

Environmental Evidence for the Future

Regional Workshop Consultation

Report from the Northern Ireland Workshop
20 September 2017

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1. Introduction

The Environmental Evidence for the Future (EEF) initiative has been set up by NERC to

- pave the way to addressing crucial challenges and opportunities for our environment presented by the UK leaving the EU. These include optimising sustainable environmental management, ensuring the resilience of our ecosystems and the quality of our environment
- define, prioritise and address the knowledge gaps in the environmental science evidence base to inform policy and practice in the medium- to long-term (+5, +10, +20 years)
- focus on areas which have the scope to be addressed in the main via the NERC community and NERC's investments

EEF is an independent, co-developed initiative that is designed to complement, not duplicate, parallel initiatives. The project is focused on identifying cross-cutting challenges that address multiple needs across organisations and departments from a position of building on and strengthening the longer term environmental science evidence base. It will not answer overly-specific or short-term/current evidence needs and it will not be prescriptive in how prioritised environmental evidence needs are or should be addressed.

To help achieve these aims, NERC is holding four regional meetings around the UK in August and September 2017 in which participants from government, NDPBs, NGOs, industry and academia identify, describe and prioritise future environmental policy challenges and opportunities in the context of the UK's exit from EU Environmental Frameworks.

This report documents the workshop process and outputs from the Northern Ireland workshop held on 20 September at the Radisson Blu Hotel, Belfast, Northern Ireland. There are seven main sections:

- **Section 1** is the introduction to the report
- **Section 2** sets out the workshop methodology
- **Section 3** provides an overview of the prioritised policy areas
- **Section 4** sets out the priority policy challenges for food, farming, timber and forests
- **Section 5** sets out the priority policy challenges for water, fisheries and marine
- **Section 6** sets out the priority policy challenges for the environment, conservation and wildlife
- **Section 7** sets out the priority policy challenges for climate change, air quality and energy

2. Workshop methodology

Introduction

The workshop was designed around a 5 step process in which participants:

1. Reviewed and discussed a series of drivers that may shape the UK environment over the next 25 years
2. Mapped the drivers according to whether they perceived them
 - To be more or less important for the UK environmental policy in the future
 - To have a certain or an uncertain outcome
3. Identified a series of priority drivers that are
 - More important and have a certain outcome
 - More important and have an uncertain outcome
4. Explored how priority drivers might play out over the next 25 years and, in particular
 - Whether drivers are more likely to create opportunities or threats to the UK environment in a post Brexit world
 - What evidence policy makers will need to capture those opportunities and mitigate the threats
5. Described a number of 100 word challenges that reflect these conversations

The detailed workshop programme is set out in Annex 1. The participant list is set out in Annex 2.

The drivers

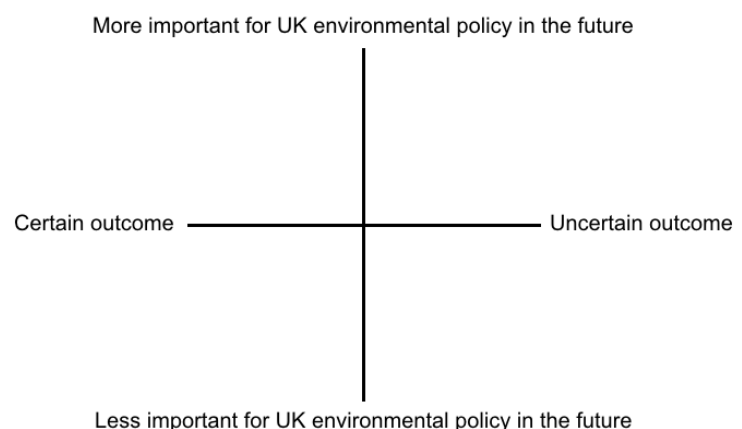
The drivers were drawn from the UK National Ecosystem Assessment Technical Report (published in 2011) and updated to reflect more recent geopolitical developments. During the course of the discussion, participants had the opportunity to add to the list of drivers if they felt there were any obvious gaps.

The full list of (amended) drivers is set out in Annex 3.

Mapping and prioritising the drivers

Participants split into four groups (Annex 2), each of which focussed on one thematic area. Each group reviewed and added to the list of drivers if they noted any specific gaps.

Each group then mapped the full set of drivers on the importance and certainty matrix and identified the priority drivers in the top right and top left quadrants.



Exploring how the priority drivers might play out

Groups discussed the priority drivers in both the top left and top right quadrants.

Drivers that mapped in the top left quadrant are **more important for UK environmental policy in the future and have a certain outcome**. For these drivers, participants explored

- What the outcome is and why it is important
- Whether the outcome offers an opportunity or a threat for the UK post Brexit
- What the impact will be in 2030 and in 2042
- What evidence policy makers will need to consider the policy response
- What links/dependencies exist to wider policy areas

Drivers that mapped in the top right quadrant are **more important for UK environmental policy in the future and have an uncertain outcome**. For these drivers, participants explored

- What the might outcome be post Brexit
- The possible threats and opportunities for the UK environment in 2030 and in 2042
- What evidence policy makers will need to develop an effective response
- What links/dependencies exist to wider policy areas

Given the constraints of time in the workshop, groups did not discuss all the priority drivers.

The 100 word challenges

For each priority driver that they discussed, groups identified a 100 word challenge to encapsulate the issues and research need.

3. Overview of the workshop outputs

Introduction

The tables on pages 5 and 6 provide an overview of the priority issues.

The prioritised drivers from all four group discussions are listed in the tables and then assigned a colour code according to whether groups believed the driver to be

- an opportunity for the future (green)
- a mixture of opportunity and threat (orange)
- a threat (red)

Drivers that were prioritised but not discussed are coded grey.

The detailed analysis and discussions of the issues are set out in sections 4-7.

More important for UK environmental policy in the future and with a certain outcome

	Food Farming Timber Forests	Water Fisheries Marine	Env't Conserv'n Wildlife	Climate change Air quality Energy
1. Agricultural support payments are increasing, focussed on public goods			●	
4. Climate change will continue to cause increased temperature and increased occurrence of extreme weather and seasonal events.	●	●	●	●
7. Data analytics will enable sophisticated mapping of demand and supply				●
8. Decarbonisation will significantly impact on policy formulation and implementation				●
11. Food security and water security will become significant challenges; perhaps even sources of conflict	●	●		
13. Global resource shortages (metals, nutrients for example) will begin to bite		●	●	
17. Improvements in farming techniques and technology will boost productivity and food security	●	●		
20. London and other major UK cities will continue to grow in size and population	●			
21. Lowland/upland land capability and use will face increasing and competing demands	●			
23. New technology will continue have an impact on the natural environment	●			
27. Planning needs to be future proofed and more embedded			●	●
30. Technology is likely to play an increasing role in regulation, both in monitoring and compliance			●	●
32. The continued decline in vertebrate species populations is part of a complex biodiversity picture creating winners and losers			●	
33. The contribution that natural capital makes to UK growth will become more important		●		
36. The ecosystem approach, landscape-scale approaches, ecosystem services and natural capital frameworks will be significant components of the policy making process	●	●		
39. The sale of petrol and diesel vehicles will be banned in 2040				●
40. The UK and its Overseas Territories will not be immune from rising sea levels, flooding, heatwaves and poor air quality				●
45. The world economy will double in size by 2045				●
Increased demand for infrastructure, e.g. housing, transport, energy				●

More important for UK environmental policy in the future with an uncertain outcome

	Food Farming Timber Forests	Water Fisheries Marine	Env't Conserv'n Wildlife	Climate change Air quality Energy
1. Agricultural support payments are increasing, focussed on public goods	●	●		
2. Circular economy practices will become more widely used and change what society values				●
3. Citizen engagement is likely to become increasingly important across a range of policy areas		●	●	●
9. Demand for energy will continue to increase				●
10. Demand for greater regional and local autonomy will continue			●	
11. Food security will become a significant challenge; perhaps even sources of conflict	●			
12. Global population is likely to exceed 8.5 billion by 2030	●			
15. Governments will continue to collaborate to address Climate Change and Sustainable Development	●			
17. Improvements in farming techniques and technology will boost productivity and food security				●
21. Lowland/upland land capability and use will face increasing and competing demands			●	
24. Patterns of land and marine use will need to change to meet the UK's food and energy needs	●			●
26. Pests and diseases will be more widely dispersed			●	
30. Technology is likely to play an increasing role in regulation, both in monitoring and compliance		●		
33. The contribution that natural capital makes to UK growth will become more important			●	●
36. The ecosystem approach, landscape-scale approaches, ecosystem services and natural capital frameworks will be significant components of the policy making process			●	
41. The UK will agree more strategic approaches to environmental delivery through legislative reform as a result of Brexit		●	●	●
43. The UK's reputation as a migrant unfriendly country will have an impact on jobs and wealth creation	●			
46. There will be no magic bullet that eases pressure on the natural environment to provide food and energy		●		
47. Waste will continue to increase and is likely to cause significant environmental challenges			●	●
Border controls between N and S are different from the present day		●		

4. Food, Farming, Timber and Forests

Stats

- **23 drivers** mapped as more important for UK environmental policy in the future and having a certain outcome
 - The group prioritised 7 and discussed 1 in detail
- **21 drivers** mapped as more important for UK environmental policy in the future and having an uncertain outcome
 - The group prioritised 6 and discussed 1 in detail
- **3 drivers** mapped as being less important for UK environmental policy in the future and having a certain outcome. These drivers can be **parked**.
- **1 driver** mapped as being less important for UK environmental policy in the future and having an uncertain outcome. It may be worth **monitoring** this drivers to determine whether – as the outcome becomes more clear – they become more important for UK environmental policy in the future.
- The group identified **1 additional driver by splitting driver 11 into**
 - *Food security will become a significant challenge; and perhaps even a source of conflict*
 - *Water security will become a significant challenge; and perhaps even a source of conflict*

Drivers that are MORE IMPORTANT for UK environmental policy and have a CERTAIN OUTCOME	Challenge	Priority	Not ranked
2. Circular economy practices will become more widely used and change what society values			●
4. Climate change will continue to cause increased temperature and increased occurrence of extreme weather and seasonal events.		●	
5. Consumption is likely to increase steadily			●
6. Cyber security will be a continuing threat to international security			●
7. Data analytics will enable sophisticated mapping of demand and supply			●
8. Decarbonisation will significantly impact on policy formulation and implementation			●
11. Water security will become a significant challenge; perhaps even a source of conflict		●	
17. Improvements in farming techniques and technology will boost productivity and food security		●	
19. Local economic performance around the UK will be uneven, leading to increased regional disparity			●
20. London and other major UK cities will continue to grow in size and population		●	
21. Lowland/upland land capability and use will face increasing and competing demands	●		
22. More than one quarter of the world's population will live with water scarcity on a daily basis by 2040			●
23. New technology will continue have an impact on the natural environment		●	
26. Pests and diseases will be more widely dispersed			●
27. Planning needs to be future proofed and more embedded			●
28. Retailer power will drive farming systems			●
29. Smart cities and autonomous vehicles will change how we live and travel			●
33. The contribution that natural capital makes to UK growth will become more important			●
36. The ecosystem approach, landscape-scale approaches, ecosystem services and natural capital frameworks will be significant components of the policy making process		●	
38. The risk of interstate conflict will continue to rise			●
40. The UK and its Overseas Territories will not be immune from rising sea levels, flooding, heatwaves and poor air quality			●
44. The value of the UK's ecotourism markets is likely to increase			●

Drivers that are MORE IMPORTANT for UK environmental policy and have an UNCERTAIN OUTCOME	Challenge	Priority	Not ranked
1. Agricultural support payments are increasing, focussed on public goods	●		
3. Citizen engagement is likely to become increasingly important across a range of policy areas			●
10. Demand for greater regional autonomy will remain a political issue			●
11. Food security will become a significant challenge; perhaps even a source of conflict		●	
12. Global population will exceed 8.5 billion by 2030		●	
15. Governments will continue to collaborate to address Climate Change and Sustainable Development		●	
16. Governments will seek to achieve a global free trade agreement			●
18. International investment in the UK will increase			●
24. Patterns of land use will need to change to meet the UK's food and energy needs		●	
25. People will have increased mobility and job flexibility			●
30. Technology is likely to play an increasing role in regulation, both in monitoring and compliance			●
31. The average age of the UK population will be 42.9 years in 2045. 1 in 12 will be over 80			●
32. The continued decline in vertebrate species populations is part of a complex biodiversity picture creating winners and losers.			●
34. Poverty and social injustice is creating a disconnection between people and the environment			●
35. The economic centre of gravity will continue to move away from the west towards China and the east			●
37. The internet of things will change production processes and practices profoundly			●
39. The sale of petrol and diesel vehicles will be banned in 2040			●
41. The UK will agree more strategic approaches to environmental delivery through legislative reform as a result of Brexit			●
42. The UK will not retain exclusive fishing rights of the 200 mile exclusive economic zone post Brexit			●
43. The UK's reputation as a migrant unfriendly country will have an impact on jobs and wealth creation		●	
45. The world economy will double in size by 2045			●
47. Waste will continue to increase and is likely to cause significant environmental challenges			●
Water security will become a significant challenge; perhaps even a source of conflict		●	

Drivers that are MORE IMPORTANT for UK environmental policy in the future and that have a CERTAIN outcome

The Driver	21. Lowland/upland land capability and use will face increasing and competing demands
The Challenge	<p>The UK needs a joined up policy on food security, the environment and health. Lowland and upland UK will face competing pressures and should be closely linked.</p> <p>Research is needed to identify these pressures, the scale of their impact and the mitigation options. This evidence is essential to formulate a balanced government policy.</p>
53 words	

Outcome of this driver	<ul style="list-style-type: none"> Increased constraints between housing, energy, food, climate mitigation and adaptation and nature mean there is a greater need for joined up food security and environment policy.
Why the outcome is important	<ul style="list-style-type: none"> To maintain sustainable food production capacity
Opportunity or threat?	<ul style="list-style-type: none"> Brexit offers opportunities for more joined up policy
Impact of the driver	<ul style="list-style-type: none"> Improvement in efficiency and technology should help with reducing tensions; but it will depend on trade deals and on how bad climate change gets. In fact, it's not certain that these improvements will be enough.
Evidence needs	<ul style="list-style-type: none"> Relevant impacts of flood risk in different areas and pressures on food production Evidence of public good provision and what mitigation measures are appropriate for different problems and different regions
Connections to other policy areas	<ul style="list-style-type: none"> Trade policies Ageing population

Drivers that are MORE IMPORTANT for UK environmental policy in the future and that have an UNCERTAIN outcome

The Driver	1. Agricultural support payments are increasing, and focussed on public goods
The Challenge	<p>The UK needs to develop an agricultural support policy which covers the provision of a wide range of public goods [which are] localised and flexible over time.</p> <p>Research is needed to identify the public goods, to develop a framework, to prioritise them in different areas and to determine the best policy delivery mechanisms.</p>
53 words	

Possible outcomes	<ul style="list-style-type: none"> • Decreased subsidies • Greater focus on public goods • Increased food prices
Possible threats	<ul style="list-style-type: none"> • Decreased subsidies • Greater focus on public goods • Increased food prices • These are all linked to trade policy changes in the EU – perhaps away from public goods)
Possible opportunities	
Evidence needs	
Connections to other policy areas	

5. Water, fisheries and Marine

Stats

- **19 drivers** mapped as more important for UK environmental policy in the future and having a certain outcome
 - The group prioritised 6 and discussed 1 in detail
- **19 drivers** mapped as more important for UK environmental policy in the future and having an uncertain outcome
 - The group prioritised 6 and discussed 1 in detail
- **3 drivers** mapped as being less important for UK environmental policy in the future and having a certain outcome. These drivers can be **parked**.
- **8 drivers** mapped as being less important for UK environmental policy in the future and having an uncertain outcome. It may be worth **monitoring** these drivers to determine whether – as the outcome becomes clearer – they become more important for UK environmental policy in the future.
- The group identified **2 additional drivers**
 - *Border controls between N and S are different from the present day*
 - *There is a general change in environmental governance*

Drivers that are MORE IMPORTANT for UK environmental policy and have a CERTAIN OUTCOME	Challenge	Priority	Not ranked
2. Circular economy practices will become more widely used and change what society values			●
4. Climate change will continue to cause increased temperature and increased occurrence of extreme weather and seasonal events.		●	
5. Consumption is likely to increase steadily			●
6. Cyber security will be a continuing threat to international security			●
7. Data analytics will enable sophisticated mapping of demand and supply			●
8. Decarbonisation will significantly impact on policy formulation and implementation			●
11. Food security will become a significant challenge; perhaps even a source of conflict		●	
13. Global resource shortages (metals, nutrients for example) will begin to bite		●	
17. Improvements in farming techniques and technology will boost productivity and food security		●	
19. Local economic performance around the UK will be uneven, leading to increased regional disparity			●
21. Lowland/upland land capability and use will face increasing and competing demands			●
23. New technology will continue have an impact on the natural environment			●
26. Pests and diseases will be more widely dispersed			●
27. Planning needs to be future proofed and more embedded			●
28. Retailer power will drive farming systems			●
33. The contribution that natural capital makes to UK growth will become more important		●	
36. The ecosystem approach, landscape-scale approaches, ecosystem services and natural capital frameworks will be significant components of the policy making process	●		
40. The UK and its Overseas Territories will not be immune from rising sea levels, flooding, heatwaves and poor air quality			●
44. The value of the UK's ecotourism markets is likely to increase			●

Drivers that are MORE IMPORTANT for UK environmental policy and have an UNCERTAIN OUTCOME	Challenge	Priority	Not ranked
1. Agricultural support payments are increasing, focussed on public goods		●	
3. Citizen engagement is likely to become increasingly important across a range of policy areas		●	
10. Demand for greater regional autonomy will remain a political issue			●
12. Global population will exceed 8.5 billion by 2030			●
14. GM crops and animals are likely to become culturally accepted in the UK			●
15. Governments will continue to collaborate to address Climate Change & Sustainable Development			●
24. Patterns of land use will need to change to meet the UK's food and energy needs			●
30. Technology is likely to play an increasing role in regulation, both in monitoring & compliance		●	
31. The average age of the UK population will be 42.9 years in 2045. 1 in 12 will be over 80			●
32. The continued decline in vertebrate species populations is part of a complex biodiversity picture creating winners and losers.			●
34. Poverty & social injustice is creating a disconnect between people & the environment			●
39. The sale of petrol and diesel vehicles will be banned in 2040			●
41. The UK will agree more strategic approaches to environmental delivery through legislative reform as a result of Brexit		●	
42. The UK will not retain exclusive fishing rights of the 200 mile exclusive economic zone post Brexit			●
46. There will be no magic bullet that eases pressure on the natural environment to provide food and energy		●	
47. Waste will continue to increase & is likely to cause significant environmental challenges			●
48. Water security will become a significant challenge; perhaps even a source of conflict			●
49. Border controls between N and S are different from the present day	●		
50. There is a change in overall environmental governance			●

Drivers that are MORE IMPORTANT for UK environmental policy in the future and that have a CERTAIN outcome

The Driver	36. The ecosystem approach (and) natural capital frameworks will be significant components of the policy making progress
The Challenge	The UK needs a natural capital framework and ecosystem approach to avoid focusing on single agenda items and consider the overall value of ecosystems. Policy needs to become more applied to how ecosystems function and consider their overall value (long term vision). Post Brexit, implementing an ecosystem approach will help promote the economic value of ecosystem services. If this is not successfully demonstrated, there is a risk that environmental protection is weakened because loss of European control. If the outcome is successful, the impact should be more resilient ecosystems. To develop and effective response, policy makers need ecosystem models to support decision making. This will benefit from more modern data analytics, big data and include concepts such as cumulative effects. The approach needs to link with international agreements such as OSPAR, climate policy and land based policy.
137 words	

Outcome of this driver	<ul style="list-style-type: none"> • Incorporation of ecosystem based approaches to systems management. Avoids focus on single agenda items. Considers the overall value of the ecosystem. .
Why the outcome is important	<ul style="list-style-type: none"> • Policy making becomes aligned to the real observed environment • Easier to integrate economic value of the ecosystem
Opportunity or threat?	<ul style="list-style-type: none"> • Brexit offers opportunities to promote the economic benefit • Risk is not being able to articulate the about the ecosystem approach.
Impact of the driver	<ul style="list-style-type: none"> • A more resilient ecosystem
Evidence needs	<ul style="list-style-type: none"> • Modelling approaches to demonstrate effectiveness of ecosystem/natural capital frameworks approach • More modern data analytics- big data more likely • Case studies to exemplify argument and approach • Ground truth modelling
Connections to other policy areas	<ul style="list-style-type: none"> • International agreement such as OSPAR, climate change policies • NASCO (salmon fisheries) • Planning linking terrestrial and marine • MSFD and WFD

Drivers that are MORE IMPORTANT for UK environmental policy in the future and that have an UNCERTAIN outcome

The Driver	49. Border controls between the North and South are different from now
The Challenge 90 words	Brexit will lead to a change in border controls for Northern Ireland and Republic of Ireland for environment and agriculture. This could lead to an increase in pollution, divergence in regulation and standards, and less cooperation. However, there may be more flexibility to refine controls and policy to suit the Northern Ireland climate and landscapes. Research is required to understand the strengths and weaknesses, and opportunities and threats of current cross border arrangements, and how these can adapt to optimise trans boundary environmental management. This should include monitoring and data.

Possible outcomes	<ul style="list-style-type: none"> • Need to deal with cross border environmental issues, pollution, drinking water contamination etc. • Loss of joint policies, currently based on EU regulations
Possible threats	<ul style="list-style-type: none"> • Increase in pollution. • Lack of consistent regulations • Less cooperation targeting crime e.g. waste discharges • Lack of access to funds and EU wide data sets e.g. Interreg funding
Possible opportunities	<ul style="list-style-type: none"> • Flexibility to refine mitigation measures and controls to suit NI climate/landscape • Differentiation in NI products e.g. NI Red Tractor • Potential to reduce conflicts in incentive schemes/single farm payments, with more consideration of ecosystem service based payments
Evidence needs	<ul style="list-style-type: none"> • We will still need to know what is happening at the EU level • Also need knowledge on global markets – tariffs and regulations • Economic models needed if we have a different system to now • Need to understand the current benefits of the arrangements and extent of cross border working
Connections to other policy areas	<ul style="list-style-type: none"> • Trade • Agricultural policy • Environmental policy

6. Environment, conservation and wildlife

Stats

- **15 drivers** mapped as more important for UK environmental policy in the future and having a certain outcome
 - The group prioritised 6 and discussed 3 in detail
- **21 drivers** mapped as more important for UK environmental policy in the future and having an uncertain outcome
 - The group prioritised 8 and discussed 1 in detail
- **3 drivers** mapped as being less important for UK environmental policy in the future and having a certain outcome. These drivers can be **parked**.
- **8 drivers** mapped as being less important for UK environmental policy in the future and having an uncertain outcome. It may be worth **monitoring** this drivers to determine whether – as the outcome becomes clearer – they become more important for UK environmental policy in the future.
- The group identified did not identify any additional drivers
- Drivers 33 and 36 were clustered together

Drivers that are MORE IMPORTANT for UK environmental policy and have a CERTAIN OUTCOME	Challenge	Priority	Not ranked
1. Agricultural support payments are increasing, focussed on public goods	●		
2. Circular economy practices will become more widely used and change what society values			●
4. Climate change will continue to cause increased temperature and increased occurrence of extreme weather and seasonal events.	●		
8. Decarbonisation will significantly impact on policy formulation and implementation			●
13. Global resource shortages (metals, nutrients for example) will begin to bite		●	
17. Improvements in farming techniques and technology will boost productivity and food security			●
20. London and other major UK cities will continue to grow in size and population			●
27. Planning needs to be future proofed and more embedded		●	
28. Retailer power will drive farming systems			●
30. Technology is likely to play an increasing role in regulation, both in monitoring and compliance		●	
32. The continued decline in vertebrate species populations is part of a complex biodiversity picture creating winners and losers.	●		
34. Poverty and social injustice is creating a disconnection between people and the environment			●
40. The UK and its Overseas Territories will not be immune from rising sea levels, flooding, heatwaves and poor air quality			●
44. The value of the UK's ecotourism markets is likely to increase			●
46. There will be no magic bullet that eases pressure on the natural environment to provide food and energy			●

Drivers that are MORE IMPORTANT for UK environmental policy and have an UNCERTAIN OUTCOME	Challenge	Priority	Not ranked
3. Citizen engagement is likely to become increasingly important across a range of policy areas		●	
7. Data analytics will enable sophisticated mapping of demand and supply			●
9. Demand for energy will continue to increase			●
10. Demand for greater regional autonomy will remain a political issue	●		
11. Food and water security will become a significant challenge; perhaps even a source of conflict			●
12. Global population will exceed 8.5 billion by 2030			●
15. Governments will continue to collaborate to address Climate Change and Sustainable Development			●
16. Governments will seek to achieve a global free trade agreement			●
19. Local economic performance around the UK will be uneven, leading to increased regional disparity			●
21. Lowland/upland land capability and use will face increasing and competing demands		●	
22. More than one quarter of the world's population will live with water scarcity on a daily basis by 2040			●
23. New technology will continue have an impact on the natural environment			●
24. Patterns of land use will need to change to meet the UK's food and energy needs			●
26. Pests and diseases will be more widely dispersed		●	
29. Smart cities and autonomous vehicles will change how we live and travel			●
33. The contribution that natural capital makes to UK growth will become more important		●	
36. The ecosystem approach, landscape-scale approaches, ecosystem services and natural capital frameworks will be significant components of the policy making process		●	
39. The sale of petrol and diesel vehicles will be banned in 2040			●
41. UK will agree more strategic approaches to environmental delivery through legislative reform as a result of Brexit		●	
42. The UK will not retain exclusive fishing rights of the 200 mile exclusive economic zone post Brexit			●
47. Waste will continue to increase and is likely to cause significant environmental challenges		●	

Drivers that are MORE IMPORTANT for UK environmental policy in the future and that have a CERTAIN outcome

The Driver	1. Agricultural Support payments are increasingly focussed upon public goods
The Challenge	<p>Sustainable and resilient agricultural systems and practices are an essential part of the future of the UK social and industrial infrastructure. Core to this ambition is maximising the public good opportunities from land use management. Public money for public goods, means payments for goods and services including securing healthy soils, clean water and air, flood management, reversing the decline of biodiversity, and carbon sequestration etc. Research is needed to underpin the development of an index of existing natural resources and land use practices, indicators and modalities for success, and economic implications.</p> <p>A challenge will be how to engage and roll-out such a shift in policy and research will be needed to ensure targeted and appropriate engagement to achieve buy-in from current and future generation farm families.</p>
126 words	

Outcome of this driver	<ul style="list-style-type: none"> • More sustainable agricultural systems (environmentally, economically and socially) • Potential indicators for this outcome: Better water catchment management, increased biodiversity, less nutrients into river systems, management of carbon sinks, increased woodland, better air quality, access and recreation.
Why the outcome is important	<ul style="list-style-type: none"> • Balance of agricultural carbon emissions • Restoring biodiversity • Mitigate risks to water pollution • Socially and culturally important – securing custodianship of land • Improved air quality • Health and wellbeing aided by access to environment
Opportunity or threat?	<ul style="list-style-type: none"> • Opportunity: Niche environmental agricultural product; Engage farming community in wider public good discussions; Increased access to the landscape for recreation and enjoyment / wellbeing; Value of systems underpinning society’s wellbeing (ecosystem services) • Threat: Definition of public good – e.g. it may be argued food security and food quality are as important as ecosystem services.
Impact of the driver	<ul style="list-style-type: none"> • Healthier environment • Resilience in the landscape increased through sustainable land use practices • Ecosystem services are valued in decision making • Stronger awareness of the co-dependence between agricultural and urban communities • Diversity of farm incomes • More engaged and vibrant farming community, and diversity in farming practices • Future-proofed farm businesses = farming seen as an attractive career choice.
Evidence needs	<ul style="list-style-type: none"> • Working examples of interactions between services and agricultural practice within the landscape • Good catchment science

	<ul style="list-style-type: none">• Good land cover data• Reproducible success case studies• Natural Capital index to quantify what we have
Connections to other policy areas	<ul style="list-style-type: none">• Land use strategy for Northern Ireland• Mitigation and adaptation strategies• River basin management plans• Biodiversity Strategy• Need a sustainable development strategy for Northern Ireland• Health and wellbeing strategy• Going for Growth agri-food strategy

The Driver	4. Climate change will continue to cause increased temperature and increased occurrence of extreme weather and seasonal events.
The Challenge	<p>Climate change is inexorable and inevitable over the next 25 years irrespective of current emissions control initiatives and international agreements. It will result in more localised flooding, sea level rise and an acceleration of the invasion of alien species and pests. Less predictable weather patterns will make agricultural planning harder and present significant economic, ecological and social impacts. Research is needed to demonstrate the economic benefits of intervention and appropriate adaptation and mitigation measures. This requires back-casting 25 years to indicate trend, rate of change, and costs incurred. This data, adjusted for world population and economic growth, should be used to test scenarios to minimise risks and maximise opportunities.</p>
109 words	

Outcome of this driver	<ul style="list-style-type: none"> • More localised flooding, less predictable weather patterns, therefore agricultural planning harder, increased risks and costs. • Sea level rise and acceleration of the invasion of alien species. • Range of species and populations changing and potential coastal land loss.
Why the outcome is important	<ul style="list-style-type: none"> • Significant economic and social impact. • Imposes planning restrictions and loss of accommodation; exposed commerce and agricultural holdings – farms, land managers and fisheries. • Unmanaged change and adaptation will impact on ecosystems and dealing with the control of pests. E.g., health impact and costs of Lyme’s disease and malaria.
Opportunity or threat?	<ul style="list-style-type: none"> • Threat from the potential loss of regulatory controls and institutions. • Opportunity for the UK to provide world class innovative and practical regulation, and limited opportunity for new crops.
Impact of the driver	<ul style="list-style-type: none"> • On current trajectory, predicted loss of land and increase in intensification, loss of regulatory control, reduced economic gain due to reduced predictability. • Possibility of catastrophic crop loss and market price distortion. • Lower resilience.
Evidence needs	<ul style="list-style-type: none"> • Back cast 25 years to indicate trend, rate of change, and physical, social and cost impacts (from repair, mitigation and adaptation). • Use this research to forecast the next 25 years adjusted for world population and economic growth and test scenarios for intervention to minimise risks and maximise opportunities.
Connections to other policy areas	<ul style="list-style-type: none"> • Yes. Comprehensively so

The Driver	32. The continued decline in vertebrate species populations is part of a complex biodiversity picture creating winners and losers.
The Challenge	<p>Continued decline in higher level species will lead to a reduction in control of habitat and food chains. This is not a simple loss but one which impacts across the board because of the fine balance of ecosystems. It will be a progressive distortion leading to a significant ecological imbalance and the creation of new potential for pests and invasive species. However, there is also potential opportunities for eco-tourism centred on rare and vulnerable species. Research is required to assess how the public values conservation and to examine the complexity of ecological networks e.g. impacts of raptor loss. Measurement of the probability and consequence of decline will provide evidence of consequential loss of representative vertebrate species.</p>
116 words	

Outcome of this driver	<ul style="list-style-type: none"> Continued decline in higher level species loss leading to a reduction in control of habitat, food chain and overall food web. This is not a simple loss but one which impacts across the biodiversity board.
Why the outcome is important	<ul style="list-style-type: none"> Ecosystems are finely balanced. The fundamental and progressive distortion of ecological networks could lead to significant ecological imbalance and the potential for new pests and invasive species.
Opportunity or threat?	<ul style="list-style-type: none"> Opportunity - eco-tourism in providing protected habitats as 'natural zoos' – rarity value of iconic species. Threat unknown because of the complexity but the potential for imbalance through raptor loss and other higher order vertebrates is clear.
Impact of the driver	<ul style="list-style-type: none"> Unknown due to complexity of decline consequences of individual species but extinction a possibility. There may not be a clear economic value but a moral duty to maintain a balance which is working even if the contribution of each element is unknown.
Evidence needs	<ul style="list-style-type: none"> Evidence of consequential loss of representative vertebrate species and the potential impact on agriculture and potential for tourism.
Connections to other policy areas	<ul style="list-style-type: none"> Yes – land management, health and well-being.

Drivers that are MORE IMPORTANT for UK environmental policy in the future and that have an UNCERTAIN outcome

The Driver	10. Demand for greater regional and local autonomy will continue
The Challenge 130 words	It is recognised that there is a need for a UK common framework for environmental standards; there is a need for the transboundary relationships to be addressed in environmental policy making. The shared land and sea border in Ireland represents a unique situation both in policy terms and as a single biogeographic unit. Devolved authority will be essential for interoperability on the island, and therefore integration of UK and ROI policy agendas and standards will require sharper focus. Research is needed to fully delineate the shared environmental concerns, boundaries and issues and how these are addressed on a North-South basis. Research is also needed to describe the extent and success of local arrangements for transboundary operations on key environmental issues, and risk analysis will be needed to identify mitigation measures.

Possible outcomes	<ul style="list-style-type: none"> • Decision making closer to communities • More successful North-South cooperation on environmental issues, i.e. for the sake of transboundary cooperation North/South Ireland, common standards will be needed • Similar standards (with the potential for improvement) as the EU will be adopted
Possible threats	<ul style="list-style-type: none"> • For NI, risk of ‘race to the bottom’ in terms of environmental regulation • Interoperability will be compromised for North/South Ireland and for the UK between regions • Significant disparity within the UK might lead to complications for uniformity on strategic priorities • Decisions more at risk of short-termism and inertia at the hands of local political forces
Possible opportunities	<ul style="list-style-type: none"> • Competition for ‘race to the top’ in terms of environmental leadership and policy innovation • UK leadership - potential for better environmental standards, going beyond the EU compromise standards • Recognition of Ireland as a single biogeographic unit • Articulation of a soil protection standard for Ireland as a whole • Local arrangements cross-border to address environmental crime
Evidence needs	<ul style="list-style-type: none"> • Understanding of unique geo-environmental characteristics North and South of Ireland • Existing successful policy collaboration • Evidence around risks of too much devolution of power of environmental decision making
Connections to other policy areas	<ul style="list-style-type: none"> • Ongoing mapping of UK policy against EU environmental Aquis • Lack of shared structures currently, e.g. NI does not have an independent EPA • North-South cooperation currently exists, e.g. North South Ministerial Council (NSMC), as well as informal cooperation

7. Climate change, air quality and energy

Stats

- **13 drivers** mapped as more important for UK environmental policy in the future and having a certain outcome
 - The group prioritised 6 and discussed 2 in detail and wrote one 100-word challenge
- **17 drivers** mapped as more important for UK environmental policy in the future and having an uncertain outcome
 - The group prioritised 8 and discussed 1 in detail and wrote one 100-word challenge
- **11 drivers** mapped as being less important for UK environmental policy in the future and having a certain outcome. These drivers can be **parked**.
- **10 drivers** mapped as being less important for UK environmental policy in the future and having an uncertain outcome. It may be worth **monitoring** this drivers to determine whether – as the outcome becomes clearer – they become more important for UK environmental policy in the future.
- The group identified **3 additional drivers**, one by splitting driver 11 into two:
 - *Increased demand for infrastructure, e.g. housing, transport, energy*
 - *Food security will become a significant challenge; and perhaps even a source of conflict*
 - *Water security will become a significant challenge; and perhaps even a source of conflict – considered less important than food security*
- Drivers 2 and 47 were clustered together; 3, 33 and 41 were clustered together; 4 and 40 were clustered together; driver 11 was split into two; Driver 15 was modified to include climate refugees; Driver 26 was modified to include invasive species; and Drivers 27 and 48 were clustered together.

Drivers that are MORE IMPORTANT for UK environmental policy and have a CERTAIN OUTCOME	Challenge	Priority	Not ranked
4. Climate change will continue to cause increased temperature and increased occurrence of extreme weather and seasonal events.	●		
7. Data analytics will enable sophisticated mapping of demand and supply		●	
8. Decarbonisation will significantly impact on policy formulation and implementation		●	
11. Food security and water security will become significant challenges; perhaps even sources of conflict			●
19. Local economic performance around the UK will be uneven, leading to increased regional disparity			●
26. Pests and diseases will be more widely dispersed			●
27. Planning needs to be future proofed and more embedded		●	
30. Technology is likely to play an increasing role in regulation, both in monitoring and compliance		●	
40. The UK and its Overseas Territories will not be immune from rising sea levels, flooding, heatwaves and poor air quality	●		
45. The world economy will double in size by 2045		●	
48. Increased demand for infrastructure, e.g. housing, transport, energy		●	
49. Water security will become a significant challenge; and perhaps even a source of conflict – which they consider less important than food security			●
50. Pests, diseases and invasive species will be more widely dispersed			●

Drivers that are MORE IMPORTANT for UK environmental policy and have an UNCERTAIN OUTCOME	Challenge	Priority	Not ranked
2. Circular economy practices will become more widely used and change what society values		●	
3. Citizen engagement is likely to become increasingly important across a range of policy areas		●	
5. Consumption is likely to increase steadily			●
9. Demand for energy will continue to increase		●	
10. Demand for greater regional and local autonomy will continue			●
14. GM crops and animals are likely to become culturally accepted in the UK			●
15. Governments will continue to collaborate to address Climate Change and Sustainable Development			●
16. Governments will seek to achieve a global free trade agreement			●
17. Improvements in farming techniques and technology will boost productivity and food security		●	
24. Patterns of land and marine use will need to change to meet the UK's food and energy needs	●		
33. The contribution that natural capital makes to UK growth will become more important		●	
34. Poverty and social injustice is creating a disconnection between people and the environment			●
36. The ecosystem approach, landscape-scale approaches, ecosystem services & natural capital frameworks will be significant components of the policy making process			●
41. The UK will agree more strategic approaches to environmental delivery through legislative reform as a result of Brexit		●	
44. The value of the UK's ecotourism markets is likely to increase			●
47. Waste will continue to increase and is likely to cause significant environmental challenges		●	
51. Governments will continue to collaborate to address Climate Change, Sustainable Development and climate refugees			●

Drivers that are MORE IMPORTANT for UK environmental policy in the future and that have a CERTAIN outcome

The Driver	<p>4. Climate change will continue to cause increased temperature and increased occurrence of extreme weather and seasonal events clustered with</p> <p>40. The UK and its Overseas Territories will not be immune from rising sea levels, flooding, heatwaves and poor air quality.</p>
The Challenge	<p>The UK faces inexorable challenges at a local level, compounded by severe global pressures as a result of climate disruption. It is important to find an acceptable balance between a sustainable environment and the often competing social, economic and political agendas. Research is needed to target mitigation and adaptation strategies using viable climate, air and water quality models and datasets. This should enable the timely development and application of social and innovative technological solutions that respond to a growing population and its requirements for food security, energy and natural resources.</p>
90 words	

Outcome of this driver	<ul style="list-style-type: none"> Known outcomes include rising sea levels, flooding, extreme weather events, heatwaves, poor air quality creating a more challenging environment to live in and potentially lower agricultural productivity. On a global scale, this means a reducing agricultural land mass and increasing population migration.
Why the outcome is important	<ul style="list-style-type: none"> The outcomes above will have social, economic, political and environmental consequences at global, UK and regional levels. E.g. flooding events – unknown consequences of prolonged inundation of soils affects farming, housing insurance, drinking water quality, infrastructure management and habitats. Rising sea level – impact from tidal surge on population, housing and agricultural land.
Opportunity or threat?	<ul style="list-style-type: none"> Both [an opportunity and a threat]. An opportunity for UK/NI to develop local solutions more appropriate to regional circumstances. Threat post Brexit is that the issue is global and requires working together across international boundaries, pooling and sharing knowledge and resources.
Impact of the driver	
Evidence needs	<ul style="list-style-type: none"> Models and datasets to enable the development and application of innovative, engineering and technological solutions. E.g. improved weather, air quality and water quality models.
Connections to other policy areas	<ul style="list-style-type: none"> Yes- linked to global population (12) and collaboration to address climate change (15), future proofing planning (27), energy policy and essentially all other environmental policy drivers.

Drivers that are MORE IMPORTANT for UK environmental policy in the future and that have an UNCERTAIN outcome

The Driver	24. Patterns of land and marine use will need to change to meet the UK's food and energy needs
The Challenge	<p>A strategy is required to direct changes in land and marine use in order to achieve effective and efficient environmental, economic outcomes for food and energy production. In a post-Brexit scenario the UK will need to explore ways to become more self-sufficient with regards to food and energy production. Evidence is required on the likely need scenarios and to better understand how climate disruption might stop NI environmental policy achieving these.</p> <p>71 words</p>
Possible outcomes	<ul style="list-style-type: none"> • Greater control/responsibility to make decisions on land and marine use. Potential to have to be more self-sufficient with respect to food production. E.g. diversification from livestock focus towards arable crops for local use. Increased focus on food from marine environment e.g. aquaculture. • There is currently a single market for electricity across the island of Ireland. Depending on the Brexit settlement, we may need to more self-sufficient in energy production. Increased focus on energy from marine environment, e.g. tidal, off-shore wind and more interconnectors with the UK. • Potential greater drivers towards energy crops. • A greater focus on regional 'natural' advantage. Ability to grow grass, a cheap livestock forage.
Possible threats	<ul style="list-style-type: none"> • Potential shortage in food products leading to market shifts. • Struggle of local electricity infrastructure to deal with peaks in demand – black outs.
Possible opportunities	<ul style="list-style-type: none"> • An opportunity to condense and simplify regulation around use of the marine environment and bring it under the control of one agency or Department.
Evidence needs	<ul style="list-style-type: none"> • We will need accurate data on what our food and energy needs are and what they are likely to be post-Brexit and by 2042. • We need to understand what 2042 might look like from a food demand, energy demand perspective in a context of climate disruption. • Evidence to quantify and map the regional land and marine use so that strategic planning decisions can be made
Connections to other policy areas	

Annex 1: The workshop programme

1000	Introduction, aims and objectives
1025	Thinking about the future
1045	Mapping the drivers of UK environmental policy post Brexit
1215	Review and discussion of emerging issues
1245	Lunch
1330	Identifying future policy challenges
1530	Tea
1550	Plenary review of group findings
1630	Close

Annex 2: Delegate list

- Aileen Lawson, Ulster Farmers' Union
- Alister Wilson, Waverley Consultants (facilitator)
- Brian Ervine, DAERA
- Chris Johnston, AFBI (Agri-Food and Biosciences Institute)
- Colin Armstrong, DAERA
- Doug Connelly, National Oceanographic Centre
- Eimear Lenehan, SSE NI
- Emily Hunter, RSPB
- Gareth Maxwell, Northern Ireland Water
- Grainne Millar, DAERA
- Hannah Lacey, Centre for Ecology & Hydrology
- Ivor Ferguson, Ulster Farmers' Union
- Jan Dick, Centre for Ecology & Hydrology
- Jennifer Fulton, Ulster Wildlife
- Jo Chamberlain, Centre for Ecology & Hydrology
- Jonathan Derham, Environmental Protection Agency, EIRE
- Mark Emmerson, Queens University Belfast
- Mark Preston, DAERA
- Mark Wright, DAERA
- Matt Service, AFBINI
- Noel McGinnity, DAERA
- Noel Bell, DAERA
- Pat Corker, Northern Ireland Environment Agency
- Paul Devine, DAERA
- Rachel Cassidy, AFBI (Agri-Food and Biosciences Institute)
- Rodrigo Olave, AFBI (Agri-Food and Biosciences Institute)
- Sean Kelly, Northern Ireland Environment Link
- Sinclair Mayne, AFBINI
- Stephen Aston, Trustee and Board Member of NIEL - Northern Ireland Environment Link
- Tony O'Neil, Agri Food Strategy Board
- Victoria Magreehan, National Trust NI
- Viviane Gravey, Queens University Belfast
- Wendy McKinley, DAERA
- Wilbert Mayne, UFU Environment Committee Chairman

Annex 3: The full set of drivers

The list of drivers presented to the workshop participants and the additional drivers created by the workshop participants

1. Agricultural support payments are increasing, focussed on public goods
2. Circular economy practices will become more widely used and change what society values
3. Citizen engagement is likely to become increasingly important across a range of policy areas
4. Climate change will continue to cause increased temperature and increased occurrence of extreme weather and seasonal events.
5. Consumption is likely to increase steadily
6. Cyber security will be a continuing threat to international security
7. Data analytics will enable sophisticated mapping of demand and supply
8. Decarbonisation will significantly impact on policy formulation and implementation
9. Demand for energy will continue to increase
10. Demand for greater regional and local autonomy will continue
11. Food security and water security will become significant challenges; perhaps even sources of conflict
12. Global population is likely to exceed 8.5 billion by 2030
13. Global resource shortages (metals, nutrients for example) will begin to bite
14. GM crops and animals are likely to become culturally accepted in the UK
15. Governments will continue to collaborate to address Climate Change and Sustainable Development
16. Governments will seek to achieve a global free trade agreement
17. Improvements in farming techniques and technology will boost productivity and food security
18. International investment in the UK will increase
19. Local economic performance around the UK will be uneven, leading to increased regional disparity
20. London and other major UK cities will continue to grow in size and population
21. Lowland/upland land capability and use will face increasing and competing demands
22. More than one quarter of the world's population will live with water scarcity on a daily basis by 2040
23. New technology will continue have an impact on the natural environment
24. Patterns of land and marine use will need to change to meet the UK's food and energy needs
25. People will have increased mobility and job flexibility
26. Pests and diseases will be more widely dispersed
27. Planning needs to be future proofed and more embedded
28. Retailer power will drive farming systems
29. Smart cities and autonomous vehicles will change how we live and travel
30. Technology is likely to play an increasing role in regulation, both in monitoring and compliance
31. The average age of the UK population will be 42.9 years in 2045. 1 in 12 will be over 80
32. The continued decline in vertebrate species populations is part of a complex biodiversity picture creating winners and losers
33. The contribution that natural capital makes to UK growth will become more important

34. Poverty and social injustice is creating a disconnection between people and the environment
35. The economic centre of gravity will continue to move away from the west towards China and the east
36. The ecosystem approach, landscape-scale approaches, ecosystem services and natural capital frameworks will be significant components of the policy making process
37. The internet of things will change production processes and practices profoundly
38. The risk of interstate conflict will continue to rise
39. The sale of petrol and diesel vehicles will be banned in 2040
40. The UK and its Overseas Territories will not be immune from rising sea levels, flooding, heatwaves and poor air quality
41. The UK will agree more strategic approaches to environmental delivery through legislative reform as a result of Brexit
42. The UK will not retain exclusive fishing rights of the 200 mile exclusive economic zone post Brexit
43. The UK's reputation as a migrant unfriendly country will have an impact on jobs and wealth creation
44. The value of the UK's ecotourism markets is likely to increase
45. The world economy will double in size by 2045
46. There will be no magic bullet that eases pressure on the natural environment to provide food and energy
47. Waste will continue to increase and is likely to cause significant environmental challenges

New drivers:

- Increased demand for infrastructure, e.g. housing, transport, energy
- Food security will become a significant challenge; perhaps even sources of conflict
- Driver 26 plus invasive species
- Driver 15 including climate refugees
- Border controls between N and S are different from the present day
- There is a change in overall environmental governance

Annex 4: Less important drivers

Less important and with an uncertain outcome

It is be worth monitoring drivers which map as less important for UK environmental policy in the future and having an uncertain outcome to determine whether they become more important for UK environmental policy in the future.

The table sets out the drivers mapped in this quadrant by each group.

	Food Farming Timber Forests	Water Fisheries Marine	Env't Conserv'n Wildlife	Climate change Air quality Energy
5. Consumption is likely to increase steadily			●	
6. Cyber security will be a continuing threat to international security			●	●
12. Global population is likely to exceed 8.5 billion by 2030				●
13. Global resource shortages (metals, nutrients for example) will begin to bite	●			●
14. GM crops and animals are likely to become culturally accepted in the UK			●	
16. Governments will seek to achieve a global free trade agreement		●		
18. International investment in the UK will increase		●	●	●
20. London and other major UK cities will continue to grow in size and population		●		●
25. People will have increased mobility and job flexibility		●		
29. Smart cities and autonomous vehicles will change how we live and travel		●		
32. The continued decline in vertebrate species populations is part of a complex biodiversity picture creating winners and losers				●
35. The economic centre of gravity will continue to move away from the west towards China and the east		●		●
37. The internet of things will change production processes and practices profoundly			●	
38. The risk of interstate conflict will continue to rise		●	●	●
42. The UK will not retain exclusive fishing rights of the 200 mile exclusive economic zone post Brexit				●

43. The UK's reputation as a migrant unfriendly country will have an impact on jobs and wealth creation			●	●
45. The world economy will double in size by 2045		●	●	

Less important and with a certain outcome

Drivers which map as less important for UK environmental policy in the future and having a certain outcome - particularly if they map in more than one or two quadrants – are almost certainly not important for the project.

	Food Farming Timber Forests	Water Fisheries Marine	Env't Conserv'n Wildlife	Climate change Air quality Energy
1. Agricultural support payments are increasing, focussed on public goods				●
9. Demand for energy will continue to increase	●			
14. GM crops and animals are likely to become culturally accepted in the UK	●			
21. Lowland/upland land capability and use will face increasing and competing demands				●
22. More than one quarter of the world's population will live with water scarcity on a daily basis by 2040		●		●
23. New technology will continue have an impact on the natural environment				●
25. People will have increased mobility and job flexibility			●	●
28. Retailer power will drive farming systems				●
29. Smart cities and autonomous vehicles will change how we live and travel				●
31. The average age of the UK population will be 42.9 years in 2045. 1 in 12 will be over 80			●	●
35. The economic centre of gravity will continue to move away from the west towards China and the east			●	
37. The internet of things will change production processes and practices profoundly		●		●
39. The sale of petrol and diesel vehicles will be banned in 2040				●
43. The UK's reputation as a migrant unfriendly country will have an impact on jobs and wealth creation		●		
46. There will be no magic bullet that eases pressure on the natural environment to provide food and energy	●			●