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Dear Louise

### **SFC Call for Evidence: Research Pooling**

The SFC Research Pooling initiative has been instrumental in allowing Scottish Universities to compete and punch above their weight on a national and international stage. That they do so has recently been underlined by the publication of the Scottish Science Advisory Council (SSAC) report entitled Scotland's Research Landscape that looked at publication metrics over the period that coincides with the SFC pooling Initiative.

- <http://www.scottishscience.org.uk/sites/default/files/article-attachments/Scotland%27s%20Science%20Landscape%20Short%20Report.pdf>

The SSAC's report compares Scotland's research performance against other UK countries and provides the evidence that it outperforms its counterparts. When one mines down into the detail, it is evident that the strong performance has arisen from new synergies that have resulted from the SFC investment, something that the funding council should be proud of and underlines the need to continue its investment.

The report made clear that Scotland is highly successful at obtaining funding from charities, research councils, EU and global funding streams. Scotland has increased its gross expenditure on Research and Development as a share of GDP in the ten-year study period, at a higher rate than any other UK nation and comparator with the exception of Norway. The quality and productivity of Scotland's research base is impressive and Scottish HEIs produce more academic publications per researcher, and these works are cited more often by their peers, than any of the comparator nations. In 2016, Scotland had more publications in the top 1% of the most cited publications in the world than any other UK nation or EU comparator nation. It is also evident that Scottish researchers are collaborating strongly with business, and these partnerships lead to more highly cited work than elsewhere in the UK.

A specific but rarely quoted example of SFC pooling success was the ECOSSE partnership between Edinburgh University and Heriot-Watt University. Such was its traction, the initiative spawned two well-funded and highly influential successors in the form of the Scottish Carbon Capture & Storage (SCCS) and the International Centre for Carbonate Research (ICCR), both of which continue to thrive today.

SCCS income has grown to over £40M p.a. spread over >100 research projects, 3 Joint Industry projects (JIPs), seen 25 PhDs graduate, produced >100 well cited research papers and produced 25 influential policy documents. ICCR is a partnership between Heriot-Watt, The University of Edinburgh, University of Oxford, Petrobras, Shell, and BG Group (prior to take over by Shell. Its total budget has risen to £6.14M

since 2010 and is a collaboration between 13 academics drawn from the three HEIs. The initiative has trained 13 PhD students, 9 postdocs, 8 academic visitors from Brazil, 2 research technicians, and over 25 MSc students. Its graduates are now assistant/associate professors at University of Newcastle, University of Coventry, Teeside University, and Heriot-Watt University and there has been strong knowledge transfer with a number of Brazilian universities. ICCR staff have published >20 peer-reviewed papers and presented >75 conference papers. The BG Group also funded a Chair in Carbonate Geoengineering at Heriot Watt University with a total added value >£100k/year. Energi Simulation also funds the “Energi Simulation Chair for Carbonate Reservoir Simulation” at Heriot Watt University since 2010 as a result of ICCR, which amount to \$1.6M for 5 years.

The cross-Scottish collaborative links that have been set up through ECOSSE and other pooling initiatives have also led to greater co-operation and partnership in other initiatives, most notably the NERC Centre for Doctoral Training (CDT) in Oil & Gas, where Heriot-Watt, Strathclyde, Glasgow, Aberdeen and Dundee partner in a £13M program of research and training in a Graduate School for 128 PhD students.

What these examples all show is that the SFC investment has encouraged research collaboration with the direct result that Scotland’s overall research quality has been enhanced and been more competitive on a national level and the international stage. The initiative has helped break down age-old academic rivalries and connected silos. It has also led to more humility whereby all but the largest institutions have faced up to the reality that they cannot conceivably do everything and it is far better and more effective to cover a spectrum of activities collaboratively.

By doing so, the pooling demonstrates that the sum is greater than any individual component part and the programs effectively showcase Scotland’s collective research strengths. These in turn make Scotland a far more attractive destination for research students be they from the UK, Europe or farther afield, the evidence and statistics for which are again laid out in the recent SSAC report. The SFC initial investment would hence, rate highly against any reasonable criteria and metric.

Looking forward, I believe that it essential to avoid a cliff edge for successful schemes and yet, provide resource for new initiatives that face some of the critical global scientific challenges facing society including mitigating for the effects of climate change, the urgent need to decarbonise energy systems and the like. To that end, it is essential that the SFC is cognisant of some of the new Government strategies in the key sectors. In the case of Decarbonisation, these include the UK Government’s Industrial Strategy for Clean Growth; the Scottish Government’s Scottish Energy Strategy; and the Royal Society of Edinburgh (RSE)’s forthcoming Scotland’s Energy Future Inquiry:

- [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/700496/clean-growth-strategy-correction-april-2018.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf)
- <https://www.gov.scot/binaries/content/documents/govscot/publications/publication/2017/12/scottish-energy-strategy-future-energy-scotland-9781788515276/documents/00529523-pdf/00529523-pdf/govscot%3Adocument>

What will be key to make any successor pooling scheme truly effective and impactful, will be to undertake a systematic, forensic review of existing pools in which their strengths, weaknesses, threats and opportunities are evaluated and importantly, also explore the options and scope for new themes or

areas to be introduced that face the major scientific research challenges and which align with and address identifiable training needs.

I deliberately introduce the latter as my sense is that the pooling initiatives have been research heavy and teaching & learning light to date. There is a lot of evidence building about the need for skilled practitioners in a number of fields and several reports have highlighted the deficiencies and need to address the crew change as an aging working population reaches retirement. An exemplar is the recent Global Energy Talent Index (GETI) report that identifies the skills gaps and needs in the energy sector:

- <https://cdn2.hubspot.net/hubfs/3277184/GETI/GETI%202019/Global%20Energy%20Talent%20Index%20-%20GETI%202019.pdf>

If Scotland is going to play a leading role in training the next generation of academic, policy or applied (industry) practitioners who can place their research into a wider societal-relevant background, rather than simply generate focused niche specialists, there will be a need to reassess priorities and encourage HEIs to introduce bespoke training programs to run alongside and help contextualise their research studies. Building a varied cohorts of research students that are undertaking individual studies under a designated global challenge theme will generate an esprit de corps and allow them to build a lasting network of people with a wide bandwidth of knowledge, experience and skills.

In so doing, there is also a timely opportunity to embrace new technologies and to ensure that Scotland's scientific research is encouraged to be cross-disciplinary and brokers new partnerships with other disciplines normally considered peripheral or outwith narrow discipline science streams (e.g. working with economics, social science, mathematicians and others) to gain public trust, obtain the social license or contract to operate and maximise the effect in enhancing the quality of life and societal impact.

A thorough independent review of the type the committee is undertaking is imperative to ensure the next phase of the SFC pooling initiative is as strategic and as successful and effective as the investment over the past decade has been.

I stand ready to contribute to your review if the need arises

Best Wishes

Yours Sincerely



Professor John Underhill  
University Chief Scientist, Heriot-Watt University  
Member of the Scottish Science Advisory Council (SSAC)