hughes, S. van der Leeuw, H. Rodhe, S. Sörlin, P. K. Snyder, R. Costanza, U. Svedin, M. Falkenmark, L. Karlberg, R. W. Corell, V. J. Fabry, J. Hansen, B. Walker, D. Liverman, K. Richardson, P. Crutzen, and J. Foley. 2009. Planetary boundaries:exploring the safe operating space for humanity. *Ecology and Society* **14**(2): 32. [online] URL: http://www.ecologyandsociety.org/vol14/iss2/art32/

[2] [2] IAASTD, 2009. International Assessment of Agricultural Knowledge, Science and Technology for Development. Agriculture at a Crossroads . Synthesis Report. A Synthesis of the Global and Sub-Global IAASTD Reports. http://www.agassessment.org/reports/IAASTD/EN/Agriculture%20at%20a%20Crossroads_Synthesis%20Report%20(English).pdf

[3] Kremer RJ & Means NE. 2009. Glyphosate and glyphosate-resistant crop interactions with rhizosphere microorganisms. European Journal of Agronomy 31: 153-161.

[4] Correia F.V. and Moreira J.C., 2010, Effects of glyphosate and 2,4-D on earthworms (Eisenia foetida) in laboratory tests.Buletin of Environmental Contamination and Toxicology 85:264-8.

[5] Isaac C, 2010. Agricultural Growth Corridors: Making Agriculture Competitive. AgDevCo Update Event: Global Food Security and Poverty Reduction in Africa London, 8th June, 2010

[6] IIED, 2012.High level policy dialogue between the Alliance for a Green Revolution in Africa (AGRA) and small scale farmers on the priorities and governance of agricultural research for development in West Afr1-3 February 2012 , Accra, Ghana. http://pubs.iied.org/pdfs/G03349.pdf

donor nations or industry is essential if sustainable international development is to be achieved.

- **Private sector investment in agri-technology and rapid uptake by farmers.**
  The IAASTD reports showed how public investment in agricultural research was declining around the world and being replaced by private investment. There is an urgent need to reverse this trend if sustainable agriculture is to be achieved. Private sector involvement in agriculture leads to the marketing of proprietary technologies and export-led agriculture, which in poor SSA countries would result in the needs of the general population and small family farmers being ignored. Existing examples of this include The Southern Agricultural Growth Corridor in Tanzania has the following corporations in support Unilever (food exports), Yara (fertiliser imports), Syngenta (seed and pesticides), DuPont (seeds and pesticides), Land 'O Lakes (US farmer cooperative producing food and selling seeds and pesticides), Monsanto (seeds and pesticides), SAB Miller (brewers) and General Mills (processed foods)[7]. DFID has direct involvement in this project[8] and in similar ones in Mozambique, Ethiopia, Burkina Faso, Ghana, Kenya and Rwanda. The "streamlining of legislation" features in some of these projects, which sounds ominously like weakening regulations. This would be highly undesirable in countries where the environment and communities are fragile and need the certainty of strong regulations to protect land and employment rights, as well as public health and the environment. DFID should also be extremely wary of projects which lead to the availability of cheap processed foods in Africa because of the harm this type of diet can do to public health[9 and 10]. Merely adopting Northern practices in the Global South could spell disaster for the people, rural economies and the environment. Therefore projects should be assessed for risks to health, the environment and socio-economic impacts and turned down if they fail these tests.
- **Increase UK exports of knowledge, products, services and technology.**
  An increase of exports stated in this objective could be a very mixed blessing for recipient poorer countries if those exports are inappropriate for reasons of public health, environment, cultural, or socioeconomic impacts. The cost of technology or products is a vital concern to small farmers. GM Bt cotton in India has served poor farmers very badly because of the high cost of the GM seeds and their poor performance on farms that cannot afford irrigation and inputs. In Maharashtra State the additional poverty caused by these failings and rising suicide rates in indebted farmers has reached the point that the State has now banned the sale of GM cotton seed[11].

  There are many good examples of appropriate technology and knowledge transfer, for instance the push-pull approach to managing the weed Striga

[7] Isaac C, 2010. Agricultural Growth Corridors: Making Agriculture Competitive. AgDevCo Update Event: Global Food Security and Poverty Reduction in Africa London, 8th June, 2010

[8] Grow Africa Accelerating Growth for Sustainable Growth in African Agriculture. http://www3.weforum.org/docs/IP/2012/NVA/WEF_NVA_Grow_Africa_Brochure.pdf

[9] Monteiro C.A., et al, 2011. Increasing consumption of ultra-processed foods and likely impact on human health: evidence from Brazil. Public health Nutrition 14, 5-13.

[10] Northcote C. et al, 2012. Are dietary patterns in childhood associated with IQ at 8 years of age? A population-based cohort study. Journal of Epidemiology and Community heath.**66**:624-628 doi:10.1136/jech.2010.111955 2012;

[11] The Times of India, 2012. Maharashtra bans Bt cotton seeds **http://articles.timesofindia.indiatimes.com/2012-08-09/india/33118430_1_cotton-seeds-bt-cotton-cotton-growing-states**

and corn borer infestation of maize, which was developed with the help of Rothamsted Research[12]. This is a highly appropriate, knowledge-based technique that has resulted in significant yield increases for the thousands of farmers who have adopted it. Another example would be water harvesting techniques developed by Practical Action[13]. The key features of both these examples is that they are affordable, deliver results quite quickly and are controlled by farmers and local communities, unlike the development of GM crops which are a continuation of the failed top-down approach to agricultural development.

Marker assisted selection (MAS) is a possible example of a technology which could assist traditional plant breeding in the Global South, providing its transfer involved full training, was free of intellectual property rights and could be wholly controlled by public plant breeding institutes and farmers, who should also be able to save seeds from the new varieties. DFID has already funded successful developments in MAS[14].
Key areas where the UK could develop knowledge and technology-based solution are the efficient use of water in agriculture, mixed farming, biological pest control and the management of organic wastes (including human sewage) to maximise the recycling of plant nutrients that currently cause pollution and/or are a threat to public health.

- **Improved take-up of knowledge and technology by farmers.**
This is a crucial part of the strategy without which all that goes before could be rendered a waste of time and money. In the UK the loss in 1997 of the free service provided by the Agricultural Development and Advisory Service (ADAS) has meant that farmers are not getting full access to impartial advice and either have to pay an independent agronomist/advisor, rely on agri-industry funded advisors or do their own research. The uptake of knowledge-based solutions stemming from extensive research (for instance the provision over-wintering and feed habitats for parasites and predator to control arable pests such as aphids[15]) has been poor despite the obvious attraction of reducing costs for farmers and improving the sustainability of arable systems.

  Provision of high-quality extension services for smallholder farmers in the Global South is patchy, although there are many excellent examples of where approaches, such as farmer-to-farmer training, have brought significant benefits[16].

  Given that many of the necessary developments toward sustainable farming and food production will be knowledge-based, rather than through the

[12] Rothamsted research, undated, The 'Push-Pull' cropping system: feeding people, feeding the soil. http://www.rothamsted.ac.uk/Content.php?Section=SuccessStories&Page=PushPull

[13] See http://practicalaction.org/rainwater-harvesting-9

[14] DFID, 2011. “Creating genetic markers to breed downy mildew and drought resistant pearl millet”. See www.dfid.gov.uk/R4D/PDF/Outputs/ICRISAT/DFID_impact_case_study_Pearl_millet_FINAL[1].pdf

[15] Powell W, A'Hara S, Harling R, Holland JM, Northing P, Thomas CFG and Walters KFA, 2004. *Managing biodiversity in field margins to enhance integrated pest control in arable crops ('3-D Farming' Project)* PROJECT REPORT NO. 356 Part 1 Home Grown Cereals Authority

[16] Van den Berg H., 2004 IPM Farmer Field Schools A synthesis of 25 impact evaluations. FAO http://www.fao.org/docrep/006/ad487e/ad487e00.htm#TopOfPage

application of a particular technology, the provision of a free UK land management advisory service for farmers and landowners should be reintroduced. The cost of this could be covered by raising the VAT rate on agro-chemicals (thus encouraging farmers to seek alternatives), which is taking place already and therefore no extra cost would be incurred for its collection.

Such an approach would not rule out the use of technologies providing these were appropriate and were controlled by those adopting them rather than those marketing them.

c. Desired outcomes and indicators of success of the strategy, and the role for Government in enabling delivery of these.

The outcomes which should be aimed for are:

- to feed more people per unit area of land with a safe and balanced diet;
- to reduce UK dependency on imported feed and feed and to develop UK-grown alternatives;
- to restore soils and other agro-ecosystems to full health with maximum biodiversity and healthy populations of soil macro and micro organisms;
- to improve animal welfare for all farmed animals;
- to minimise non-renewable resource inputs.

Indicators of success would be that:

- the planetary limits which are threatened because of agricultural and land use changes are not breached and return to sustainable levels;
- there is a progressive reduction in malnourished people;
- there is a progressive reduction in the numbers of obese people and other dietary related diseases.

The Government has a key role in providing the policy frameworks and necessary legislation on agriculture, public health, pollution control, climate change, water management and protection and enhancement of biodiversity, organic waste and sewage recycling and the restoration of soil to full health.

Another key area of Government responsibility is the correct application of the precautionary principle. Previous experience, for example organochlorines and ozone depleting chemicals, shows that failure to apply the precautionary principle correctly can result in catastrophic consequences. It is therefore vital that Government insists on the most robust risk assessments for all new products and technologies and review those for existing products including GM crops. In particular, careful attention must be paid to the impact of low-level exposure over a long period of time, which the current risk assessments for pesticides, biocides, GMO and chemicals fail to do.

d. Any potential drawbacks / unintended consequences associated with these outcomes and how these could be mitigated.

The application of the precautionary principle and the adoption of an agroecological approach to land management will allow development to take place within the limits

imposed on us by the planet.

This form of sustainable development is already widely practiced throughout the world but not in the most intensively-farmed regions where most environmental damage has taken place. Technology, on the other hand, is more likely to bring about unintended consequences. Mitigation measures are no substitute for thorough risk assessment, and if doubt or data gaps exist no technology should get approval. Mitigation measures must be proven to work, be practical and be enforceable. Post-market monitoring of the impacts of technologies is also not an acceptable substitute for thorough risk assessment prior to the introduction of new technology because companies holding the intellectual property rights have a vested interest in not finding adverse effects. Generally it is independent scientists who unearth unexpected events, often after serious harm has been caused. In the case of GMOs in the US restrictive clauses in sales agreements prevented[17] independent research being undertaken on their impacts for many years. It is this type of behaviour that a strategy on agri-technology should seek to prevent.

2. What in your view are the current strengths and weaknesses of the UK agricultural technology sector? Please provide evidence in support of your responses.

The main weakness of the UK's agricultural technology sector at present is that :

- It has no effective communications with the majority of farmers and consumers and hence product development meets the needs of the developing company rather than the farmer or consumer. For example, Rothamsted's GM wheat to repel aphids by producing an alarm pheromone has no clear market in the UK with farmers[18] or food manufacturers[19];
- Most of its technological development takes place without reference to pressing environmental and socio-economic problems and often without meaningful reference to the natural limits of the planet.
- Failure to carry out adequate long-term risk assessments before releasing new technology can produce unexpected consequences, particularly when the organism is question is not well studied, including the long-term impact of escapes or cross breeding.
- Another major weakness of the UK's approach to agri-technology is that none of the risk assessments require research into possible interactions between similar technologies (for instance synergy between two different pesticides applied to the same crop or between active ingredients and adjuvants in formulated pesticides) or between different technologies, for instance GM and pesticides or GM and nanotech or pesticides and nanotech or GM, nanotech and food additives/packaging.
- The requirement to submit impact assessment with applications to research councils has the potential to move researchers in the direction of technologies which can be patented (and hence generate repeat sales) rather than

[17] Pollack A., 2009. Crop Scientists Say Biotechnology Seed Companies Are Thwarting Research, New York Times 19 February 2009
http://www.nytimes.com/2009/02/20/business/20crop.html
[18] Guy Smith farmer in SE Essex commented "For me as a practical farmer, I spend less than £5/acre on insecticide sprays when growing wheat, so the economic benefits are not exactly exciting. But the main question I have is why are we spending a large chunk of our finite R&D budget on a crop no one wants to buy?"
http://www.fwi.co.uk/Articles/11/05/2012/132852/39Marmite39-debate-gets-us-nowhere-on-GMs.htm
[19] All major UK supermarkets have pledged not to supply GM ingredients in their products for 14 years. See
http://www.gmfreeze.org/why-freeze/unwanted/what-supermarkets-say-about-gm-feed/

research that develops knowledge and knowledge based solutions. An example of this is the GM wheat developed by Rothamsted research to control aphid attacks. Clearly the underlying intention here would be to develop commercial GM seed varieties. Previously Rothamsted had been involved in researching how farmland habitats could be managed differently to ensure that there were high populations of aphid predators and parasitoids present on arable farms. This research also had other benefits in that it provided stable habitats for pollinating insects and farmland birds, both of which are subject to long-term declines in populations. It is questionable whether the impact assessment on the GM wheat would have picked up on the fact that management-based solutions could deliver more benefits overall. This illustrates that fact that market-orientated research can fail to maximise benefits. We would recommend that the BBSRC reviews the value of the current impact assessments when they are only looked at in isolation and not compared with other approaches.

3. How do you think the ability of the agri-tech sector to bring growth to the UK economy could best be facilitated or supported by Government working with the industry? Please cite/suggest appropriate mechanisms and measures to attract new revenues to the agricultural technology sector, that are feasible, value for money and effective; while paying attention to UK, EU and global finance available for agricultural science.

GM Freeze believes that the emphasis placed on economic growth from agri-tech solutions fails to recognised the multiple benefits which would accrue from a systems-based approach to agricultural R&D. Agriculture has played a major role in environmental degradation in the last 70 years – a period when agri-technology has been adopted almost without question only for it to be subsequently banned or regulated to minimise environmental impacts. This approach was deemed by IAASTD to be inappropriate to tackle future challenges for producing food in a sustainable manner. Thus we believe that BIS and Defra need to re-think their entire approach to the development of agriculture by placing the restoration of the soil, minimisation of pollution, conservation of natural resources and the restoration of biodiversity at its heart. There also need to be a realistic assessment of what future human diets and animal feeds would look like in order to ensure that none of the planetary limits identified are exceeded. We believe that such an approach (which can be described as agroecology) will also need technological innovation to ensure that water, the existing genetic potential of plants and animals and plant nutrients are not used inefficiently allied to sound management of the soil.

4. What is the potential and what should be the role of technology in addressing the needs of UK farmers, and meeting the challenges of global food security and the increasing demand for non-food bio-renewable products and resources? This would include new technologies (such as nanotechnologies, robotics, remote sensing), modern biotechnology techniques (such as genomics analysis, cloning, GM) and engineering solutions. Please provide examples where

technologies may be particularly transformative in their impact, and how research skills in these may be enhanced.

In the section above we suggest a different approach is needed to the development of agriculture with more emphasis on management and development of appropriate technology to solve specific problems. The development of genomics, molecular biology and genetic modification in the last 30 years has been accompanied by an increasingly restrictive approach to intellectual property rights, which has resulted in restricting access to the genetic resources available to plant and animal breeders and control of genetic resource moving from the public to the private sector. In the long term the ownership of global genetics by a handful of companies will result in further serious erosion of genetic diversity in crops and farmed animals available to farmers at a period when maximising diversity will be essential to cope with changes in climate, pest and diseases. This is already happening because of the control exerted by the major agri-biotech companies over which seeds are available to farmers[20] and the genetics of the main farmed animals[21].The ongoing loss of agricultural genetic diversity in the form of varieties or breeds because they are not considered necessary for current farming is a major error and seriously undermines the options for future generations of farmers and breeders and should therefore be prevented as part of the agri-technology strategy.

5. What do you think are the main barriers to the achievement of the proposed strategic objectives and how do you think they might be overcome?

What we see is the problems that the strategy will exasperate and create. The first challenge is how to ensure that the release of new technologies into the environmental and food chain will be safe. The second challenge is how to ensure technologies deemed to be safe bring benefits to the wider society and not just the holders of the intellectual property rights and/or those who market it. The global nature of trade and the potential for high volumes to be traded means that billions of people could be exposed to possible harmful effect of the product or its breakdown products or the consequences of that product harming other processes essential to a healthy environment or life.

At present industry has little incentive to carry out exhaustive testing of its products because the regulations do not require it and they will not be held liable once they have obtained approval from the regulator if things go wrong. If in the event of a disastrous introduction, consent holders can defend themselves under the Environmental Liability Regulations by means of the permit defence and the state of knowledge defence. This is not a satisfactory state of affairs because they allow companies to market products with insufficient or inadequate data on their safety and therefore the environment and public carry all the risks. Post-market monitoring carried out by the consent holders is not a solution because it is not an ethical or

[20] ETC group, 2008. Who owns Nature? Corporate Power and the Final Frontier in the Commodification of Life. www.etcgroup.org/sites/www.etcgroup.org/files/publication/707/01/etc_won_report_final_color.pdf

[21] Gura Susanne, 2008. Industrial livestock production and its impact on smallholders in developing countries. Consultancy report to the League for Pastoral Peoples and Endogenous Livestock Development (www.pastoralpeoples.org), Germany

reliable way to establish whether a product is safe or not.

Part of the problem is that the development of new technology takes place in a bubble into which the public are not invited. This means that sensible questions are not addressed early in the process, such as:

- who benefits?
- what's the point?
- are the benefits worth the risk?
- how many jobs will this cost?
- what's the alternative?
- will we be told if are food has been produced using the new technology?

This often means these questions are not addressed at all or, if they are, the process is carried out by small groups of people at a point when it is too late to send R&D in different direction. This type of approach is best illustrated by reference to the introduction of GMOs in to food chain when the first many people know about this technology was when the first products went on sale in supermarkets in the late 1990s. The majority of the public rightly rejected GM food ingredients because, for instance, they thought that only biotech companies would benefit and their safety had not been demonstrated.

The UK has a poor record when it comes to rejecting technology if they were considered to be too risky or where data gaps and scientific uncertainty were such that the precautionary principle should have been used to block their approval. It took an ludicrously long time to ban organochlorine chemicals despite the fact that evidence that they were having a disastrous impact on predatory birds and mammals was very strong (if not completely understood) from very early on. At present we see a similar process being played out over neonicotinoid insecticides and bees when evidence of harm is clear but the interests of industry hold sway[22 and 23]. We believe that the herbicide glyphosate is a similar case where evidence gathered by independent researchers is being ignored in favour of continued approval based on industry generated data[24].

Please let us know if you/your organisation would like to be considered to take part in future activities that may arise as a result of the implementation of this strategy.

GM Freeze is always willing to engage in processes aimed at ensuring new technology in the food chain is acceptable, safe, brings socio-economic benefits to society and is capable of being properly regulated. It is also important involve the public as early as possible. It is also vital that an outcome of such processes must transparently include the possibility that a technology could be rejected on grounds of ethical (for example cloning), safety or socio-economic reasons.

[22] Gill RJ et al, 2012. Combined pesticide exposure severely affectsindividual- and colony level traits in bees. Nature doi:10.1038/nature11585

[23] Whitehorn, P. R., et al, 2012. Neonicotinoid pesticide reduces bumble bee colony growth and queen production. Science 336, 351–352 (2012).

[24] Antoniou M, Habib MEM, Howard CV, Jennings RC, Leifert C, et al. (2012) Teratogenic Effects of Glyphosate-Based Herbicides: Divergence of Regulatory Decisions from Scientific Evidence. Journal of Environmental and Analytical Toxicology S4:006. doi:10.4172/2161-0525.S4-006

If so, please write here your name/ the name of your organisation and your contact details

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