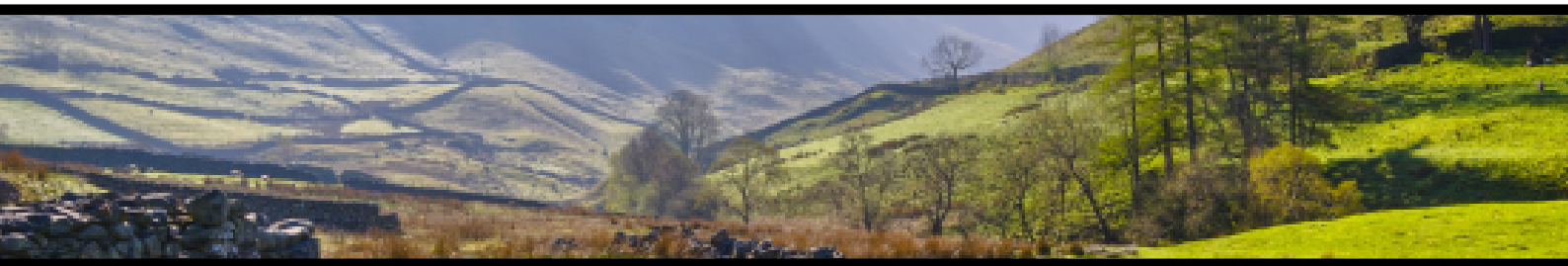
CERF Horizon Scan

Cranfield UNIVERSITY



#29 February 2012

KEY FACTORS

(hover over for links to rest of document)

- Consumer attitudes and behaviour
- Energy supply and demand
- Natural resources and waste management
- Agriculture and rural communities
- Oceans, marine life and fisheries
- Food production, processing and distribution
- Science, technology and innovation
- Climate, environment and biodiversity
- Economy and industry
- Globalisation, (geo)politics and national security
- Demographics and urbanisation
- Land use and land management

TOP HEADLINES

Limited materials for a green future

Increasing contribution of biofuels to energy security & Algal biofuel

Remote sensing helps grape growing

Protection of biodiversity?

Local ecosystem impacts from major developments could be irreversible

About CERF

The Centre for Environmental Risks and Futures (CERF) is based within Cranfield University's School of Applied Sciences. Our expertise spans the natural, technological, economic and political domains. Our horizon scanning activity is part of a £1.8m project within the Centre, funded by a partnership of 12 organisations.

Visit www.cranfield.ac.uk/sas/cerf for more details.

We value feedback - tell us what you think!

Send your thoughts and feedback to h.shaw@cranfield.ac.uk or follow us using twitter (@TheRiskExchange), or our blog (https://theriskexchange.wordpress.com).

KEY DEFINITIONS

Throughout the document we use a number of key terms to describe the insights we generate. This page provides a quick overview of key factors (what they are and why we conduct our scanning around them), in addition to an explanation of the ratings we use to assess each insight.

What is a key factor?

The key factors we use are designed to reflect the most important topic areas shaping the future of our partner organisations. Each quarter, we analyse over 700 insights to identify and highlight the 3 or 4 most important emerging issues under each key factor. The partnership includes: Defra, Scottish & Welsh Governments, DECC, Department for Transport, Natural England, Forestry Commission, Environment Agency, Scottish Environmental Protection Agency, Marine Management Organisation, Food Standards Agency and the Natural Environment Research Council (NERC).

What are the 3 horizons?

A horizon is the period of time in which a risk/ opportunity is likely to first occur and have impact. Normally, a technology horizon is very short - meaning things change very quickly. Conversely, ecological horizons can often be very long. We have decided upon three horizons to help decision makers understand the likely timescale of a first impact for each insight.

- Horizon 1: 1-3 years
- Horizon 2: 3-10 years
- Horizon 3: 10+ years

Please note: These horizons should not be used as an indicator of when action is needed. An event likely to occur in 15 years may still require action now to mitigate against it.

What do we mean by credibility?

This refers to the credibility of the insight.:

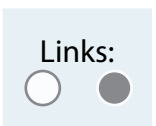
- "Low": little or no supporting evidence is available, but is an issue which the researcher feels is plausible and important.
- "Medium": one or two pieces of supporting evidence are available, of any kind.
- "High": typically 3 or more pieces of non-academic supporting evidence has been published, or 1 or 2 pieces of evidence from credible sources (e.g. peer reviewed academic journals, government, or expert communities).

What do we mean by importance?

Importance is an indicator of the level of likely risk/ opportunity associated with each insight. A rating of "High" (H) could indicate major risk, or major opportunity.

What do we mean by action points?

Throughout the document we indicate whether the insight is something that Government may wish to act upon within the next year, or prepare to act on in the future. These recommendations reflect the opinions of the researchers and do not indicate liability.



What are the links?

Click on the white circles to see pages with related articles in this newsletter, or click the grey circles to see related insights from past newsletters.

Consumer attitudes and behaviour

More channels may not mean more readership

- With the global success of technology, social networking sites and social media, individuals have access to a world of information in the palm of their hand.
- Whilst these technologies present huge opportunities for disseminating science, the use of blogs, twitter, facebook, linkedin, or other filtered news channels means that people have far more choice over the news they want to receive.
- Combined with the death of printed news, broad knowledge consumption is likely to reduce, meaning environmental news may be actively filtered out by Generation Y technology consumers.
- We are likely see the evolution of more "specialist" interest communities, with the general public becoming less widely read, less aware of issues past their immediate concern, and increasingly difficult to target.

It is likely that government will need to invest in robust communication strategies to ensure messages are received far beyond the "converted" community, and continue to educate and inform the wider public in light of evolving consumer behaviour.

http://tinyurl.com/c5uv6jy; http://tinyurl.com/7sjb5qs; http://tinyurl.com/88zoxyy

Horizon: 1

Importance: M

Action Point: Act Now

Credibility: M

Links:

Idlesourcing – a novel way of monitoring and reporting environmental risk?

- Individuals often want to contribute information to help our environment, but knowing how and where to act is difficult.
- Idlesourcing has made it simple (if not effortless) for individuals to contribute information to online resources in other fields. For example, road users can feed traffic information into Mobile apps (e.g. Waze), allowing others to plan their route to avoid traffic. In the US, city officials get real-time info on jams using mobile geo-tagging data. Trendwatching.com considers idlesourcing to be a growing consumer trend in 2012.
- The applications and benefits in all types of environmental risk could be huge. Users could take geo-tagged pictures of wildlife to aid biodiversity modelling. Gardeners or growers could send geo-tagged pictures of unusual pests for plant health monitoring. Pollution issues could be reported by the public into a central system, and inspectors could track and share information in real time.
- Social media technologies have been used in crisis scenarios such as the Haiti earthquake and tsunamis, but less frequently for day to day environmental reporting.

Investment in idlesourcing technologies could reduce the workload of government inspectors, improve monitoring with fewer resources, and improve community engagement in environmental issues.

http://tinyurl.com/7v2o75g

Horizon: 2

Importance: M

Action Point: Act Now

Credibility: M-H

Links:

Consumer attitudes and behaviour

Eco-cycology

- Recent trend watches have dubbed a new wave of consumer and manufacturer eco-awareness as "eco-cycology". The move has been spearheaded by recent mandatory recycling laws in San Diego, San Francisco and Seattle, and recent EU votes for tougher recycling regulations.
- Businesses are now jumping on the trend, and encouraging consumers to return old, damaged and used goods to their stores for recycling.
- Nike's reuse a shoe scheme was a pioneer in 1990s, and has now recycled over 25m shoes into athletic/ playground surfaces. Patagonia clothing's Common Threads Initiative has also recycled 45 tons of clothes to date.
- Business-lead initiatives may encourage a shift in consumer behaviour and see specialist product recycling.

To hit recycling targets, Government may seek to support and encourage such schemes, particularly in markets where products are not easily recycled by mainstream processing.

http://tinyurl.com/blugt32

Horizon: 2

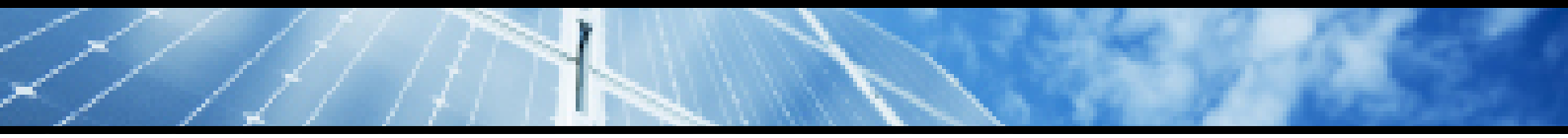
Importance: M

Action Point: Act Now

Credibility: M

Links:

Energy supply and demand



Correlated markets - energy and food

- Energy and global food production are intrinsically linked due to the highly energy dependent nature of food production. Strong correlations have been demonstrated previously. Volatile oil prices pose a considerable threat to an affordable, secure food supply.
- For developing nations rising energy costs are compounded by agricultural policies of industrialised nations whose dumping of surplus product onto local markets exacerbates economic disparity.
- With oil prices only expected to rise, the issue of increasing food costs is of tremendous concern.

For Government, the issues of increasing energy prices and agricultural policy are intimately linked and given the complexity of the global food systems, consideration of the far reaching impacts of national policies will become increasingly imperative.

http://tinyurl.com/6vhzcmz

Horizon: 2

Importance: M

Action Point: Prepare to Act

Credibility: M

Links:

Technology watch

- As pressures from climate change increase, decision makers will seek innovative solutions that tackle concerns about energy generation, transmission and efficiency. Keeping an eye on the technological fringe, three such innovations are quickly approaching technological and economic viability.
- The electrical grid has changed little over the past 120 years. As renewables come on line the grid will experience greater demands to improve flexibility and efficiency. Efficiency gains may come in the form of small, high-speed digital switches that can replace existing high-voltage transformers. Flexibility may be introduced via improved energy storage devices such as liquid-metal batteries, flywheels and ultra-capacitors – the energy storage the grid helps to moderate the peaks and troughs synonymous with renewable systems.
- The housing stock is responsible for a great deal of energy consumption. New compressorless air conditioners that use desiccants to dehumidify air may drastically reduce air conditioning energy costs while electrochromic window technologies are predicted to slash heating costs in half by simply adjusting window shading.

Innovation in carbon capture technologies may soon make the technology economically viable. Able to capture 90% of CO2 emissions, this advancement may enable cheap coal fire power plants to stay online well into the future.

http://tinyurl.com/6pe8q3a

Horizon: 1

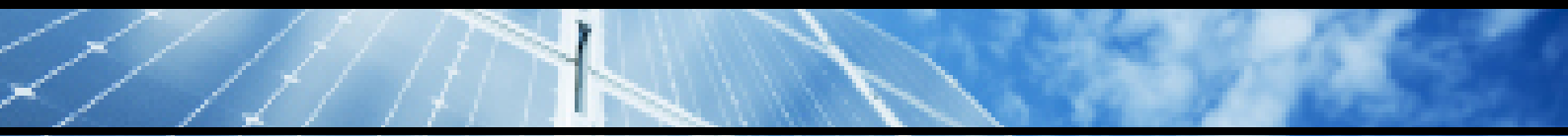
Importance: H

Action Point: Prepare to Act

Credibility: H

Links:

Energy supply and demand



Alternative fuels

- EU requirements stating that all fuel must contain 10% biofuel by 2020 are fast approaching.
- Butanol is a common biofuel that may be added to petrol at concentrations approaching 20% without changes being made to combustion engines. Produced via the microbial fermentation of sugars (e.g. corn, sugar cane), butanol production is often at odds with food production, competing for agricultural land and fertiliser.
- Researchers have recently shown that wood biomass may be used to produce butanol, thus representing a raw material not in competition with food production.
- The technology effectively separates the usable components of wood biomass permitting more efficient use of each fraction leading to more efficient use of the raw material. Researchers envision the transformation of pulp and paper mills into modern biorefineries.

For countries lacking a pulp industry the quest is to identify alternative non-food feed-stocks for biofuel production as well as opportunity to integrate existing industrial processes into biorefineries.

http://tinyurl.com/7x8tddm

Horizon: 2

Importance: L

Action Point: Prepare to Act

Credibility: M

Links:

Renewables and disaster preparation

- As the proportion of renewables in the energy mix increases, questions begin to formulate about preparation levels in the event of disaster.
- Some recent examples include a wind turbine catching fire in gale force winds. Another involves improper installation of an export cable linking an offshore wind farm to the mainland.
- These events raise concerns about preparedness for disaster – natural or manmade – and what contingencies or regulations are in place to mitigate against these concerns.

In the short term critical review of current regulation and procedure may be necessary to ensure the Government is not playing 'catch-up' to industrial progress.

http://tinyurl.com/6pck2n4; http://tinyurl.com/7zpw5lg

Horizon: 2

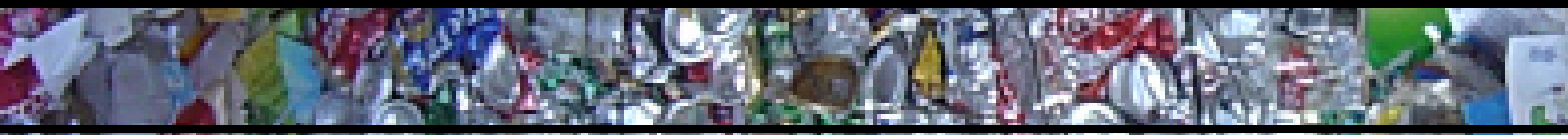
Importance: M

Action Point: Prepare to Act

Credibility: M

Links: N/A

Natural resources and waste management



Limited materials for a green future

- The restricted supply of rare earth elements (REE) and platinum-group elements (PGE) may inhibit the development of green technologies such as new generation electromagnets and fuel cells.
- These metals are distributed unevenly in finite quantities in the earth's crust, with 97% of the world's REEs produced in China, and 80% of the world's platinum and rhodium coming from one source in South Africa.
- Research by Cardiff University's School of Earth and Ocean Sciences and the National Museum Wales has shown that unless new sources of these metals are discovered, the development of low carbon transport and wind power, may grind to a halt.

Concern has also been raised that Government decisions could heighten the issue if the limited supplies are cut due to geopolitical or economic issues. This could affect the UK's ability to develop new green technologies on the scale necessary to deliver carbon reduction targets, effectively stalling the move to a 'green economy'.

http://tinyurl.com/899kpot

Horizon: 3

Importance: H

Action Point: Prepare to Act

Credibility: H

Links: ○

Advanced plasma power

- Advanced plasma power's Gasplasma is an advanced conversion technology (ACT) that converts waste feedstock into a clean, hydrogen-rich synthesis gas, and a vitrified recyclate product, using a combination of standard gasification and plasma treatment.
- The products have a variety of end uses, such as electricity generation. As the technology advances, it is expected that the products can be used commercially in fuel cells within the next five years.

Policy makers are recognising the potential for waste to be treated as a resource. Now, these opportunities for ACTs need to be realised in order to improve energy security, achieve renewable energy targets, and support Europe's vision for a zero waste economy.

http://tinyurl.com/7wgq39v; http://tinyurl.com/73t4smv

Horizon: 3

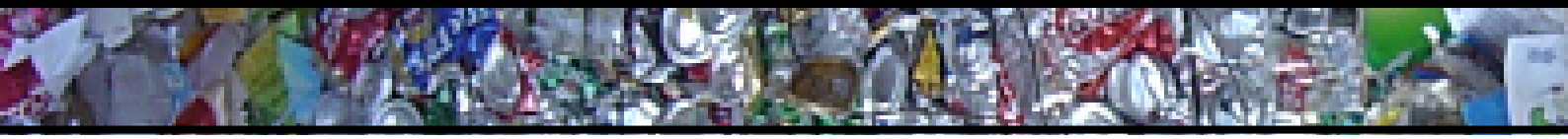
Importance: M

Action Point: Prepare to Act

Credibility: H

Links: Above, plus ○ ○

Natural resources and waste management



The increasing contribution of biofuels to energy security

- Biomethane, produced from a range of feed stocks such as organic waste materials, can be injected to the natural gas grid and has shown to be far superior to first generation liquid biofuels such as biodiesel.
- Roadmaps developed by the International Energy Agency (IEA), at the request of the G8, suggest that by 2050, these biofuels will provide 27% of world transport fuel. For a country to have renewable gas industries, a renewable gas laboratory is a requirement.
- Strong and balanced policy efforts are required to create a stable investment environment and allow commercialisation of advanced biofuel technologies, efficiency improvements and production cost reductions. International collaboration and discussions are critical to achieve these goals.

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http://tinyurl.com/8xqvbsk; http://tinyurl.com/824gcms

Horizon: 3

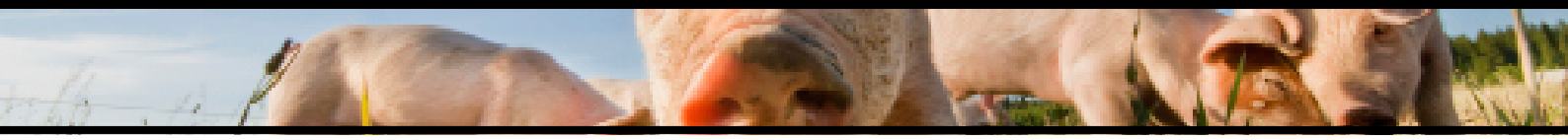
Importance: H

Action Point: Act Now

Credibility: H

Links:

Agriculture and rural communities



Laying hens and pig welfare directives

- An estimated 30 producers (30,000 hens) in the UK and up to 50 million hens in other EU member states are reportedly flouting a new EU directive on the welfare of laying hens, brought into force on 1st January 2012, banning conventional battery cages for egg production.
- British producers have invested £400m to implement the new standards, but there are fears that eggs from illegal cages will undermine the efforts of those UK producers who have invested in compliance.
- This has raised similar fears for a similar ban on the use of sow stalls in the pig sector due to come into force at the end of the year. The UK has had a unilateral ban on sow stalls in place since January 1999 meaning that British pig producers have struggled to compete with cheaper European imports in recent years.

There are calls for the Commission to put more stringent measures in place for the sow stall ban to penalise those who do not comply and protect UK producers. A present both are at risk of being undermined.

http://tinyurl.com/7yx92re; http://tinyurl.com/6u2z2wa; http://tinyurl.com/7sk6tld; http://tinyurl.com/76y99gc

Horizon: 1

Importance: M

Action Point: Act Now

Credibility: H

Links: N/A

The future of tractors?

- Driverless, smaller powered and narrower could all be features of the next generation of tractors.
- Semi-autonomous and autonomous tractors may mean that growers can have several units working around the clock, while smaller powered tractors with narrower implements may reduce compaction, increasing yields by 5-7%.
- While the smaller engines may be less fuel efficient, this is likely to be offset by yield gains.
- Tractors are likely to be easier to service, and have a shorter service life which will mean options for recycling and upgrading to the latest technology will become more viable.

Government may wish to monitor new developments and balance potential fuel losses with yield gains. It may be beneficial to develop a position on new technologies and recommended those with greatest yield, low environmental impact, and low cost to farming communities.

http://tinyurl.com/7s527bx; http://tinyurl.com/77e4tt2

Horizon: 3

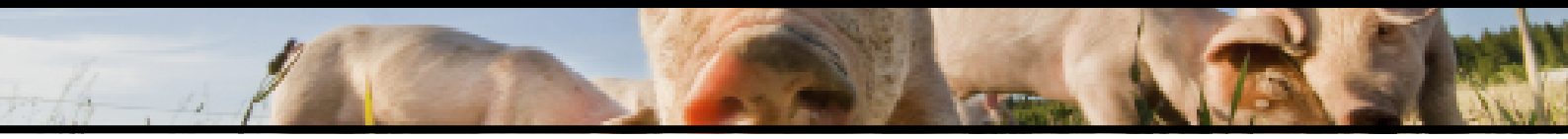
Importance: M

Action Point: Monitor

Credibility: M

Links: N/A

Agriculture and rural communities



Remote sensing to help grape growing

- The European Space Agency have developed a new service, known as GrapeLook, to help decide when and how much to irrigate vineyards.
- The technology uses a combination of Earth observation data and field measurements via satellite link and remote sensing to monitor how much water is released from the plants, how much biomass has grown and the efficiency of water use.
- The system should improve grape yields and the quality of wine produced, whilst reducing water consumption.

Having tested the service with South African grape growers, the system shows great potential for expansion to other crops and areas. UK investment in such technologies (e.g. through subsidies) could reduce water shortages, improve efficiency, and improve yield.

http://tinyurl.com/6mx4sza

Horizon: 3

Importance: M-H

Action Point: Act Now

Credibility: M

Links: N/A

Time to invest in hemp?

- Hemp is set to be a crop for the future, with applications as a replacement for fibreglass in car manufacture, building insulation and reinforced plastics
- Whilst it may take ten years to take off (most likely when the cooking oil price reaches a level, and where the fibre is a widely viable alternative), the market is growing and there are further benefits to growing the crop. For example:
    - it can help to control blackgrass and improve soil structure
    - it can be used as a low-saturated fat alternative to olive oil; and
    - it is also a valuable cover crop that reduces herbicide use.

Hemp is a growing market with potential uses in many sectors. Investment could help stimulate agricultural markets and offer farmers new avenues for income.

http://tinyurl.com/6vm7uuu

Horizon: 3

Importance: M-H

Action Point: Act Now

Credibility: M

Links: N/A

Oceans, marine life and fisheries

There's oil in them there.... waters?

- Biofuel production is plagued by two main issues. The first is a conflict with food crops for the production of biofuel feedstocks consisting primarily of simple sugars. The second involves the type feedstock used. Microbes such as E. coli and Saccharomyces cerevisiae can only convert simple sugars to ethanol and are not able to convert cellulosic materials (e.g. wood biomass or seaweed alginate) to ethanol, which would alleviate conflict with crop production.
- Researchers may have identified solutions to both issues by bioengineering a microbe capable of converting alginate (from seaweed) into ethanol. Seaweed is already produced in large quantities, does not compete with agriculture and may provide a scalable solution to biofuel production. Add in the fact that seaweed does not need to be fertilised, instead absorbing diffuse nutrient run-off, and the end result may be a cleaner marine environment.

With the UK's extensive coast line and expansive marine environment there is an excellent opportunity to commit to seaweed production and thus creating a biofuel feedstock that does not compete with agricultural production.

http://tinyurl.com/7ylpcz8

Horizon: 3

Importance: M

Action Point: Prepare to act

Credibility: L

Links:

Oil spills have surprising effect on herring embryos

- Researchers have previously shown that bunker oil spills can cause heart deformities in developing herring embryos. However, new research in San Francisco has tested the effects of oil in both shallow and deep waters.
- The study investigated the moderately-sized spill of container ship, Cosco Busan, in 2007.
- The study revealed that almost all embryos in shallow waters died, and their tissues deteriorated faster than expected in the cool water. Embryos had greater chance of survival in deep water.
- Scientists expect that greater levels of sunlight in shallow waters alters the chemistry of the oil leading to high levels of toxicity, despite the moderate size of oil spill.

Given bunker fuel spills occur relatively frequently, it is important to understand the effect of smaller spills on vulnerable sites. Government may wish to invest in additional research relating to the effect of near-shore/ shallow water spills on embryo development for other species.

http://tinyurl.com/7vvhmmq

Horizon: 1

Importance: M

Action Point: Act Now

Credibility: H

Links: N/A

Floating wind turbines

- The Energy Technologies Institute has announced that it is looking for partners for its £25 million offshore wind floating system demonstration project, with the aim of showing that 'floating' wind turbines placed near to shore to take advantage of higher wind speeds can reduce the cost of electricity.
- The project was developed in response to the UK Government call to reduce the cost of offshore wind. It aims to install a near shore floating system, in water between 60 and 100 metres deep, to be in operation by 2016.

It is thought that a floating solution has huge potential for cost reduction and is thought to be particularly suitable for British coasts where water is too deep for conventional turbines, but has strong wind near-to-shore. It is expected there will also be a considerable global market for floating turbines that can be developed in the UK.

http://tinyurl.com/6qwao3n

Horizon: 3

Importance: M

Action Point: Prepare to Act

Credibility: M

Links: N/A

Food production, processing and distribution

From food waste to fuel in 6 days to give zero to 60 in 3.9sec

- A new Biorefinery Centre has been opened at the Institute of Food Research, which will be used to explore new ways of making use of residual plant material from agriculture and food processing.
- One of the main facilities will be a steam explosion pilot plant to be used to blow plant cell walls apart to extract natural materials trapped in the walls of straw and woody plants. These can then be treated to produce bio-ethanol.
- This bio-alcohol will be tested by Lotus – one of the project collaborators – for use in bi-fuel and tri-fuel engines. Waste products will include brewer spent grain, unused oil-seed rape and wheat straw, hemp and waste cereal grain from milling.

Government may wish to consider the facility which presents a new opportunity to find improved uses for waste plant material, which would not compete with food production. The added benefit of using bio-alcohol is that existing engines can be easily adapted to run on it and existing distribution methods can be used.

http://tinyurl.com/7nel84f

Horizon: 3

Importance: M

Action Point: Prepare to Act

Credibility: M

Links:

BRICS first meeting on Climate Change and Food Security

- Leading scientists from the most influential developing countries who are expected to play a major role in upcoming climate change talks, met in China in November for the first time to discuss food security and climate change issues.
- The group of countries known as BRICS – Brazil, Russia, India, China and South Africa were due to meet alongside the United States and Indonesia at the International Conference on Climate Change and Food Security (ICCCFS), organized by the International Food Policy Research Institute (IFPRI) and the Chinese Academy of Agricultural Sciences (CAAS), to report on issues including human wellbeing, calorie availability, and child malnutrition.

The BRICS are expected to be increasingly influential both in terms of their emissions and their ability to implement mitigating measures. Recommendations emerging from the talks included (a) strengthening public sector agricultural research in 12 priority areas and (b) increasing the amount, appropriateness, and accessibility of spatial data. Outputs are likely to be of use to UK Government.

http://tinyurl.com/7rk4eum; http://tinyurl.com/84wd4la

Horizon: 2

Importance: M-H

Action Point: Prepare to Act

Credibility: H

Links:

Food production, processing and distribution

Green revolution

- The Green Revolution marked a milestone in food production enabling the world to feed its growing population. However, as populations increase, and land and water become scarcer, natural production systems have become increasingly stressed and crop diversity has decreased.
- Finding ways to restore ecosystem services and maintain diversity while feeding the world is a challenging task and a new 3-year initiative, begun by the International Landscapes for People, Food and Nature, is looking at successful innovations around the world that may be sustainably scaled up.
- The initiative will consider how complex and diverse ecosystems can support increased production and is investigating the role of small-hold farmers – who collectively supply 1/3rd the world's food requirement – in providing sustainable production.
- It is unlikely that the issue of food insecurity will be solved by a simple increase in food production. This is because the future of food production will need to integrate ecosystem and diversity protection.

Policy makers may need to support innovative bespoke solutions and these may include increased urban food production or an increase in local small-hold production.

http://tinyurl.com/7tdnavb

Horizon: 2

Importance: H

Action Point: Prepare to Act

Credibility: M

Links:

Kite powered fishing boats

- New innovative kite technology applied to small fishing vessels may provide fuel savings of 40-50% while the kite is in use (30-40%) of the time.
- Providing wind conditions are between 14 and 20 knots total overall fuel savings may be between 12 and 20%.
- Fuel use on boats is one of the largest sources of energy use and hence greenhouse gas emissions associated with fish consumption.
- This technology shows the potential to provide fuel savings to other vessels and larger kites are being tested for operation on long line fishing vessels.

Government may wish to follow the research to understand the benefits of large-scale implementation, and consider it's potential to reduce UK fuel reliance and emissions.

http://tinyurl.com/828htws

Horizon: 3

Importance: M

Action Point: Prepare to Act

Credibility: L-M

Links: N/A

Science, technology and innovation

Sweet rubber

- The first half of the 20th century witnessed the development of synthetic rubber, which is now used to produce almost 1 billion tyres annually worldwide. Manufactured using derivatives of crude oil, synthetic rubber costs are sensitive to oil pricing.
- To reduce costs and improve sustainability, tyre manufacturers are partnering with industrial biotechnology to produce bio-based rubber.
- Employing microbes to transform simple sugars into the building blocks necessary to create rubber (e.g. isoprene, isobutene, and butadiene), researchers have created a bio-based prototype that meets tyre manufacturer's specifications. Commercial development remains another 3 to 5 years away.

As bio-production of fine chemicals increases, concern will be directed to supplying adequate quantities of feed stocks (e.g. sugar). Production of these plant based feed stocks require agricultural space, which will inevitably compete with space for biofuel and sustenance crops, thus further complicating the already complex food security issue.

http://tinyurl.com/79brla7

Horizon: 3

Importance: L

Action Point: Prepare to Act

Credibility: M

Links:

Funding cleaner transport

- Mexico City, home to 9 million people, has achieved success in reducing emissions via development of the first phase of a rapid transit Metrobus system.
- Efficiently transporting 390,000 passengers a day, Metrobus has generated an income of $1.1 million through carbon credits – funds that are helping to offset the $65.2 million investment made by the government.
- Expansion of the system is expected as the cost to operate the 'bendy' buses are much less than those needed to expand the subway. This project was registered by the U.N.'s Clean Development Mechanism and received money via the original carbon market created by the Kyoto Protocol.
- With uncertainty in carbon markets and the EU's interest in targeting emission reduction in the least developed countries, rather than emerging countries like Mexico, funding for projects like Metrobus are in limbo.

For Government this raises key policy issues about where funds should be spent. Is this an issue of simply targeting the least developed countries or an issue of better value for money, whereby projects like Metrobus offer the greatest 'bang for the buck'? A balance must be struck.

http://tinyurl.com/752n2lx

Horizon: 2

Importance: M

Action Point: Act Now

Credibility: H

Links: N/A

Science, technology and innovation

Follow the leader

- With shale gas exploration expected to take off in the near future, concern has shifted to the environmental impacts this activity will have, in particular those associated with fracking. Used to free trapped gas, fracking requires injection of a mix of proprietary chemicals, sand and water.
- A recent study released by the US EPA suggests that fracking fluids were responsible for contaminated groundwater in Wyoming. More interesting is the adoption of a fracturing fluid chemical disclosure policy by the State of Colorado which provides citizens access to a searchable chemical database and requires full disclosure of all chemicals used in fracking – hazardous or not.

Learning from the US, Government could consider proactive regulation that aims to limit the environmental impact of fracking. Examples may include development of industry specific environmental risk assessments, scientific investigation of health impacts or simply a review of safety procedures in the fracking process.

http://tinyurl.com/7wem9hn

Horizon: 1

Importance: H

Action Point: Act Now

Credibility: M

Links:

Climate, environment and biodiversity

Arctic methane on the up

- The scale and volume of methane release from the Arctic seabed is thought to be much greater than originally anticipated. Predicted to seep from the seabed at a rate of 8 million tonnes per year, Russian scientists now suggest this number is dramatically higher.
- The scientists observed columns of bubbling methane much larger than those ever observed before with some having diameters up to 1000m.
- As a green house gas methane is 20 times more potent than CO2, but is this release of methane a precursor to catastrophe?
- The authors suggest that methane concentrations are not spiking and instead these findings are more likely a long term response to seabed flooding some 8000 years ago.
- Though the Arctic is warming the vast quantities of methane hydrates remain intact.

Though these findings do not suggest the methane 'time-bomb' has been activated the results do suggest the fragility of the Arctic and the vast quantities of methane stored in the seabed. Policy makers need to look to the Arctic as a barometer of climate change, but must express caution for fear of misinterpreting the data.

http://tinyurl.com/757yz46; http://tinyurl.com/7ttol68

Horizon: 3

Importance: M

Action Point: Act Now

Credibility: M

Links: N/A

A green deal?

- The Government's plan to improve the energy efficiency of 14m homes over the next decade has received criticism from the Committee on Climate Change (CCC) – their own climate advisors – who suggest that fuel poverty will prevent households from improving efficiency.
- By placing the onus to improve home energy efficiency on the home owner and allowing for the 'market' to dictate economics leaves home owners exposed to fluctuations in energy and insulation prices.
- Experts believe the greatest reduction in green house gas emissions can be made by simply improving the energy efficiency of the housing stock. Left to market forces and given the current economic situation, these efficiency gains are unlikely to occur.

Government requires policy that is progressive while protecting the needs of the home owner. A more proactive approach may involve dramatic improvements in energy efficiency regulation at the point of construction, particularly in light of current house construction trends.

http://tinyurl.com/77g38kb

Horizon: 1

Importance: H

Action Point: Act Now

Credibility: H

Links:

Climate, environment and biodiversity

Protection of biodiversity?

- An often applied measure for protecting biodiversity is the creation of protected areas in the sea and on land.
- Recent findings suggest that protected areas alone will not slow biodiversity loss and that additional measures to tackle human population growth and the increased use of natural resources are necessary.
- Findings reveal that although designated protected areas have increased over the past decades, land and marine biodiversity loss remains significant.
- Human activities that threaten biodiversity include harvesting of natural resources, habitat conversion and introduction of invasive species.
- Protected areas may also succumb to poaching, corruption, poor funding and local population displacement. Key to the success of protected areas is in ensuring community buy-in and support in the design and management of protected areas.

In the UK development of protected areas is in competition with issues such as wind farms, transport routes, urbanisation and agriculture. Faced with a plurality of pressures, combating biodiversity loss will require creative bridging solutions, foremost being the securing of community support and the identification of a balance between progress and protection.

Horizon: 1

Importance: H

Action Point: Act Now

Credibility: H

Links:

** This article was taken from the Science for Environment Policy DG Environment News Alert Service. Citation to the academic article is provided below.

Mora, C., Sale, P.F. (2011) Ongoing global biodiversity loss and the need to move beyond protected areas: a review of the technical and practical shortcomings of protected areas on land and sea. Marine Ecology Progress Series. 434:251-266.

The world awash with Nitrogen

- Nitrogen is an inert, naturally occurring compound that is essential for life, exists mainly in our atmosphere and was cycled at low, but balanced levels for millennia.
- Recent research shows that humans have disrupted the nitrogen balance. Major increases in nitrogen can be linked to 1895, coinciding with the large scale burning of fossil fuels and 1970, in line with the 'Green Revolution' and the large scale manufacturing of fertilizers.
- The impacts of increased nitrogen levels include decreased water quality, deterioration of coastal marine fisheries and decreased value of recreation waters. These impacts cross multiple policy boundaries.

Moving forward, Government may seek solutions that target more than one policy issue thus improving the economic efficiency of their policy decisions.

http://tinyurl.com/6mguobf

Horizon: 3

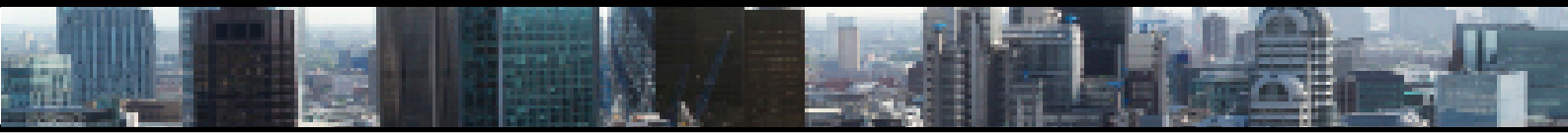
Importance: M

Action Point: Prepare to Act

Credibility: M

Links: N/A

Economy and industry



Second generation algae biofuel

- The shipping industry contributes 3-4% of global greenhouse gas emissions and coupled with volatile oil prices, alternative fuels are an attractive proposition.
- US based Solazyme has developed one such substitute in what are fast growing crop and forest waste fed algae that produce oil in fermentation tanks.
- The world's two largest shipping fleets and consequently foremost consumers of highly polluting bunker fuel have begun running test ships in what will cut greenhouse gas emissions by 80% through CO2 sequestration by the algae and a reduction in emissions when burned. One operator is aiming for 10% of its fleet to be powered by algal derived fuel by 2020.
- This could potentially indicate the start of a major shift away from the provision of energy by fossil fuels which would serve as a blueprint for other operates within the shipping industry.

Widespread adoption could serve to cut emissions significantly. However, government may wish to balance the benefits of widespread adoption with issues regarding feed-stock availability. Land use and CO2 emissions throughout the feed-stock supply chain may need consideration.

http://tinyurl.com/7l26on9

Horizon: 3

Importance: H

Action Point: Prepare to Act

Credibility: H

Links: ○ ○ ○

The economic crisis and the environment

- The economic crisis within Europe and North America will have some broadly negative impacts on the environment. With financial uncertainty, governments through to individual consumers are less likely to care about issues that they feel might not affect them for a long time if at all.
- Austerity measures will focus consumer attention on political matters that have a direct impact on their day to day lives. The recent failures of the Kyoto Accord are a high level indication of the conflict many governments face due to mounting domestic pressure and adverse future economic uncertainty.
- The crisis has however made consumers hyper aware of the financial implications of their day to day choices and so travel less, reduce waste of energy and consumables on a domestic and industrial level.
- Disillusionment and financial difficulties have also fuelled the rapid growth of investment in credit unions, ethically sound co-operative banking and the UK green economy grew by 4.3% in 2010.

The crisis is projected to result in a shortfall for climate aid as the UN chief urges G20 to deliver "green growth" as the most effective means of recovery. This is despite the recent reduction to the UK feed in tariff for solar panels that is predicted to have a negative impact on a growing sector.

http://tinyurl.com/7pwxmw6; http://tinyurl.com/7sso7n7; http://tinyurl.com/866c43l

Horizon: 1

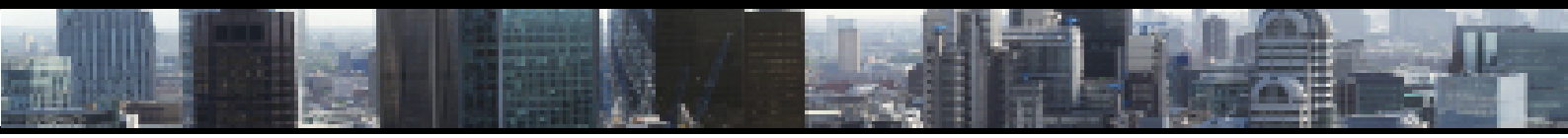
Importance: H

Action Point: Act Now

Credibility: M

Links: ○

Economy and industry



Will anyone take the EUETS seriously?

- There is strong resistance to the EU's emissions trading scheme (ETS) within the US and China as they threaten to undermine its existence.
- In the US a bill has been introduced to the senate attempting block US airlines from participating in the EU ETS, stating that American air passengers having to pay European tax "flies in the face of our country's sovereignty".
- This comes at a time when the organisation which represents four of China's biggest airlines, the China Air Transport Association (CATA) simply says that "they won't pay".

Some analysts are hinting of a trade war, particularly between the EU and China but the general consensus is that the two most vehemently opposing nations (USA & China) to emissions initiatives such as the Kyoto Accord are resisting in case the EU looks at other trade related climate measures.

http://tinyurl.com/6muuppe; http://tinyurl.com/7u96xzm

Horizon: 1

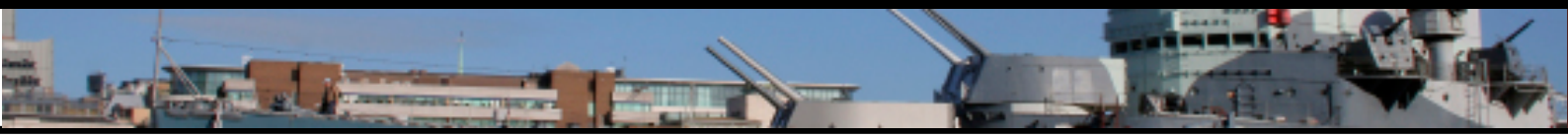
Importance: H

Action Point: Act Now

Credibility: H

Links:

Globalisation, (geo)politics and national security



Agricultural power shifts

- Findings, drawing upon information from the Oxford Farming Conference suggest that the globalisation of markets and the growth of multinational corporations have caused a worldwide shift in agricultural power.
- Consolidation of these corporations has been followed by a move away from the power of governments in the agricultural field to corporate businesses.
- Concerns have been raised that the future position of the UK as an agricultural player depends on its capability to significantly increase its productivity, such as through investment in research and development.

Government may need to adopt the OECD's proactive realisation that global partnerships and international co-operations must increase to support development, while investment can be targeted at increased productivity through research and development.

http://tinyurl.com/7smnop3; http://tinyurl.com/8xudq5a

Horizon: 2

Importance: H

Action Point: Prepare to Act

Credibility: M

Links: N/A

Oil and gas power shifts

- A transformation in fossil fuel supply and demand patterns, driven by an expansion of technological capabilities, along with the declining US influence in the Middle East, Asia and Africa may alter strategic power reach and subsequently control and logistical patterns for oil and gas distribution.
- Geopolitical chaos stemming from oil embargoes that have been imposed by the EU on Libya and Syria and potentially Iran, could significantly raise oil prices globally.

Government needs to consider the effect this could have on the UK's current aging population, and reduction in the size of the working population with declining birthrates and increases in health and pension costs .

http://tinyurl.com/88fsmjo; http://tinyurl.com/89djkmy

Horizon: 3

Importance: H

Action Point: Prepare to Act

Credibility: L-M

Links: N/A

Globalisation, (geo)politics and national security

A new global partnership

- The recently documented Busan agreement describes a paradigm shift that is taking place towards a new global reality that involves the west playing a supportive rather than a dominating role.
- At the Busan Fourth High Level Forum on Aid Effectiveness (HLF4), where 2000 delegates met, the idea emerged that civil society should be a formal part of many more UN processes in order to make sure that aid is spent effectively and that it is working for recipient countries. Transparency of funding streams and programmes is vital for this.
- The UK's approach to refocus its aid on fragile states is controversial as it has been reported that development aid cannot be successful and sustainable in countries before security is assured, and in fragile states, development activities have considerably higher costs.

The UK Government now has the opportunity to show leadership on international development and build a transparent evidence base on what has and has not worked over the 5 years since the Paris declaration.

http://tinyurl.com/75eqaw6; http://tinyurl.com/89z6tmw; http://tinyurl.com/7sqd6mm; http://tinyurl.com/8xj3sbn

Horizon: 2

Importance: H

Action Point: Act Now

Credibility: H

Links: N/A

Demographics and urbanisation

Environmentally friendly supermarkets

- UK based global supermarket company Tesco has launched Ireland's first "zero carbon" store to capitalise on new technology that reduces operating costs whilst contributing to an environmentally friendly provision of its services.
- IKEA is adding solar panels to 75% of its US store locations again as an indication of industry leaders responding to exposure within uncertain energy markets whilst concurrently adding benefit to the environment.
- Within UK Tesco "zero carbon" stores" they are able to transfer energy back on to the national grid thus adding broader economic benefits due to the feed in tariff that has been attributed to growth in employment, development of new technology such as solar roof tiles and energy supply security met through decentralised means.

If managed well then such moves could be followed by wide scale adoption by competitors and even within entirely new sectors as this serves as a template for other industries with large-scale property assets.

http://tinyurl.com/7olfqjk; http://tinyurl.com/6teg27z; http://tinyurl.com/6sy9gp7

Horizon: 2

Importance: H

Action Point: Act Now

Credibility: H

Links: N/A

Inner city food producers

- Urban farming has been around for some time on a small fractured scale but a trend has now emerged where a fully functional network of producers who supply inner city restaurants, individual consumers and retailers are meeting growing demand that has environmental benefits through logistical efficiency and optimised use of space
- Where support was limited in the past, growth can be attributed to growing demand for locally sourced produce and the support from the "Capital Growth" scheme run by Sustain where London growing spaces have risen from 50 in 2008 to 1'500 in 2012.
- The movement has other economic benefits associated with employment where shelters employ the homeless to grow and sell their vegetable's to local eateries. With inflation having a strong impact on food and energy prices, urban farming is the logical step to cut down on and control associated costs.

Urban farming has shown that it can compete and that there is significant demand but now that it has moved from a hobby to a business the operators will need financial support, advice, training, vertical and horizontal industry collaboration and incentives.

http://tinyurl.com/887lgau; http://tinyurl.com/86vh27l

Horizon: 1

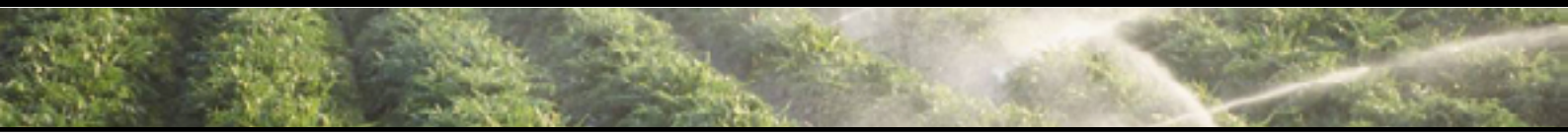
Importance: L

Action Point: Act Now

Credibility: H

Links:

Land use and land management



Local ecosystem impacts from major developments could be irreversible

- Research in desert environments has shown that ecosystems which suffer rapid and severe impacts from drought, climate, or land management decisions may not recover.
- Rapid changes to land use can reduce the opportunity for local species to adapt, and can cause local extinction.
- The effect is not necessarily that the overall richness of the area is reduced. Rather, the make-up of the areas is no longer the same, as other species will come to take their place.
- Further research may be needed to establish whether gradual land use changes could reduce the potential for local extinction in the UK.

Government may wish to consider a national policy for gradual land use alterations. For example, planners may be encouraged to ensure large-scale development occurs as part of a multi-point process wherever possible, in areas where valuable ecosystems are at risk.

http://tinyurl.com/7b8uk5b

Horizon: 1

Importance: H

Action Point: Act Now

Credibility: M

Links:

New satellite survey measures net global deforestation

- The past decade has seen global efforts to reduce deforestation through tree planting programmes, but do these programmes counter the losses caused by deforestation? A new survey conducted by FAO measured net forest gains and losses between 1998 and 2005 by climactic region and geographic region.
- Europe (inc Russia), N. America and Africa all had net losses, with S. America having the largest losses of 72.9 million hectares over the 7 year period. However, net losses were not as large as previously predicted
- The research shows that whilst planting programmes are having a greater global impact than anticipated, far more work is needed to ensure sustainable use.

Government investment in land management, recycling campaigns, responsible consumerism could continue to play an important role in countering deforestation.

http://tinyurl.com/6sl9fmn

Horizon: 1

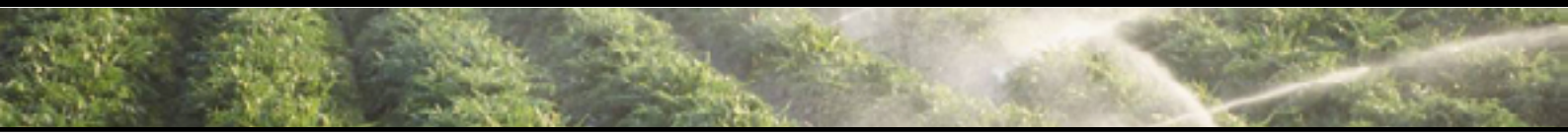
Importance: M

Action Point: Act Now

Credibility: H

Links: N/A

Land use and land management



Geo-visualisation is science's new black

- GIS is no longer just an analytical tool for "techies". IT advances mean that GIS outputs are increasingly accessible to the public and decision makers.
- Innovations in Bolivia will map (previously separate) wildlife information in an open access website. The site will help the Bolivian government to understand the potential impacts of agricultural/ built developments on local biodiversity, and engage the public in conservation issues. Similar innovations have been implemented in Israel, Australia and the USA.
- Additionally, innovative new games have allowed decision makers to understand the impact of their decisions through final 3D visualisations of the landscape. Games can support decisions ranging from whole farm planning to renewable energy planning.

These innovations are increasingly able to synthesise and simplify complex data to help support planning decisions, suggesting that UK government may wish to continue to invest in mapping capabilities. In the future, integrated maps which account for biodiversity, natural hazards, soil quality, and housing/agricultural demand could help to optimise land use.

http://tinyurl.com/82y35oh

Horizon: 1

Importance: M

Action Point: Act Now

Credibility: M

Links: N/A

Developments on corruption in land use

- Ensuring effective land use is critical to meeting global food and resource security challenges.
- The UN FAO have released a report which highlights that weak governance has increased the likelihood of corruption in land tenure and administration, and is intensifying the impact of pressures on land use.
- The exploitation of unsecured land is not a new revelation. However, new voluntary guidelines are being drafted to help improve land governance. Such global guidelines may provide a framework through which land owners can help to maximise land use potential and restrict corrupt use.

Governments may wish to consider the implications of the guidelines within the UK, and investigate the impacts of global adoption on improving food security.

http://tinyurl.com/7uorvne

Horizon: 2

Importance: L

Action Point: Prepare to Act

Credibility: M

Links: