Report of the Strategic Advisory Board for RESAS-funded science

Supporting evidence and commentary

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The role of the Strategic Advisory Board (SAB) for RESAS funded science

1. The Scottish Government has a long history of funding a portfolio of science relevant to the environment and agri-food sector.

2. Since 2006, funding has been by means of 5-year programmes of research with the majority of the funding directed towards a set of Scottish Institutes known collectively as the Main Research Providers or MRPs: the Moredun Research Institute (MRI), the James Hutton Institute (JHI) (incorporating Biomathematics and Statistics Scotland - BioSS), the Rowett Institute (RI), and Scotland's Rural College (SRUC).

3. Over the period 2011-16, 87% of the total funding available through the budget provided for research by the Rural Environment Science and Analytical Services Division of the Scottish Government, (RESAS), was granted to these organisations (Figure 1).

4. RESAS also funds Centres of Expertise (CoEs), bringing collaboration with and expertise from the wider academic community: in animal disease preparedness, water, climate change and most recently in plant health. The Centres are intended to access a hinterland of skills and evidence including from more strategic /longer term research to inform their work and delivery. They have also proved to be effective at the science-policy interface, generating 42% (95 of 225) of RESAS-funded policy outputs in 2017-18. In that year, the first three CoEs received some 11% of RESAS funds. The CoEs have mediated further collaboration between the wider academic community and the MRPs, for example 23% of the CoE's policy outputs had contributions from both MRPs and the wider academic community.

FIGURE 1: Distribution of total research funding by the Scottish Government through RESAS over the period 2011-2016 in support of the-then Rural Affairs Food and Environment (RAFE) Ministerial portfolio. The diagram shows that the majority (87%) of this investment, was allocated to the Main Research Providers (MRP) funding programmes of strategic research and underpinning capacity in those organisations. MRPs also received money through their involvement in RESAS funded policy focussed Centres of Expertise and strategic partnerships – collaborations with academic and commercial partners. Further monies were also secured by MRPs from the competitive Contract Research Fund which delivers research and consultancy to answer mainly short-term policy questions.

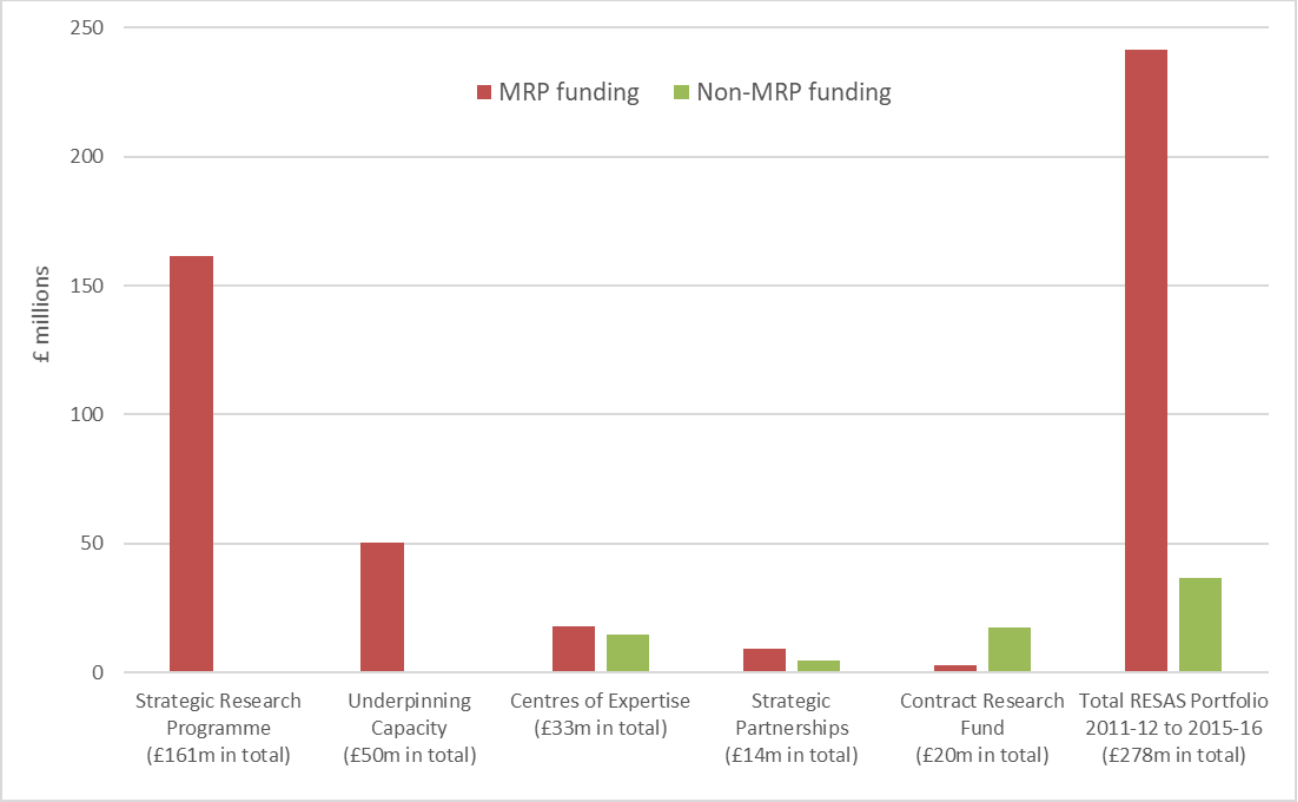
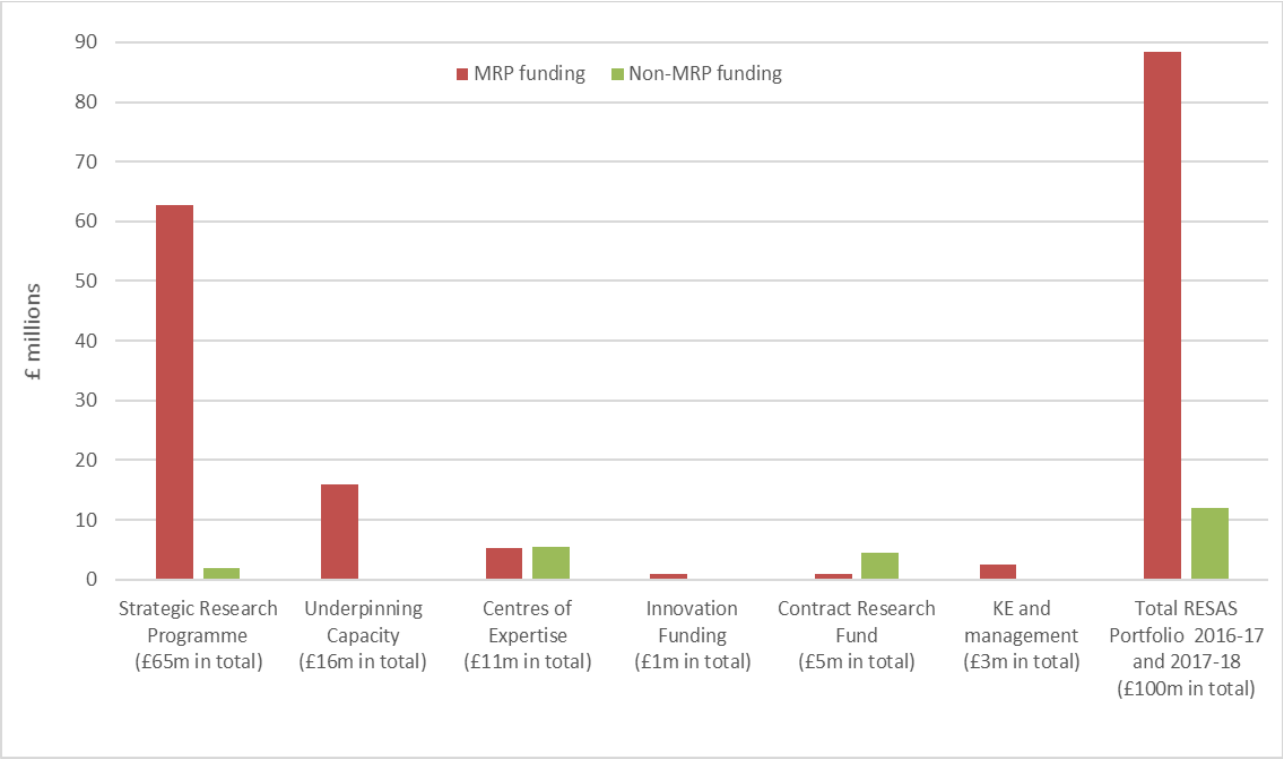


FIGURE 2: Distribution of total research funding by the Scottish Government through RESAS for the first two years of the current research programme (2016-18). As with the 2011-16 programme, the majority of this investment (88%) is allocated to the MRPs.



5. The overarching strategy for the current 5-year programme, which runs from April 2016-March 2021, was set by the Scottish Government (Rural Affairs, Food and Environment Research Strategy 2016-21). The content of the 2016-21 programme was informed by the mid-programme review of the 2011-16 programme and by extensive stakeholder consultation. The assumption that the current providers would continue to receive the majority of the funding (Figure 2) led to an evolution of the science and capability provided in the 2011-2016 and earlier programmes.

6. The 2016-21 programme was developed over 14 months, towards the end of the 2011-16 programme: Scottish Government only published its forward strategy in November 2014, invitations to tender for grant funding were issued in January 2015, with initial tenders to be provided by May 2015. Peer review was completed by the end of August, which allowed a short window until December 2015 for Scottish Government and MRPs to deal with any concerns. This time-frame was far from ideal for the funder or those seeking funding. Restricting planning and research specification to a relatively short interval, for a subsequent, 5-year programme, was typical of the episodic approach to the use of RESAS funding over a succession of 5-year programmes.

7. Against this background, the Scottish Government identified the need to take a more strategic approach to planning future funding beyond March 2021 and to start planning as soon as possible. The Scottish Government also wanted to improve its understanding of the strategic context within which its funding would operate; and to have more regularised, independent advice on strategy. Additionally, 2021 will mark 15 years since the Scottish Government last took a more fundamental look at its approach to its needs and research funding for the environment and agri-food.

8. Against this background, the Strategic Advisory Board (SAB) for RESAS funded science was established in December 2015 by the then Chief Scientific Adviser to the Scottish Government for Rural Affairs, Food and the Environment (RAFE), Professor Louise Heathwaite.

9. The SAB first met on 3 December 2015 and comprised the following members:

Professor Louise Heathwaite - Chief Scientific Adviser Scottish Government, Rural Affairs Food and Environment (chair until September 2017)

Dr. Linda Pooley – interim chair; Deputy Director, Rural & Environment Science & Analytical Services, Scottish Government

Prof. Sheila M. Bird – formerly programme leader at the Medical Research Council Biostatistics Unit, University of Cambridge
Dr. Paul Burrows - Director, Corporate Policy & Strategy, Biotechnology & Biological Sciences Research Council
Prof. Colin Campbell – then Chair, Main Research Providers, Directors Executive Committee (the role of DEC Chair rotates annually).
Dr. Stuart Fancey - Director Research & Innovation, Scottish Funding Council
Prof. Iain Gillespie - Pro Vice-Chancellor, University of Leicester
Prof. Sir Charles Godfray - Jesus College, Oxford University

Prof. Paul Leinster - Cranfield University (until May 2018)
Dr. David Pirie - Executive Director, Scottish Environment Protection Agency
Kenny Richmond - Economics Director, Scottish Enterprise
Prof. Tim Wheeler - Director of Science & Innovation, Natural Environment Research Council (until September 2018)

Bridget Campbell - Director for Environment & Forestry, Scottish Government
Elinor Mitchell – Director for Agriculture and Rural Economy, Scottish Government

with an agreed mission statement:

"The board will drive improvements in the quality, relevance, impact, visibility and leverage of the RESAS science research programmes; help prioritise areas for strategic research in alignment with policy and stakeholder needs and RAFE portfolio outcomes; ensure synergies and opportunities with the wider research landscape are maximised."

The SAB operates at a strategic level with a focus on creating the conditions and opportunities for the Scottish Government and research delivery partners to deliver the Scottish Government's research priorities.

10. When the SAB was formed, the policy landscape in Scotland was evolving, the wider research system across the UK was changing and constraints on fiscal resources were predicted. The situation remains complex and evolving.

11. Since SAB's inception, the outcome of the 2016 Scottish Parliamentary elections put renewed emphasis on the environment and growing Scotland's economy. The former RAFE portfolio was also split into two new portfolios: Rural Economy and Connectivity (REC) and Environment, Climate Change and Land Reform (ECCLR). The funding streams that SAB is concerned with are now overseen by the Cabinet Secretary for the ECCLR portfolio but continue to serve the interests of both portfolios. There have also been significant changes in funding structures for research at a UK level and Brexit has injected considerable uncertainty for staff as well as about access to a significant stream of research funding at the MRPs.

12. Consequently, the focus of SAB has been to advise the Scottish Government on how to make best use of its budget and optimise its system of funding in a way that is scientifically purposeful and that delivers the best outcomes for Scotland.

13. SAB has focussed on helping the Scottish Government understand how to identify and articulate better its future needs, how it might use its funding to meet those needs and to point to change. Our aim is to ensure that the Scottish Government can continue to fund, access and influence the scientific research, capabilities and evidence-base that it will need.

Scottish Government's funding of science for the environment and agri-food.

14. Government invests in science for a range of reasons. Research helps to grow our knowledge and skills, attracts talent, stimulates innovations that drive the economy and, in doing so, attracts additional investment and leads to high quality jobs. Science also underpins evidence used to aid decision making; and can be used as a platform to drive forward international collaboration as well as diplomatic engagement.

15. In 2005, the Scottish Government made the clear decision to use its direct funding for science in the areas of the environment and agri-food in a way that was more overtly aligned with the needs of Government. The 2005-2010 strategy set out an ambitious programme of change to ensure a more strategic approach to research, closer collaboration, greater critical mass, a greater proportion of policy led research, a move from grant in aid funding of research to grants for rolling programmes; and a greater focus on the provision and promotion of knowledge and understanding.

16. Those ambitions have been confirmed by successive administrations and Ministers. **The core tenets of this funding by Scottish Government are strategic research that is both aligned with the needs of Government and impactful.** The research supported is very wide-ranging, covering discovery science and translational research, long-term monitoring and short-term evidence synthesis. The Scottish Government's research bridges between basic research undertaken in Universities and fully applied research/innovation; underpins the delivery of national outcomes in Scotland; and provides an evidence base for decision making by Government and practitioners. The Scottish Government recognises that this investment also brings the broader benefits of research listed above (see paragraph 14). The spectrum of research activities that are supported will affect these benefits.

17. The current system, whereby the Scottish Government provides most of this funding directly through a set of independent institutions, is unique within the UK. Elsewhere in the UK, funding for such research is provided **either** to institutes and agencies that are under the direct control of Government **or** is delivered through third party funders (such as UK Research & Innovation) to their directly-controlled institutions and to independent institutions.

Future Scottish Government needs

18. RESAS will continue to engage with Scottish Government's policy teams and external stakeholders to identify currently unmet evidence needs and potential, future needs to align better the provision of evidence with demand.

19. For example, over the summer of 2016, an initial short, qualitative consultation exercise on evidence needs was conducted with the policy teams for the Environment Climate Change and Land Reform (ECCLR) and the agri-food related elements of the Rural Economy and Connectivity (REC) portfolios. This approach was set out in SAB paper 03/03 and the results presented and critically discussed in papers 04/02 and 05/01.

20. The main indication was that RESAS-funded research delivered strong evidence to the policy teams concerned with plant and animal health (in 14 specific areas). Other policy areas were less well served: with significant evidence gaps or only limited evidence known to policy teams from any current RESAS resources (funding and/or scientific advice) in the following policy areas:

- AQg = Air quality (5 gaps out of 5 specific areas identified)
- WCg = Waste and the circular economy (6 gaps out of 6)
- FDg = Food (6 gaps out of 8)
- ACg = Agricultural interventions for biodiversity and climate change (5 gaps out of 10)
- LUg = Land use and ownership issues (7 gaps out of 12)
- EEg = Environmental and economic analyses of various policy interventions (12 gaps out of 20)
- PEg = Peatlands (3 gaps out of 5)
- DWg = Drinking water quality (3 gaps out of 8)

21. New research was not necessarily required to fill these gaps: a number of areas, such as peatlands and drinking water quality, had potential evidence providers (in part funded by RESAS), but interpretation and translation of the evidence were required.

22. Relatively few of the strongly-met evidence needs were met through funding other than from the Scottish Government, which vindicates the Scottish Government's deployment of funding to address them.

23. Skills gaps in the science base and in evidence provision were identified. Deficiencies included: multidisciplinary skills; interlocutors of evidence, environmental and economic capacity and skills in emerging areas such as the circular economy and natural capital, biomathematics, system modelling for both natural and social sciences and new technologies such as genomics and remote sensing.

24. Further exercises in 2017 mapped currently-supported research to policy priorities and sought to develop high level questions that identified potential, future evidence needs. The questions were sent as a survey to a wide range of external stakeholders, comprising 536 individuals or organisations from whom 109 responses were received.

25. Analysis of the responses is tempered both by the low response rate (20%) and by the spread of respondents' interests. Interest in evidence on the future for agriculture and in its relationship with climate change stood out in responses both to overarching and to topic-specific questions. Interest in innovation and the diffusion of new technologies was widely evident and there was clear, but not universal, concern about Brexit. Evidence relating to changes of behaviour (of producers, consumers etc.) also scored as a high priority.

26. The Environment and Forestry Directorate of Scottish Government developed Knowledge Accounts during late 2017 and 2018, bringing together baseline evidence

for informing the development of Scottish Government's Environment Strategy. The draft accounts on the Environment were opened to public consultation alongside a draft Environment Strategy during the autumn of 2018: 70 responses were received. The updated accounts for the Environment are due to be published during 2019.

27. Each account utilised the evidence on Scotland's environment held by the Scottish Government, public bodies, research institutes and other organisations. As the accounts are intended to be living documents, each contained an assessment of our current understanding and the likely future drivers of change. In addition, the accounts summarise evidence on the impact of current policy initiatives and the key gaps in evidence which need to be addressed, see air quality as an example:

Key evidence gaps
Unclear how to quantify and maximise the co-benefits of integrated air quality and climate change policies. Unclear how to assess the collective policy-impacts on both target outcomes (air quality/climate change) and non-target outcomes (e.g. biodiversity). Uncertainty over the impacts (including cumulative impact) of $PM_{2.5}$ emissions from biomass burning in urban areas on local air quality. Quantify the impacts of air pollution in terms of life-years-lost through shortened lifespans or the wider social and economic costs.

28. RESAS must now bring the multiple strands together in a simple framework of prioritized research needs, each linked to a policy driver and time-bound. Such a framework will allow the Scottish Government to document its evidence needs, direct the research funding process, and update the framework as necessary, ensuring that Scottish Government's resources are used efficiently in meeting its needs (see paragraph 44).

Future availability of funding

29. The SAB supports the Scottish Government's continued commitment to research in the RESAS area. Such funding brings the widespread benefits noted in paragraph 14 and is essential for Scotland to respond to current policy drivers.

30. Scotland's current policy drivers include:

- adaptation to and mitigation of climate change impacts, as set out in Scotland's Climate Change Plan (2018-2032) and Scotland's Climate Change Adaptation Programme,
- inclusive growth for rural communities, as part of Scotland's Economic Strategy, and

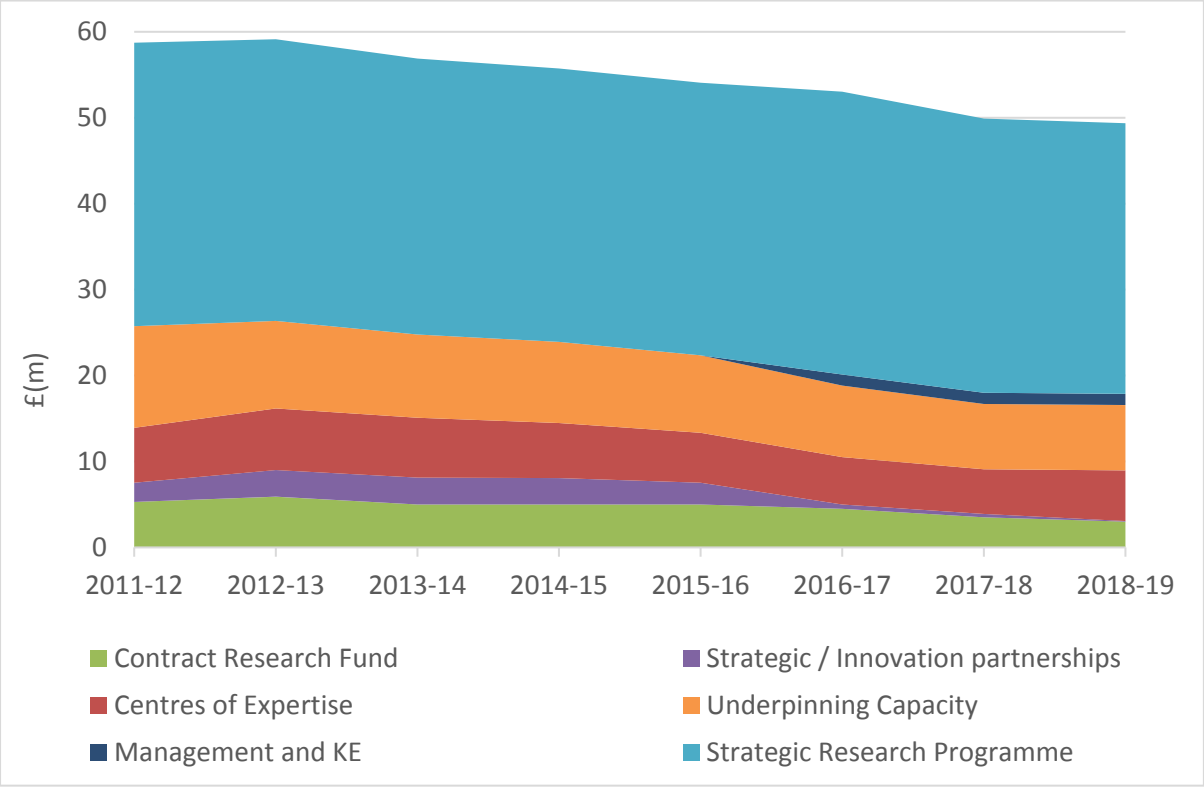
- economic performance of the Food and Drink sector, which is critical to Scotland's exports, supported by the Ambition 2030 initiative.

31. New opportunities arise from changes in the research funding landscape in the UK, detailed in paragraphs 39-42, and from other initiatives such as Scotland's data-driven innovation and aerospace technologies. Addressing Scotland's research priorities requires ongoing investment; RESAS funding uniquely contributes to securing the Scottish Government's needs from its research ecosystem.

32. The pace of geophysical, social and political change indicates that the Scottish Government's investment should not fall. Indeed, in comparator countries, Government investment in R&D is growing as a means to secure greater business investment. The SAB notes the Scottish Government's commitment to double business investment in research and development (BERD) between 2015 and 2025.

33. RESAS funding from 2011-12 to date is shown below (Figure 3), combining funds to all research providers from both the main Programme of Research and the Contract Research Fund, without adjustment for inflation.

FIGURE 3: RESAS portfolio funding allocations 2011-2018. Over the past 7 years there has been a consistent downward trend in the budget allocated for strategic research. In 2011-12 the budget was £58.7 million. In 2018-19, the budget decreased to £49.4 million.



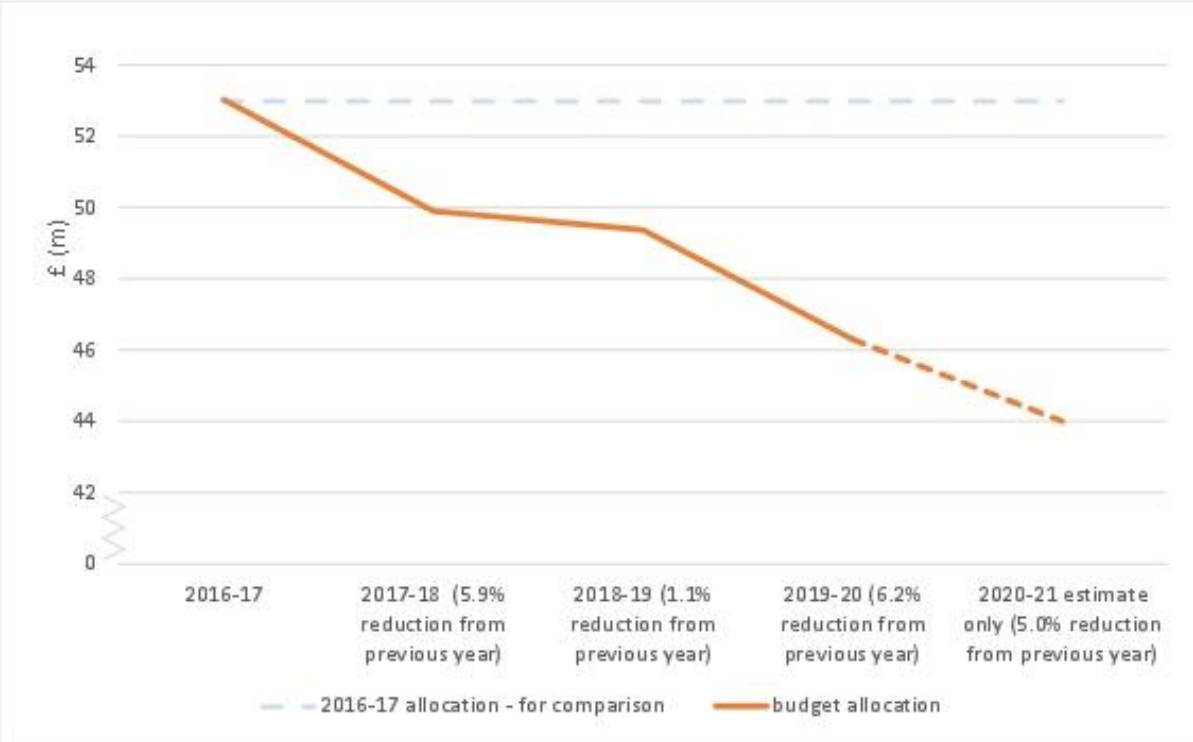
34. In 2016/17, the total allocation to RESAS was £53.0m. A report by the Fraser of Allander Institute published in 2017 indicated that Scottish Government budgets, such as those managed by RESAS, may well need to accommodate significant multi-annual efficiency savings of 5%. Since 2016-17 the portfolio allocation has

reduced (Table 1 and Figure 4). The reduction in 2017-18 was 5.9%, in 2018-19 1.1%, and 2019-20 will be 6.2%, which will result in a total reduction of £6.7m since 2016-17. Assuming a 5% reduction is implemented in 2020-21 this would lead to a £9.0m (17%) reduction in total over the duration of the 2016-21 programme.

TABLE 1: Budget allocations and reductions from 2016-20, and estimated allocation and reduction for 2020-21. The estimate for 2020-21 has been produced by assuming 5% budget reduction from the previous year, in line with the estimates produced by the Fraser of Allander Institute in 2017.

	Budget allocation (£m)	Reduction from previous year (£m)	% reduction from previous year	Reduction from 2016-17 (£m)	% reduction from 2016-17
2016-17	53.0	0.0	0.0	0.0	0.0
2017-18	49.9	3.1	5.9	3.1	5.9
2018-19	49.4	0.5	1.1	3.7	6.9
2019-20	46.3	3.1	6.2	6.7	12.7
2020-21 (estimate only)	44.0	2.3	5.0	9.0	17.0

FIGURE 4: Actual and estimated RESAS research budget allocations from 2016-21. The solid red line represents actual allocations, the dotted red line shows the estimated allocation for 2020-21 assuming that the c.5% budget reductions estimated by the Fraser of Allander Institute will continue. The dashed blue line represents the budget allocation for 2016-17 and is provided for comparison purposes only. Each budget allocation is for the total RESAS research portfolio, which includes: Strategic Research Programme, Centres of Expertise, Management and Knowledge Exchange, Innovation, Underpinning Capacity and Contract Research Fund.



35. Without identifying new funding and partnership opportunities, a funding gap of that order would have profound effects on the levels of research activity that could be supported directly by the Scottish Government. It would preclude a “salami slicing” of budgets and would require a more decisive reappraisal and prioritisation of support and mechanisms for evidence provision and delivery.

36. For illustrative purposes, that reduction, if it were to arise abruptly, would equate to a one-off loss of funding in 2020-21 in excess of that currently provided annually **either** to some of the main elements of the current strategic research programme **or** to the entire annual funding received by some individual institutions (Table 2). The illustrative, cumulative reduction would exceed the RESAS annual investment in the Rowett or SRUC or the Moredun, or the annual investment in one of the three areas of activity that are listed in Table 2.

TABLE 2: Budget allocations and indicative added funding for 2018-19. The budget allocation represents the amount invested by RESAS in 2018-19 in three of the individual MRPs and in three areas of activity: Theme 1 (Natural Assets) and Theme 3 (Food, Health and Wellbeing) of the Strategic Research Programme, and the combined investment in the centres of expertise (CoE), knowledge exchange (KE), Higher Education Institutes (HEIs). The indicative value of added funding indicates the average amounts of external funding that are leveraged on this investment each year by the institutes. Added funding is not recorded for individual areas of funding activity.

	RESAS budget allocation 2018-19 (£m)	**Indicative value of added funding from other sources (£m)**
Moredun	6.0	4.7
SRUC	7.0	7.5
Rowett	7.2	2.7
CoEs, HEIs and KE	8.3	
Theme 1	7.4	
Theme 3	8.0	

37. The historical trend of funding reduction must be reversed if the *status quo* is to be maintained. Otherwise, increased and diversifying research needs will mean that the *status quo* is simply not sustainable. Funding reductions of the scale illustrated will also put at risk the external funding that the MRPs currently gain (shown in Table 2), multiplying the detrimental impacts.

38. **Scottish Government therefore needs to identify and set out its research and evidence needs, prioritise what it will and must fund, and ensure that it can lever with partners or access other research to help deliver its research and evidence needs.**

Changing science landscape

39. At a UK level, the UK government is increasing its overall investment in science and research. It is however doing this in a more directive manner than before with funding increasingly being directed towards tackling big societal challenges and to foster innovation in key areas of the economy. Where these interests overlap with the areas of Scottish Government investment in environment and agri-food, this represents a huge opportunity for the recipients of Scottish Government funding. Accessing and capitalising on this additional funding offers benefits to the research providers and to Scotland. It is also a potential means by which the evidence needs of the Scottish Government could be met through partnership working. It is uncertain how the consequences of EU exit might affect this UK funding, in addition to limiting or eliminating direct EU funding.

40. The formation of UKRI is another opportunity that both the Scottish Government and the current providers should benefit from, as all the MRPs are now eligible for direct funding from UKRI. For example, from a £0.1M investment, RESAS participates with multiple partners in an £18.8M initiative from the UKRI Strategic Priorities Fund to fund future research in Plant Bacterial Diseases.

41. Measuring the impact of university-based science through the REF exercise has incentivised Higher Education Institutions to focus increasingly upon the potential application of the research that they undertake. Again, this is an opportunity for the Scottish Government as it opens up a significant number of additional, potential partners and research providers.

42. However, a significant reduction in funds to the MRPs is unlikely to be substituted fully (or possibly at any significant level) by funding attracted from other, external sources, because the national and international funding landscape is highly competitive. Over-reliance on leveraged funding brings risks to the nation's long-term research capacity and the generation of knowledge underpinning growth in the Scottish economy.

The forward role of Scottish Government

43. In recent years, the focus of RESAS has been too often on the management of research funding. While accountability is important, accountability for the management and delivery of the funded research must sit with those that are funded to undertake it.

44. **The roles of government should be:**

- **to frame and specify the need;**
- **to facilitate the provision of evidence (in formats appropriate to meet the need) through funding, access to data, expertise and other resources; and**
- **to work with the research providers to ensure that research outputs are interpreted, disseminated and used.**

45. RESAS should articulate the future scientific evidence and resources that it needs for all the policy areas that it is responsible for supporting, and be responsible for sourcing and, where necessary, contribute to interpreting that evidence for use in policy development and implementation.

46. Each of those needs should be linked to a clear policy driver, be time bound and prioritised. The evidence gaps identified in the emerging Knowledge Accounts (paragraph 26) should contribute to the shorter-term needs. Other approaches to strategic prioritisation will also be required, such as horizon-scanning, to address longer-term needs. The list of needs should be public, developed with stakeholders, and subject to regular review. The list will act as a signal to the whole academic community and other funders of scientific research of the needs of the Scottish Government ECCLR portfolio and the agri-food related elements of the REC portfolio.

47. The list of needs should be the basis for deciding what to fund and (in consultation with the research providers) how best to deliver the scientific evidence, supported by funding mechanisms that are sufficiently flexible to allow resource to be realigned when required.

Implications for current funding model and providers

48. The current MRPs are focussed on the agri-food sector and certain aspects of the environment. Scottish Government's future needs go beyond these core strengths, with other organisations potentially well positioned to address them. Future funding mechanisms should therefore have the flexibility to accommodate evidence needs in more diverse research areas, which might be met from a wider range of providers.

49. If meeting future needs requires re-distribution of Scottish Government funding, then this will impact on the current MRPs. The MRPs provide areas of world-leading research and also national capabilities, such as acquiring and curating important historical series of surveillance data and other, uniquely-Scottish data and resources.

50. If institutional instability is to be avoided, then adjustment will need to be carefully handled. This will require deliberate action by both Scottish Government and the Institutes themselves.

51. The SAB notes the separate implementation plans being developed by RESAS.

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