The Industrial Strategy - delivering through UKRI

Dr Sophie Laurie

Associate Director Innovation and Partnerships, NERC

Industrial Strategy – Autumn Statement 2016

- *"**Mr Speaker, we do not invest enough in research, development and innovation**.*
- *As the pace of technology advances and competition from the rest of the world increases, we must build on our strengths in science and tech innovation to ensure the next generation of discoveries is made, developed and produced in Britain.*
- *So today I can confirm the additional investment in R&D, **rising to an extra £2 billion per year by 20-21**, announced by my Right Honourable Friend, the Prime Minister on Monday."*

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NERC green paper response

NERC SCIENCE OF THE ENVIRONMENT

The NERC response to the Industrial Strategy green paper stated that environmental science is essential to economic growth; technology and skills enable business, government and society to:

- Safely find and secure raw materials, harvest renewable resources, and re-use or return our waste to the environment;
- Invest in infrastructure, businesses and jobs that are resilient to current and future environmental shocks – in the UK and across our global supply chains;
- Maximise the benefits versus costs of new technology and innovation – across whole systems and life-cycles of products, services and economic development;
- Reduce the costs to business and government of environmental regulation and subsidies;
- Support a healthy and productive environment and workforce;
- Reduce reputational risks, and win public consent, through environmentally responsible investment, innovation and operation.

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UK Industrial Strategy

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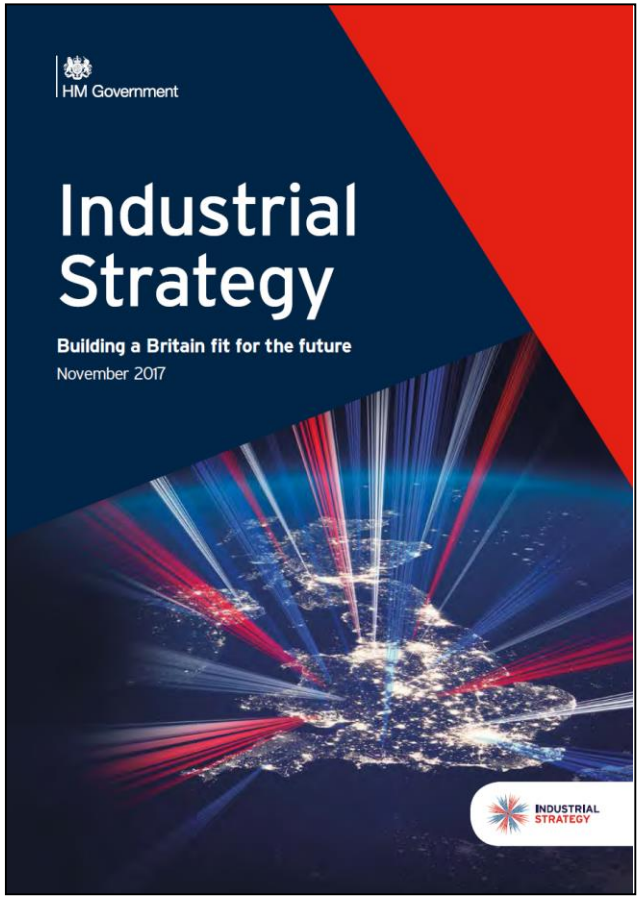

In November 2017, the government published its Industrial Strategy White paper, outlining a £4.7bn investment under the National Productivity and Investment Fund including;

- Innovation and Future Leaders Fellowships
- The Strength in Places Fund
- The Industrial Strategy Challenge Fund

This signalled a continuation of large scale funding for business led research and innovation;

"We will run a third wave of Industrial Strategy Challenge Fund programmes, with UK Research and Innovation launching an expression of interest for potential challenges next year."

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Industrial Strategy quotes…

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'We will continue to work closely with the **nuclear and offshore wind industries** to further drive down the costs of clean power, while building UK supply chains.' p32 and p45

'Many of our stakeholders have called on us to take a '**whole systems approach**' to the decarbonisation of energy infrastructure systems. We agree with this principle, and will position the UK as a leader in clean and efficient power, transport and heat through an integrated approach to decarbonising these increasingly connected systems. P 145'

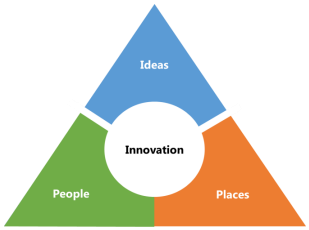
'While the move towards clean growth is clear, **oil and gas** remains one of the most productive sectors of the UK economy, supporting 200,000 jobs directly and in the supply chain, and generating £24bn in annual exports p158.

'We will develop an agile approach to **regulation** that promotes innovation, the growth of new sectors, and innovative market entrants while ensuring effective protections for citizens and the environment. P70'

'New technologies, new ways of doing business and new industries often require **an agile but dependable regulatory system** to support them…..The right business environment demands a regulatory system responsive to not only today's economy but to the future economy as well. We are committed to this aim. P175'

'We are setting high standards in **cyber and climate change resilience** for our projects across the UK, which will give us greater security and protection from natural risks, and can be the basis for a successful industry exporting these services. Resilience is proposed as a key performance measure within the National Infrastructure Commission's assessments. P131'

'We are investing £2.6bn to better protect the nation from **flooding,** including more than 1,500 flood defence schemes, which will protect 7,500 households and provide £30bn in economic benefits p147'



Innovation in UKRI

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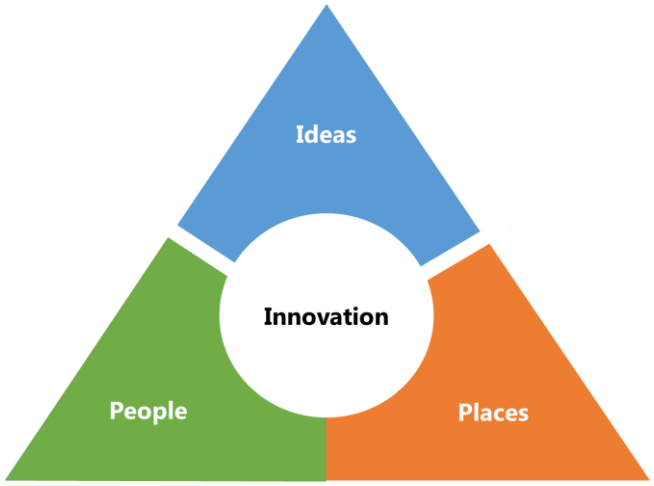
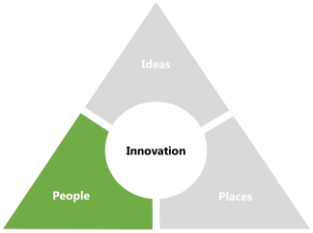
- NERC has been leading a strategic activity for innovation in UKRI, first defining the Research Council offer under three headings:





People

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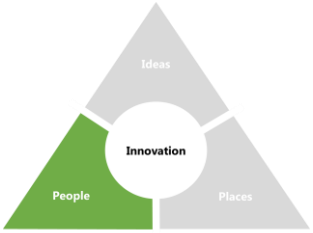
Research Councils have unparalleled insight into the academic community and provide support for the development of **skills, expertise and (sectoral) mobility** of people

- enhancing knowledge and enabling mobility of skilled people
- enabling knowledge exchange to progress outputs of research towards application including commercialisation
- promoting a culture of enterprise and innovation

Support by NERC covers all career stages and areas of environmental science.

Our approaches have been innovative and adopted by other Councils

NERC has also supported cross Council approaches including industrial CASE studentships and the Knowledge Transfer Partnership (KTP) scheme.



NERC KE Fellows

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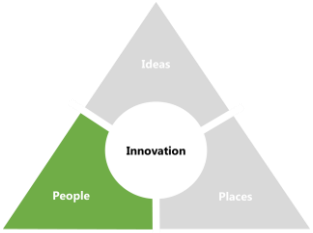
- Number of case studies in 2014 REF – even though early days of scheme
- Positive External Evaluation in 2014/15
- Large innovation awards have followed KE fellowship work – iCASP at Leeds and SWEEP at Exeter
- Widely copied – N8, Sat Apps Catapult, Universities, Research Councils
- High profile – one tweet announcing NERC 2018 call had 7821 impressions in 48 hours.
- Rich seam of future case studies



Prof Bob Holdsworth, Durham
– now works with nuclear industry

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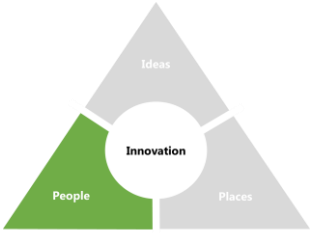
Launched 3 externally-funded multi-party industry-academic research consortia with significant funding (Volcanic Margins, £1.05m; GeoPOP3, £2.4m; ReFINE, >£4m). GEOPOP3 funded by BG, BP, Chevron, ConocoPhillips, DONG Energy, E.ON, ENI, Petrobras, Petronas, Statoil and Tullow.
Helped 8 individuals to launch spin-out company 'GeoEnergy Durham'



Professor Steve Simpson - bioacoustics

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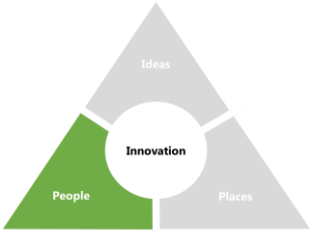
"I was a NERC Knowledge Exchange Fellow.

I developed lasting collaborations with a diverse range of partners, including Defra, the International Council for the Exploration of the Seas, the IUCN, the UK Underwater Sound Forum, the fishing industry, the offshore renewable energy sector and the Institute of Marine Engineering Science and Technology."

Prof. Simpson in Blue Planet II – he was an Academic Advisor to the entire series, helping to shape some episodes and ensure the scripts were grounded in scientific understanding. He has also written on the official Blue Planet II website about his research.



2017 NPIF Fellowships

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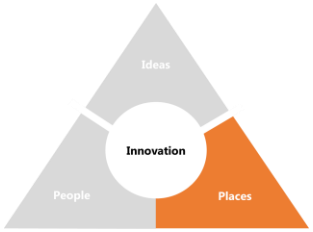
- UKRI fellowship programmes delivered by Research Councils
- Funded through National Productivity Investment Fund (Industrial Strategy)
- 2 schemes: Industrial Innovation Fellowships & Industrial Mobility Fellowships.
- Future Leaders Fellows announced April 2018



Places

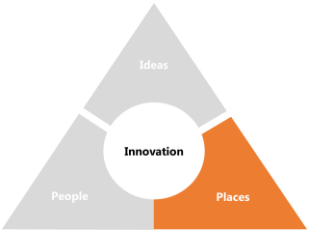
High quality research organisations in a region are known to stimulate local growth. Research Councils facilitate this; building collaborative research and innovation environments to facilitate user engagement with UK research capability.

This includes:

- Investing in ***Research and innovation campuses, Hubs and Institutes***, building a 'critical business mass' around publicly funded research facilities.
- **Enabling access to national research facilities and major data sets and collections** provided directly or indirectly by the Research Councils.
- **Stimulating collaboration** between regional players; businesses, local public sector bodies and academics, to encourage growth

NERC is the only Council with a dedicated regional impact initiative, which is leveraging substantial co-funding from industry and other regional bodies.

Other 'place-based' investments include the Science and Innovation Campuses; MARSIC at NOC and Aurora at BAS.



sweep
Applying research to benefit our environment and economy

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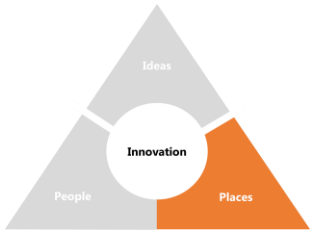
- Delivery of a wide range of pioneering impact projects
- Commitment from the Universities of Exeter and Plymouth to co-fund 13 studentships aligned to SWEEP
- The Natural Environment Valuation Online Tool (NEVO) has been brought into SWEEP
- Creation of a Marine Natural Capital Geodatabase for Natural England
- Development of a UK Farmer Network and Data Platform to inform agri-environment policy making (co-funded by WWF)
- Influencing £25m of potential private sector investment in natural-capital based approaches in PR19
- Commitment of over £20m in future projects



iCASP
Integrated Catchment Solutions Programme

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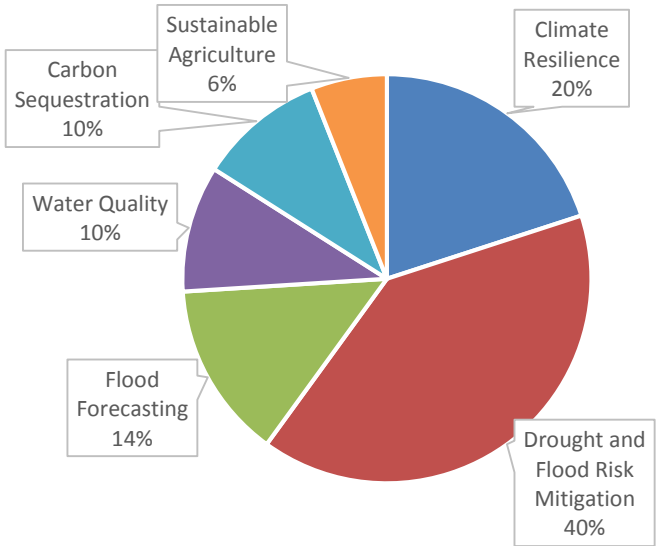
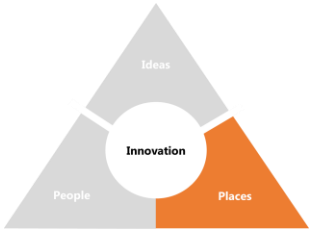
- Monitoring the effectiveness of the Leeds Flood Alleviation Scheme Phase II (FASII) – an £11.5m programme of catchment management activities to reduce flood risk in Leeds
- Influencing the €6.6 million Pennine MoorLIFE and £16 million MoorLIFE2020 peatland restoration projects and will seek to inform grants from the Defra £10 million capital grant scheme for peat restoration
- Supporting the Yorkshire Natural Flood Management (NFM) pilots (in excess of £2m) to deliver evidence and guidance that will influence national implementation and financing of NFM

iCASP Projects (live or latter stages of development) Contribution to iCASP Workstreams





Strength in Places Fund

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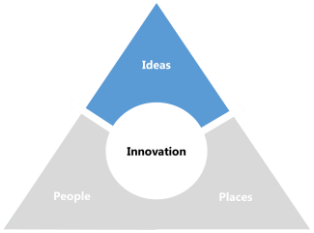
'We will launch a new competitive £115m Strength in Places Fund to support areas to build on their science and innovation strengths and develop stronger local networks.'



Ideas

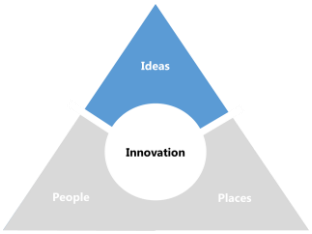
Supporting **generation of impact** is a key activity for Research Councils in order to facilitate value realisation from the primary research investment.

Mechanisms are designed to:

- Drive user-inspired ambitions and challenges – ensuring that research outputs and outcomes are of value to users
- Nurture the emergence of new ideas, processes and technologies before their value is known
- Support emerging and very early stage companies - enabling individuals to explore potential commercial opportunities, create companies and secure early stage investment.
- Support partnership approaches that bring together users and the academic research base in neutral platforms, to address problems and challenges that are too big, difficult, and risky for individual organisations to take on.

NERC currently operates 4 Directed, challenge-led Innovation Programmes with 36 business programme members across the programmes, initiated over the last three years

NERC also operates an open innovation programme focused on engaging the academic community in a wider range of innovation activity



Ideas

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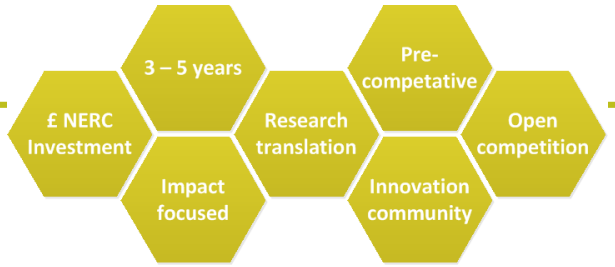
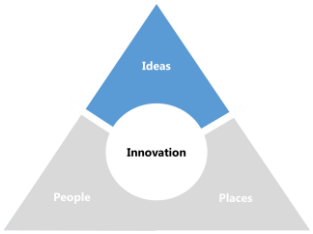


Directed Innovation programmes

- Business sectors with greatest absorptive capacity to engage with NERC science are targeted strategically across four priority areas: energy, risk and resilience, sustainable food systems, and environmental data.
- Strong and sustained relationships built with a group of businesses in each programme, governed by a formal MoU.
- Through proactive relationships with key user organisations, relying on the knowledge of sector experts in NERC, investment in innovation projects is directed via a 'business-led' approach.

Existing environmental science and research → Real issues and opportunities facing end-users → Innovative approaches, solutions and tools



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Predictive jellyfish bloom dispersal maps for UK coastal electricity generating facilities

Environmental Risks to Infrastructure Innovation Programme

- 2011 – EDF Energy's Torness nuclear power plant closed for 1 week = £1m per day
- NERC investment £160k
- 18 month project to develop early warning tool

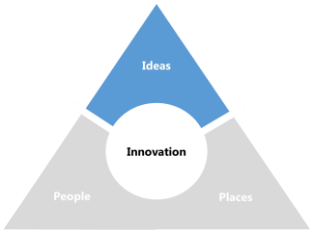
"Jellyfish swarms are an occasional but challenging issue for our power stations. They can have an impact on the amount of electricity we are able to supply to consumers. . [we] are pleased to be working with the University of Bristol to develop a tool that will allow us to continue delivering, safe, secure and responsible nuclear electricity."

Pietro Bernadara, EDF Energy

EDF ENERGY

SSE

Scottish Salmon PRODUCERS ORGANISATION



Partnering through innovation programmes has grown year on year

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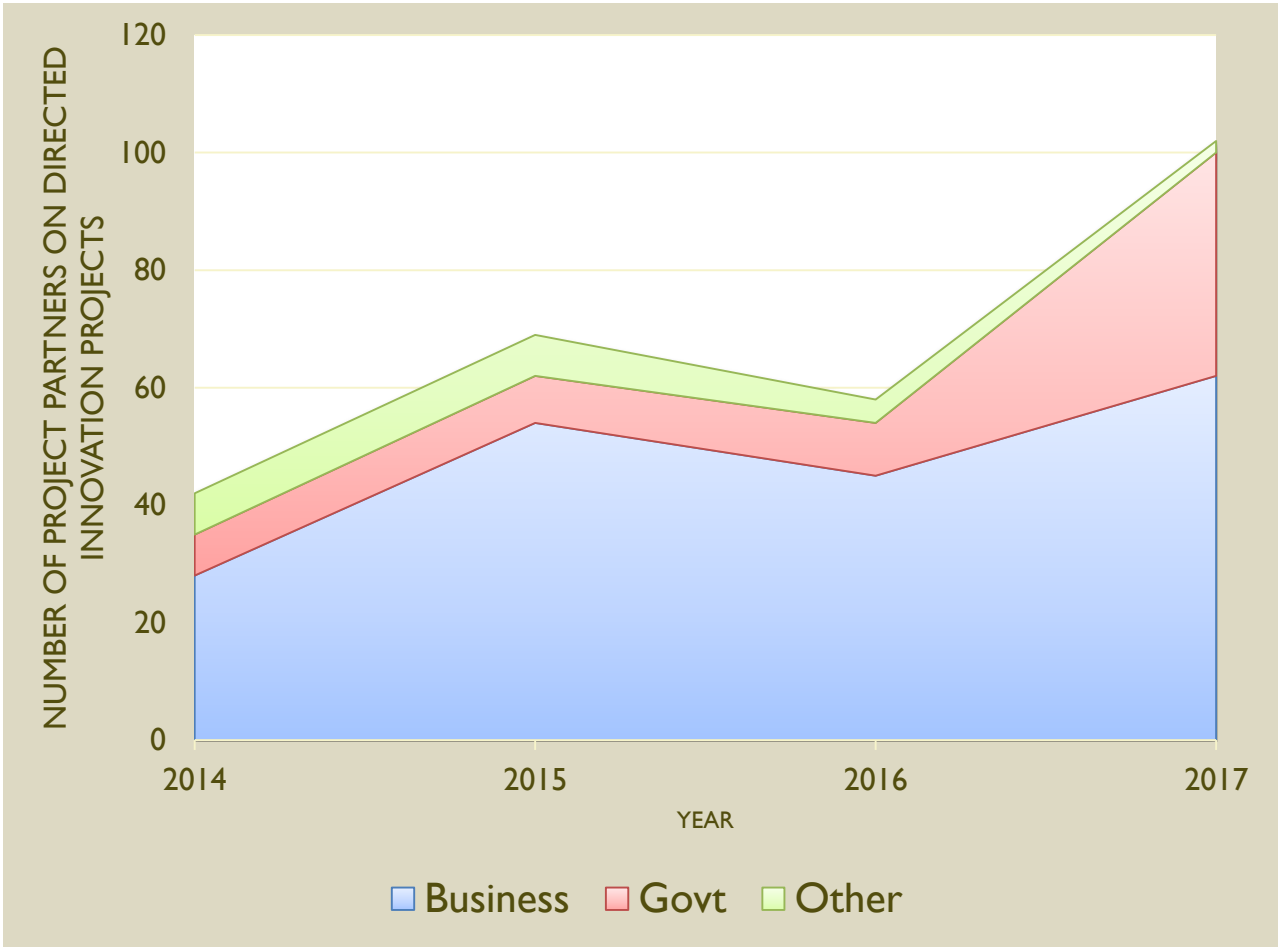
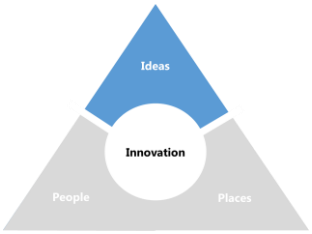


- Shows upward trend through directed innovation programmes of project partners
- From 40 in 2014 calls to over 100 in 2017 calls



Industrial Strategy Challenge Fund

- The ISCF will focus on challenges where:
  - the global market is potentially large, or fast growing and sustainable;
  - the UK has capabilities to meet market needs in terms of research strength and business capacity;
  - there are significant social and economic benefits; and
  - there is evidence that government support will make a difference

Recognise that our economy depends on the natural environment

Recognise that environmental science delivers economic outcomes

- Clean growth
- Resilient economy
- Productive regulation

Wave 2; Topics announced

- *Prospering from the energy revolution*
- *Transforming construction*
- *Transforming food production: from farm to fork:*
- *Healthy Ageing*
- *Data to early diagnosis and precision medicine*
- *Audience of the future*
- *Pioneer funding for Next Generation Services*
- *Pioneer funding for quantum technologies*

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Topics Wave 3…

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- Space Data (at least 2 bids)
- Digital Manufacturing
- Nuclear (more likely Wave 4)
- Cities/Urban (multiple bids)
- Plastics (Zero Plastic Waste plus multiple others)
- Circular economy more broadly - including bulk materials (metals, ceramics)
- Water (at least 2 bids)
- Aquaculture
- Energy (Hydrogen)

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NERC areas of interest

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Clean growth

Achieving clean growth is a challenge for the whole economy, across all sectors of industry and the environment.

The UK has the world's largest capacity for offshore wind energy, 50% of Europe's tidal energy and 35% of Europe's wave energy, together with world-leading capability in environmental impact monitoring. Similarly, the UK agri-food industry contributes £108 billion (6.8% of national GVA in 2014) to our economy, employs 3.9 million people (13.5% of UK jobs) and generates £18 billion in exports (2015).

Wave 3 | Area of interest | Space data revolution – NERC contact: Simon Kerley

Opportunity to increase productivity by exploiting full value of satellite imaging data. By combining satellite images with other data sources on the ground, companies will convert crude data into useful information, to inform decisions that improve productivity.

Key focus: commercialization of next-gen digital technology, tools and data analytics to enable data assimilation and visualisation, development of products and services using EO data.

Wave 3 | Area of interest | Healthy aquaculture – NERC contact: Jodie Mitchell

Opportunities to sustainably increase productivity from aquaculture; to better understand and predict changing environmental conditions in order to protect the industry; to increase resource use efficiency and manage environmental impacts, contributing to clean growth.

Key focus: Integrated catchment management to ensure clean and healthy coastal waters, understanding ecosystem services and potential trade-offs.

Wave 3 | Area of interest | Decommissioning offshore structures – NERC contact: Lizzie Garratt

The UK has significant capability in decommissioning, especially in the oil and gas sector. This experience can be built on and translated across the energy sector with a focus on offshore industries. A focus in this area would enable targeted test bed for innovative approaches.

Key focus: Big data analytics, circular economy and lifecycle design, whole system modelling, visualisation and decision-making

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Wave 3 update

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- 252 Expressions of Interest received by 18th April deadline
- Read through and sift by UKRI on basis of Grand Challenge remit
- Consolidation and potential for grouping
- Next steps…

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Timeline for next steps

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By end May	• **Identify the working-list of proposed challenges**
By early July	• Identify short-list of proposed challenges
Summer 2018	• UK Research and Innovation colleagues work with the leaders of short-listed Expression of Interests leader to develop the challenge further
Early September 2018	• Deep-dive workshops with experts across the country to explore the short-listed challenges.
Mid-October	• UKRI review and short-listed challenges > makes recommendation to decision board
November (to be confirmed)	• Announcement of selected challenges