Rural Affairs, Food and Environment Research Strategy for 2016 - 2021

The Scottish Government
Riaghaltas na h-Alba

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Introduction

This strategy sets out the principles and processes behind the investment we will make in research for the Rural Affairs, Food and Environment portfolio from 2016 to 2021.

The Scottish Government continues to be an important funder of science in the area of rural affairs, food and the environment. We are the third largest public sector funder of R&D on agriculture and food combined in the UK.[1] We invest more than £50 million each year to support a broad suite of research, ranging from investigations on urban air quality to studies designed to help understand the behaviours that lie behind consumer choices on food. Our core funding is focussed on agriculture, food, environmental change and rural communities.

Our investment in science is distinctive in the UK because we support the capability to create interdisciplinary research at a national scale to ensure the delivery of genuine science–driven impact.

That investment also helps support the training of some of the next generation of scientists working across the rural sphere, maintains vital scientific infrastructure and research platforms, including collections of plants and soils that are globally unique, and also allows us to work in partnership with others to maximise the impact of the research we do here in Scotland.

We ask a lot from the research we fund; we expect it to be excellent science, respected by the wider research community, but at the same time accessible to a wide range of stakeholders, informing and supporting our policy making processes.

Our investment is made on the basis that access to excellent science, and scientists with the skills to interpret scientific evidence from a range of sources, will help the Scottish Government fulfil its single purpose, and in doing so have a positive impact for Scotland as a whole.

The institutes through which we make much of our investment in research cannot cover the vast array of topics that are contained in the rural affairs, food and environment portfolio, nor can they be expected to have the expertise in all areas. Therefore, we will continue to look to broaden our supply base for our research, working with an expanding range of providers of research to meet our needs. In particular we will better connect the research we support with the wider Scottish and UK public sector, businesses, Scottish Universities and the UK Research Councils.

[1] A UK Strategy for Agricultural Technologies, July 2013 - https://www.gov.uk/government/publications/uk-agricultural-technologies-strategy

Our Strategic Priority

The high level aim for investment in research by the Scottish Government remains its single purpose - **"to focus the Government and public services on creating a more successful country, with opportunities for all of Scotland to flourish, through increasing sustainable economic growth".**

Vision

Within the context of that single purpose, the Scottish Government vision for this research strategy is:

This vision places the science that we invest in at the heart of Scottish society, and looks to those engaged in the research we fund to visibly and proactively contribute to the health, wealth and wellbeing of the nation, by applying their collective talents for the benefit of all of Scotland's people.

This strategy sets out the future direction for the science which the Rural Affairs, Food and Environment portfolio will require, and the ways of working which we will adopt by:

- outlining a high level vision for the 2016-2021 period;

- identifying the priority themes through which we will frame the application of our research efforts and resources;

- setting out the ways in which we want to work in the future, including our approaches to knowledge exchange and innovation.

The vision for Rural Affairs, Food and Environment Portfolio research in 2021

We will have delivered **research that is relevant, respected and responsive to Scotland's communities, its people and to the rural economy** in 2021 by:

- Having a Strategic Research Programme, which has interdisciplinarity at its core and has a single clear identity that is recognised nationally and internationally for its excellent science.

- Demonstrating increased levels of collaboration with researchers from other institutions through leverage of our investment in research.

- Having evidence of increasing innovation activity associated with the programme with a range of non-commercial and commercial funders.

- Ensuring we demonstrate the impact of our research undertaken on the communities, businesses, public sector and the economy of Scotland in a clear and measurable way.

- Making the significant data holdings we support through our funding more visible and accessible.

- Creating Centres of Expertise at points of significant demand in the system for the translation of scientific understanding from across Scotland into solutions to critical questions that will emerge over time.

The Rural Affairs, Food and Environment Portfolio in context

The Scottish Government Rural Affairs, Food and Environment portfolio is broad, with its policies and activities affecting many aspects of life across Scotland, for example:

- Rural Scotland extends over 95% of the land area of Scotland and is home to 18% of the Scottish population.

- Between 2014 and 2020, £1.2 billion will be invested in farming, forestry, crofting and rural development through Scotland's Rural Development Programme.

- Scotland has a diverse and distinctive range of landscapes that are a significant part of the country's natural and cultural heritage, and which make

an important and positive contribution to the economic, cultural and social wellbeing of the nation.

- Scotland's food and drink exports account for around 30% of the total exports of the country, and were valued at £5.3 billion in 2013.

- Scottish Government policies are leading in both local and global efforts to tackle climate change, and by moving towards a zero-waste society, encouraging waste to be viewed as a resource, rather than a problem.

Investment in research by the Scottish Government in the Rural Affairs, Food and Environment portfolio is only a part contribution to the broader landscape of science required, and that landscape continues to evolve. Strong alignment between this strategy and others in the same policy space; especially the sectoral strategies in the marine and forestry sectors[2] and the strategies and evidence plans of CAMERAS[3] partners, are important to make.

The public sector landscape is also changing, both as a result of well-documented financial challenges and as new initiatives such as the new food body, Food Standards Scotland - starting in 2015 - take shape. The Rural Affairs, Food and Environment portfolio must therefore operate against a background of on-going change, and will need to adapt and innovate to respond effectively to emerging issues.

The portfolio of strategic scientific research supports the development and delivery of Rural Affairs, Food and Environment policies and the achievement of the Scottish Government's single purpose. There is a particular focus on supporting a Greener, Smarter and Wealthier Scotland, contributing towards the achievement of a number of national outcomes including:

- We value and enjoy our built and natural environment and protect it and enhance it for future generations;

- We reduce the local and global environmental impact of our consumption and production;

- We are better educated, more skilled and more successful, renowned for our research and innovation.

Our long-term investment and support in Scotland's capability and capacity in the areas of land-based sciences, has created a resource unique to Scotland in the form

[2] Scottish Marine Science Strategy 2010 – 2015 and Science and Innovation Strategy for Forestry in Great Britain.

[3] Coordinated Agenda for Marine Environment & Rural Affairs Science - the CAMERAS partner organisations are: Food Standards Agency Scotland, Forestry Commission Scotland, Marine Science Scotland, Rural and Environment Science & Analytical Services (RESAS), Science & Advice for Scottish Agriculture, Scottish Environment Protection Agency, Scottish Water and Scottish Natural Heritage.

of our Main Research Providers (MRPs)[4], and both that research and the MRPs we support contribute to the fulfilment of these outcomes.

Funding strategic research programmes at these institutes represents 60-65% of our overall investment over recent years. They are however not the only source from which expertise is drawn, nor does the work they do represent the full extent of our science needs.

There are a wide range of questions the portfolio needs to explore, such as understanding the extent of, and opportunities created by, vehicle recycling as we move towards a Zero Waste Scotland, through to examining the potential for deep geothermal energy in Scotland. These types of policy-driven questions are also supported by our research funding through wider collaborations with Higher Education Institutes and Industry.

Benefits from Scottish Government investment

Delivering policies across this breadth of activities requires interpretation and understanding derived from specialist skills and capacity in scientific, economic and social research - an *interdisciplinary*[5] approach.

These skills and capacities are supported directly by the Scottish Government, as part of an annual investment of c. £55 M in research made through its Rural and Environment Science and Analytical Services Division (RESAS). That investment is also informed by the needs of key stakeholders such as our CAMERAS partners.

This investment supports more than 1,600 jobs in Scotland including 440 highly-skilled posts. In 2013-2014 our funding was instrumental in levering an additional £27 M from other sources including those from across the UK and further afield with over £12 M of this coming from funding for industry-related research.

The skills and expertise are highly valued by other research funders and scientific collaborators alike, with the result that these Scottish-based researchers are active in more than 50 countries across the globe, excluding the strong links they have developed with other EU partners.

Scotland has established a good reputation for the quality of its biological and environmental research. A very significant benefit of this is not only capacity to undertake research, but also to understand and use, for Scotland's benefit, the outputs of research funded and/or undertaken by others. We also continue to seek to develop and deepen links with a range of funders including the Scottish Funding Council, Innovate UK, Defra and some of the main UK Research Councils – BBSRC,

[4]Biomathematics and Statistics Scotland (BioSS), Moredun Research Institute (MRI), Scotland's Rural College (SRUC), Royal Botanic Garden Edinburgh (RBGE), the Rowett Institute of Nutrition and Health (RINH) within the University of Aberdeen and the James Hutton Institute (JHI).

[5] **Interdisciplinary** is used here to describe activities that place an emphasis on joint working, bringing the perspectives of different disciplines together to yield distinctly new, common frameworks and approaches to research problems.

NERC and ESRC – working closely in areas in which our strategic research aims coincide to enhance the impact of research we fund.

The challenges for the Rural Affairs, Food and Environment Portfolio and the role of research

The challenges both now and for the future of the Rural Affairs, Food and Environment portfolio take place in the 'real world' of societal challenges that are, inevitably, heavily inter-related with a range of influences and also multi-faceted in nature. Our science base therefore needs to have two very different characteristics:

- a core of science skills and research facilities that can build upon investment over the years in the key areas of land based sciences, helping us to understand how the social and natural environment of rural Scotland functions and changes over time; and

- capacity to work in a more rapid and solution-focussed way, so that the longer term research from across a range of disciplines is brought together and translated in ways that help solve more immediate issues which the portfolio faces.

For example, there is increasing recognition that, on their own, the weight of facts and evidence are often insufficient to persuade individuals and communities to make changes in their behaviour which can have wider benefits for example around diet, health, energy, climate change, animal welfare and the economy. Therefore, effective advice requires both the identification of steps that may be beneficial to policy aims (e.g. help develop new methods to reduce emissions from agriculture), and also the conditions required in order for those benefits to be realised (e.g. the proposed reduction methods need to also be cost effective).

When seeking support from research in policy development, simple 'cause and effect' questions are rare, instead, the questions are more complex; for example:

- How do we realise the multiple benefits of land use, balance competing demands placed on those resources, get land managers engaged in these issues and at the same time adapt to climate change, reduce emissions, and maintain biodiversity and other ecosystem services?

- How do we use our knowledge of current and emerging strategic risks from animal and plant disease to help reduce and manage the risks to agricultural and forest productivity and the wider environment?

- What opportunities are there to increase the long-term health prospects of the individual by adopting diets that are healthy, nutritious and affordable and at the same time reduce the load on our health services and support Scotland's food producers?

Taking on these questions raises significant challenges to our understanding of the ways in which the environment, economy and society of rural Scotland functions. Through the research investment made in Scotland over many years, we have

unique resources and experience within our research base to apply to questions that are raised in developing policy, both for today and the future.

A major opportunity from the investment in science that the Scottish Government makes is that the research required straddles physical, biological, social and economic science disciplines, in a single Strategic Research Programme. This is a unique proposition within UK science, with the capability to deliver interdisciplinary research at a national scale, and one that can deliver genuine science–driven impact.

Therefore, in order to fully realise the benefit of this longer-term multi-stranded investment, and get the best from the knowledge accumulated over time, the research we invest has to connect with other disciplines, unconstrained by subject boundaries.

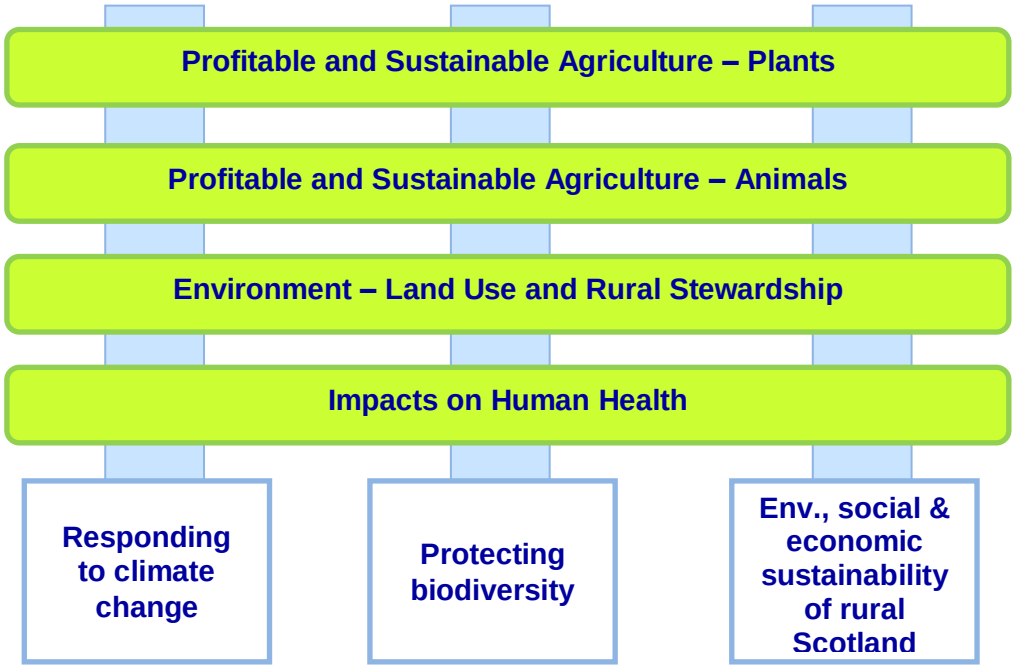
The changing shape of research

Research commissioning for this portfolio, and the structures in which the research required is shaped, have changed significantly over time. Prior to 2006, funding of institutes was based upon grant-in-aid, with the content of the research largely directed by the MRPs themselves.

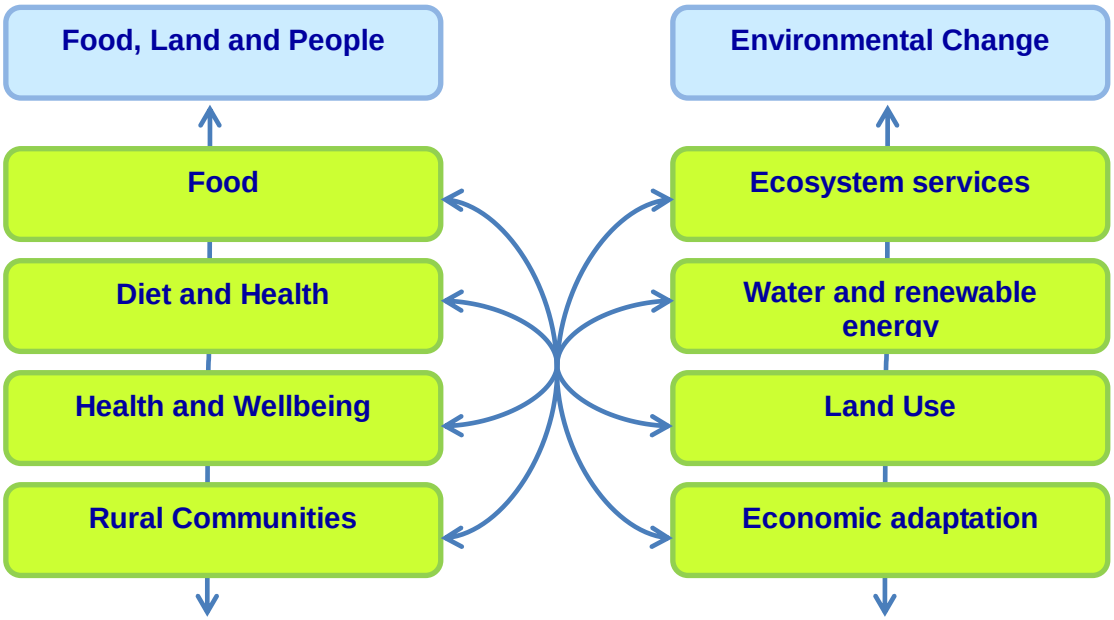
Subsequently, the Scottish Government has become more active in seeking to strategically align the research it funds with its over-arching purpose and objectives.. This Strategy and the programmes of research it defines have been actively developed with contributions from policy, practice and business stakeholders. The research activity funded over the period 2016-2021will be co-constructed between the providers and end users of the science.

The emphasis continues to be on increasing the level of policy involvement, creating connections across the different areas of science, and generating knowledge exchange and impact from the investment made in research.

The shaping of the science sought has also evolved over time; in 2006, the new funding round saw four programmes of research established, with three cross-cutting themes introduced:

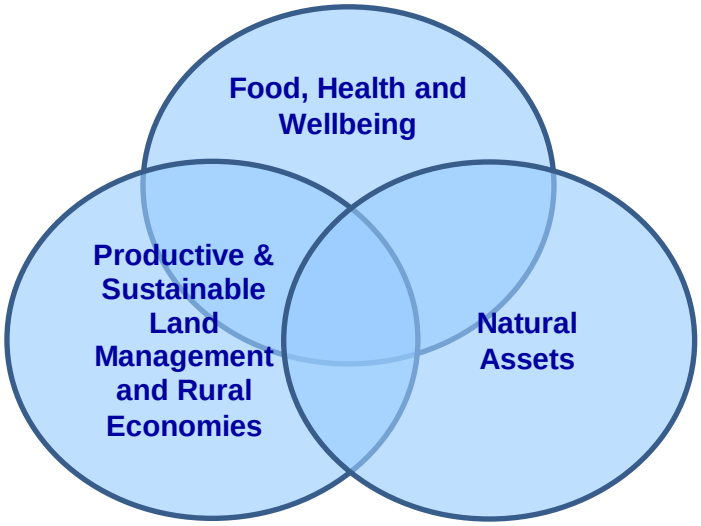


In 2011, two main Programmes, containing eight Themes, were used to brigade the research requirements of the portfolio. These programmes aligned with key drivers identified for science and policy at that time. In this framework, multiple connections are sought, both within the Programmes and between Themes, spanning across programmes.



In addition, and for the first time, underpinning capacity – the resources and facilities that are fundamental to carrying out much of the research – was identified as a separate funding stream, securing those resources for the future. Further new approaches to collaboration and impact were put in place with the formation of strategic partnerships with Scottish Higher Education Institutes and the development Centres of Expertise.

Research themes for 2016-2021



The current science needs of the Rural Affairs, Food and Environment portfolio can be captured in three strategic, but highly interlinked, research themes that support the widest range of specific policy outcomes, and address the key drivers of the portfolio.

The rationale for the Theme structure outlined above is to simplify the research landscape and emphasise the close ties that exist between them all. Consequently, the Theme titles express broad areas under which research needs arise, but there is a high degree of connectivity between all three. For example:

- sustainable agriculture should both draw upon and contribute to natural assets, and will also contribute to economic and social outcomes;
- the well-being of a rural community can be measured in many different ways and is subject to a range of factors which may include elements of social cohesion, the natural assets it has access to and economic considerations.

This overlapping structure makes clear that bringing together skills from across our research community will continue to be important to deliver excellent science that has impact when translated into practical use. The complex interactions described will also need system-based approaches to be applied, in order that the new knowledge and insights generated from research are to contribute to delivering the Scottish Government overarching vision of sustainable economic growth.

The three Themes are:

- **A Food, Health and Wellbeing Theme** – the health, wellbeing and economic performance of our local rural economies, through community-led innovation, good local environmental quality, and secure supply chains, are central to this theme. Building our understanding of how economic and social resilience of rural areas of Scotland can be enhanced through the empowerment of communities is central to place-based policy. Our research on food and drink will inform how the performance of our food and drink sector can be enhanced, what a healthy sustainable diet looks like and how this can be

encouraged, and the role of short food supply networks within the broader challenge of ensuring food security in Scotland.

Outcomes of this work will include:

- Helping understand how flourishing and resilient communities emerge, and practical ways to encourage their development;
- Safer food and more secure food supply chains across Scotland;
- Advice that can contributes to developing a healthier and more sustainable Scottish diet;
- Increased uptake of key low carbon and other behaviours that contribute to broader societal wellbeing across Scotland;
- Understanding and defining what form of diverse and resilient energy networks can be achieved in rural Scotland.

Some of the key policy drivers and policy needs for the work of this Theme include: Community Empowerment Bill, Food (Scotland) Bill, Fragile communities, Good Food Nation, Land and Land Tenure Reform, Land Use Strategy, LEADER programme, Less Favoured Areas Support Scheme, Place-based policies, Prevention of obesity routemap, Public sector equalities duties, Recipe for Success, Report on Proposals and Policies, Supporting Healthy Choices, Welfare Reform.

- **A Productive and Sustainable Land Management and Rural Economies Theme** – in recognising that farming is one of a number of important land use activities in the wider rural economy, we need to continue to find novel means to improve land management decisions and raise productivity while enhancing the environmental sustainability of existing and future agricultural systems. In addition, we need to understand the measures that will be most effective in supporting the diversity of rural industries, will help improve our food and other primary production, and help Scottish rural businesses to innovate, adapt and thrive in response to future challenges, climatic or otherwise.

  Outcomes of this work will include:

  - An increasingly innovative and competitive Scottish rural economy;
  - A more profitable and sustainable Scottish food and drink industry;
  - Improved land use and land management choices;
  - Productive, profitable and sustainable agriculture, based on improved health and welfare of livestock practices throughout Scotland;
  - Greater application of integrated pest and disease management across Scottish farming.

Some of the key policy drivers and policy needs for the work of this Theme include: Animal Health & Welfare (Scotland) Act 2006, Circular economy roadmap, Common Agricultural Policy reform, Community Renewable Energy targets, Good Food Nation, Land Reform, Plant Health Directive 2000, Plant Health (Scotland) Order 2005, Prevention of obesity routemap, Report on Proposals and Policies, Resource Efficient Scotland, Scotland Rural Development Programme, Supporting Healthy Choices.

- **A Natural Assets Theme** – by focussing on understanding the natural capacity of Scotland, we can continue to improve the frameworks for decision

making across all aspects of our environment. Recognising that diversity of living species is key to many services we depend on, those choices will be informed to ensure the integrity, health and function of key ecosystem services are maintained, and also take into account the multiple objectives that the people of Scotland seek from these natural assets.

Outcomes for this Theme will include:

- Improved quality of our natural assets to maximise the benefits that society gains from them;
- Climate change mitigation and adaptation strategies that are increasingly optimised for the conditions and economy of Scotland;
- Greater use of low carbon and efficient waste management systems that are appropriate to Scotland;
- Greater use of integrated approaches to the management of water and land resources by land managers and regulators to secure multiple benefits;
- Development of approaches to river flooding and coastal erosion that are increasingly managed through appropriate land use practices.

Some of the key drivers for the work of this Theme include: Climate Change (Scotland) Act 2009, Common Agricultural Policy, Convention on Biological Diversity (1992) and the Aichi targets, Flood Risk Management (Scotland) Act 2009, Land Use Strategy, Our Place in Time, Report on Proposals and Policies, Scotland Rural Development Programme, Biodiversity 2020 Challenge, Scottish Climate Change Adaptation Programme, Scottish Soil Framework, The Water Supplies (Water Quality)(Scotland) Regulations 2014, Water Environment & Water Services Act 2003.

The way we will work

Our working approach will be common to **all** the research we commission. We will continue to expect ever greater collaboration both within and between the science organisations that we fund to demonstrate our requirement for *interdisciplinary* working, and that collaboration must extend not only to the wider research community, both in Scotland and elsewhere, but also the public and private sector - *transdisciplinary*[6] working, with CAMERAS partners and other stakeholders.

We will continue to insist upon the best science possible being undertaken and the highest quality outputs being produced and made accessible through our funding. In all the research we support, we also expect that the impact of that work will be maximised. We will require the outputs generated from our funding to be brought to the attention of audiences through novel and evolving means that demonstrate an understanding of their needs and help provide answers to their questions.

[6] The term **transdisciplinary** is used here to describe an approach that integrates a wider range of perspectives, including those of stakeholders and non-academics, to address a common problem.

We will achieve this through:

- **Inspiring Innovation** - challenging and supporting our science base to take novel approaches in new areas of science and in the application of existing strengths, including facilitating interdisciplinary research with a systems focus, seeking new funding sources in both public and private sectors, and by expanding levels of collaborative working.

- **Exchanging Knowledge and Enhancing Impact** –networks of communication are rapidly evolving, and we will designate specific resources to ensure that knowledge is shared and discussed with the widest possible audience of end users[7], and by doing so, encourage greater awareness and impact for the work we fund over time.

- **Maintaining National and International Capability** – supporting the physical and intellectual assets within our science base including infrastructure, equipment, data and expertise and other research platforms (e.g. labs and demonstration farms) to safeguard the continuous development and retention of internationally recognised expertise within Scotland, and increase the accessibility of those resources to a wider audience.

The delivery mechanisms we will use

There will be five key mechanisms which will be funded in order to take this strategy forward in 2016-2021 - the Strategic Research Programme, Centres of Expertise, Innovation Funding, Underpinning Capacity and the Contract Research Fund.

Strategic Research Programme

- The Strategic Research Programme will remain the principal focus of science delivery for the Rural Affairs Food and Environment portfolio.

- We will continue to use the MRPs as the principal providers of the strategic research the Scottish Government procures.

- In order to widen the skills base available to the Scottish Government and to accelerate the levels of interdisciplinarity, delivery of the 2016-2021 programme will feature greater levels of collaboration between the MRPs and the Higher Education Institutes of Scotland than at present.

- A central resource and strategic leadership for knowledge exchange to focus the outputs from the overall programme and create a single identity for the investment in the programme will be established.

[7] Government/policy makers/implementers; commercial business, the public (including schools and other sectors across the community); other stakeholders (includes farmers, land based industries, health care professionals etc.) and also the scientific community.

Centres of Expertise

- We will continue to support the three current policy-facing Centres of Expertise for Climate Change, Water and Animal Disease Outbreaks.

- A new Centre on Plant Health will be established in the lead up to the start of the 2016-2021 programme.

- Throughout the 2016-2021 funding period, we will work with stakeholders to look for opportunities to develop further Centres where demand indicates that greater access to dedicated science advisory capacity is of benefit.

Innovation

- For 2016-2021, funding will be made available specifically to lever knowledge from the Strategic Research Programme into joint projects with industrial collaborators, widening the impact of the research investment.
- We will continue to pursue collaborations with other science funders both within Scotland and across the UK to maximise the potential application of this investment.

Underpinning Capacity

- The Underpinning Capacity funding stream will continue to be available to ensure key assets are maintained and their long-term sustainability is secured.
- Access to, and availability of, the range of science resources supported by this funding to wider audiences will be a key focus of the 2016-2021 period, in line with overarching requirement for increased accessibility of publicly-funded data and facilities.

Contract Research Fund

- The flexibility to commission short-term policy-led projects has significant impact for policy making, and will be maintained in 2016-2021.
- Access to these funds has been widened to include CAMERAS partners coming forward with co-constructed proposals.
- We will improve the visibility of the products of this funding stream to ensure that details of all completed projects are made more easily available to the widest potential audiences.
- Greater strategic use will be made of this funding to encourage partnerships with other research funders that can support capacity building in areas of common interest and foster connectivity across the research base in Scotland, and beyond.

How we will monitor progress

We already monitor and evaluate our investment in research. We will develop this further by:

- For the work within the Strategic Research Programme we will collect, and make public, measures of science excellence, benchmarked against other research funders on the basis of a range of scientific quality measures.
- We will continue to undertake an independent mid-term review of the portfolio of research activity, engaging fully with stakeholders of the research as part of this.
- For all research we fund, we will collect and make public information based upon case studies, user testimonies, and where possible, economic valuations, to demonstrate the impact and value of research on an economic and societal basis.
- Throughout 2016-2021 we will continue to develop and refine the indicators we collect, recognising that detecting and understanding the impact of strategic research may take place over longer timescales to the more immediate and policy-focused research.
- In 2016-2021 we will also develop specific indicators for new areas such as business partnership, accessibility of information and services, as well as seeking suitable benchmarks to enhance our understanding of value for money in the research we support.

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