



Engineering and
Physical Sciences
Research Council

Environmentally Sustainable Materials

Zaffie Cox, Senior Portfolio Manager
– Advanced Materials

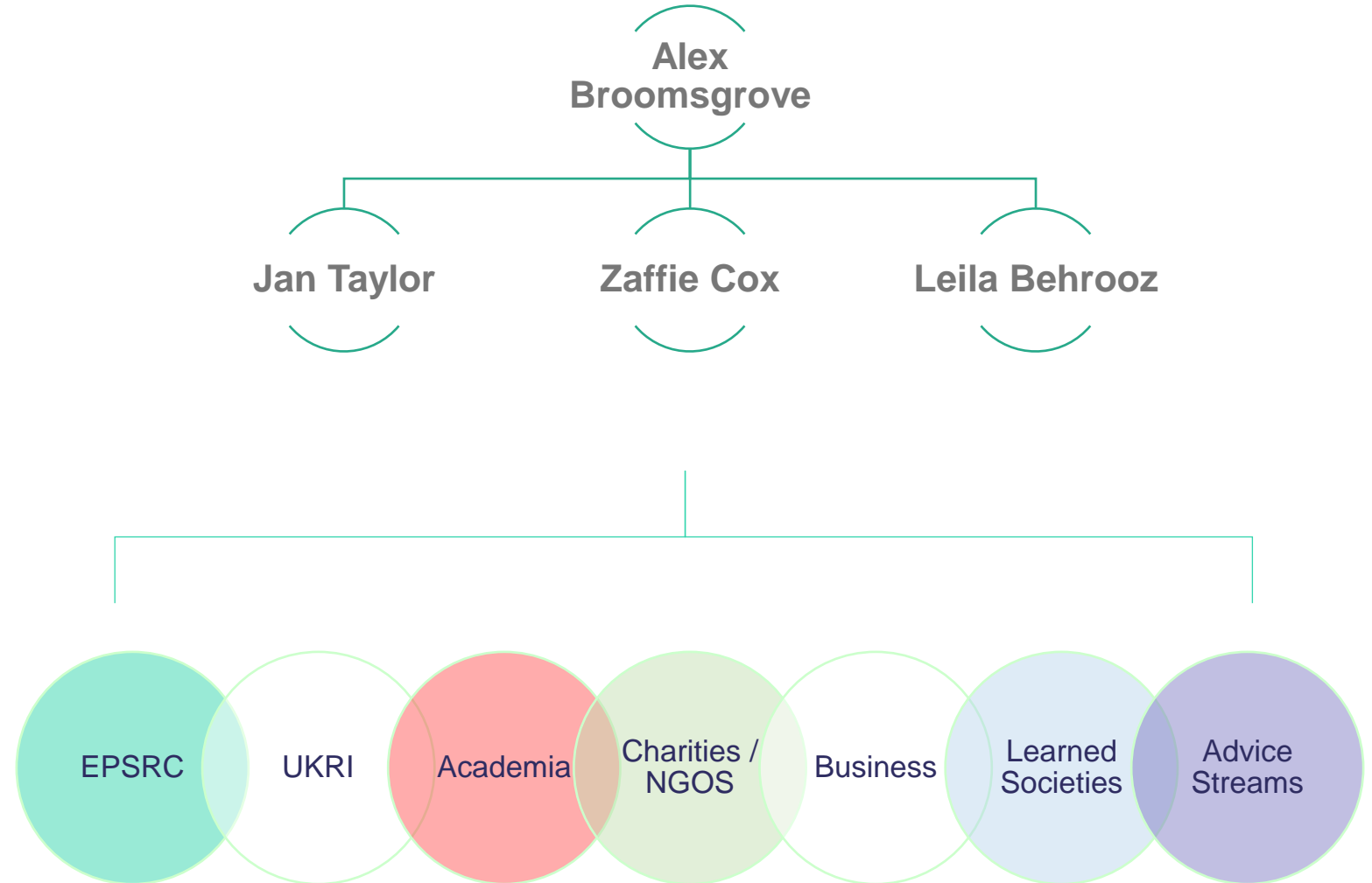
Engagement
styles vary:



Advanced Materials Team

Vision

EPSRC as part of UKRI is seen as a key partner for the UK materials community, it plays a leadership role in scoping, developing and championing materials research within the UK (across UKRI, informing government decision making and working in collaboration with business and industry)



Team Strategic Framework

Materials for Sustainable Futures

Skills Pipeline

Research Infrastructure

Impact & International

Cross-cutting
priorities

Emerging
Technologies

Fundamental

Mission Inspired

Translational

Research priorities

AM Strategic Framework

Materials for Sustainable Futures



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Research priorities

Sides of the coin



Engineering Net Zero

EPSRC will support a **whole systems approach** to research and innovation critical to the **discovery, development and deployment of solutions** to tackle climate change, enhance sustainability and ensure economic prosperity.

Reduce

Deliver solutions to **reduce demand and increase efficiency** across all greenhouse gas emitting, resource consuming and polluting systems and sectors taking a whole systems approach.

Replace

Produce **low and zero carbon and zero waste solutions** to meet our needs through extensive electrification, alternative sustainable fuels and resource efficiency to deliver **circular economies**.

Remove

Discover and develop **negative emission technologies** including greenhouse gas reduction technologies (GGRs) and carbon capture utilisation and storage (CCUS) solutions.

Redefine

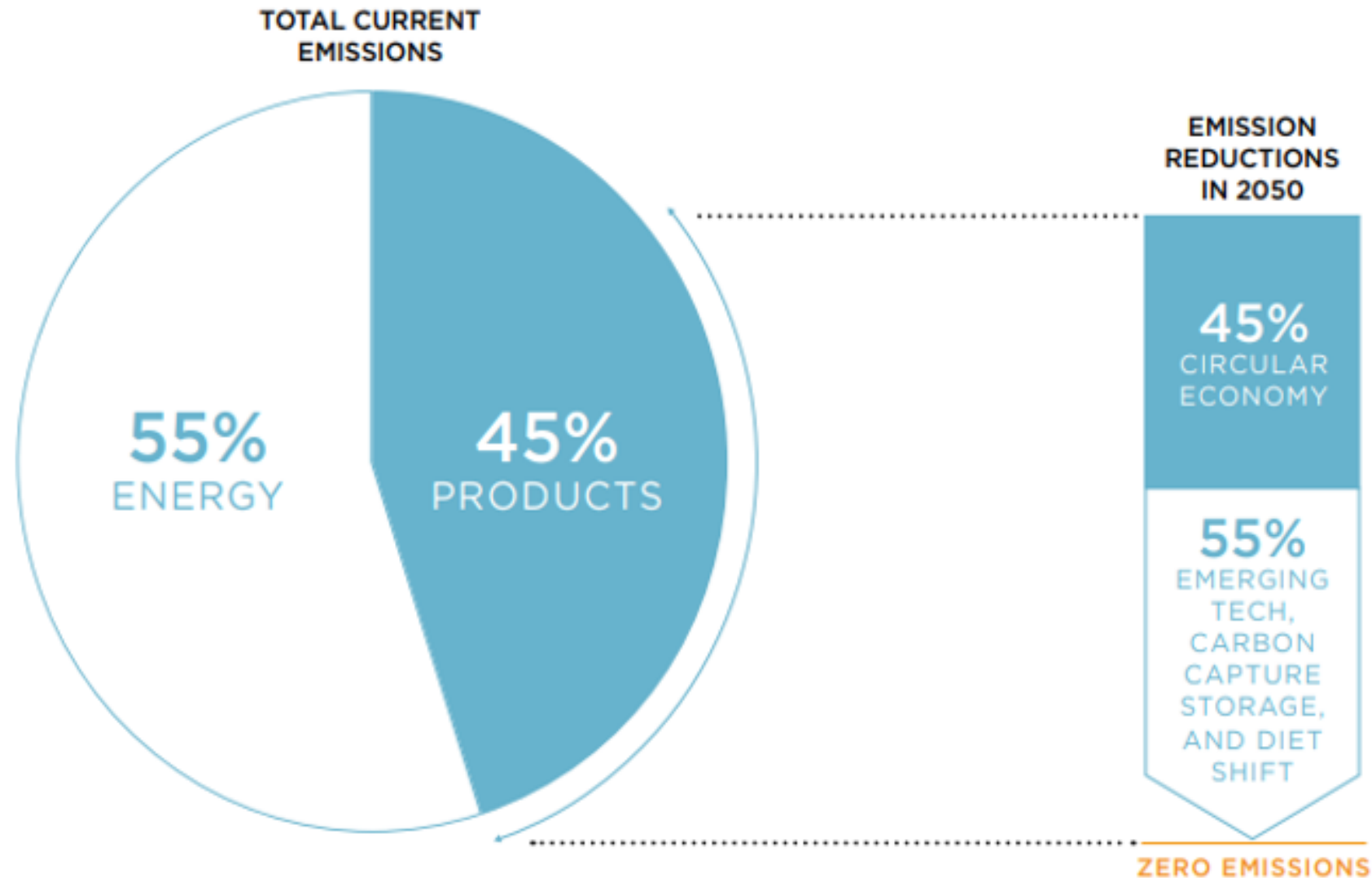
Deliver critical mass investments in **sustainable manufacturing** transforming our industrial manufacturing processes to create and recover maximum value from products across their whole life cycle

Reimagine

Deliver **high risk, high reward** research whilst attracting, training and retaining talented **Net Zero researchers and innovations** in the UK.

Materials Emissions

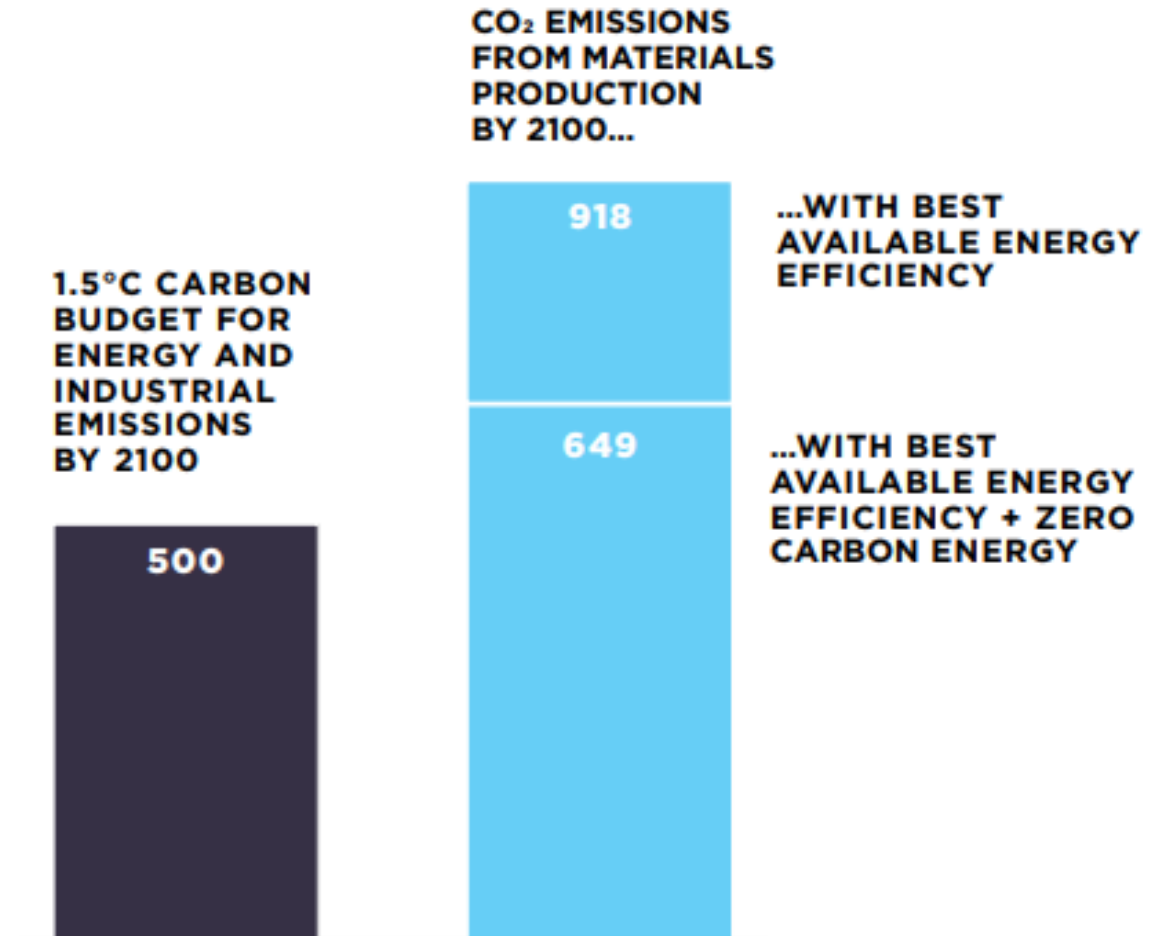
- Material Production global GHG emissions in 2010 were 10.2 Billion tonnes
- ALL materials need to be considered to reach a sustainable global future.



Future Projections

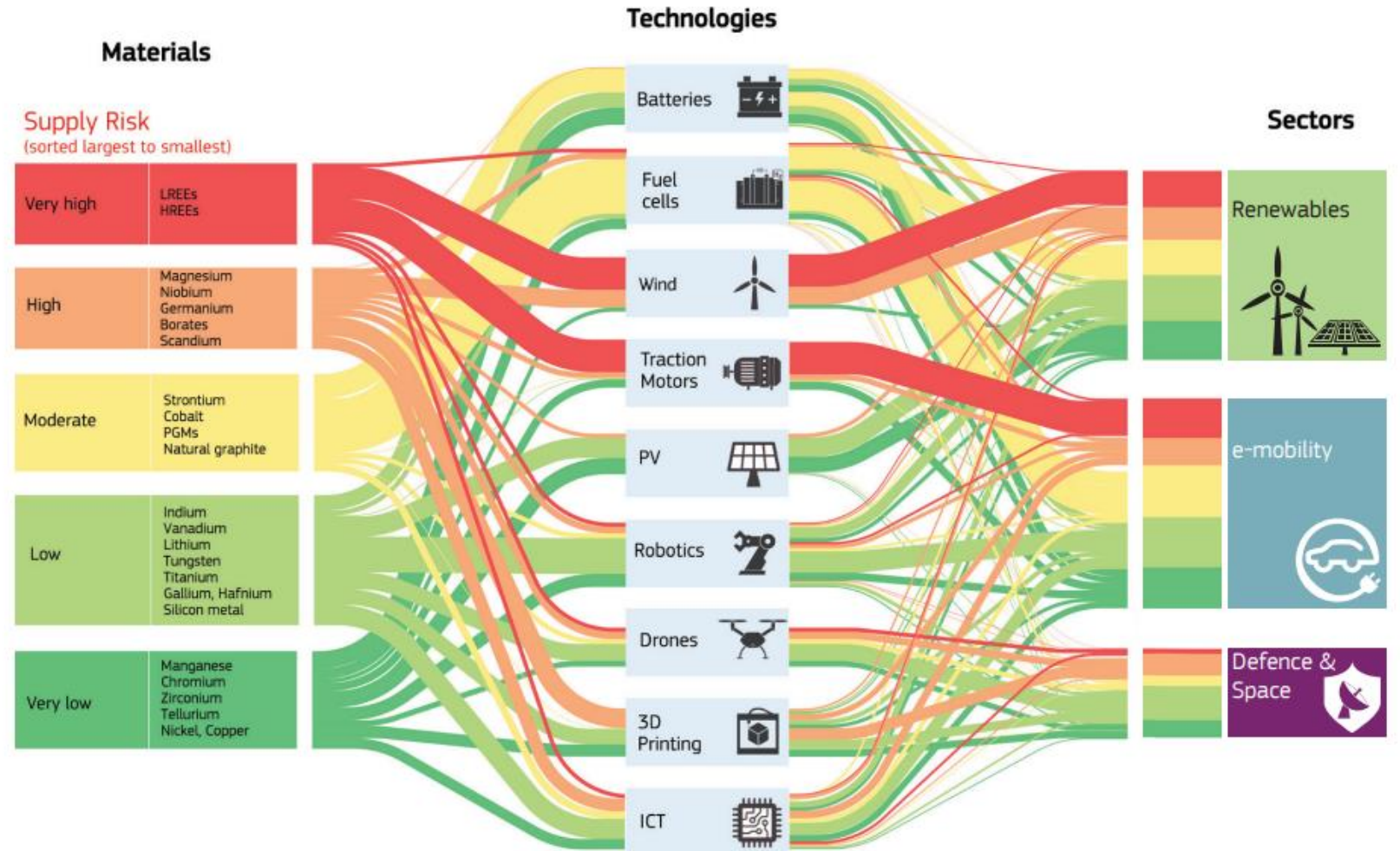
- Clean energy is not enough
- Currently there is a lot of research on materials for Net Zero systems
- We need intelligently designed and chosen materials to be part of the Net Zero system

FIGURE 2: MATERIALS PRODUCTION WILL RESULT IN 649 BILLION TONNES OF CO₂e EMISSIONS BY 2100 EVEN UNDER A SCENARIO THAT INCLUDES RENEWABLE ENERGY AND ENERGY EFFICIENCY



Source: Tong, D. et al. *Committed emissions from existing energy infrastructure jeopardize 1.5 °C climate target*, Nature 572, 373-377 (2019); Material Economics, *The Circular Economy - A Powerful Force for Climate Mitigation* (2018)

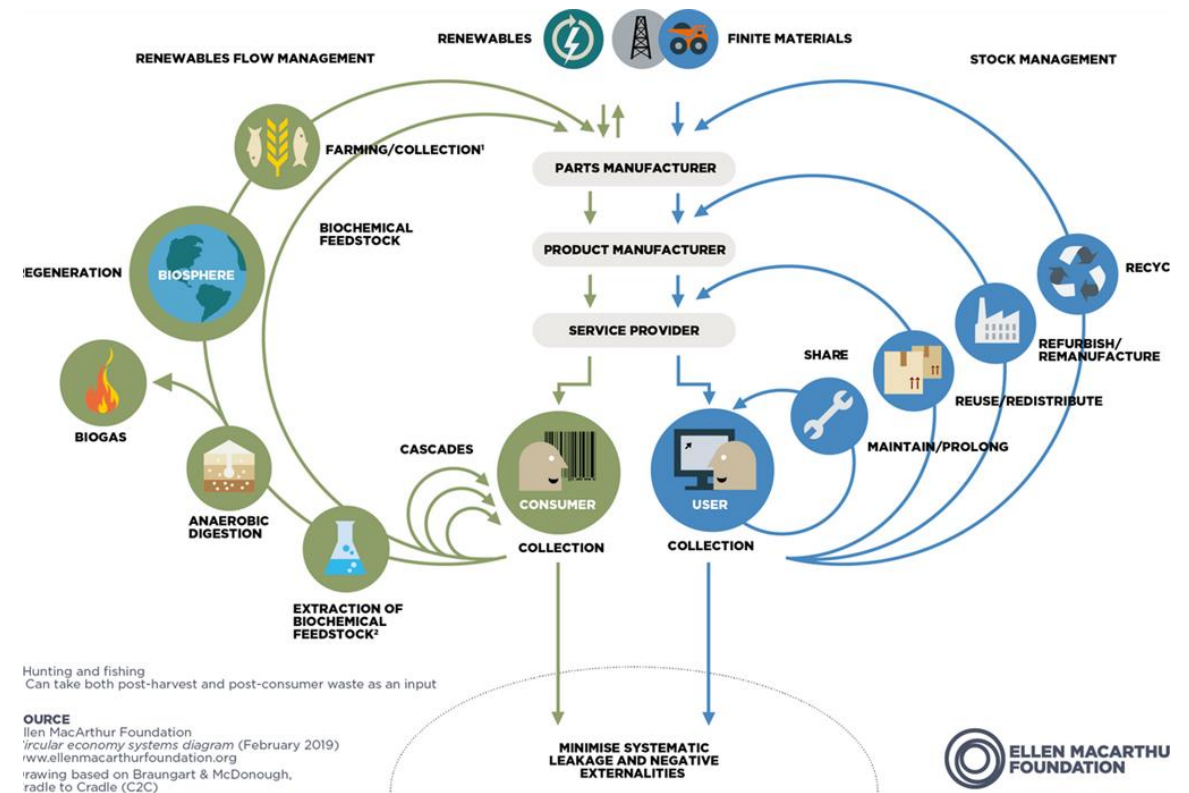
Critical Minerals



Systems and Circular Thinking

Universal challenge to think both about

- (1) what the metamaterials you are creating can do
- (2) How the materials you create interact with the world over time



What Materials or Applications?

UKRI Strategic Themes

Building a green future

- Critical Materials and Minerals replacement
- Sustainable Materials for Novel Energy, and Energy reduction, Systems and technologies

Building a secure and resilient world

- Sustainable materials manufacturing capabilities
- Novel and sustainable structural or construction materials

Securing better health, ageing and wellbeing

- Sustainable biomedical materials
- Remote Sensing for materials repair and timely replacement

Tackling infections

- Sustainable materials for disrupting transmission and treating infection such as Anti-microbial surfaces
- Understanding biomass-based materials
- Sustainable materials for drug delivery

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All Areas!

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Materials Priorities

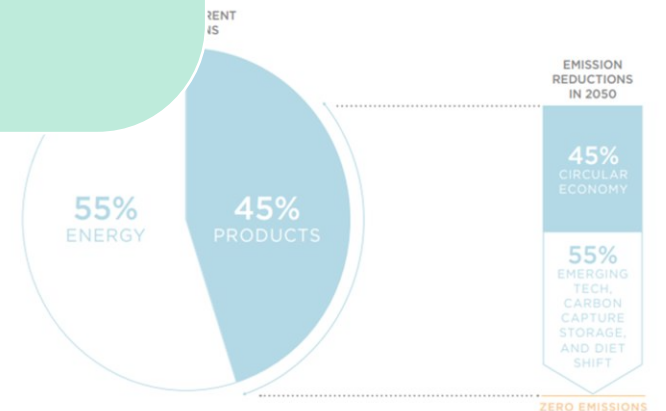
Reduce	Replace	Remove	Redefine	Reimagine
Deliver solutions to reduce demand and increase efficiency across all greenhouse gas emitting, resource consuming and polluting systems and	Produce low and zero carbon and zero waste solutions to meet our needs through extensive electrification, alternative sustainable fuels and resource efficiency to deliver circular economies .	Discover and develop negative emission technologies including greenhouse gas reduction technologies (GGRs) and carbon capture utilisation and storage (CCUS) solutions.	Deliver critical mass investments in sustainable manufacturing transforming our industrial manufacturing processes to create and recover maximum value from products across their whole life cycle	Deliver high risk, high reward research whilst attracting, training and retaining talented Net Zero researchers and innovations in the UK.

Sustainable Materials

Materials that are considered and designed to be inherently as environmentally sustainable as possible

Materials for Sustainability Technologies

Materials that enable and build environmentally sustainable products and practices





Building community

- Support, value and help each other in cross-discipline collaboration
- Remind ourselves that we do not have to know and understand it all
- Collecting and collating relevant data for others at inception

Finding Communities

- Manufacturing research hubs for a sustainable future
- Research for a plastics circular economy call
- Circular economy critical mass programmes
 - Full stage open now – information on successful outlines available on our [website](#)
- NICER programme (Hub or subject areas)
- BBSRC NIBB
- ICT/CE/Materials interface community
 - Outline call open, Network call in development



My questions to you...

- Knowledge
 - What journey have your raw materials been on?
 - Where might your materials end up in 100 years?
- Approach
 - Have you built sustainability experts or expertise into your future plans and proposals?
 - How do you make your work accessible to 'Systems' or Life Cycle Assessment experts?
- What is it you need to take your next step towards sustainable materials design?