

The Circular Economy: Economics, Policies, and the Role of China

ReTraCE Seminar, University of Sheffield

15 March 2021

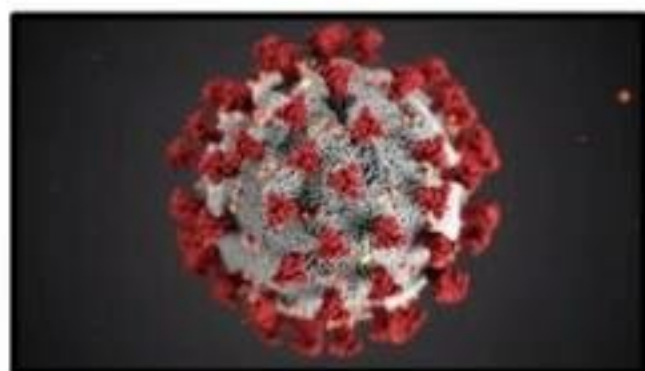


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Chair in Sustainable Global Resources

Director, The Bartlett School of Environment Energy and Resources

The World of Today: Shock Waves and Fragmentation



Covid-19: shutdowns worldwide. An emerging recession. However, largest ever annual fall of CO₂ emissions.



Climate emergency continues, COP26 ahead

- need for systems thinking
- and approaches inviting bold action



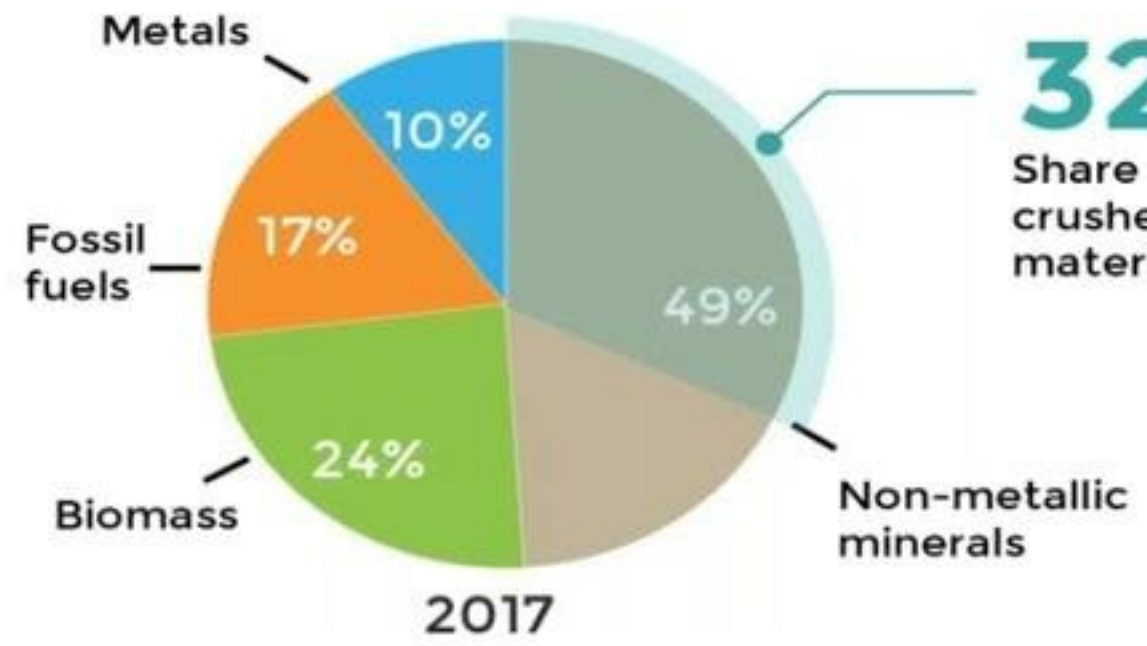
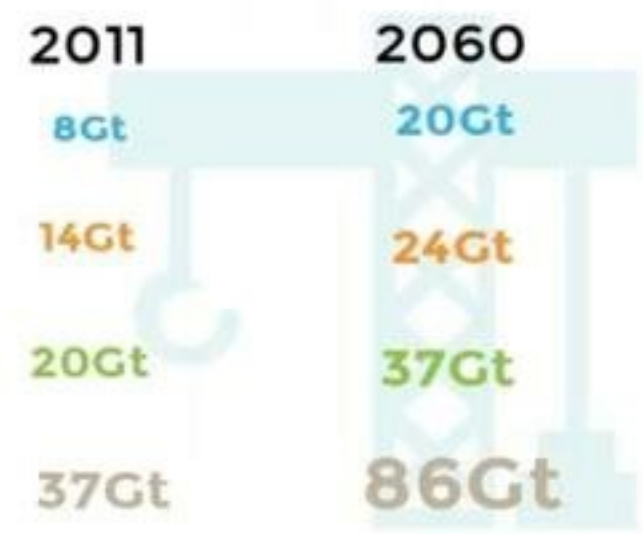
IN PARTNERSHIP WITH ITALY

Dynamic Demand Increase Projected for 2060

Materials use increase



-  Metals
-  Fossil fuels
-  Biomass
-  Non-metallic minerals



Construction materials use stabilises in China after 2025





CE Principles at Work

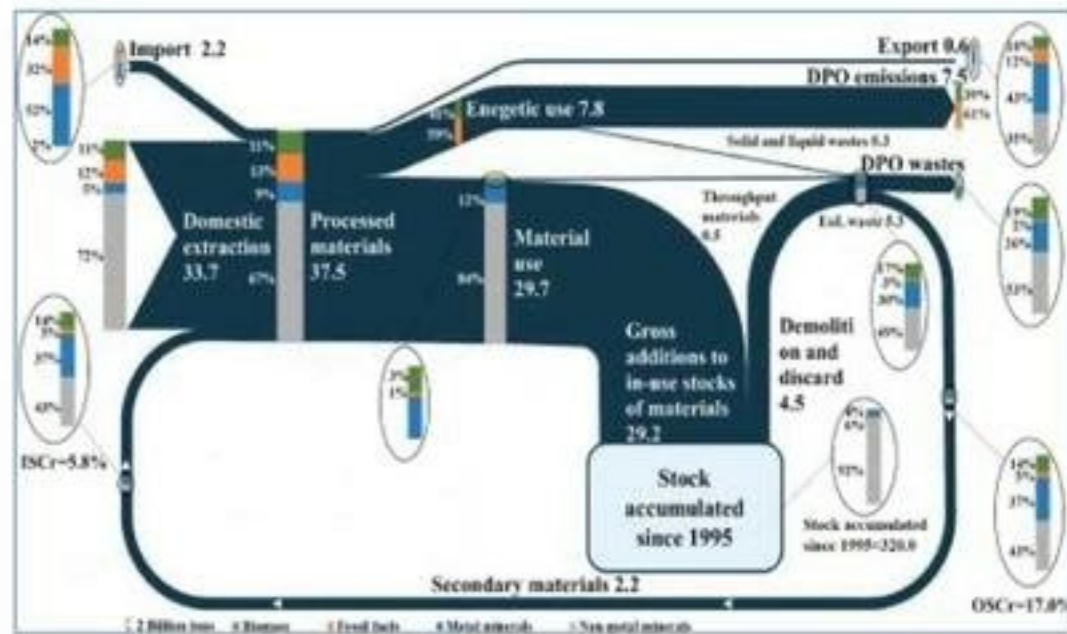
- Design out waste and pollution e.g. through novel product design, cleaner production, material efficiency
 - additional energy or other resources? Net benefit?
 - Barriers? Rebound effect?
- Maintain materials' utility and value e.g. through sharing and re-use, extended lifetimes
 - additional energy or other resources? Net benefit?
 - Barriers? Rebound effect? Social and public value?
- Regenerate natural systems e.g. through agroforestry, regenerative agriculture, solar-based drip-irrigation, nature-based solutions, bio-based materials
 - Environmental assessments? Land use? Planetary Boundaries?
 - Pro-active role in soil productivity, ocean sustainability and carbon sequestration?

Principles – and MFA-based Measurements

Monitor

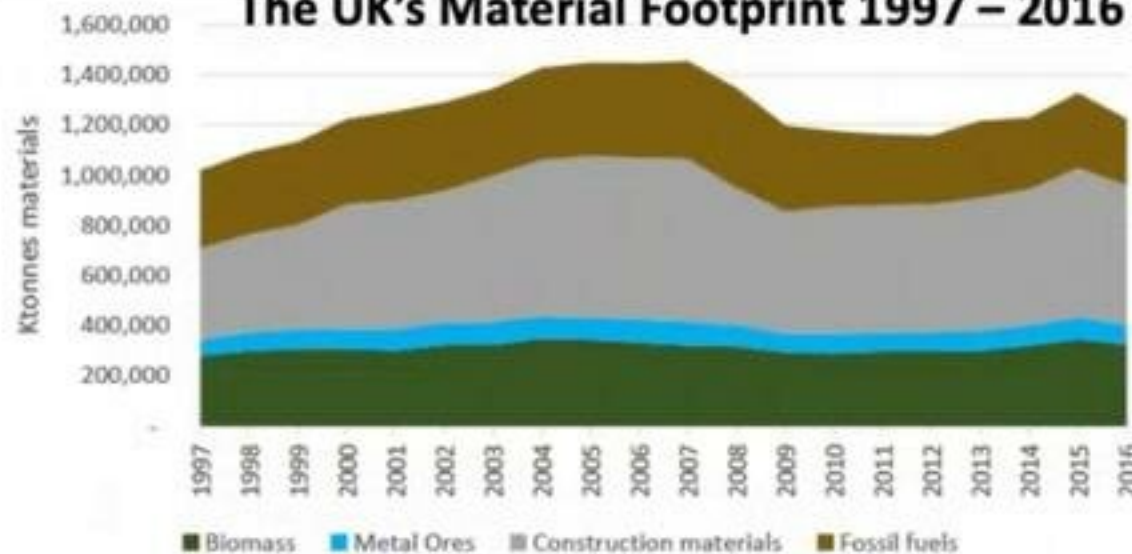
- waste and adds main emissions via EE-IOA (1st principle)
- Captures energy measured in tons
- Development of stocks (2nd principle)
- Material footprints (SR principle)
- Use of secondary materials (CE Action Plan)

Requires data such as IOA and EE-IOA => see e.g. UNEP IRP



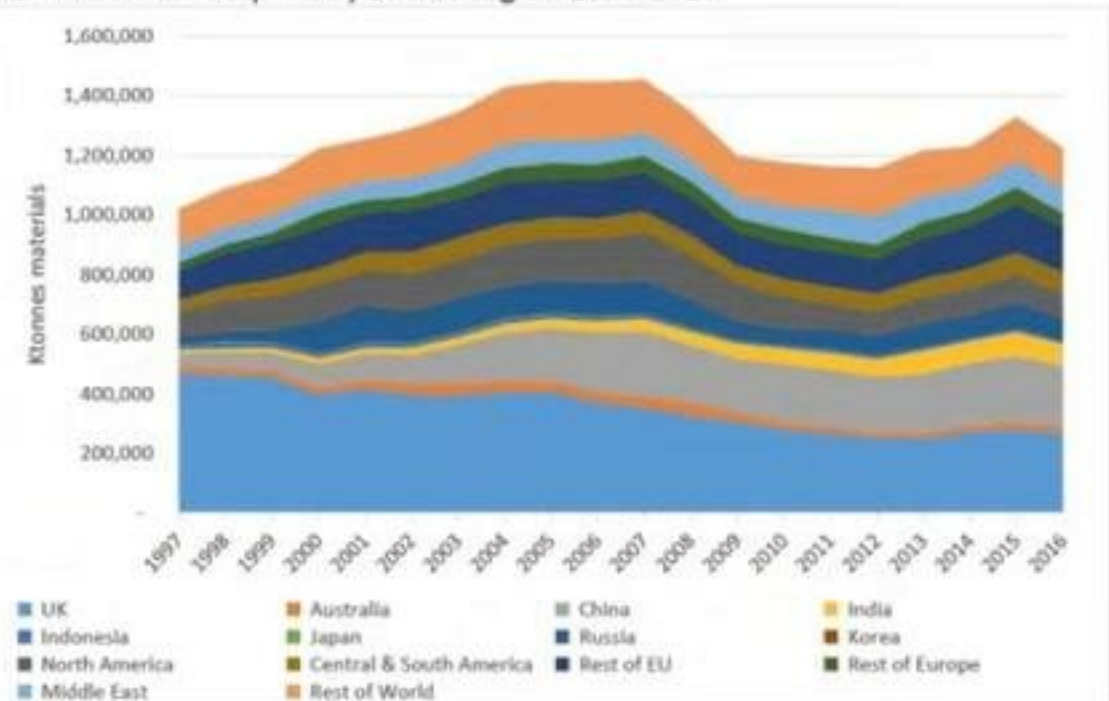
China's aggregated flows in 2015
Source: Wang et al. 2020

The UK's Material Footprint 1997 – 2016



Source; Anne Owen et al, Leeds, 2019

4.3 Material Footprint by source region 1997-2016



MFA-based Measurements, Weaknesses and Frontiers

- **Aggregation and time gap:** Measures the aggregated outcome of measures on recycling, re-use, repair etc, can track product groups and regions, but not individual activities on time. There is no specific information on how recycling and re-use take place
- **Spatially neutral:** does not allow to assess particular local environmental stress (but see ongoing research: <https://www.fineprint.global>, Stefan Giljum
- **Environmentally weak:** re-using biomass is hidden, no tracking of biogeochemical flows and their impacts, no radar for transgressing PBs or local ecosystem fragilities

For your review & forum discussion:

- 1) Fineprint research project
 - 2) Circularity Gap Reporting Initiative
- => Both brand-new and addressing some weaknesses
- => Draw conclusions on their achievements

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The Norwegian economy is 2.4% circular

This is below the global average (8.6%), but with the right policies, Norway could increase its circularity up twenty times.

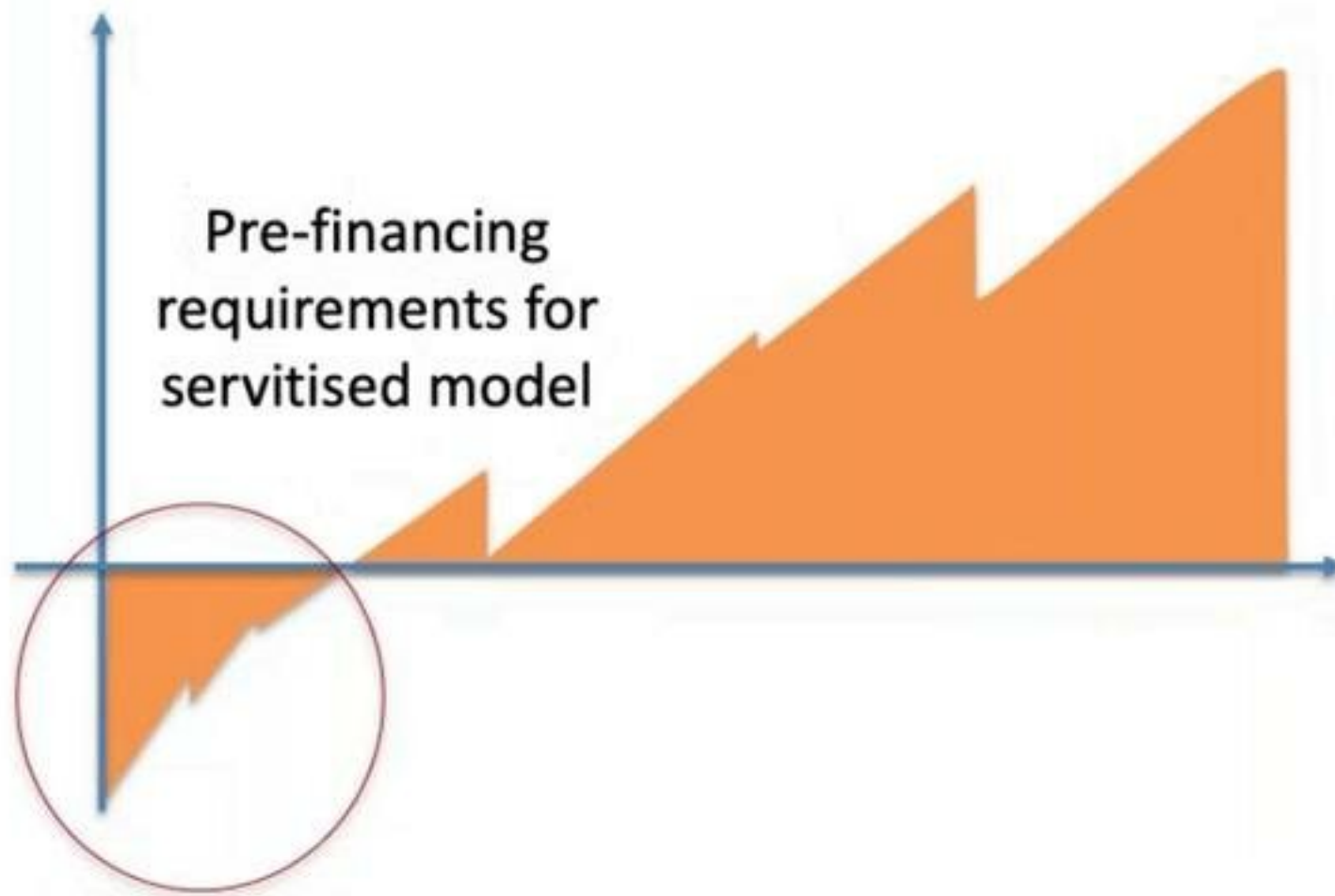
Transforming Steel (Metals)



- Steel is almost infinitely recyclable, secondary steel route uses electricity that can be based on REN. Hydrogen applications ahead.
- China could gain up to cumulated USD 819 billion by 2030, despite losses in primary steel capacity
- International implications mixed: likely losses for iron ore producers (Australia, Brazil and India) but gains for most developing countries benefiting from lower steel prices.
- Watch out for increasing demand of coal in electricity production!
– Alignment with energy transitions clearly needed
- Recent innovation transforms recaptured steel into liquid metals that can be applied to high-tech

Sources: Nechifor et al, World Development 2020; Zhongyun Fan

Financing a Circular Economy



What is the viability of new business models and how does it fit into innovation systems and transformations

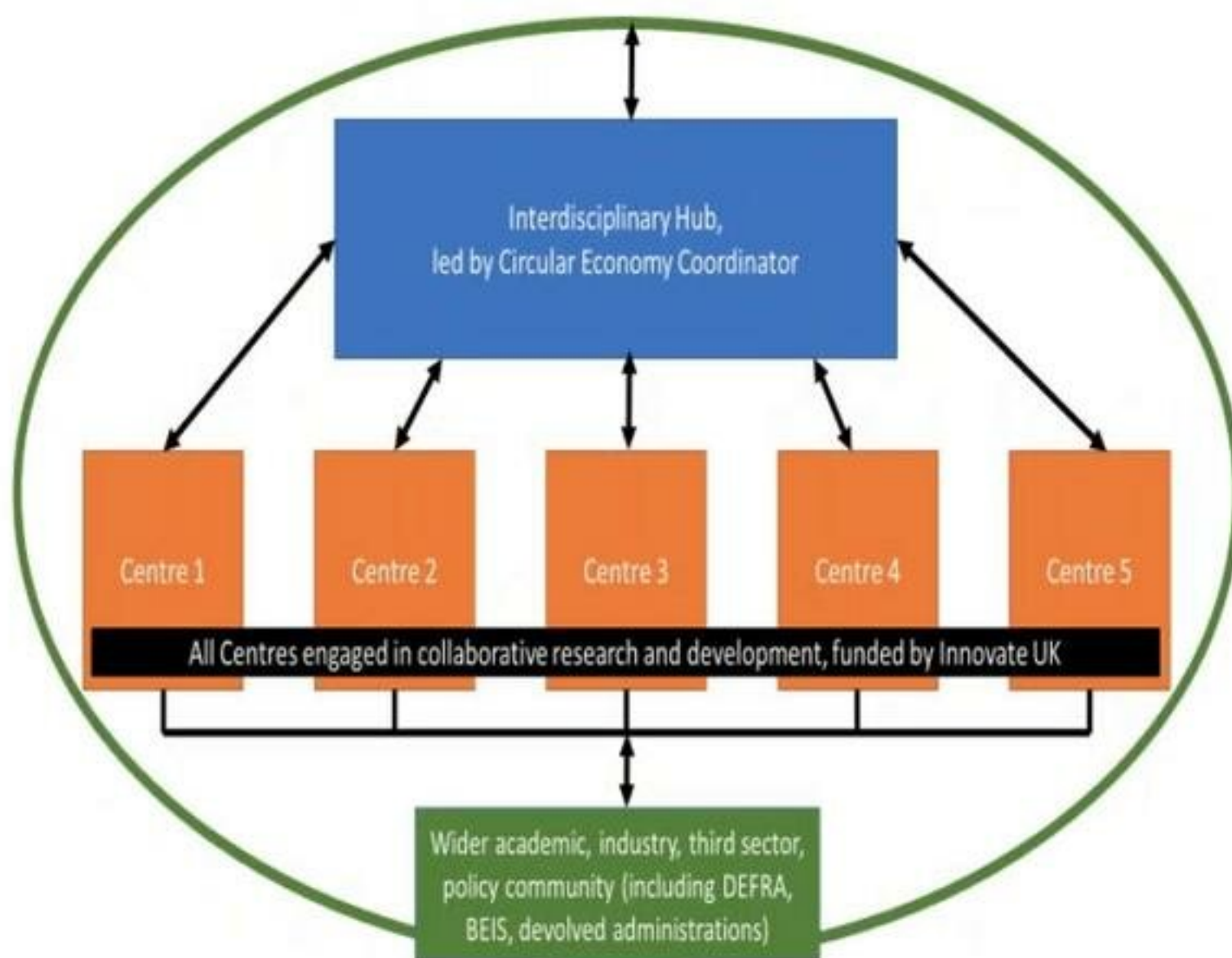




Circular London

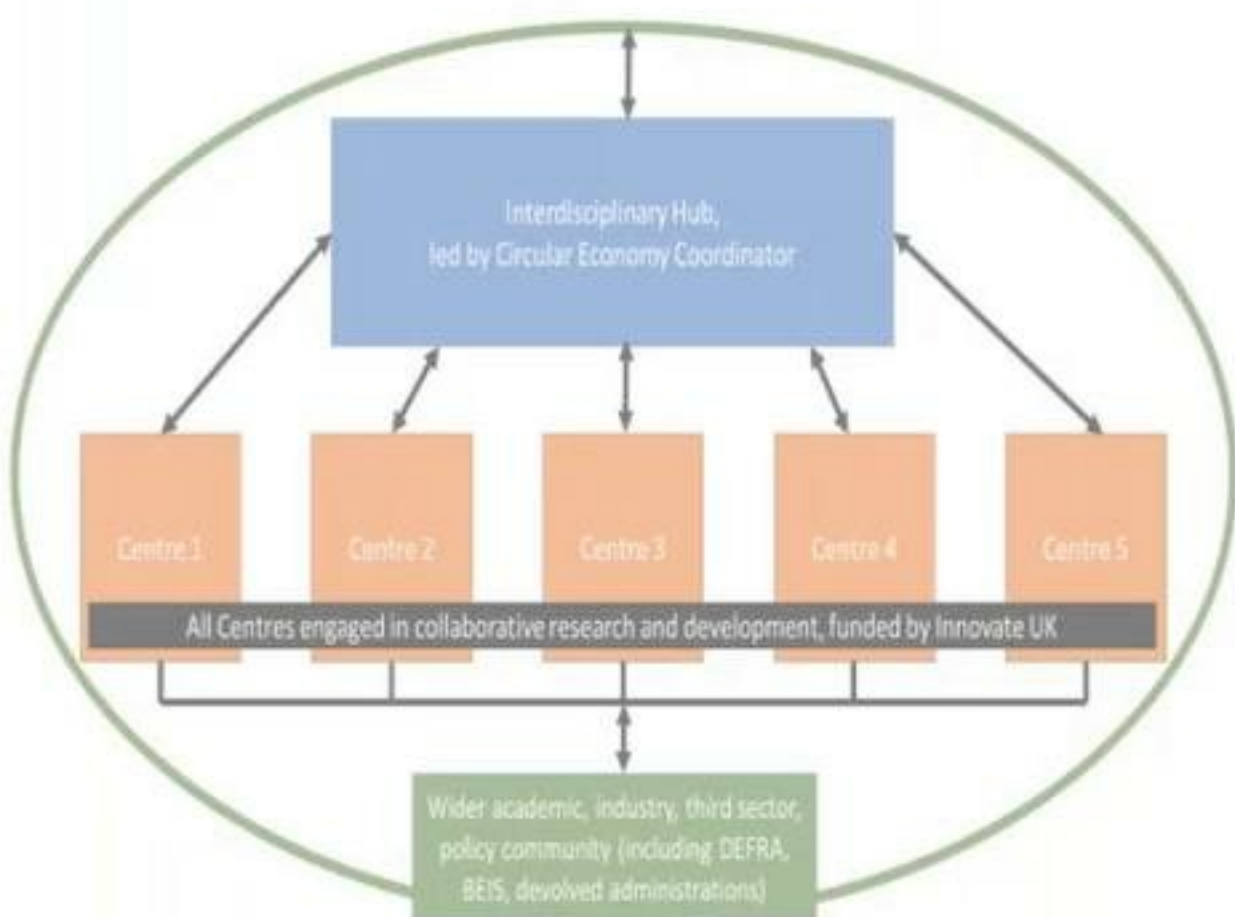
- The London Waste and Recycling Board (LWARB) is a partnership of the Mayor of London and the London boroughs to improve waste and resource management.
- A new Circular London Accelerator delivered in partnership with Carbon Trust, supports circular innovation in the built environment sector.
- Action areas on food, SMEs etc
- Roadmap launched in 2017 currently under revision
- How can cities design better roadmaps, based on participatory tools and impact assessments

The new UKRI CE Centres (announced 11 Nov 2020)



- £30m of funding for five interdisciplinary Circular Economy Centres and an integration Hub led by (co-) Coordinator(s).
- Structured around 'resource flow systems'
- Starting January 2021 with a duration of 4 years
- Key words: systems approach, accelerating solutions, high ambitions, policy support and partners
- Encouraged to collaborate with partners and multiply efforts

Our Role in those UKRI CE Centres

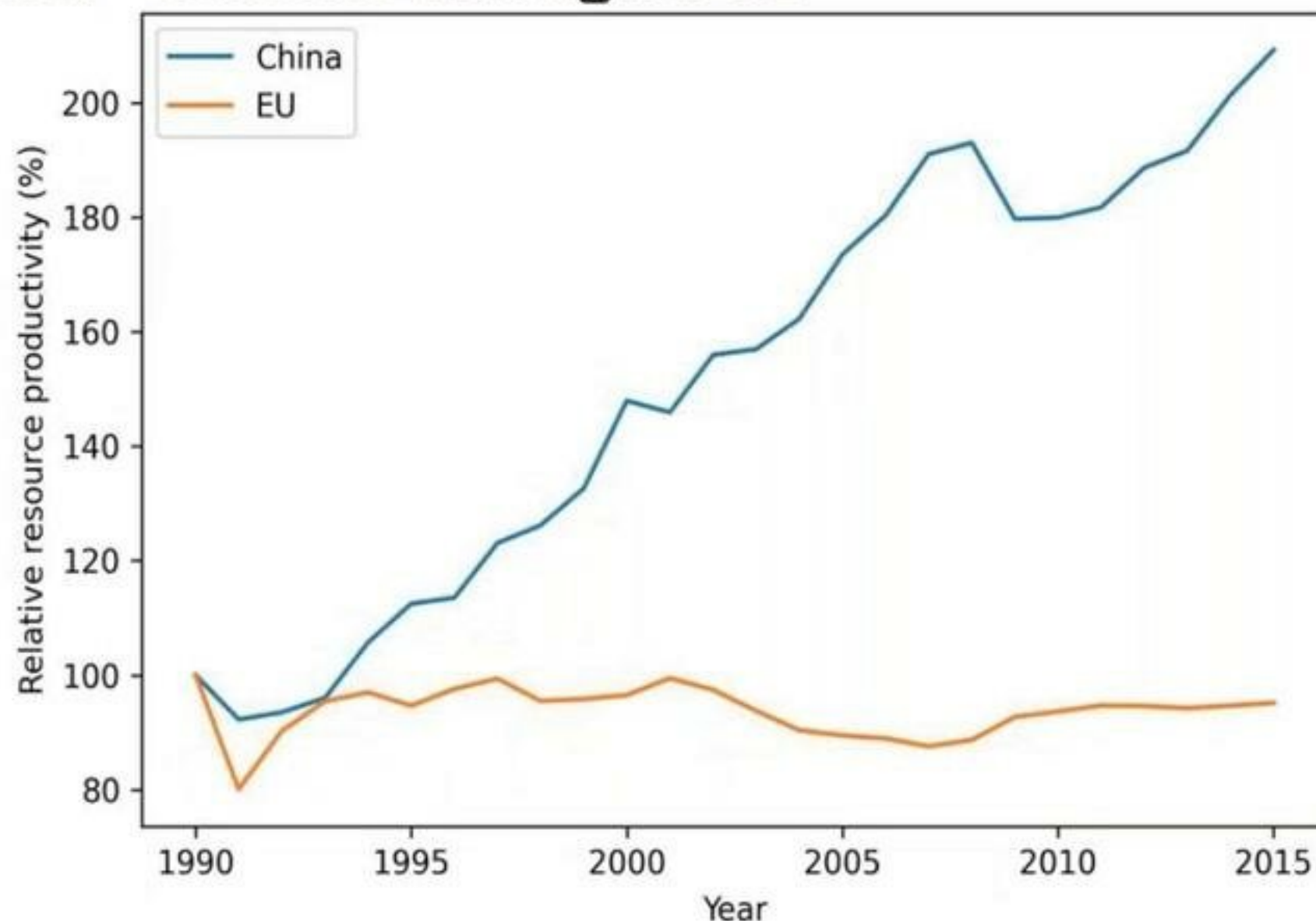


- 1) **Circular metals**, Fan Zhongyun (Brunel) => I'll be Co-I addressing economics & policy
- 2) **Construction Materials**, Julia Stegemann (UCL) => I'll be Co-I addressing economics and policy
- 3) **Techmetals**, Frances Wall (Exeter)
- 4) **Chemicals-Olefins**, Jin Xuan, (Loughborough) – addresses plastics
- 5) **Textiles**, Sharon Baurley (RCA), with some UCL involvement too

Decision on the hub soon to be taken

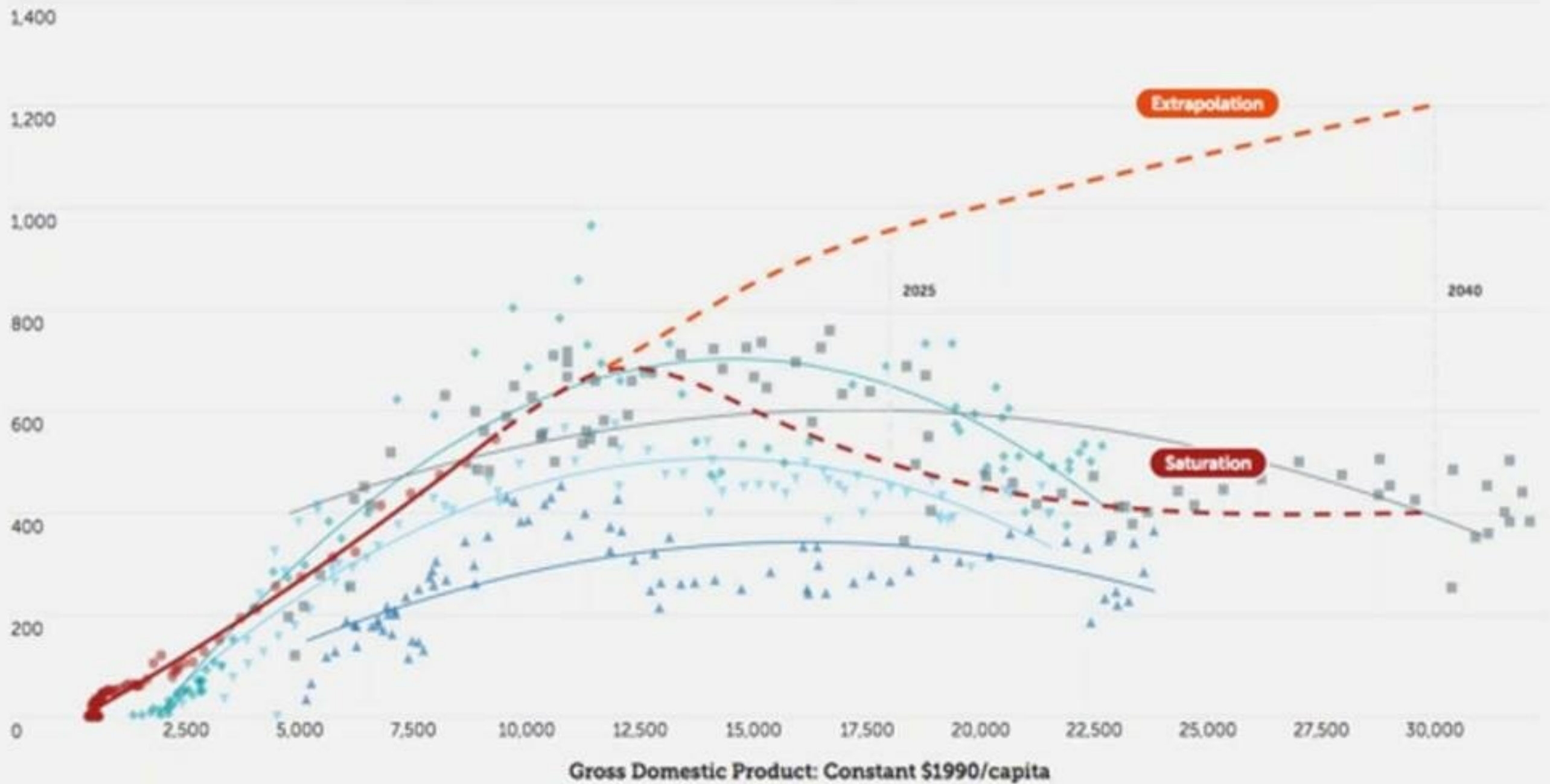
China doubled its resource productivity since 1990s, while EU stagnated – success through a CE

- Enormous growth in resource use 1990 – 2017 (3x)
- 7-fold increase in using secondary resources – yet at low levels
- CE Ambitions and interests



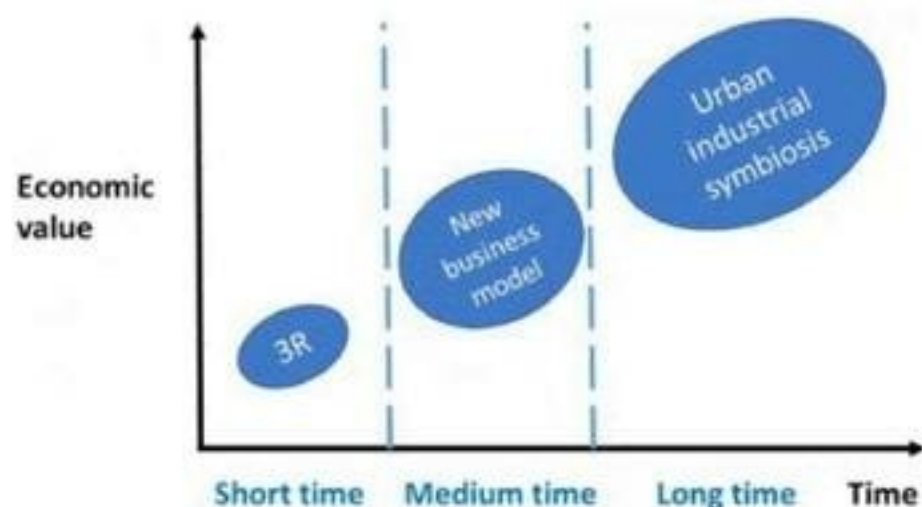
Two scenarios for China: growth as usual or saturation?

Apparent domestic steel consumption: kg/capita



China USA UK Japan Germany

A CE in China



- A CE Promotion Law in 2008
- Action Plans and Indicators
- Demo projects and Eco-Industrial Parks

- The CE in China follows concepts of industrial ecology, MFA and the 3Rs = quite comparable to Europe and others
- It addresses main environmental challenges and is now embedded in the vision of an 'ecological civilization'
- There is a focus on industrial innovation and urban industrial symbiosis; an alignment with the decarbonization efforts

A EU / UK Plus Partnership with China

- Shared policy goals, different systems;
MoU on a CE
- New core indicators for a circular economy and monitoring frameworks at different levels
- Standards for product design and market development for new products, including RFID codes for tracking and monitoring of material flows
- Urban CE and industrial symbiosis, including construction and demolition waste, water and waste-water management, food and food waste, supporting role of start-ups

A Circular Economy – Better economics and policies needed

- Complements and strengthens efforts towards net zero carbon, especially in ‘hard-to-abate’ sectors, agriculture and food, urban development, product design, smart adaptation
- Good fit for a green industrial revolution, supply chain resilience & green finance – but policies needed (targets, standards, enabling programmes)
- Macro-economic benefits from savings, innovation, new business models, reduced import dependence, skills and human and social capital – but overall assessments need better evidence
- What international partnerships, especially with EU, China, Japan, Canada



C4P - RCR:
Building back
better with
synergistic
climate change
and circular
economy
interventions

Thank you!

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PowerPoint ribbon with various tool icons and settings like Calibri (Body) 18, Paste, New Slide, Section, etc.

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The Bartlett School of Environment, Energy and Resources

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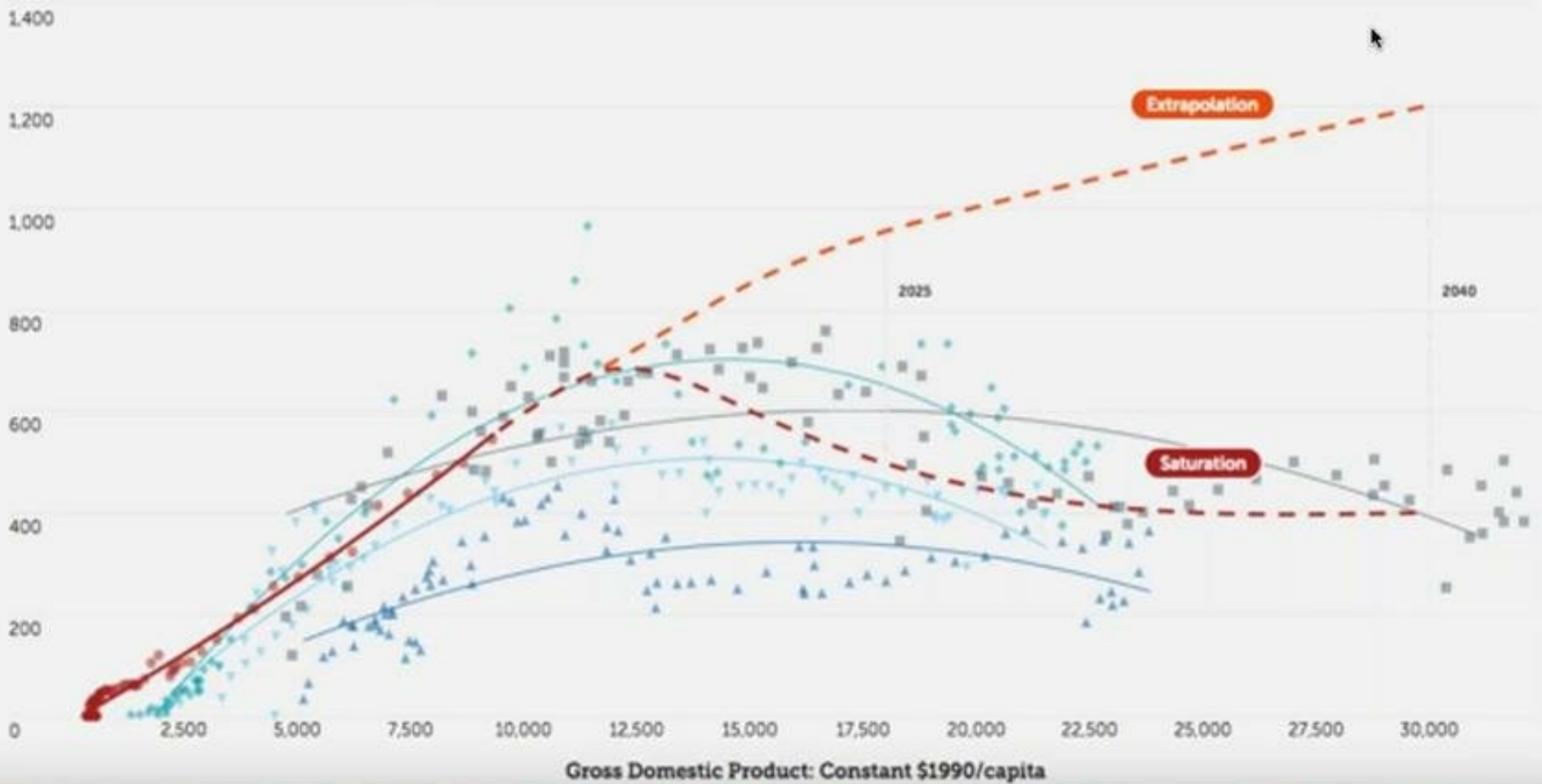
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Click to add notes

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