

# Environmental Evidence for the Future

## Regional Workshop Consultation

Report from the Scotland Workshop

24 August 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 compliment, 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 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 Scotland workshop held on 24 August at Heriot Watt University, Edinburgh. 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

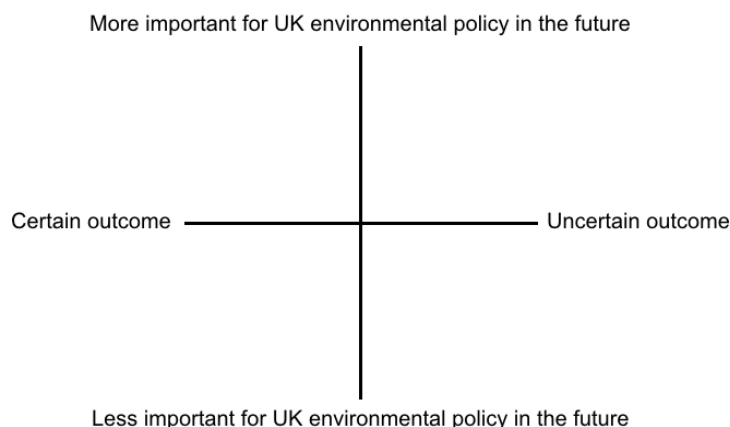
The drivers were drawn from the UK National Ecosystem Assessment Technical Report (published in 2011) and updated to reflect more recent geopolitical developments. During the course of the discussion, participants had the opportunity to add to the list of drivers if they felt there were any obvious gaps.

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 3 and 4 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
Agricultural support payments are increasing, focussed on public goods	●			
Circular economy practices will change what society values [changing values and natural capital]		●		●
Climate change is resulting in increased temperature and increased fluctuation in extreme weather and seasonal events.	●	●	●	●
Consumption will continue to increase	●		●	●
Data analytics will be used to understand changing demand and supply patterns for a range of goods and services				●
Decarbonisation will significantly impact on policy formulation and implementation			●	●
Demand for energy is increasing, with potential impacts on the environment from new technology.		●		
Food security and water security will become significant challenges; perhaps even sources of conflict	●	●	●	
Global population will exceed 8.5 billion by 2030		●		
Governments will continue to collaborate to achieve the UN Sustainable Development Goals		●		
Patterns of land and marine use will need to change to meet the UK's food and energy needs			●	●
Poverty and social injustice in Scotland is resulting in a disconnection between people and the environment	●			
Retailer power drives farming systems	●			
Technology may play an increasing role in regulation, both in monitoring and compliance			●	●
The ageing population will place significant pressure on public services				●
The UK and its Overseas Territories will not be immune from rising sea levels, flooding, heatwaves and poor air quality		●		
There is increasing pressure on land and the marine environment to provide food and 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
Circular economy practices will change what society values [changing values and natural capital]		●	●	
Consumption will continue to increase			●	
Current levels of growth in London and other major UK cities cannot be sustained without significant investment to protect the natural environment				●
Decarbonisation will significantly impact on policy formulation and implementation		●		
Future proof planning needs to be more embedded				●
Governments will continue to collaborate to achieve the Paris Agreement on Climate Change				●
Governments will continue to collaborate to achieve the UN Sustainable Development Goals			●	●
Govts will seek to achieve more free trade agreements	●		●	●
Improvements in farming techniques and technology will boost productivity and increase food security	●			
Patterns of land and marine use will need to change to meet the UK's food and energy needs		●		
The continued decline in vertebrate and other species populations is part of a complex biodiversity picture creating winners and losers [+UKOTS]			●	
The contribution that natural capital makes to UK growth will become more important	●			●
The ecosystem approach, landscape-scale approaches, ecosystem services and natural capital frameworks will be significant components of policy making		●	●	
The internet of things will change production processes and practices profoundly	●			
The UK is likely to agree more strategic approaches to environmental delivery through legislative reform as a result of Brexit		●	●	●
The UK will not retain exclusive fishing rights of the 200 mile exclusive economic zone post Brexit		●		
The world economy is expected to double by 2045	●			
UK political structures and processes for political decision making are likely to change	●			●



## 4. Food, Farming, Timber and Forests

### Stats

- **30 drivers** mapped as more important for UK environmental policy in the future and having a certain outcome
  - The group prioritised 7 and discussed 4 in detail
- **18 drivers** mapped as more important for UK environmental policy in the future and having an uncertain outcome
  - The group prioritised 6 and discussed 4 in detail
- **6 drivers** mapped as being less important for UK environmental policy in the future and having a certain outcome. These drivers can be **parked**.
- **9 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 more clear – they become more important for UK environmental policy in the future.
- The group identified **7 additional drivers**.

Drivers that are MORE IMPORTANT for UK environmental policy and have a CERTAIN OUTCOME	Challenge	Priority	Not ranked
<b><i>Agricultural support payments are increasing, focussed on public goods</i></b>		●	
Carbon rationing might be a possibility by 2040			●
Central Asia will be the world's fastest growing region between now and 2030. Western Europe will be the slowest.			●
<b><i>Changing diets (meat, global vs UK)</i></b>			●
Climate change is resulting in increased temperature and increased fluctuation in extreme weather and seasonal events.	●		
Cyber security is an increasing threat to international security			●
Data analytics will be used to understand changing demand and supply patterns for a range of goods and services			●
Decarbonisation will significantly impact on policy formulation and implementation			●
Demand for greater regional autonomy will remain a political issue			●
Food security and water security will become significant challenges; perhaps even sources of conflict	●		
<b><i>Food Waste</i></b>			●
Global growth in trade will increase by 5% per annum between now and 2045			●
<b><i>Global resource shortage (metals, nutrients) begins to bite</i></b>			●
Global population will exceed 8.5 billion by 2030			●
Increasing international investment in local and regional economies and resources			●
Local economic performance around the UK will be uneven, leading to increased regional disparity			●
More than one quarter of the world's population may live with water scarcity on a daily basis by 2040			●
Patterns of land use will need to change to meet the UK's food and energy needs			●
<b><i>Poverty and social injustice in Scotland is resulting in a disconnection between people and the environment</i></b>		●	
[Pressure on the UK from] Consumption will continue to increase	●		
There is increasing pressure on land to provide food and energy and timber		●	
<b><i>Retailer power drives farming systems</i></b>	●		
Technology may play an increasing role in regulation, both in monitoring and compliance			●
The ageing population will place significant pressure on public services			●
The continued decline in vertebrate species populations is part of a complex biodiversity picture creating winners and losers.			●
The economic centre of gravity is shifting from the west towards China and the east			●

The ecosystem approach, landscape-scale approaches, ecosystem services and natural capital frameworks will be significant components of the policy making process			●
The UK and its Overseas Territories will not be immune from rising sea levels, flooding, heatwaves and poor air quality.			●
There is increasing pressure on the marine env't to provide food and energy			●
UK population will pass 70 million by 2030			●

Drivers that are MORE IMPORTANT for UK environmental policy and have an UNCERTAIN OUTCOME	Challenge	Priority	Not ranked
Circular economy practices will change what society values [changing values and natural capital]			●
Current levels of urban growth in London and other major UK cities cannot be sustained without significant investment to protect the natural environment			●
Demand for energy is increasing in the UK, with potential impacts on the environment from new technology.			●
GM crops and animals will become culturally accepted in the UK			●
Governments will continue to collaborate to achieve the Paris Agreement on Climate Change			●
Governments will seek to achieve more free trade agreements	●		
Improvements in farming techniques and technology will boost productivity and increase food security	●		
Increasing value of the UK's cultural ecosystem services (landscapes/open green space, market towns, heritage sites) to global tourism markets			●
Less stable and predictable political leadership leading to global insecurity			●
The contribution that natural capital makes to UK growth will become more important		●	
The internet of things will change production processes and practices profoundly	●		
The risk of interstate conflict will continue to rise			●
The UK is likely to agree more strategic approaches to environmental delivery through legislative reform as a result of Brexit			●
The UK will not retain exclusive fishing rights of the 200 mile exclusive economic zone post Brexit			●
The UK's reputation as a migrant unfriendly country will have an impact on jobs and wealth creation			●
The world economy is expected to double in size by 2045	●		
UK economic growth between now and 2045 is likely to be around 45%			●
UK political structures and processes for political decision making are likely to change		●	

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

The Driver	Food security and water security will become significant challenges and perhaps even sources of conflict
The Challenge	<p>Greater demand for food and water and increasing prices alongside climate change and population will change the spatial production of food.</p> <p>Conflicts will therefore arise in the areas of the world where there are adjacent areas of sufficiency and deficiency. We need to ensure affordable sustainable food, conducive to a good diet both in the UK and internationally. We also need to ensure a resilient water supply for people, the environment and business.</p> <p>Brexit is a threat with the UK leaving a bigger club and potential reduction in economic standing of the UK. We need to understand – forecast and monitor – what the demands for food and water in the UK in an international context. We also need to understand implications of this are optimising production and food conducive to a good diet from land without compromising environment</p> <p>137 words</p>

Outcome of this driver	<ul style="list-style-type: none"> <li>• Greater demand for food and water</li> <li>• Spatial production of the food will change, driven by climate and population</li> <li>• Food and water prices will increase</li> <li>• Conflict will arise in parts of the world where there are adjacent areas of sufficiency and deficiency</li> <li>• Need to consider national and international outcomes</li> </ul>
Why the outcome is important	<ul style="list-style-type: none"> <li>• Providing affordable, suitable food for all, both UK and international</li> <li>• Securing a sustainable food supply for the UK and internationally</li> <li>• Providing food that is conducive for a good diet</li> <li>• Securing resilient water supplies for people, the environment, businesses</li> </ul>
Opportunity or threat?	<ul style="list-style-type: none"> <li>• Food and water security are an increasing threat post Brexit since neither Scotland nor the UK will be part of a bigger club</li> <li>• Another threat is that the UK economy will become smaller while others increase</li> </ul>
Impact of the driver	
Evidence needs	<ul style="list-style-type: none"> <li>• Understanding what the demands Will be</li> <li>• Optimising production of food that is conducive to good diet from land without compromising the environment</li> <li>• Forecasting and monitoring demand for food and water in the UK, taking account of external/international dependencies</li> <li>• This helps inform policy-making and will also</li> </ul>
Connections to other policy areas	<ul style="list-style-type: none"> <li>• Land and water management</li> <li>• Agriculture</li> <li>• Trade</li> </ul>

<b>The Driver</b>	Climate change is resulting in increased temperature and increased fluctuation in extreme weather and seasonal events
<b>The Challenge</b>	<p>Climate change present risks to producers from increased temperature and more frequent and severe weather events. This leads to an increase in the risks borne by the producer such as crop loss and less productive animals. Climate change and other environmental policies are also limiting producers' tools for managing risk (eg. fertiliser and pesticides).</p> <p>We therefore need to establish more resilient to production systems and appropriate intervention tools to support the land-based industries. Examples include ensuring schemes and futures markets.</p> <p>There is a danger that risk will drive restructuring of businesses across the sector and ancillary support sectors.</p>
98 words	

<b>Outcome of this driver</b>	<ul style="list-style-type: none"> <li>• More risk to production - crop loss and animals' loss of productivity</li> <li>• Animal welfare</li> <li>• Pressure to reduce inputs can lead to more variable yields and increased risks</li> </ul>
<b>Why the outcome is important</b>	<ul style="list-style-type: none"> <li>• Threat to our production system</li> </ul>
<b>Opportunity or threat?</b>	<ul style="list-style-type: none"> <li>• We will have more flexibility in our response but a more limited ability to respond appropriately</li> <li>• The market will potentially become smaller</li> </ul>
<b>Impact of the driver</b>	<ul style="list-style-type: none"> <li>• There will be opportunities to devise and implement better and more resilient production systems</li> <li>• We might see a change in the crops we are producing</li> <li>• There will be opportunities in the supply chain and the knock-on effects of ancillary services</li> <li>• There will be a reduction in innovation – no investment capacity</li> <li>• There will be consolidation of the sector</li> </ul>
<b>Evidence needs</b>	<ul style="list-style-type: none"> <li>• Justification of insurance based market support [publicly funded]. Lessons can be learned from other markets, such as America</li> <li>• What the impacts of climate change are going to be, including extreme events</li> <li>• What the possible response strategies are</li> <li>• Evidence to allow scenario planning</li> </ul>
<b>Connections to other policy areas</b>	<ul style="list-style-type: none"> <li>• Economic policy</li> <li>• Agricultural policy</li> <li>• Flooding policy/drought</li> <li>• Treaty commitments</li> <li>• Innovation to support cash poor businesses</li> <li>• Knowledge transfer mechanisms to support transition to resilient systems</li> </ul>

<b>The Driver</b>	<b>Retailer power drives farming systems</b>
<b>The Challenge</b>	The supply chain is dysfunctional, with asymmetric power and profit for the retailers. This is affecting the sustainability of many farms and processors. If Brexit is to not exacerbate this, there must be an effort to regulate against the worst aspect of this, to develop and implement alternative business models and to educate the public about the true cost of food (production, waste, imports, climate change). More research on this essential.
71 words	

<b>Outcome of this driver</b>	<ul style="list-style-type: none"> <li>• It limits innovation uptake</li> <li>• Running down of assets</li> <li>• Negative mental health</li> <li>• Suppresses food prices</li> <li>• Negative perception of retailers</li> <li>• Control of the whole food chain leads to instability and volatility resulting in food waste</li> </ul>
<b>Why the outcome is important</b>	<ul style="list-style-type: none"> <li>• Negative environmental and social outcomes</li> <li>• Dysfunctional consumer perceptions about the true cost of food</li> <li>• Disconnects consumers from the source of food</li> </ul>
<b>Opportunity or threat?</b>	<ul style="list-style-type: none"> <li>• Text</li> </ul>
<b>Impact of the driver</b>	<p>In 2030</p> <ul style="list-style-type: none"> <li>• Exacerbation of existing negative issues</li> <li>• Substandard animal welfare imports</li> <li>• Increased risk of disease importation</li> <li>• Land abandonment</li> </ul> <p>In 2042</p> <ul style="list-style-type: none"> <li>• Rural depopulation</li> <li>• Farm infrastructure failure</li> <li>• Wider rural business impacts</li> </ul>
<b>Evidence needs</b>	<ul style="list-style-type: none"> <li>• Willingness for politicians to talk about the true cost of food and to regulate retailers to ensure fairness</li> <li>• Better understanding of the commercial aspects of the food chain</li> <li>• Alternative retail models</li> </ul>
<b>Connections to other policy areas</b>	<ul style="list-style-type: none"> <li>• Skills (eg. For adding value)</li> <li>• Business</li> <li>• Groceries code adjudicator</li> <li>• Planning</li> <li>• Waste</li> <li>• Climate change</li> </ul>

The Driver	Poverty and social injustice in Scotland is resulting in a disconnection between people and the environment
The Challenge	Poverty and social injustice in Scotland consume very significant resources and political space, which results in a gap in provision of support for environmental services. This large sector of society is disconnected from the environment with adverse effects on health, wellbeing and economic contribution. Research on social science aspects of early life interventions and the economic benefits of this should be increased.
62 words	

Outcome of this driver	<ul style="list-style-type: none"> <li>• People spend more money on processed rather than fresh food</li> <li>• Very poor or no knowledge of food systems, or of nutrition and health issues relating to food</li> <li>• Wellbeing and mental health affected by lack of access to the countryside</li> <li>• Environmental issues much less important than other aspects of life</li> </ul>
Why the outcome is important	<ul style="list-style-type: none"> <li>• Long term health impacts including short life expectancy, diabetes and heart disease</li> <li>• Increased cost and health damage of processed food compared to fresh food</li> <li>• Issues such as air quality and ecosystems are undervalued and underappreciated by a large percentage of the population</li> </ul>
Opportunity or threat?	<ul style="list-style-type: none"> <li>• Text</li> </ul>
Impact of the driver	<p>In 2030</p> <ul style="list-style-type: none"> <li>• Economic uncertainties post Brexit are expected to affect poor people adversely - at least in the short-term</li> <li>• Potential acceleration of living costs, including food production</li> </ul> <p>In 2042</p> <ul style="list-style-type: none"> <li>• National economic resources will be directed to poverty issues (eg. health) and people won't contribute to building and improving environmental systems and outcomes</li> <li>• Poor people won't be able to contribute to building a sustainable economy in Scotland</li> </ul>
Evidence needs	<ul style="list-style-type: none"> <li>• Lots exists <u>but</u> there's a lack of data on the interactions between poverty and the environment (except for green space in cities)</li> </ul>
Connections to other policy areas	<ul style="list-style-type: none"> <li>• Social inclusion policies</li> <li>• Tax</li> <li>• Education</li> <li>• Transport</li> <li>• Drug/alcohol abuse</li> </ul>

The Driver	Agricultural support payments are focused on public goods
The Challenge	[not completed]

Outcome of this driver	<ul style="list-style-type: none"> <li>• Greater linkage between agricultural subsidies and public good</li> <li>• Less environmental impact, increased natural capital (carbon sequestration, flood storage etc)</li> <li>• There is scope to do a policy analysis of what we want and can achieve with agricultural subsidies</li> </ul>
Why the outcome is important	<ul style="list-style-type: none"> <li>• This is the key lever for influencing the agricultural economy</li> </ul>
Opportunity or threat?	<ul style="list-style-type: none"> <li>• Both</li> </ul>
Impact of the driver	
Evidence needs	<ul style="list-style-type: none"> <li>• Scenarios to show policy choices, so policymakers can see what options exist</li> <li>• A review of other agricultural subsidy systems</li> </ul>
Connections to other policy areas	<ul style="list-style-type: none"> <li>• Across the entire policy spectrum, especially environment, one, health, poverty and energy</li> </ul>



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

The Driver	Governments will seek to achieve more free trade agreements
The Challenge	<p>The challenge is to understand domestic land-based production sectors in the context of global trading partners.</p> <p>There are a number of factors at play, including quality of production, welfare standards and production support mechanisms. Attitudes to free trade are also changing globally and there is uncertainty about how this will play out for Scotland. It's not clear how agriculture will fare in trade negotiations versus other sectors such as financial services and business services.</p> <p>73 words</p>

Possible outcomes	<ul style="list-style-type: none"> <li>• Significant uncertainty</li> <li>• Markets might affect the way we farm</li> <li>• Agriculture could become a victim of trade agreements</li> <li>• Tariffs and quotas could have huge impacts</li> <li>• Might gain access to new markets (Internet of things/provenance)</li> </ul>
Possible threats	
Possible opportunities	
Evidence needs	<ul style="list-style-type: none"> <li>• What the possible knock-on effects of free trade agreements would be</li> <li>• Technical requirements which facilitate trade</li> <li>• Sanitary barriers to trade</li> <li>• The production standards of trade partners</li> <li>• How current relationships will change (regulations, tariffs, quotas etc)</li> </ul>
Connections to other policy areas	<ul style="list-style-type: none"> <li>• Trade policy</li> <li>• Animal and plant policy</li> <li>• Agricultural support policy</li> <li>• Quality standards</li> <li>• Climate change</li> </ul>

The Driver	UK political structures and processes for political decision-making are likely to change
The Challenge 37 words	Through Brexit, environmental and other powers become repatriated. The challenge is how and to what extent these powers are devolved; and how the UK maintains and assesses practice against standards – especially against other (Non-EU) international agreements.

Possible outcomes	<ul style="list-style-type: none"> <li>• Brexit provides a single point of change within a long-term trend of devolving power and decision making. At present, there is a risk of reduced environmental standards.</li> <li>• Need to agree a framework that sets minimum standards, but allows devolved administrations to go Beyond those standards</li> </ul>
Possible threats	
Possible opportunities	
Evidence needs	<ul style="list-style-type: none"> <li>• This is political</li> <li>• State of Environment reporting becomes important, especially to check against minimum standards</li> <li>• How do we deliver an environmental plan? We need an impartial assessment (for instance the Climate Change Commission).</li> </ul>
Connections to other policy areas	<ul style="list-style-type: none"> <li>• How do things such as trade agreements set the baselines required?</li> <li>• All other policy areas, especially health and nutrition</li> </ul>

The Driver	Improvements in farming techniques and technology will boost productivity and increase food security
The Challenge	<p>Improvements in farming techniques and technology <u>will</u> boost productivity and increase food security. This will depend on our ability to have well informed policy built on good public debate and understanding of science; and on an agricultural workforce and structure that can sustainably capitalise on it.</p> <p>This depends on maintaining scientific credibility through ongoing funding [which will have] major impacts on ensuring Scotland's natural capital is optimised from multiple ecosystem benefits.</p>
71 words	

Possible outcomes	<ul style="list-style-type: none"> <li>Technologies and products banned in the EU may be exploited by the UK government (eg. GM and plant protection products).</li> <li>Constant evolution of innovative technologies is already happening worldwide, including the UK</li> <li>Reduced EU funding for R &amp; D could constrain technology</li> <li>Productivity/efficiency depends on technology uptake and knowledge exchange/ education</li> </ul>
Possible threats	<p>In 2030</p> <ul style="list-style-type: none"> <li>Lack of facilities and knowledge in certain areas (eg. pesticides)</li> <li>R&amp;D undermine to level of global non-competitiveness</li> <li>Loss of IP and staff to competitor countries</li> <li>Loss of ability to adapt to changing circumstances</li> <li>Ecosystems could be adversely impacted if productivity <u>alone</u> is the outcome</li> <li>Farm consolidation may be required to afford the technology</li> </ul> <p>In 2042</p> <ul style="list-style-type: none"> <li>New technologies could adversely affect 'provenance', 'clean/green' food (etc)</li> <li>Ecosystems could be adversely impacted if productivity <u>alone</u> is the outcome</li> </ul>
Possible opportunities	<p>In 2030</p> <ul style="list-style-type: none"> <li>UK open to use of global technologies</li> <li>Reduced reliance on imported products (eg. fruit, cheese) to feed national populations</li> </ul> <p>In 2042</p> <ul style="list-style-type: none"> <li>UK land would be protected (relatively) due to better use of technologies (eg soils, biodiversity)</li> <li>Gene editing, designer crops and animals and [...] suitable for UK circumstances widely adopted</li> </ul>
Evidence needs	<ul style="list-style-type: none"> <li>The policymakers will require scientific understanding of the issues; that is, to be 'an intelligent customer' of research</li> <li>No policy blocking of scientific innovation</li> <li>International collaboration on policy awareness</li> </ul>
Connections to other policy areas	<ul style="list-style-type: none"> <li>Understanding of wider impacts (eg. economic/social)</li> <li>Threats of foreign consolidation on rural communities; but wider changes and opportunities as a result of technology development</li> </ul>

The Driver	The internet of things will change production processes and practices profoundly
The Challenge	<p>Digital technology provides the opportunity to gather information in new ways and link it together. This is the internet of things. We could use this intelligence to provide new services - such as ecosystem services - and link them to new methods of payment. Examples include animal health, trade (provenance) and carbon sequestration.</p> <p>The challenge is to provide evidence through real-life demonstrations all the range of possible benefits. This may require public/private partnerships to address market failures.</p>
77 words	

Possible outcomes	<ul style="list-style-type: none"> <li>• Will join up agriculture and food demand</li> <li>• Facilitate delivery of ecosystem services from land-use</li> <li>• Monetise novel ecosystem services</li> <li>• Provide a link between consumer and producer</li> <li>• <u>Could</u> provide trade solutions to sell to new markets and address barriers to trade; this is an opportunity</li> </ul>
Possible threats	<ul style="list-style-type: none"> <li>•</li> </ul>
Possible opportunities	<p>In 2042</p> <ul style="list-style-type: none"> <li>• To develop smart regulation to take account of smart technology</li> <li>• Bespoke solutions to agricultural problems to maximise competitive advantage</li> <li>• To deliver a more efficient production</li> </ul>
Evidence needs	<ul style="list-style-type: none"> <li>• Evidence to show and measure the public good. This could be a pilot projects such as (for example) sensors and cows</li> <li>• Business models to link polluter to mitigator through the internet of things</li> </ul>
Connections to other policy areas	<ul style="list-style-type: none"> <li>• Climate change</li> <li>• Rural economies</li> <li>• International trade</li> <li>• Animal welfare/health</li> <li>• Plant health</li> <li>• Public health</li> </ul>

## 5. Water, Fisheries and Marine

### Stats

- **20 drivers** mapped as more important for UK environmental policy in the future and having a certain outcome
  - The group prioritised 7 and discussed 3 in detail
- **22 drivers** mapped as more important for UK environmental policy in the future and having an uncertain outcome
  - The group prioritised 8 and discussed 2 in detail
- **6 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 more clear – they become more important for UK environmental policy in the future.

Drivers that are MORE IMPORTANT for UK environmental policy and have a CERTAIN OUTCOME	Challenge	Priority	Not ranked
Carbon rationing might be a possibility by 2040			●
Climate change is resulting in increased temperature and increased fluctuation in extreme	●		
Current levels of growth in London and other major UK cities cannot be sustained without significant investment to protect the natural environment			●
Demand for energy is increasing, with potential impacts on the environment from new technology		●	
Food security and water security will become significant challenges; perhaps even sources of conflict	●		
Global population will exceed 8.5 billion by 2030		●	
Governments will continue to collaborate to achieve the Paris Agreement on Climate Change			●
Governments will continue to collaborate to achieve the UN Sustainable Development Goals		●	
Increasing concentration of population in urban centres			●
More than one quarter of the world's population may live with water scarcity on a daily basis by 2040			●
Technology may play an increasing role in regulation, both in monitoring and compliance			●
The burden of 'lifestyle' diseases such as obesity, diabetes and mental health may have an impact on the availability of healthcare			●
The contribution that natural capital makes to UK growth will become more important			●
The sale of petrol and diesel vehicles will be banned in 2040			●
The UK and its Overseas Territories will not be immune from rising sea levels, flooding, heatwaves and poor air quality		●	
The world economy is expected to double in size by 2045			●
There is increasing pressure on land and the marine environment to provide food and energy	●		
UK growth between now and 2045 is likely to be around 45%			●
UK population will pass 70 million by 2030			●

Drivers that are MORE IMPORTANT for UK environmental policy and have an UNCERTAIN OUTCOME	Challenge	Priority	Not ranked
Circular economy practices will change what society values [changing values and natural capital]		●	
Consumption will continue to increase	●		
Decarbonisation will significantly impact on policy formulation and implementation		●	
Demand for greater regional autonomy will remain a political issue			●
Devolution of decision making down to local/metropolitan actors			●
Global growth in trade will increase by 5% per annum between now and 2045			●
GM crops and animals will become culturally accepted in the UK			●
Governments will seek to achieve a global free trade agreement			●
Growing interest in nationalism			●
Improvements in farming techniques and technology will boost productivity and increase food security			●
Increasing international investment in local and regional economies and resources			●
Increasing value of the UK's cultural ecosystem services (landscapes/open green space, market towns, heritage sites) to global tourism markets		●	
Local economic performance around the UK will be uneven, leading to increased regional disparity			●
Patterns of land and marine use will need to change to meet the UK's food and energy needs		●	
The continued decline in vertebrate and other species populations is part of a complex biodiversity picture creating winners and losers			●
The distinction between greater and lesser affluence will increase			●
The ecosystem approach, landscape-scale approaches, ecosystem services and natural capital frameworks will be significant components of the policy making process	●		
The risk of interstate conflict will continue to rise			●
The UK is likely to agree more strategic approaches to environmental delivery through legislative reform as a result of Brexit		●	
The UK will not retain exclusive fishing rights of the 200 mile exclusive economic zone post Brexit		●	
The UK's reputation as a migrant unfriendly country will have an impact on jobs and wealth creation			●
UK political structures and processes for political decision making are likely to change			●

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

The Driver	There is increasing pressure on land and the marine environment to provide food and energy
The Challenge	There will be increasing pressure on the marine and terrestrial environment to provide food and energy for a growing global population. Policy will need to evolve to allow the sustainable exploitation of natural capital; there is an opportunity for innovative policy beyond the scope of the existing standards and thresholds (regional, national, European, global). Research will be needed to understand the carrying capacity for specific resources under the context of resource demand and the challenges of related issues such as climate change. Solutions should take into account the wider social-ecological-legislative frameworks.
91 words	

Outcome of this driver	<ul style="list-style-type: none"> <li>• Potential overuse of resource (Land, relevant product, cultured)</li> </ul>
Why the outcome is important	<ul style="list-style-type: none"> <li>• Reduced trade</li> <li>• Reduced standards of living</li> <li>• Environmental and human health</li> </ul>
Opportunity or threat?	<p><b>Threat</b></p> <ul style="list-style-type: none"> <li>• Loss of natural capital</li> </ul> <p><b>Opportunity</b></p> <ul style="list-style-type: none"> <li>• Innovation</li> <li>• Management of natural capital</li> </ul>
Impact of the driver	<p><b>In 2030</b></p> <ul style="list-style-type: none"> <li>• Increased control/management of resource capture</li> <li>• Competition for land/marine spatial resource</li> </ul> <p><b>In 2042</b></p> <ul style="list-style-type: none"> <li>• Increase in pollution</li> </ul>
Evidence needs	<ul style="list-style-type: none"> <li>• Knowledge of the carrying capacity of the environment for each resource</li> <li>• Understanding the nature of growing pressures on marine and land environments</li> <li>• Understanding of innovation and technologies that can support production</li> <li>• Reduction and/or utilisation of work stream</li> </ul>
Connections to other policy areas	<ul style="list-style-type: none"> <li>• Climate change - integrated with social/health policy</li> <li>• International Law (legal frameworks) around (eg) trade</li> <li>• Energy/carbon policy</li> <li>• ‘Green gun’ – human health and natural capital</li> </ul>



The Driver	Climate change is resulting in increased temperature and increased fluctuation in extreme weather and seasonal events
The Challenge	<p>Climate change is highly likely to lead to more extreme events, currently poorly understood and hard to predict. The effects of these events on aquatic ecosystems include the consequences of increased sediment and pollutant transport, with likely impacts on aquaculture and benthic quality and potential for eutrophication, and more generally on fresh water quality and availability.</p> <p>Prediction is likely to become more difficult with Earth system changes consequent on climate change and other anthropogenic pressures.</p> <p>Evidence is needed to understand these events and their consequences for ecosystems, and to construct and validate models to confidently predict and mitigate these events.</p> <p>100 words</p>

Outcome of this driver	<ul style="list-style-type: none"> <li>Increased run-off, flooding, soil erosion and other inputs to sea</li> <li>Pressures on ground water, increasing water temperature</li> <li>More physico-chemical fluctuations in the aquatic environment</li> <li>More storm surges</li> </ul>	
Why the outcome is important	<ul style="list-style-type: none"> <li>Because, for example, increased run-off might overwhelm land drainage, leading to water quality issues or flooding; or effects on estuaries and coastal seas</li> </ul>	
Opportunity or threat?	<b>Threats</b> <ul style="list-style-type: none"> <li>To existing aquacultural species (eg. salmon, trout)</li> <li>Soil erosion (need harbour dredging)</li> <li>Smothering of benthic communities</li> <li>Increased eutrophication</li> <li>More contamination of potable water and bathing beaches</li> </ul>	<b>Opportunities</b> <ul style="list-style-type: none"> <li>For new aquacultural species (eg. sea bream, tilapia)</li> <li>To mitigate threats by more managed retreat and improved intratidal communities</li> </ul>
Impact of the driver	<p><b>In 2030</b></p> <ul style="list-style-type: none"> <li>More events like flooding of the Somerset levels and the east coast of England</li> <li>More closure of the Thames Barriers</li> <li>Back-up in sewage pipes, increasing pollution and beach closures</li> <li>Spread of alien species</li> <li>Issues that were once 1:100 risks may become 1:20 risks</li> </ul> <p><b>In 2042</b></p> <ul style="list-style-type: none"> <li>More of the same</li> <li>Scotland's water becoming refugia for threatened species</li> </ul>	
Evidence needs	<ul style="list-style-type: none"> <li>Long-term datasets to estimate change in risk (eg from 1:100 events to 1:50), to understand likely scenarios and validate models to improve predictive confidence</li> <li>Evidence on novel waterborne pathogens</li> <li>Monitoring network for aquatic ecosystem change, especially in impacted biotic communities</li> </ul>	
Connections to other policy areas	<ul style="list-style-type: none"> <li>Assure international partners of our scientific and monitoring competence</li> <li>Transport, housing, planning, social, health, economy, food, agriculture, water supply etc...</li> </ul>	

The Driver	Food security and water security becomes significant challenges, perhaps even sources of conflict
The Challenge	Food and water security will become significant challenges but the impact will be regional. There are direct impacts in the UK but global implications. Consequences include geopolitical instability and migration, impacts on trade and economy, and restricted food imports. There may also be impacts on availability and water quality related to human health and constraining commercial and agricultural production. There are regional opportunities for water-based industry (electronics, paper, tofu) and export of expertise in water efficiency and management. Research in terms of consumption rates (domestic and commercial), new technologies for water recycling, circular industry, reduced waste, and innovative food production;
100 words	

Outcome of this driver	<ul style="list-style-type: none"> <li>• Geopolitical instability</li> <li>• Migration</li> <li>• Impact of global trade/economy</li> <li>• Restricted access to food imports</li> </ul>
Why the outcome is important	<ul style="list-style-type: none"> <li>• Water quality impacts on human health</li> <li>• Water quantity can constrain agricultural production</li> </ul>
Opportunity or threat?	<ul style="list-style-type: none"> <li>• There will be regional differences</li> <li>• There will be <b>opportunities</b> in water-based industries, wet products (eg electronics, paper, textiles, whisky, salmon)</li> <li>• ... but the south-east of England is in water stress, requiring desalination - a <b>threat</b></li> </ul>
Evidence needs	<ul style="list-style-type: none"> <li>• Prediction of consumption rates, both domestic and commercial</li> <li>• Technologies for water recycling/regeneration from waste and more efficient water use</li> <li>• Innovation in food production – eg non land-based production</li> </ul>
Connections to other policy areas	

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

The Driver	The ecosystem approach, landscape-scale approaches, ecosystem services and natural capital frameworks will be significant components of the policy making process
The Challenge	The challenges/opportunities are the need: for monitoring evidence to understand the condition of the ecosystem and how it changes with adaptive management; to understand the natural capital of Scotland/UK, have a shared view of what it means, how we value it, the value of each component, and its use in decision-making (for example: using the tourist and other value of beavers v. the land use challenges; comparing the benefit of increased farm land from removing hedges v. wildlife costs); to understand how to balance tick-box with holistic regulation; to demonstrate that the EA/ES approach, when properly implemented, leads to a more efficient, equitable and sustainable aquatic environment.
107 words	

Possible outcomes	<ul style="list-style-type: none"> <li>• We remain signed up to global agreements in our own right, but remove the requirement to report in on EU based agreements</li> <li>• There is an opportunity to report against health of the environment rather than being pressured on how to get there</li> <li>• A more efficient, equitable sustainable aquatic environment...OR a race to the bottom, trading environmental standards for economic opportunity</li> </ul>
Possible threats	<p><b>In 2030</b></p> <ul style="list-style-type: none"> <li>• To our reputation as environmentally clean – whisky and salmon, for example</li> <li>• Dilution of other environmental legislation</li> <li>• Public engagement challenges using this language</li> <li>• Reputation in international fora</li> </ul>
Possible opportunities	<p><b>In 2030</b></p> <ul style="list-style-type: none"> <li>• To research with controls and interventions; i.e. to improve the evidence base by understanding what happens with no intervention</li> <li>• Opportunity to involve citizens in decision-making, monitoring, data collection and engagement</li> <li>• Reputation in international fora</li> <li>• Approach used to underpin land management decisions (and subsidy) ecosystem services – drawing in food, biodiversity, rural sustainability etc – rather than directive policy, law and support</li> </ul> <p><b>In 2042</b></p> <ul style="list-style-type: none"> <li>• This way of thinking/research embedded in policy-making across governments</li> <li>• No need to revisit "What are we talking about, again?"!</li> </ul>
Evidence needs	<ul style="list-style-type: none"> <li>• Robust ecosystem data, proper monitoring programmes</li> <li>• Evidence on whether the approach is working, with complete protection control areas</li> </ul>
Connections to other policy areas	<ul style="list-style-type: none"> <li>• By definition, links across the natural world (and so beyond). A resilient and well functioning environment underpins human constructs – eg society, economy, culture etc</li> </ul>

The Driver	Consumption will continue to increase
The Challenge  100 words	Overall consumption will vary and is difficult to predict but some areas of consumption will increase and require control. Threats include constrained resource availability and increased waste. Some resources are finite (rare earth metals, oil and gas) and supplies will decline forcing price increases. There are opportunities for innovation, greater efficiency in resource utilisation, development of novel resources/products, reduction of waste, and developing circular economies. Research can deliver understanding of resource use, consumer patterns and supply chain efficiencies. There is an opportunity to market UK niche products (water, seafood, alcohol). Education, cultural change and innovative legislative frameworks will be required.

Possible outcomes	<ul style="list-style-type: none"> <li>• Population may stabilise and Scotland; regional differences may increase elsewhere</li> <li>• Less choice, poorer nutrition</li> <li>• Increasing prices as the £ exchange rate declines leading to decreased consumption</li> <li>• Lack of available resources, rationing, increased costs</li> <li>• Will oil supply be sufficient to meet demand?</li> </ul>
Possible threats	<b>In 2030</b> <ul style="list-style-type: none"> <li>• Limited resources</li> <li>• Increased waste</li> </ul> <b>In 2042</b> <ul style="list-style-type: none"> <li>• Declining oil supply/increased costs</li> </ul>
Possible opportunities	<b>In 2030</b> <ul style="list-style-type: none"> <li>• More efficiency in use of resources – Circular economy recycling of waste</li> <li>• Innovation in novel resources (eg seaweed)</li> <li>• UK opportunities for UK niche products</li> </ul>
Evidence needs	<ul style="list-style-type: none"> <li>• Understanding consumer patterns and choices and supply chain deficiencies</li> <li>• Public attitudes (Dietary choices)</li> </ul>
Connections to other policy areas	<ul style="list-style-type: none"> <li>• Food and agricultural production</li> <li>• Energy</li> <li>• Society attitudes to circular economy/recycling (Need to research)</li> <li>• Education, outreach</li> </ul>

## 6. Environment, conservation and wildlife

### Stats

- **23 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
- **23 drivers** mapped as more important for UK environmental policy in the future and having an uncertain outcome
  - The group prioritised 6 and discussed 2 in detail
- **7 drivers** mapped as being less important for UK environmental policy in the future and having a certain outcome. These drivers can be **parked**.
- **2 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 more clear – they become more important for UK environmental policy in the future.
- **1 driver** - *People will use recreational drugs more to enhance performance*, which was a duplication – was not mapped.

Drivers that are MORE IMPORTANT for UK environmental policy and have a CERTAIN OUTCOME	Challenge	Priority	Not ranked
Climate change is resulting in increased temperature and increased fluctuation in extreme weather and seasonal events.	●		
Consumption will continue to increase		●	
Data analytics will be used to understand changing demand and supply patterns for a range of goods and services			
Decarbonisation will significantly impact on policy formulation and implementation		●	
Food security and water security will become significant challenges; perhaps even sources of conflict	●		
GM crops and animals will become culturally accepted in the UK			●
Increasing value of the UK's cultural ecosystem services (landscapes/open green space, market towns, heritage sites) to global tourism markets			●
More than one quarter of the world's population may live with water scarcity on a daily basis by 2040			●
Patterns of land and marine use will need to change to meet the UK's food and energy needs	●		
Smart cities and autonomous vehicles may change how we live and travel			●
Technology may play an increasing role in regulation, both in monitoring and compliance		●	
The ageing population will place significant pressure on public services			●
The average age of the UK population will be 42.9 years in 2045. 1 in 12 will be over 80.			●
The burden of 'lifestyle' diseases such as obesity, diabetes and mental health may have an impact on the availability of healthcare			●
The internet of things will change production processes and practices profoundly			●
The sale of petrol and diesel vehicles will be banned in 2040			●
The UK and its Overseas Territories will not be immune from rising sea levels, flooding, heatwaves and poor air quality.			●
The UK will not retain exclusive fishing rights of the 200 mile exclusive economic zone post Brexit			●
The world economy is expected to double in size by 2045			●
There is increasing pressure on land to provide food and energy			●
There is increasing pressure on the marine env't to provide food and energy			●
UK growth between now and 2045 is likely to be around 45%			●
UK population will pass 70 million by 2030			●

Drivers that are MORE IMPORTANT for UK environmental policy and have an UNCERTAIN OUTCOME	Challenge	Priority	Not ranked
Carbon rationing might be a possibility by 2040			●
Central Asia will be the world's fastest growing region between now and 2030. Western Europe will be the slowest.			●
Circular economy practices will change what society values [changing values and natural capital]		●	
Demand for energy is increasing, with potential impacts on the environment from new technology.			●
Devolution of decision making down to local/metropolitan actors			●
Global growth in trade will increase by 5% per annum between now and 2045			●
Global population will exceed 8.5 billion by 2030			●
Governments will continue to collaborate to achieve the Paris Agreement on Climate Change			●
Governments will continue to collaborate to achieve the UN Sustainable Development Goals		●	
Governments will seek to achieve a global free trade agreement		●	
Improvements in farming techniques and technology will boost productivity and increase food security			●
Increasing international investment in local and regional economies and resources			●
Less stable and predictable political leadership leading to global insecurity			●
Local economic performance around the UK will be uneven, leading to increased regional disparity			●
People will enjoy increased mobility and job flexibility			●
Societal and political pressures on London and the South East may result in resources and population being moved to the rest of the UK			●
The continued decline in vertebrate and other species populations is part of a complex biodiversity picture creating winners and losers [+UKOTS]	●		
The contribution that natural capital makes to UK growth will become more important			●
The distinction between greater and lesser affluence will increase			●
The economic centre of gravity is shifting away from the west towards China and the east			●
The ecosystem approach, landscape-scale approaches, ecosystem services and natural capital frameworks will be significant components of the policy making process	●		
The UK is likely to agree more strategic approaches to environmental delivery through legislative reform as a result of Brexit	●		
UK political structures and processes for decision making are likely to change			●

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

The Driver	Climate change is resulting in increased temperature and increased fluctuation in extreme weather and seasonal event
The Challenge	<p>We need to remain at the global forefront of climate measurement, modelling and policy response - through, for example, incentives to reduce carbon.</p> <p>A robust and pervasive evidence base, including wildlife trends, is needed to justify the costs and explain the benefits of amelioration.</p> <p>Two outcomes of this could be to</p> <ul style="list-style-type: none"> <li>• Justify investment in green technology and energy-saving</li> <li>• Safeguard biodiversity on land and in our fresh waters and seas</li> </ul>
69 words	
Outcome of this driver	<ul style="list-style-type: none"> <li>• Declining biodiversity, shifts in habitat and species range</li> <li>• Constraints and costs on land use</li> <li>• Threats due to invasive non-native species and diseases</li> <li>• Flooding impacts on land, water bodies and coasts</li> <li>• Erosion affecting Ireland: water bodies and coasts</li> <li>• Unpredictable weather events makes forward planning hard</li> </ul>
Why the outcome is important	<ul style="list-style-type: none"> <li>• Economic costs, including livelihoods</li> <li>• Constrains resource use</li> <li>• Undermines ecosystem resilience</li> <li>• Loss of natural capital</li> </ul>
Opportunity or threat?	<ul style="list-style-type: none"> <li>• Threat</li> </ul>
Impact of the driver	<p><b>In 2030</b></p> <ul style="list-style-type: none"> <li>• Increased denial of climate change</li> <li>• Populist pressure to renege on international climate change agreements</li> <li>• No penalties for non-compliance</li> <li>• Lack of investment in green infrastructure due to energy and long Brexit uncertainty period</li> </ul> <p><b>In 2042</b></p> <ul style="list-style-type: none"> <li>• Risk that lack of incentives will lead to reduced action to mitigate climate change</li> <li>• Risk that technology and innovation will not be maintained at current levels</li> <li>• Energy uncertainty and insecurity</li> </ul>
Evidence needs	<ul style="list-style-type: none"> <li>• Met model projections</li> <li>• More robust/lower uncertainty in climate models</li> <li>• Better understanding of current and future climate impacts</li> <li>• Costs of climate impacts and <u>benefits</u> of mitigation (cross scale: national to local)</li> <li>• Quantification of species level ecosystem degradation (eg peatlands)</li> </ul>
Connections to other policy areas	<ul style="list-style-type: none"> <li>• Energy, Land use and resource use, Marine, Built environment</li> </ul>



The Driver	Food security and water security will become significant challenges within the UK; perhaps even sources of conflict
The Challenge	<p>The UK is experiencing food and water security challenges. This is causing regional instability, shortages, and conflicts which are having negative effects on society and the environment. To address this we need to understand</p> <ul style="list-style-type: none"> <li>• How can new technology and different approaches to food production and water use – grey water and vertical growing, for example – help alleviate these challenges?</li> <li>• How can changes in food and water policies help alleviate these challenges?</li> <li>• What are the knock-on effects of these shortages across sectors (environment, healthcare and crime, for example)?</li> <li>• How can we build societal resilience (through, for example, addressing regional insecurities in supply and demand)?</li> </ul> <p>87 words</p>

Outcome of this driver	<ul style="list-style-type: none"> <li>• Change of land use in the UK and perhaps land value</li> <li>• ... perhaps with more focus on local food production, allotments and ‘digging for victory’</li> <li>• Change in diet</li> <li>• Impacts on food and drink businesses</li> <li>• Promotion of alternative technologies (lab produced food, for example)</li> <li>• Socio-economic impacts: household budgeting, structure of urban and rural communities, for example</li> </ul>	
Why the outcome is important	<ul style="list-style-type: none"> <li>• It challenges the way we live and stresses the importance of the environment</li> <li>• [We need to solve this.] Everyone needs to eat and drink</li> </ul>	
Opportunity or threat?	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>• Conflict for land use/income</li> <li>• More polarised society and wealth distribution</li> <li>• Regional differences – “A country is only 3 full meals away from a revolution”</li> <li>• Rationing/Increased prices</li> <li>• Environment valued less in relation to food production, resulting in loss of environmental protections</li> </ul> <p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>• Introducing technologies</li> <li>• Changing land use practices</li> </ul>	
Impact of the driver	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>• Consequences are likely to more volatile because of the lack of time to plan and respond and adjust systems</li> <li>• Rushed new agricultural policy causes greater instability</li> </ul>	<p><b>In 2042</b></p> <ul style="list-style-type: none"> <li>• Adaptation kicking in leads to greater stability and more even distribution of resources</li> </ul>
Evidence needs	<ul style="list-style-type: none"> <li>• How will loss of CAP influence agriculture and land use policy</li> </ul>	

The Driver	Patterns of land and marine use will need to change to meet the UK's food and energy needs
The Challenge	<p>The UK needs to ensure that food and energy needs are met with an increasing population. With regard to this post-Brexit, it would be desirable to plan sustainable food energy policies by encouraging new technologies and understanding their impacts. This requires the capture of impacts and methods of mitigating unfortunate impacts, which in turn requires cross disciplinary research.</p> <p>Engagement with the farming and fishery establishments will be required to discuss and plan this.</p>
73 words	

Outcome of this driver	<ul style="list-style-type: none"> <li>• Change the landscape and ecology of sea life</li> <li>• Using landscape differently to provide energy and food security</li> <li>• Different use of seas and coast</li> <li>• Different look to countryside (eg wind turbines and solar arrays)</li> </ul>		
Why the outcome is important	<ul style="list-style-type: none"> <li>• Because we need security in supply of food and energy</li> <li>• Because human patterns of land-use for recreation could change</li> <li>• Resolving dependency on imports and have an opportunity for lower food miles</li> <li>• There could be more employment opportunities</li> </ul>		
Opportunity or threat?	<ul style="list-style-type: none"> <li>• Could be either an opportunity (employment, home grown food) or a threat (shortage of labour etc)</li> </ul> <table border="0" style="width: 100%;"> <tr> <td style="vertical-align: top; width: 50%;"> <p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>• To manage land and sea more sustainably</li> <li>• Use advances in technology to produce more</li> <li>• More renewable energy and wider range of technologies around energy</li> <li>• More land for forestry and income</li> <li>• Fishing</li> <li>• Nuclear energy</li> <li>• Mechanisation</li> <li>• Farming different crops in response to climate change</li> </ul> </td> <td style="vertical-align: top; width: 50%;"> <p><b>Threats</b></p> <ul style="list-style-type: none"> <li>• Over exploitation</li> <li>• Erosion of landscape</li> <li>• Soil worn out</li> <li>• Paying more for imported food</li> <li>• Shortage of labour in the future in, for example, agriculture and horticulture</li> <li>• Nuclear energy</li> <li>• Mechanisation</li> <li>• Farming poorer quality crops in response to climate change</li> </ul> </td> </tr> </table>	<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>• To manage land and sea more sustainably</li> <li>• Use advances in technology to produce more</li> <li>• More renewable energy and wider range of technologies around energy</li> <li>• More land for forestry and income</li> <li>• Fishing</li> <li>• Nuclear energy</li> <li>• Mechanisation</li> <li>• Farming different crops in response to climate change</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>• Over exploitation</li> <li>• Erosion of landscape</li> <li>• Soil worn out</li> <li>• Paying more for imported food</li> <li>• Shortage of labour in the future in, for example, agriculture and horticulture</li> <li>• Nuclear energy</li> <li>• Mechanisation</li> <li>• Farming poorer quality crops in response to climate change</li> </ul>
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Evidence needs	<ul style="list-style-type: none"> <li>• Effects of climate change</li> <li>• Nutritional needs of the population</li> <li>• Fuel poverty</li> <li>• Identifying constraints</li> <li>• Availability of labour</li> <li>• Fish stocks</li> <li>• Monitoring practices re fishing – pollution amounts</li> <li>• Agri-environment schemes – food production costs/benefits</li> </ul>		
Connections to other policy areas	<ul style="list-style-type: none"> <li>• Marine use: economic policies, nutritional needs, climate change, agricultural practices, historic environment</li> </ul>		

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

The Driver	The ecosystem approach, landscape-scale approaches, ecosystem services and natural capital frameworks will be significant components of the policy making process
The Challenge	<p>The UK needs to adopt a whole system approach to policy-making to provide a more holistic policy landscape. This approach provides greater opportunities for improved environmental management with greater community and stakeholder involvement. Brexit provides an opportunity to build on European frameworks to create a world-class, sustainable system of environmental management and conservation.</p> <p>Research is needed on ecosystems, using a cross disciplinary approach to include the historic environment. Greater opportunities for designing research across the environment – both natural and cultural - are required to support the implementation of these approaches.</p>

90 words

Possible outcomes	<ul style="list-style-type: none"> <li>• A whole system approach to policy-making, making it more holistic across the environment (natural and historic)</li> <li>• Greater opportunities for community/stakeholder involvement</li> <li>• It is a more effective way of conserving the natural and historic environment</li> </ul>
Possible threats	<ul style="list-style-type: none"> <li>• Because the approach looks at inter-relationships, allows for greater partnership working and leads to greater coherence of policy-making and delivery</li> <li>• It is important as a way of reversing current negative trends and environmental management and should encourage inward investment to support conservation</li> </ul>
Possible opportunities	<ul style="list-style-type: none"> <li>• It will be an opportunity provided the UK government adopts this approach; that relies on there being the political will to do so</li> </ul>
Impact of the driver	<p><b>If it is perceived as an opportunity</b></p> <ul style="list-style-type: none"> <li>• Progress towards meeting targets set by international frameworks</li> <li>• Natural capital accounting will become mainstream within government</li> <li>• Case studies/lessons learned to improve approaches</li> <li>• Green bonds?</li> <li>• Links between natural and cultural aspects of the environment will be recognised and the historic environment will be recognised for its material aspects as well as intangibles (eg. tourism)</li> <li>• Interdisciplinary approaches to environmental management can be at the forefront of policy-making</li> </ul> <p><b>If it is perceived as a threat</b></p> <ul style="list-style-type: none"> <li>• Fragmentation of environmental research in areas will worsen</li> <li>• Fragmentation of approaches across UK administrations if it does seem as negating other government aims (such as housebuilding)</li> <li>• Success relies on the continuity of approach buy government</li> </ul>

Evidence needs	<ul style="list-style-type: none"> <li>• The current evidence base is focused on species rather than ecosystems. In a scenario where this approach is adopted, more research on ecosystems will be needed and will need to be a broad, cross disciplinary approach that includes the historic environment.</li> <li>• Results of monitoring to know what is working and What is not -including major infrastructure projects</li> <li>• Examples/case studies of payment to ecosystem services</li> <li>• Landscape scale approaches – NERC biodiversity and ecosystem services sustainability project outcomes</li> <li>• Outcomes from catchment management schemes</li> </ul>
Connections to other policy areas	<ul style="list-style-type: none"> <li>• Community empowerment</li> <li>• Historic environment</li> <li>• Generally, across government policy making</li> <li>• Climate change policy</li> </ul>

The Driver	The UK is likely to agree more strategic approaches to environmental delivery through legislative reform as a result of Brexit
The Challenge	<p>On leaving the EU, the UK has the chance to redesign environmental delivery through legislative reform. This is an opportunity to be much more strategic, effective and efficient in our approach to improving ecosystem health and human wellbeing. To achieve this, we need better understanding of</p> <p>(a) Clarity of desired outcomes</p> <p>(b) Which actions would achieve those outcomes</p> <p>(c) Direct and indirect effects (environmental/social/economic) of those actions within and across different sectors (transport, health, housing)</p> <p>(d) How emerging technologies can be used to improve implementation and compliance</p>
87 words	

Possible outcomes	<ul style="list-style-type: none"> <li>• Relaxation or tightening of various environmental standards, including better compliance and enforcement</li> <li>• More efficient and effective outcome delivery</li> <li>• Improved ecosystem, health and human well-being</li> </ul>
Possible threats	<ul style="list-style-type: none"> <li>• Limited resources increase the need to be effective and efficient</li> <li>• Legislative reform in general is a significant threat post Brexit because of the loss of the EU backstop</li> </ul>
Possible opportunities	<p><b>In 2030</b></p> <ul style="list-style-type: none"> <li>• The law is an important driver of people’s actions; it defines minimum acceptable standards</li> <li>• A well-designed, flexible and adaptable framework will allow review and revision of policies to improve environmental delivery</li> <li>• Recognition of the social and economic value of good environmental quality</li> </ul> <p><b>In 2042</b></p> <ul style="list-style-type: none"> <li>• Increased efficiency of environmental spending (limits other funding pressures) frees up resources</li> <li>• Less waste</li> <li>• More efficient use of water</li> <li>• Bigger, better and more joined up habitats</li> <li>• More preventative approach</li> <li>• Appropriate use of technology</li> </ul>
Evidence needs	<ul style="list-style-type: none"> <li>• What are the relationships between emerging technologies and environmental outcomes?</li> <li>• Holistic pathways to prioritisation (including economic, social)</li> <li>• Mapping of connections between law and policy areas</li> <li>• What are the indirect environmental, social, cultural and economic effects of actions? For example, what are the knock-on effects on banning pesticides</li> <li>• How do we improve implementation and compliance?</li> <li>• How can technology be used to improve monitoring and compliance?</li> </ul>
Connections to other policy areas	<ul style="list-style-type: none"> <li>• Almost everywhere</li> </ul>

<b>The Driver</b>	The continued decline in vertebrate and other species populations is part of a complex biodiversity picture creating winners and losers
<b>The Challenge</b>	<p>With the removal of European safeguards, we need to frame our national policies around resilient ecosystems that are valued by society. We should utilise and develop our evidence base, with creative use of technology and stakeholder engagement to inform policy and action.</p> <p>Our objective is more integrated and strategic environmental policy for</p> <ul style="list-style-type: none"> <li>• Best use of scarce resources</li> <li>• Increased well-being and security</li> <li>• Rich and healthy biodiversity</li> </ul>
65 words	

<b>Possible outcomes</b>	<ul style="list-style-type: none"> <li>• Economic growth overrides environmental concerns</li> <li>• Weaker environmental safeguards on the environment, wildlife and conservation</li> <li>• Less enforcement of environmental protection measures</li> <li>• No penalties for lack of compliance</li> <li>• Natural network is threatened which will impact on resilience</li> <li>• National standards Will probably be lower than EU/international</li> </ul>
<b>Possible threats</b>	<p><b>In 2030</b></p> <ul style="list-style-type: none"> <li>• Greater room for lack of compliance</li> <li>• Reduced ecosystem resilience</li> </ul> <p><b>In 2042</b></p> <ul style="list-style-type: none"> <li>• Lack of understanding of what future environmental policies will look like</li> <li>• Reduced environmental security</li> <li>• Environment falls down the political agenda due to economic pressures</li> </ul>
<b>Possible opportunities</b>	<p><b>In 2030</b></p> <ul style="list-style-type: none"> <li>• More emphasis on ecosystem/landscape scale approach rather than focusing on species</li> <li>• Resolution of conflicting conservation objectives</li> <li>• Shaping a more integrated policy with other policy sectors</li> </ul> <p><b>In 2042</b></p> <ul style="list-style-type: none"> <li>• Better integrated environmental policy with, for example, land use policy</li> <li>• More strategic environmental policy</li> </ul>
<b>Evidence needs</b>	<ul style="list-style-type: none"> <li>• Spatial and temporal biodiversity status and trends. Need new techniques such as eDNA, remote sensing...)</li> <li>• Better data analysis and <u>integration</u> and interpretation at <u>national</u> scale across the board – (NGOs, citizen science)</li> <li>• New technology to allow real-time view alerts of status and trends</li> <li>• Assessing overall monetary and non-monetary value of biodiversity to society</li> </ul>
<b>Connections to other policy areas</b>	<ul style="list-style-type: none"> <li>• Land use policy</li> <li>• Energy</li> <li>• Marine/fisheries</li> </ul>

## 7. Climate change, air quality and energy

### Stats

- **20 drivers** mapped as more important for UK environmental policy in the future and having a certain outcome
  - The group prioritised 8 and discussed 2 in detail
- **22 drivers** mapped as more important for UK environmental policy in the future and having an uncertain outcome
  - The group prioritised 10 and discussed 2 in detail
- **9 drivers** mapped as being less important for UK environmental policy in the future and having a certain outcome. These drivers can be **parked**.
- **11 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 more clear – they become more important for UK environmental policy in the future.
- The group identified **6 additional drivers**

Drivers that are MORE IMPORTANT for UK environmental policy and have a CERTAIN OUTCOME	Challenge	Priority	Not ranked
Circular economy practices will change what society values [changing values and natural capital]		●	
Climate change is resulting in increased temperature and increased fluctuation in extreme weather and seasonal events.		●	
<b>Co-produce research with policy/decision makers</b>			●
Consumption will continue to increase	●		
Data analytics will be used to understand changing demand and supply patterns for a range of goods and services		●	
Decarbonisation will significantly impact on policy formulation and implementation		●	
<b>Demand for energy is increasing, with potential impacts on the environment from new technology</b>			●
<b>Energy security increases the risk of conflict</b>			●
Food security and water security will become significant challenges; perhaps even sources of conflict			●
<b>Lowland/upland land capability and land use [faces increasing and competing demands from] wildlife adaptation and land use for mitigation</b>			●
Patterns of land and marine use will need to change to meet the UK's food and energy needs	●		
Technology may play an increasing role in regulation, both in monitoring and compliance		●	
The ageing population will place significant pressure on public services		●	
The average age of the UK population will be 42.9 years in 2045. 1 in 12 will be over 80.			●
The continued decline in vertebrate and other species populations is part of a complex biodiversity picture creating winners and losers			●
The sale of petrol and diesel vehicles will be banned in 2040			●
The UK and its Overseas Territories will not be immune from rising sea levels, flooding, heatwaves and poor air quality			●
The world economy is expected to double in size by 2045			●
There is increasing pressure on land and the marine environment to provide food and energy			●
UK population will pass 70 million by 2030			●



Drivers that are MORE IMPORTANT for UK environmental policy and have an UNCERTAIN OUTCOME	Challenge	Priority	Not ranked
Carbon rationing might be a possibility by 2040			●
<b>Citizen engagement</b>			●
Current levels of growth in London and other major UK cities cannot be sustained without significant investment to protect the natural environment		●	
Demand for greater regional autonomy will remain a political issue		●	
Devolution of decision making down to local/metropolitan actors		●	
<b>Future proof planning needs to be more embedded</b>	●		
Global growth in trade will increase by 5% per annum between now and 2045			●
Global population will exceed 8.5 billion by 2030			●
Governments will continue to collaborate to achieve the Paris Agreement on Climate Change		●	
Governments will continue to collaborate to achieve the UN Sustainable Development Goals		●	
Governments will seek to achieve a global free trade agreement	●		
Improvements in farming techniques and technology will boost productivity and increase food security [behaviours]			●
Increasing concentration of population in urban centres		●	
<b>Pests and diseases</b>			●
Smart cities and autonomous vehicles may change how we live and travel		●	
The contribution that natural capital makes to UK growth will become more important		●	
The distinction between greater and lesser affluence will increase			●
The ecosystem approach, landscape-scale approaches, ecosystem services and natural capital frameworks will be significant components of the policy making process		●	
The UK is likely to agree more strategic approaches to environmental delivery through legislative reform as a result of Brexit		●	
There is increasing pressure on the marine environment to provide food and energy (the blue economy)			●
UK growth between now and 2045 is likely to be around 45%			●
UK political structures and processes for political decision making are likely to change		●	

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

<b>The Driver</b>	<b>Consumption will continue to increase</b>
<b>The Challenge</b>	<p>The current rate of consumption increase is unsustainable and is a finite trajectory in terms of resources, energy, waste, space and biodiversity.</p> <p>Impacts are wide ranging, predominantly negative, in many cases irreversible and cumulatively catastrophic. Behavioural change is a fundamental requirement to pull consumption back to a sustainable level.</p> <p>We need a clear, concise definition of the ‘breaking point’. We then need to understand consumer choice to bring about policy change that encourages sustainable decisions at an individual and organisational level to ensure this breaking point is not reached</p>
89 words	

<b>Outcome of this driver</b>	<ul style="list-style-type: none"> <li>• Increased pressure on resources</li> <li>• Waste</li> <li>• Emissions</li> <li>• Biodiversity loss</li> <li>• Inequality (global, acknowledging the impact of developed nations. Consumption of developing nations)</li> </ul>
<b>Why the outcome is important</b>	<ul style="list-style-type: none"> <li>• Not sustainable in many ways</li> <li>• Finite trajectory</li> </ul>
<b>Opportunity or threat?</b>	<ul style="list-style-type: none"> <li>• The threat is that the environmental policy perspective is at odds with the potential wealth to be gained from Increased consumption</li> </ul>
<b>Impact of the driver</b>	<ul style="list-style-type: none"> <li>• Resource shortages potentially leading to conflict</li> <li>• Continuing degradation of the environment, progressing to irredeemable</li> <li>• Nowhere to put waste</li> <li>• Health issues such as convenience in food, ensuring air-quality, rising temperatures etc</li> <li>• Displaced populations</li> <li>• People are disengaged, seeing the problem as too big and too far away</li> <li>• Disenfranchised</li> </ul>
<b>Evidence needs</b>	<ul style="list-style-type: none"> <li>• How to change behaviour: incentives, changing what’s desirable, changing that people are totally numbed about the consequences</li> <li>• Behavioural economics</li> <li>• How to use understanding of consumer choice to bring about policy change (NB the commercial sector is way ahead on this)</li> <li>• Identifying the benefits of thinking about these things over much longer time horizons</li> <li>• Understanding the breaking/tipping point and how to communicate it in a succinct and energising way</li> </ul>
<b>Connections to other policy areas</b>	

The Driver	Patterns of land use will need to change to meet the UK's food and energy needs
The Challenge	<p>To ensure that, as there is increased pressure from land to produce food and energy, this is not at the expense of (<i>inter alia</i>) environmental and social objectives.</p> <p>We need to understand the current and potential trajectories of land-use change, the values of different benefits of land and the trade-offs that will be required at strategic points.</p> <p>Emissions from land use will [also] become proportionately more significant for the UK in meeting its climate change targets.</p>
76 words	

Other drivers linked to this issue

- Increasing pressure on land to provide food and energy
- Change in land capability and land use is linked to climate change adaptation and mitigation, especially in the uplands

Outcome of this driver	<ul style="list-style-type: none"> <li>• Change of land use to more productive uses</li> <li>• This means trade-offs; there are conflicting objectives and difficult decisions about what land is used for</li> <li>• The outcome is not that certain it depends on the way policy goals</li> </ul>
Why the outcome is important	<ul style="list-style-type: none"> <li>• Land is a finite resource and how we use it - and what it is used for - has significant implications for societal objectives; such as mitigating climate change, producing food, adapting to climate change and maintaining environmental quality</li> </ul>
Opportunity or threat?	<ul style="list-style-type: none"> <li>• Brexit provides <b>an opportunity</b> to influence land use differently through public support</li> <li>• The <b>threat</b> is a failure to use land wisely</li> </ul>
Impact of the driver	<p>In 2030</p> <ul style="list-style-type: none"> <li>• There will be a different system of agricultural payments</li> <li>• The importance of land use as a source and sink of emissions will be much greater</li> <li>• ... so the role of land use in meeting greenhouse gas targets will be significant</li> </ul> <p>In 2042</p> <ul style="list-style-type: none"> <li>• The importance of land as a source and sink of emissions will have increased further</li> <li>• More land will be used for energy production</li> <li>• More land will be in productive use or at least capable of being in productive use</li> <li>• There will be more forest cover</li> <li>• There will be more diverse types of agro-forestry</li> </ul>

Evidence needs	<ul style="list-style-type: none"> <li>• How many people are living and working in the countryside, what are their incomes and impact on communities and services?</li> <li>• How do we manage the complexity of this issue and its relationship with other policies?</li> <li>• How will land be affected by societal change (people eating less meat, for example)?</li> <li>• Understanding trade-offs - multiple benefits of different ways to use and manage land</li> <li>• Putting a value on benefits like flood management, pollination and cultural aspects to inform policy decisions</li> <li>• How much can UK land use policy influence what drives land use in Scotland/the UK versus global markets?</li> <li>• How is agriculture being affected by climate change and how will it be affected in the future?</li> <li>• How are farmland habitats and wildlife performing under changed land use come online management and climate change?</li> <li>• How are our measures of success affected by climate change? What are the indicators?</li> <li>• What are the consequences of not intervening in land use?</li> </ul>
Connections to other policy areas	<ul style="list-style-type: none"> <li>• Trade agreements will influence how much we can support land-use</li> <li>• Rural development</li> <li>• Public services and communities and the wellbeing of rural communities</li> </ul>

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

The Driver	Governments will seek to achieve a global free-trade agreement
The Challenge	<p>In securing a global free trade agreement, the UK will face significant challenges to secure the position of environmental requirements within those negotiations.</p> <p>The key challenge will be to maintain and enhance protections the UK already has. To do so, we will need to understand the environmental implications for climate change, energy and air quality. That understanding will require a clear picture of the regimes of environmental control and protection in the other trading jurisdictions, backed up by a clear scientific rationale for the environmental standards, limits and governance which the UK promulgates.</p>
93 words	

Possible outcomes	<ul style="list-style-type: none"> <li>• Multiple agreements with the range of regulations</li> <li>• Potential for agreements which have little basis in climate policy</li> <li>• Potential the trade agreements             <ul style="list-style-type: none"> <li>i. Dictate to UK policy</li> <li>ii. Affect our ability to construct support payments</li> <li>iii. Reduce our environmental standards</li> </ul> </li> <li>• Potential to increase exposure to invasive and non-native pests</li> </ul>
Possible threats	<p>In 2030</p> <ul style="list-style-type: none"> <li>• Reduced environmental standards</li> <li>• Disruption to predictions of land-use patterns</li> <li>• Uncertainty of policy environment</li> <li>• Increased potential for disease and pests</li> <li>• Reversal of the current trends in improving environmental quality</li> <li>• Weakening of an environmental regulations</li> <li>• Shifting consumption patterns and global resource use</li> </ul>
Possible opportunities	<p>In 2030</p> <ul style="list-style-type: none"> <li>• Potential agreement could encourage spread of environmental improvements</li> <li>• Innovation</li> <li>• Exporting technologies and development of new IPR opportunities</li> <li>• Develop <u>genuine</u> trade off in terms of production and the economy</li> <li>• Higher standards of protection available in other jurisdictions</li> </ul>
Evidence needs	<ul style="list-style-type: none"> <li>• Understanding environmental implications of a global free trade agreement on climate change and energy</li> <li>• What are the key thresholds in terms of standards, limits and governance that we need to maintain or enhance?</li> <li>• Deeper understanding of regimes of environmental control and protection in other jurisdictions</li> </ul>
Connections to other policy areas	<ul style="list-style-type: none"> <li>• Yes, lots</li> </ul>

The Driver	Future proof planning needs to be more embedded
The Challenge	Current decision-making processes take varying consideration of climate change impacts and often happen in isolation. UK and devolved legislation requires different degrees of integration. Providing evidence of the social, economic and environmental benefits of integrated planning for distant horizon scenarios will help make the case for pragmatic and positive policy revision and development post Brexit.
55 words	

Possible outcomes	<ul style="list-style-type: none"> <li>• Potentially reinforce better confusion in the development of policy and legislation</li> <li>• Further isolation of decision-making [these two are exclusive]</li> </ul>
Possible threats	<ul style="list-style-type: none"> <li>• Continued short-term policy-making, politically driven</li> <li>• Increased development in inappropriate locations (Flood risk etc)</li> <li>• Inefficient resource use, thinking in silence and increased public cost</li> <li>• Fragmented policy double</li> </ul>
Possible opportunities	<ul style="list-style-type: none"> <li>• Cost-effective multifunctional infrastructure</li> </ul>
Evidence needs	<ul style="list-style-type: none"> <li>• Evidence of the socio-economic benefits of integrated planning and policy approaches for climate change</li> </ul>
Connections to other policy areas	<ul style="list-style-type: none"> <li>• Yes</li> </ul>

## Annex 1: Attendees

Emma Ahart, Scottish & Southern Electricity  
Andrew Bauer, National Farmers Union Scotland  
Nick Brokie, Scottish & Southern Electricity  
Ciara O'Connor, Climate Exchange  
Graeme Cook, Scottish Environment, Food and Agriculture Research Institute  
Anne Conrad, Scottish Environmental Protection Agency  
Nathan Critchlow-Watton, Scottish Environmental Protection Agency  
Mary Christie, Scottish Natural Heritage  
Jim Densham, RSPB  
Chris Dodds, Scottish Government  
Ruth Ellis, Scottish Environmental Protection Agency  
Bob Ferrier, The James Hutton Institute  
Julie Fitzpatrick, Moredun Research Institute  
Lesley Frostick, Scottish Enterprise  
Alan Gray, Centre for Ecology and Hydrology  
Alison Hester, The James Hutton Institute  
Helen Jones, Scottish Government  
David Kenyon, Science Advice for Scottish Agriculture  
Liam Kelly, Scottish Government  
John Kerr, Scottish Government  
Paul Leinster, Cranfield University  
Michael Mcleod, Marine Scotland  
Ed Mackey, Scottish Natural Heritage  
Bruce Nicoll, Forestry Research  
Eddie Palmer, Scottish Environment Link  
David Paterson, Marine Alliance for Science and Technology for Scotland  
Adele Shaw, Historic Environment Scotland  
Peter Singleton, Scottish Environmental Protection Agency  
Anne-Michelle Slater, University of Aberdeen  
Alistair Stott, Scotland's Rural College  
Norval Strachan, Food Standards Scotland  
Tom West, ClientEarth  
Mark Williams, Scottish Water  
Juliette Young, Centre for Ecology and Hydrology

## Annex 2: 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 3: The full set of drivers

The list of drivers presented here is slightly modified from the list that participants used during the workshop. Some drivers have been slightly reworded; a few overlapping drivers have been removed and 10 drivers – added during the workshop – have been included (italicised in the list).

1. *Agricultural support payments are increasing, focussed on public goods*
2. Central Asia will be the world's fastest growing region between now and 2030. Western Europe will be the slowest.
3. Circular economy practices will change what society values
4. *Citizen engagement is likely to become increasingly important*
5. Climate change is resulting in increased temperature and increased occurrence of extreme weather and seasonal events.
6. Consumption will continue to increase
7. Cyber security is an increasing threat to international security
8. Data analytics will be used to understand changing demand and supply patterns for a range of goods and services
9. Decarbonisation will significantly impact on policy formulation and implementation
10. *Demand for energy is increasing, with potential impacts on the environment from new technology*
11. Demand for greater regional autonomy will remain a political issue
12. Devolution of decision making down to local/metropolitan actors
13. *Diets are changing*
14. *Energy security increases the risk of conflict*
15. Food security and water security will become significant challenges; perhaps even sources of conflict
16. *Food Waste is increasing*
17. *Future proof planning needs to be more embedded*
18. Global population will exceed 8.5 billion by 2030
19. *Global resource shortages (metals, nutrients) will begin to bite*
20. GM crops and animals will become culturally accepted in the UK
21. Governments will continue to collaborate to achieve the Paris Agreement on Climate Change
22. Governments will continue to collaborate to achieve the UN Sustainable Development Goals
23. Governments will seek to achieve a global free trade agreement

24. Improvements in farming techniques and technology will boost productivity and increase food security
25. *Increasing need to co-produce research with policy and decision makers*
26. Increasing value of the UK's ecotourism markets
27. International investment in the UK will increase
28. Less stable and predictable political leadership leading to global insecurity
29. Local economic performance around the UK will be uneven, leading to increased regional disparity
30. London and other major UK cities will continue to grow in size and population
31. *Lowland/upland land capability and land use faces increasing and competing demands from wildlife adaptation and land use for mitigation*
32. More than one quarter of the world's population may live with water scarcity on a daily basis by 2040
33. New technology is increasingly impacting on the natural environment
34. Patterns of land use will need to change to meet the UK's food and energy needs
35. People will have increased mobility and job flexibility
36. *Pests and diseases are more widely dispersed*
37. Poverty and social injustice is resulting in a disconnection between people and the environment
38. Retailer power drives farming systems
39. Smart cities and autonomous vehicles will change how we live and travel
40. Societal and political pressures on London and the South East may result in resources and population being moved to the rest of the UK
41. Technology may play an increasing role in regulation, both in monitoring and compliance
42. The average age of the UK population will be 42.9 years in 2045. 1 in 12 will be over 80
43. The burden of 'lifestyle' diseases such as obesity, diabetes may have an impact on the availability of healthcare
44. The continued decline in vertebrate species populations is part of a complex biodiversity picture creating winners and losers
45. The contribution that natural capital makes to UK growth will become more important
46. The distinction between greater and lesser affluence will increase
47. The economic centre of gravity will continue to away from the west towards China and the east
48. The ecosystem approach, landscape-scale approaches, ecosystem services and natural capital frameworks will be significant components of the policy making process
49. The internet of things will change production processes and practices profoundly

50. The risk of interstate conflict will continue to rise
51. The sale of petrol and diesel vehicles will be banned in 2040
52. The UK will agree more strategic approaches to environmental delivery through legislative reform as a result of Brexit
53. The UK will not retain exclusive fishing rights of the 200 mile exclusive economic zone post Brexit
54. The UK's reputation as a migrant unfriendly country will have an impact on jobs and wealth creation
55. The world economy will double in size by 2045
56. There is increasing pressure on land to provide food and energy
57. There is increasing pressure on the marine environment to provide food and energy (the blue economy)
58. There will be increased use of recreational drugs
59. UK political structures and processes for political decision making are likely to change
60. UK population will pass 70 million by 2030

## 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
Cyber security is an increasing threat to international security			●	
Demand for greater regional autonomy will remain a political issue			●	
Devolution of decision making down to local/metropolitan actors	●			
GM crops and animals will become culturally accepted in the UK				●
Governments will continue to collaborate to achieve the UN Sustainable Development Goals	●			
Growing interest in nationalism			●	●
Increasing international investment in local and regional economies and resources				●
Increasing value of the UK's cultural ecosystem services (landscapes/open green space, market towns, heritage sites) to global tourism markets				●
Less stable and predictable political leadership leading to global insecurity		●		●
More than one quarter of the world's population may live with water scarcity on a daily basis by 2040				●
People will enjoy increased mobility and job flexibility	●	●		●
People will use recreational drugs more to enhance performance and create a sense of wellbeing	●	●		
Smart cities and autonomous vehicles may change how we live and travel		●		
Societal and political pressures on London and the South East may result in resources and population being moved to the rest of the UK	●	●	●	●
The distinction between greater and lesser affluence will increase	●			

The internet of things will change production processes and practices profoundly		●		●
The rise of non state actors will continue to threaten global security	●	●	●	
The risk of interstate conflict will continue to rise			●	●
The UK will not retain exclusive fishing rights of the 200 mile exclusive economic zone post Brexit				●
The UK's reputation as a migrant unfriendly country will have an impact on jobs and wealth creation			●	

## 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
Central Asia will be the world's fastest growing region between now and 2030. Western Europe will be the slowest.		●		●
Current levels of growth in London and other major UK cities cannot be sustained without significant investment to protect the natural environment		●		
Cyber security is an increasing threat to international security		●		●
Data analytics will be used to understand changing demand and supply patterns for a range of goods and services		●		
Higher international tourism to the UK		●		
Increasing concentration of population in urban centres	●		●	
Local economic performance around the UK will be uneven, leading to increased regional disparity				●
People will use recreational drugs more to enhance performance and create a sense of wellbeing				●
Smart cities and autonomous vehicles may change how we live and travel	●			
The ageing population will place significant pressure on public services		●		
The average age of the UK population will be 42.9 years in 2045. 1 in 12 will be over 80.	●	●		
The burden of 'lifestyle' diseases such as obesity, diabetes and mental health may have an impact on the availability of healthcare	●			●
The economic centre of gravity is shifting away from the west towards China and the east		●		●
The rise of non state actors will continue to threaten global security				●
The sale of petrol and diesel vehicles will be banned in 2040	●			
The UK's reputation as a migrant unfriendly country will have an impact on jobs and wealth creation				●