

# THE INTERDISCIPLINARY CENTRE FOR CIRCULAR METALS

Helping the UK become the first country to fully recycle and  
reuse metals

Lead: Brunel University London  
Partners: University of Warwick & University College London.

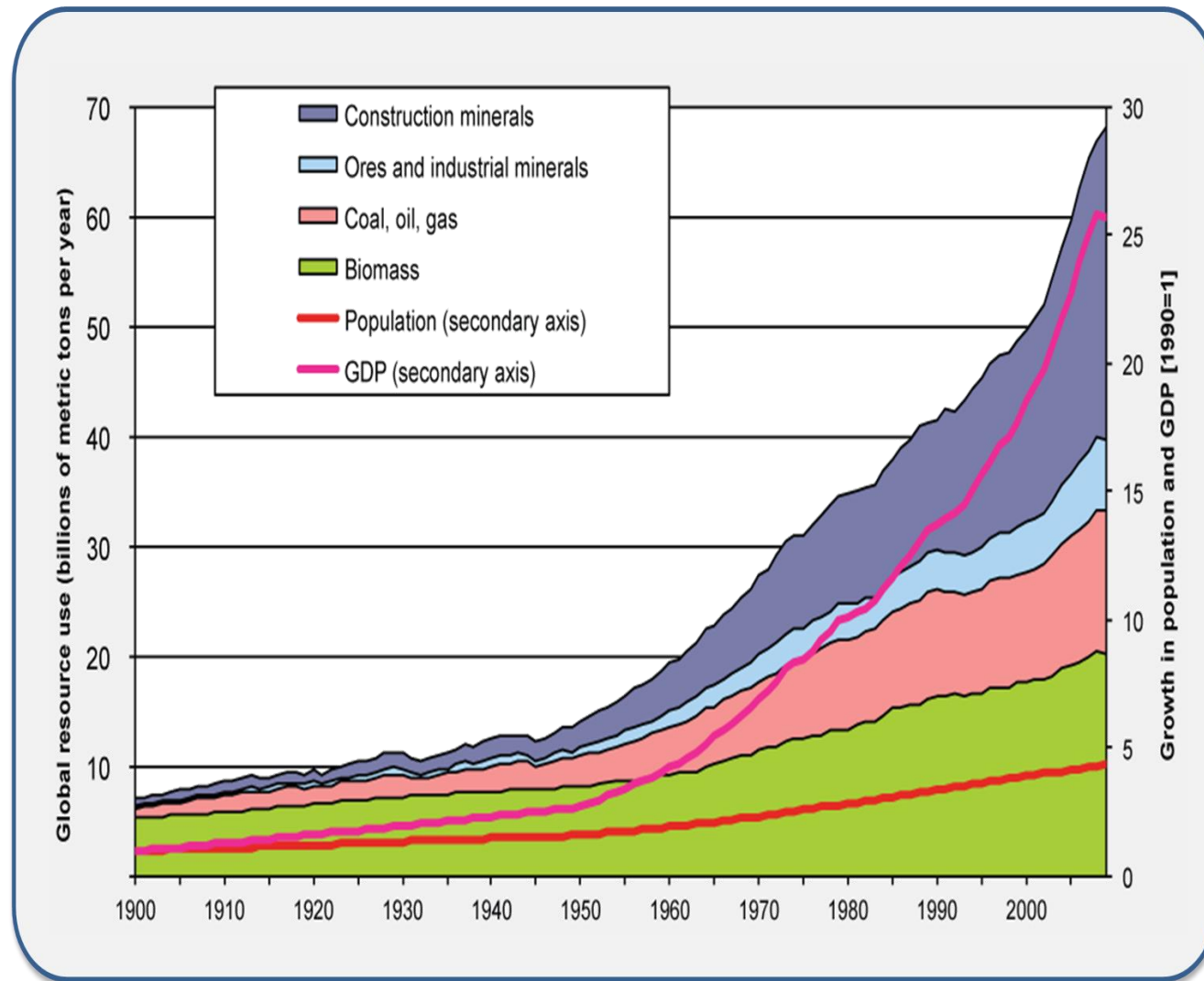


# Biography: Sumit Hazra

- Based at WMG, University of Warwick
- Senior Research Fellow at the CircularMetal Circular Economy Centre
- Background in researching the fracture of polymers and the formability of steels and aluminium
- These projects have been in collaboration with the automotive, heavy duty and off-road vehicle sectors
- The type of impact of this research includes
  - Adding £2.8m of value to automotive supply chain and safeguarding 35 jobs
  - Writing and deploying specialist software to the supply chain
  - Academic outputs such as publications (31) and knowledge transfer

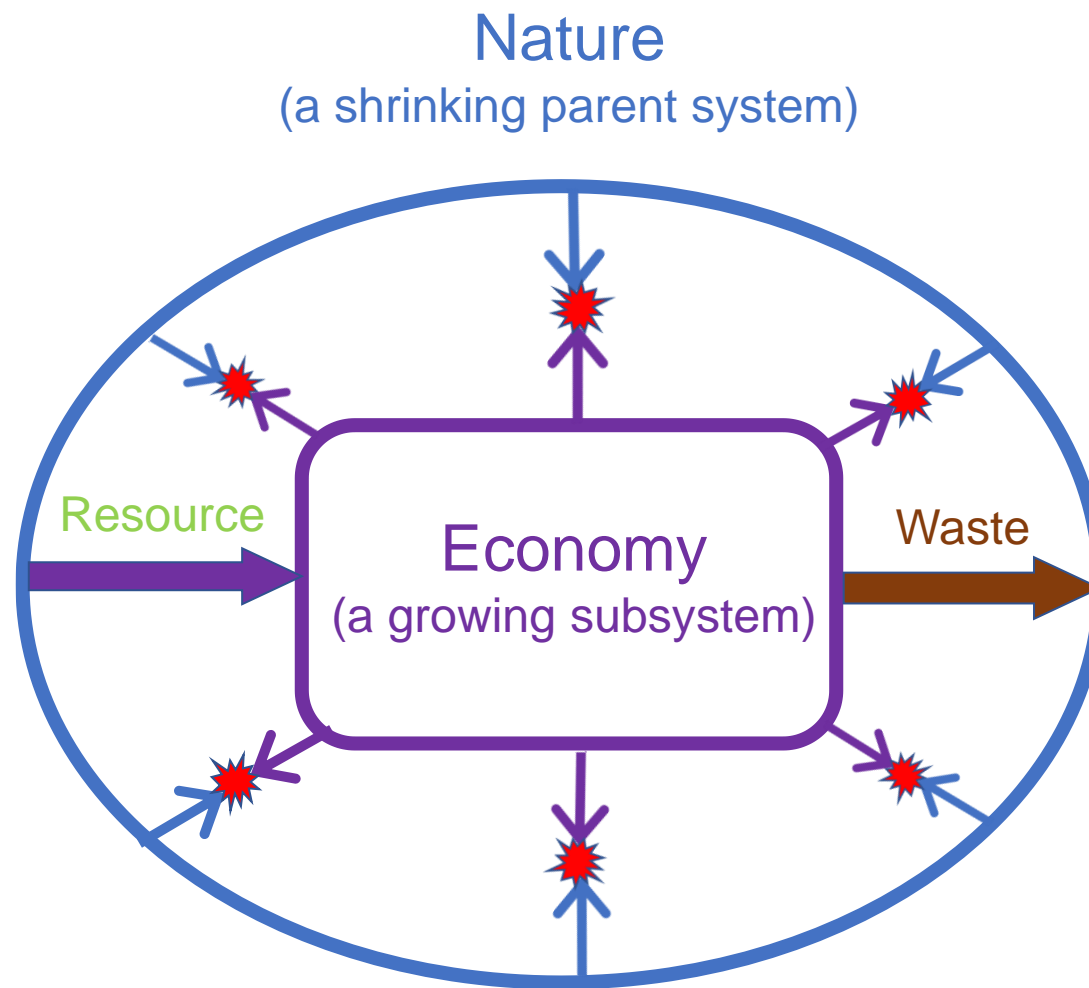
# Resource consumption

Resource consumption was historically **circular**, became **linear** after the industrial revolution and **exponential** after the second world war.



# Unsustainability

- The linear resource flow is leading to a head collision between the Nature and the human economy
- The global ecosystem is shrinking and losing its potential to sustain life.



Adapted from J Korhonen, *et al*: Eco. Economics, 143 (2017), 37.

# Metal Industry

Metallic materials are the backbone of manufacturing and the fuel for economic growth. The UK metals industry comprises:

- 11,100 companies
- Employs 230,000 people
- Directly contributes £10.7bn to the UK GDP
- Indirectly supports a further 750,000 employees and some £200bn UK GDP





Circular Economy: a potential solution to our unsustainability problem

Circular Economy aims to radically reduce or eliminate the extraction of raw materials and the production of waste.



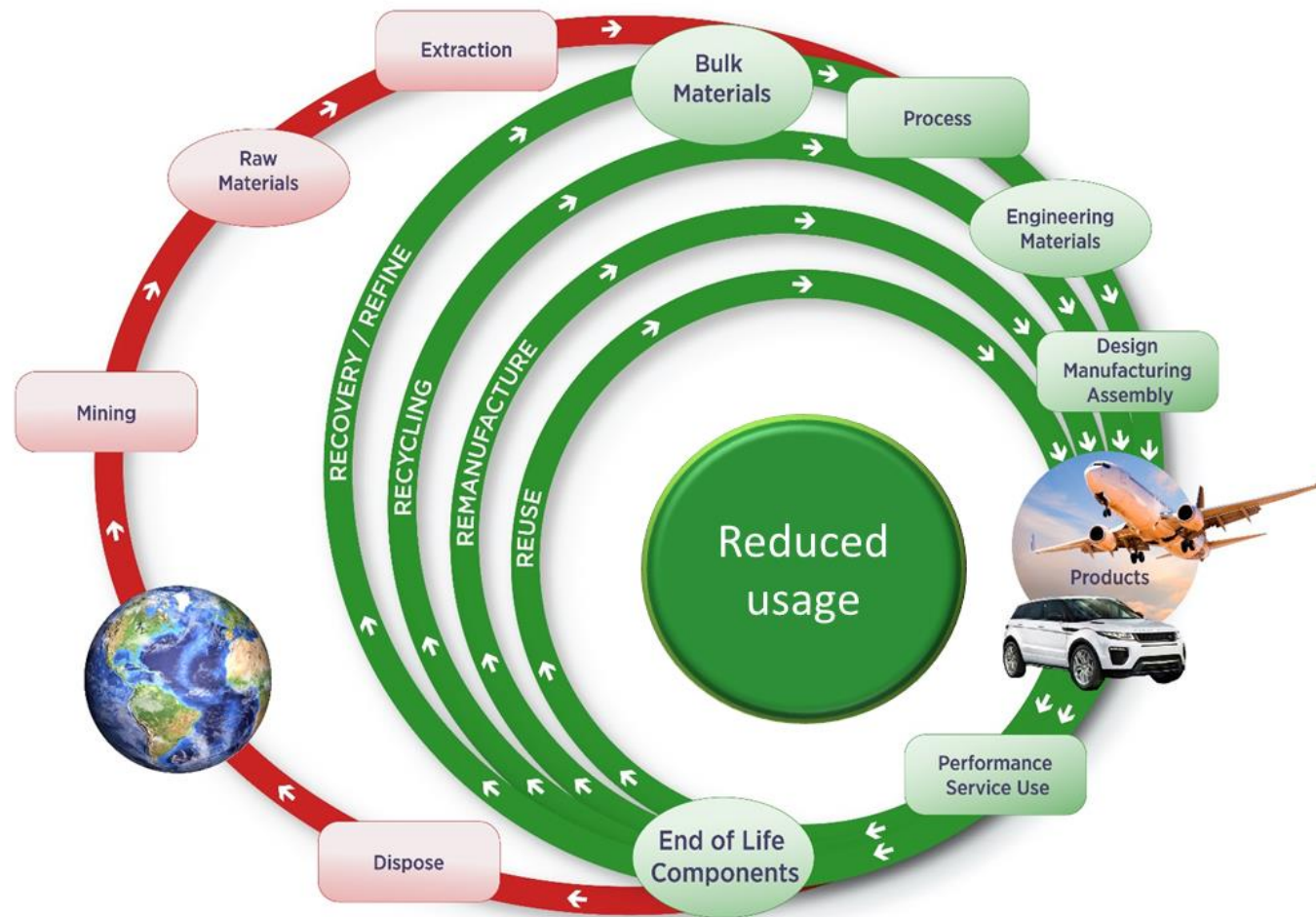
# Circular Economy (CE) goes well beyond economics

- **Philosophy:** friends, not masters
- **Economy:** work within nature's ability
- **Research:** rethinking science and technology
- **Government:** visible vs. invisible hands
- **Manufacturing:** high quality and long-lasting products
- **Society:** equality, diversity and inclusivity
- **Future generation:** a better planet
- And more ...



# Our long-term vision is Full Metal Circulation

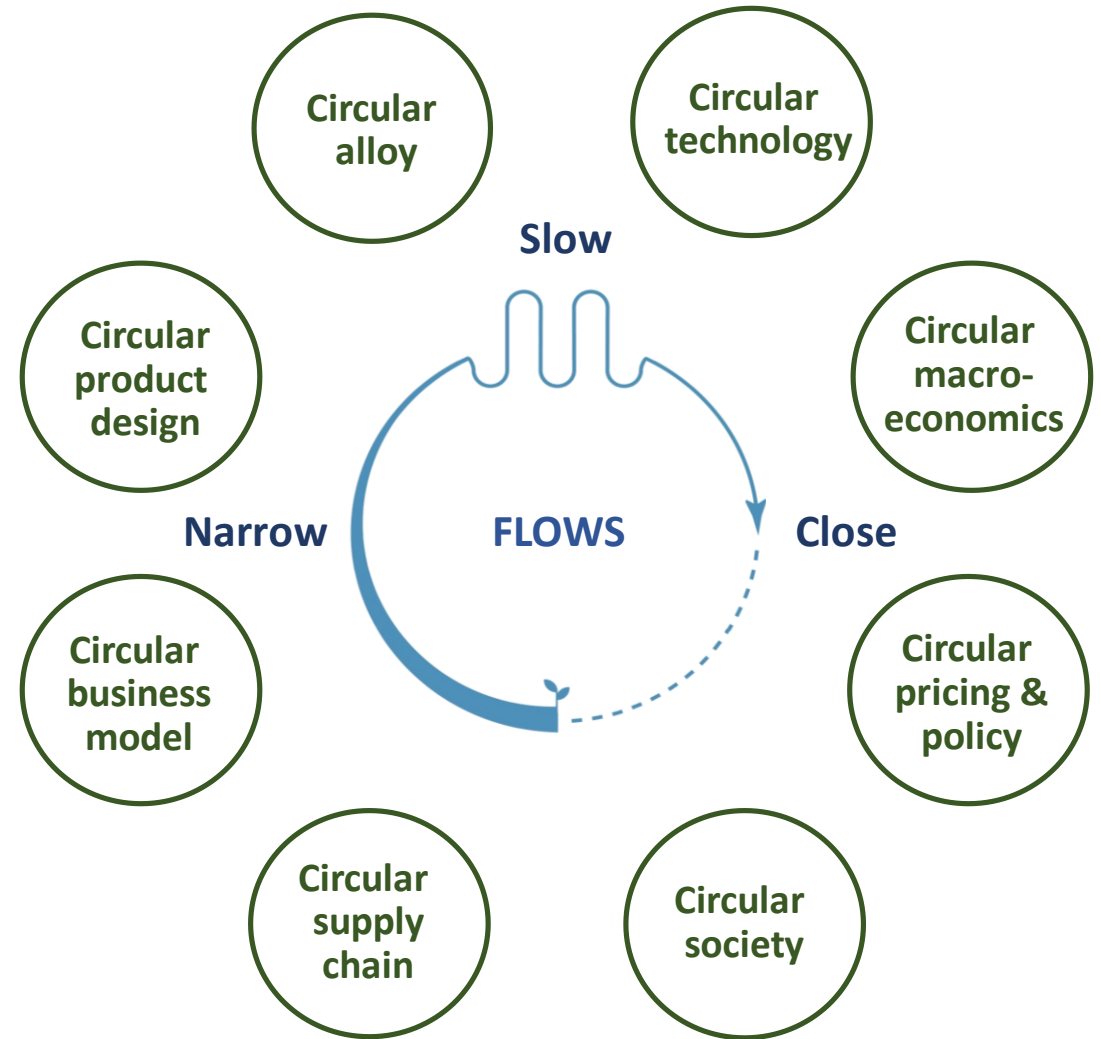
The global demand for metals is met by the circulation of secondary metals through reduce, reuse, remanufacture, recycling and recovery. This means no more mining, and no more metal extraction!





# CircularMetal Strategy

- **Closing the loop – designing out waste and pollution:** eliminating extraction; use of existing metals
- **Slowing down the loop – keeping metals in use:** designing for durability, reuse, remanufacture.
- **Narrowing the loop – using less for more:** use less; serve longer; higher performance; encouraging sufficiency ...



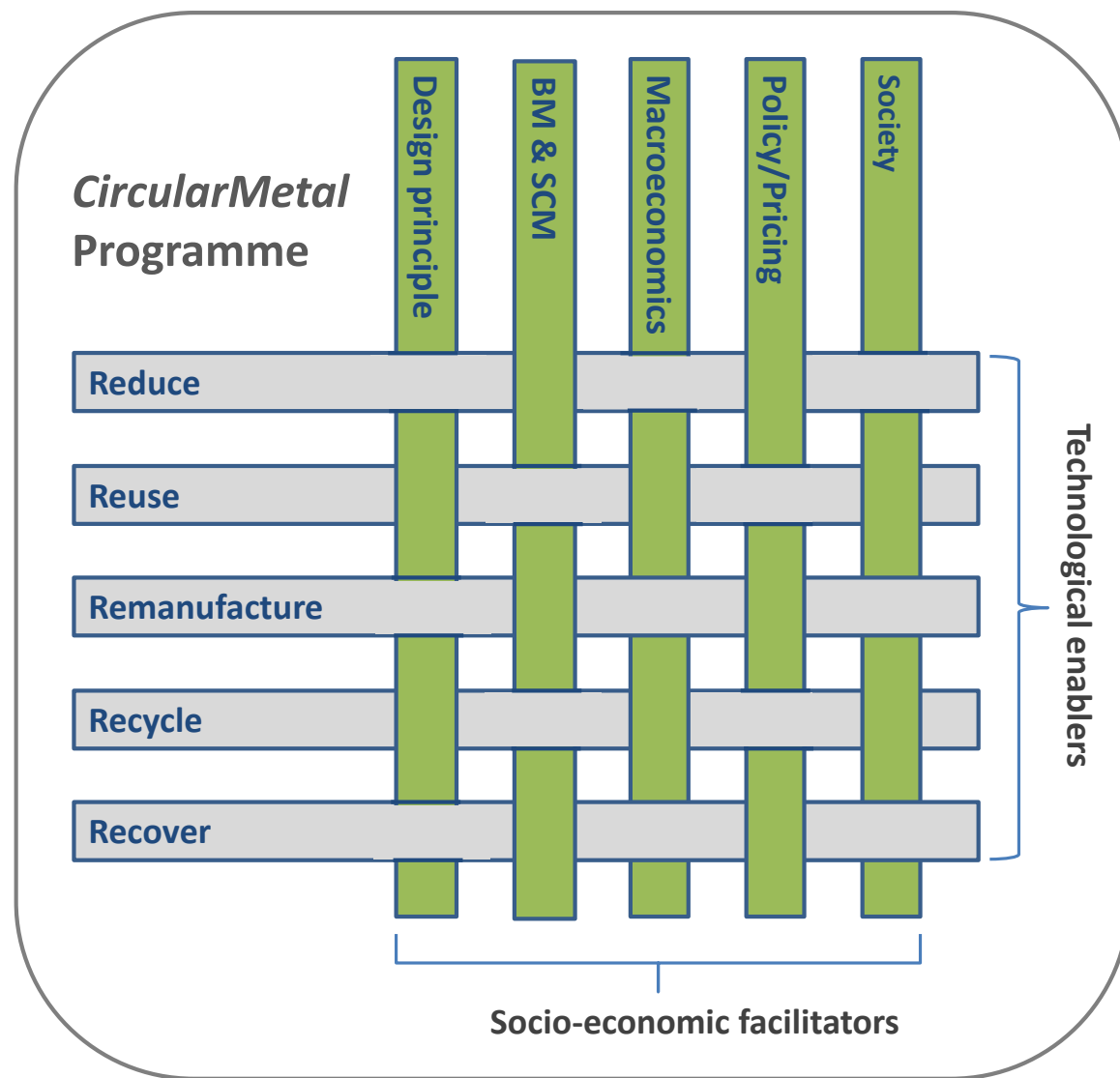
# Disruptive capability of circular economics

- Saidani *et al.*<sup>1</sup> manually disassembled an 8-ton forklift truck in France
  - 26 hours to disassemble 16 largest component assemblies eg. motor & gearboxes
  - High profit margins from remanufacturing and reuse
  - The economic break-even point was to disassemble 75% of the mass of the vehicle to remanufacture 10%, reuse 5% and recycle the remaining components
- Current purchasing decisions are made on performance and cost
  - Disruption could occur if the criteria changes to cost, performance and environmental

<sup>1</sup>Saidani *et al.*, *Res., Con. and Recycling* (2020), Vol. 156, No. 104684

# CircularMetal Research Programme

So much need to be done,  
but we can only set projects in  
strategically important areas  
to reflect the intertwining 5  
socio-economic facilitators  
and 5 technological enablers





# CircularMetal Research Programme

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Four Key Work Packages:

1. **Circular Alloys** - alloys designed for reuse, alloys designed for high performance and alloys designed for recycling.
2. **Circular Processing Technologies** - cover the full range of technological approaches to deliver full metal circulation: reduce, reuse, remanufacture, recycle and recover.
3. **Circular Business** - leading to a range of novel circular business models, supply chains and designed products.
4. **Circular Economics & Circular Society** - will develop insights on future policies, pricing scenarios and roadmaps; and will develop CE principles that reflect insights from macro-economics, new institutional and evolutionary economics, political economy, and consumer research.





This is not even the end of beginning, ...

Circular economy research is truly multi-disciplinary, multi-dimensional, multi-actors and multi-stakeholders. So much need to be done, so little we can do. Please join us to speed up the transition to circular economy!

# Thank You!

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