

# Defra Science Advisory Council (SAC)

## Minutes of meeting, 14 June 2023

### Actions arising

Action number	Action	Owner
01	BEC secretariat to let SAC know when the recruitment advert is published.	BEC secretariat
02	Circulate BEC Terms of Reference with the SAC	BEC secretariat
03	SAC-SSEG conversation about developing technologies such as AI and bioengineering.	SAC-SSEG secretariat
04	The SAC to suggest names of public organisations with expertise in environmental monitoring and public organisations with test beds across the UK	SAC members

## 1. Welcome and apologies

The Chair welcomed attendees, apologies are recorded in Annex A.

## 2. SAC reflections from dinner

The SAC chair thanked Professor Graham for an interesting talk on his work as Director of [BioYorkshire](#), and their reflections of opportunities in biotech for environment and agriculture.

There was a discussion around the communication strategy employed by BioYorkshire about the biotechnology they are developing. The SAC suggested using a clear and transparent strategy might help to engage all stakeholders early in the process. It was felt that there is a need to bring in social science thinking to help deal with the challenge of engaging society on biodiversity in general and on the relationships between biodiversity and biotechnology, as much of society are still not engaged on this topic. There was also a discussion around aligning industry in this new technology as they are important users of the research.

The SAC asked about rates of change and how quickly new technology can be ramped up. For example, how quickly can we meet our carbon footprint goals based on our current diet? Prof. Graham mentioned industrial hemp with its many uses as a good example of new technologies; the first UK variety was registered last year.

The SAC and Professor Graham discussed the production of new bio-engineering products related to land sharing or land sparing strategies due to the UK's limited amount of land and the many needs placed upon it.

The SAC and Professor Graham discussed the need to ensure soil health and management was included in designs for crop technology. The SAC felt the ideal solution would be to combine technological interventions with regenerative solutions.

There was a discussion around demonstrative benefits of biotechnology and why some technological introductions are successful while other equally beneficial technology introductions are not. It was felt that this may be due to risk assessments and how these are discussed and explained.

### 3. CSA update

The CSA provided the following updates:

1. The new head of the Environment Agency (EA) is Philip Duffy, who was previously at HM Treasury.
2. The [Science and technology framework](#) came out in March 2023 and is an important Government document. It mentions priority technologies including Artificial Intelligence (AI) and engineering biology.
3. Cross governmental publication on [powering up Britain](#) was published at the end of March 2023.
4. Defra are the lead department in government on climate adaptation. The [climate change risk assessment](#) was published in 2022 and the National adaptation plan will be published later on in 2023.
5. Defra are working closely with UKRI and developing interesting co-designed and co-funded projects. These include calls on net zero, climate adaptation, and environmental monitoring innovation.
6. There has been media attention on the [Prime Minister's Food Summit](#), including on cost of food and food security. The [Farm Innovative programme](#) is one part of Defra's input in this area. The CSA thanked SAC member Lin Field for input via the Food Innovation Programme steering board.
7. The COVID-19 enquiry has begun.
8. The CSA has been asked to comment on gamebird release in the context of avian influenza.
9. The [Global Centre on Biodiversity for Climate](#) is Defra's major overseas development programme with a Research and Development (R&D) focus and was formally launched on 25<sup>th</sup> May 2023. This has a call for proposals for a £40 million R&D programme to help the world's poor by using nature to help adapt to or mitigate climate change. This has received more than 1000 expressions of interest in the first couple of weeks.
10. The National Strategic Risk Assessment has been revised internally in government. A public version will be published soon.

The CSA asked the SAC to engage in horizon scanning on risks government may not be prepared for. In response the SAC discussed the following:

1. Risks around biodiversity decline.
2. Gamebird release and avian influenza.
3. Nonlinearity of environmental responses, including the rise in global sea temperatures.
4. Public perceptions and trust in science
5. Unilateral use of geoengineering options such as solar radiation management. Risks related to interference of photosynthesis were also mentioned.
6. The potential for civil unrest associated with climate change.

## 4. Net Zero R&D programme

The Government made a public commitment in the Net Zero Strategy to spend on R&D which resulted in Defra being provided with a minimum of £75m to spend on Net Zero R&D to address reaching Net Zero in the natural resource and land sectors. This is distributed over three years with Defra currently in the second year.

Defra provided SAC with an update on the Net Zero strategy and in particular the R&D elements of it. The [Net Zero strategy](#) was published in 2021 followed by a [Net Zero growth plan](#) (NZGP) published in March 2023. The Defra sectors within this are agriculture, waste, waste water, land use (including trees and peat) and fluorinated gases which together account for approximately 19% of UK emissions. This proportion will likely increase as other areas decarbonise more quickly due to the difficult nature of decarbonising some of these sectors quickly. In the NZGP Defra listed the measures they are pursuing to achieve the sectors' contributions to [Carbon Budgets](#) 4, 5 and 6. This included both a list of quantified measures, with their associated carbon savings, and a list of unquantified measures. Unquantified measures are those which have the potential to provide carbon savings in the future, but where Defra has been unable to quantify specific savings (e.g. where evidence gaps exist). Defra is working to improve the delivery confidence of the whole programme.

The SAC suggested Defra get rough estimates for the unquantified measures to understand how large the affect could be and to prioritise this work. The SAC noted the focus on terrestrial systems; it was recommended that fresh water and marine, such as coastal regions, should not be overlooked.

The SAC discussed measures aimed at reducing methane emissions from livestock . The SAC suggested that efficiencies could be improved by improving health and welfare measures across the whole animal health and welfare system.

The SAC felt that alternative protein sources should be a priority. The SAC recommended that Defra work out the most effective mechanisms to accelerate behaviour change such as carbon footprints on menus. The SAC recommended

Defra consider getting a social science perspective on food cultures and how they are changing.

The SAC discussed timber used in construction and the carbon benefits of woodland management in addition to woodland creation.

The SAC discussed upland and lowland peat and why these should be treated differently. A balance will need to be struck to carefully manage any gains vs downsides from rewetting. The SAC discussed risks and how discussions on land use change are not sufficiently considered in the context of climate change occurring. Climate extremes might limit the potential of a lot of the mitigation structures proposed.

## 5. BEC update

The Biodiversity Expert Committee (BEC) gave an update on the progress of its setup. This sub-committee of SAC will cover terrestrial, freshwater and marine habitats and provide advice on meeting the 2030 biodiversity targets. The BEC will meet quarterly and be reassessed after 5 years. There will be twelve members; four core members recruited with direct invitations and eight recruited through open competition.

**ACTION 01:** BEC secretariat to let SAC know when the recruitment advert is published.

**ACTION 02:** Circulate BEC Terms of Reference with the SAC.

## 6. Agri-Food Science & Innovation Research

Defra is currently driving forward several science and innovation research projects that will help to create a resilient food system whilst ensuring environmental commitments are met. The SAC were provided with an update on some of Defra's key agri-food science and innovation research and related policies enabling environmental resilience, sustainability and climate change adaptation. For example, innovation in alternative protein feed sources, genetic improvement research, and the Genetic Technology ([Precision Breeding](#)) Act. The SAC were asked for their views on Defra research and innovation direction of travel, and any opportunities.

### 6.1 Genetic Technologies

Genetic Technologies and Alternative proteins are two areas predicted to grow rapidly. Genetic technology provides opportunity for economic, environmental and sustainability gains and reduction in food waste and increasing productivity.

The SAC advised that caution is required when promoting the benefits of genetic technologies because the deliverables are still a long way off, however their benefits need to be highlighted now so that secondary legislation can be championed.

The SAC noted that crop breeding and land management are integrally linked, and so genetic technologies also need to be thought of alongside land management.

The SAC also asked about using genetic technologies to contribute towards specific ecosystem services such as carbon sequestration and nutrient use efficiency to reduce water pollution and greenhouse gas emissions.

The SAC suggested Defra consider putting in place monitoring to provide early warnings of unintended consequences.

## **6.2 Alternative Proteins**

The challenges and opportunities of the alternative protein sector were discussed. Opportunities include their potential to combat climate change, use fewer resources, and less land. Challenges include production at scale such as cell cultures, public acceptance, regulations keeping pace, and how to attract more investment.

The SAC was asked to consider acceptance barriers for these new technologies and maximise their opportunities.

The Scottish devolved administrative official brought to Defra's attention that in Scotland hemp is being assessed as an alternative for proteins, oils, and fibre. Opportunities for more diverse uses of barley within our food system were also discussed.

The SAC made Defra aware of the conflict that may occur with alternative proteins requiring a lot of processing before they're edible and the public questioning the potential impacts of industrially processed food. Innovation is needed to provide the optimal nutritional profile for the level of processing involved.

## **6.3 General**

The SAC suggested measuring sustainability of new technologies as they are rolled out to build an evidence base and quantify their benefits.

The SAC warned that public engagement should not be used as a means of overcoming acceptance barriers. Engagement is more helpful to understand different views and recommended Defra refer to the SAC-Social Science Expert Group's (SAC-SSEG) [public engagement review](#). Defra responded that the public were engaged with on genetic technology and their views were used by social science researchers to manage the workshops. Current public engagement aims to find solutions around coexistence of precision breeding crops and organic crops, and assessment of what the public thinks these terminologies mean.

The SAC suggested more thought should be given to how these technologies fit with systems thinking. Systems thinking will be important when expecting this technology

to help deliver on broad goals such as how sustainable proteins can contribute to Net Zero.

## 7. Innovation in Environmental Monitoring Programme

Defra reminded the SAC about the previous meeting on this topic ([Defra's innovation strategy discussion](#)). Innovation in the Environmental Monitoring programme is being developed by Defra in partnership with the Natural Environmental Research Council (NERC) and Innovate UK. It aims to develop enhanced monitoring capabilities in areas of joint strategic interest (biodiversity net gain, soil carbon trading, and nature-based solutions). Defra aim to announce the first call in the summer of 2023, which will be led by NERC and will focus on the feasibility phase of technology development. A second call will be launched in the autumn, which will be led by Innovate UK and focus on testing, verification, and demonstration. The current discussion focusses on the set up of the second call, which will have a strong component of having test beds, which will allow companies to test their technologies out in a kind of practical situation.

The SAC discussed the various options of using test beds to capture data for new technologies including long-term and quick data capture options. The SAC felt that for the test beds to have value they need to be visible, and the data needs to be accessible. The SAC suggested thinking about the design, availability of data and where we are already invested heavily. The SAC felt the real power of this would emerge when looking at large scale change.

The SAC felt early warning indicators of abrupt changes would be an interesting application of monitoring test beds.

**Action 04:** The SAC to suggest names of public organisations with expertise in environmental monitoring and public organisations with test beds across the UK.

## 8. Engineering Biology Forward Look

Defra introduced their Engineering Biology forward look to the SAC, which is set in the wider context of cross-government activity and delivery planning. The intention was to seek SAC views on the engineering biology approach, and identify areas for improvement in forward plans, including on Defra's role in the Department of Science, Innovation and Technology (DSIT) cross-government Engineering Biology Delivery Plan. Defra explained how the Economic Strategy was striving for sustainable economic growth, including by working with DSIT through the adoption of critical technologies in the DSIT [UK Science and Technology Framework](#). Engineering Biology became an established priority across government in March 2023. Defra have been actioned by NSTC to provide a response to DSIT by

August 2023 to set out Defra's relevant levers, spend, and an assessment of where engineering biology can support the department's work.

The SAC discussed the communication challenges involved in developing products in this space including public perception of products that have already been developed. The regulation and facilitation of regulations were also discussed. The SAC felt that regulation should be seen as a facilitator for innovation but that there was a need to develop regulation that was science based, proportionate and future proof. Defra were asked to consider co-designing these with key players for example industry and Non-Governmental Organisations (NGO's).

The SAC mentioned diagnostics as being an important tool in understanding the potential disease-causing pathogens in the environment and animal populations and in detecting disease in animals and plants entering the country. Having a better way of detecting wildlife populations would also be beneficial in terms of managing disease outbreaks and biodiversity. SAC further referenced areas for consideration in the Defra return, including biomass, wood and timber, plant health, and waste as a feedstock.

The SAC discussed the need to train future talent and to ensure retention. Defra recognise the skills gap and are exploring how this can be addressed.

The SAC raised concerns about potential overlaps between the Engineering Biology delivery plan and the UK Research and Innovation (UKRI funded) 'Engineering Biology Mission Hubs and Mission Awards' scheme as well as these being developed without much input from Social Science. The CSA suggested SAC-SSEG could look into priority technology in general, not just Engineering Biology and potentially also AI.

**Action 03:** SAC-SSEG conversation about developing technologies such as AI and bioengineering.

## 9. SAC-Social Science Expert Group (SSEG) Update

The SAC-SSEG Chair, Professor Susan Owens, provided an update on recent SAC-SSEG activities. The SAC-SSEG recruited five new members earlier this year. Interest in these positions demonstrates that there is a pool of social scientists from a range of different disciplines who want to work with Defra. New members of the SAC-SSEG come from a range of institutions and disciplinary backgrounds, with expertise including human geography (different specialisms), sociology, quantitative social sciences, climate change and agriculture.

The [Review of public engagement](#), which was published in October 2022, has received a very positive reception and now has its own dedicated web page. The SAC-SSEG is trying to ensure it reaches all those it was intended to reach in the Defra group including the social science profession and various policy and evidence

teams. The British Academy has drawn upon the Review in its project on science, trust and policymaking. Professor Owens has also been promoting the report with the Royal Society and the Royal Academy of Engineering.

Upcoming SAC-SSEG topics include animal welfare, food labelling and water as a finite natural resource. The SAC-SSEG continues to provide advice for Defra teams working on 25 Year Environment Plan biodiversity targets, the One Health agenda and the National Bio-surveillance network.

## **10. Wrap up session**

The SAC shared their reflections and suggestions for further work on the Net Zero R&D programme, including prioritising work quickly by estimating the importance of each. Hybrid (meaning dual use) approaches was also suggested, for example silvo-pastoral systems combining trees and grazing. The SAC feel Defra are doing a good job getting this work started, but the task is very large and will require lots of support. The SAC emphasised the need to ensure Defra has the right skills and capacity to do this work.

The SAC discussed the use of artificial intelligence (AI) and natural sciences. It was noted that:

- The AI research community is relatively small.
- More thought should be given to developing deeper AI skills within the natural sciences through training.
- The private sector has greater AI research capacity and opportunities to collaborate should be explored.

The SAC felt Defra needed to think about the skills that will be required to address the issues discussed at this SAC meeting, namely biotechnology, food innovation, and environmental monitoring:

- Do the requisite skills exist?
- Are we at risk of duplicating efforts using different sources of funding?
- Does Defra's funding system adequately engage new research providers?

The SAC suggested secondments as potential way of getting early career scientists working in these fields and shaping them which would enable Defra to have a community of people who know how publicly funded research works and would also enrich the research outcomes.



## **Annex A: Attendees and apologies**

### **SAC Members**

Louise Heathwaite (Chair)

Lin Field

Lisa Collins

Peter Cox

Susan Owens

Rowland Kao

Rosie Hails

Richard Bardgett

Marian Scott

Felix Eigenbrod

### **Defra Chief Scientific Adviser's Office**

Gideon Henderson – Chief Scientific Adviser (CSA)

Justine Bejta – Deputy Chief Scientific Adviser (DCSA)

SAC Secretariat

### **Devolved administration observers**

Alistair Carson – Northern Irish Government Observer

Paul Devine - Northern Irish Government Observer

Matthew Williams – Scottish Government Observer

### **Defra and other officials in relation to specific agenda discussion**

#### Net Zero

Head of Systems, Innovation and Futures

Head of Net Zero R&D Funding

Head of Climate Mitigation Science

Deputy Director Net Zero & Biomass

#### Agri Food Science

Agri-Food Science Lead

Food Systems Sustainability Lead

Genetic Resources and GM Reform

Head of Genetic Modification Reform

#### Innovation

Head of Innovation Strategy

Head of Systems, Innovation and Futures

Innovation Strategy Senior Advisor

#### Engineering Biology Forward Look

Head of Office of the Chief Economist

Economic Strategy Policy Lead

Economist, Office of the Chief Economist

### **Defra observers**

Science & Engineering Fast Streamer, International Science Partnerships

Science & Engineering Fast Streamer, Genetic Modification Team

UKRI Intern, Farming Science Team

Head of Chief Scientific Adviser's Private Office and Strategy team

### **Apologies**

Nick Hanley - SAC member

Caryl Williams – Welsh Government Observer