



Government
Office for Science

From Waste to Resource Productivity – Themed Annual Report of Government Chief Scientific Adviser

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Government Office for Science

Resource Recovery from Waste – 1 December 2016



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Government Chief Scientific Adviser

- **Health, wellbeing, security & resilience**
- **Knowledge translated to economic advantage**
- **The right science for emergencies**
- **Underpinning policy with evidence**
- **Advocacy and leadership for science**



Image: Wikimedia Foundation

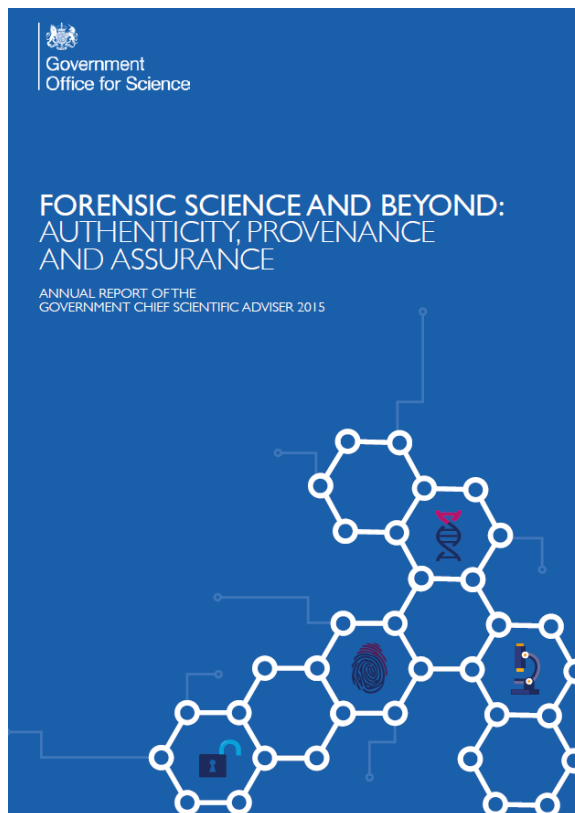


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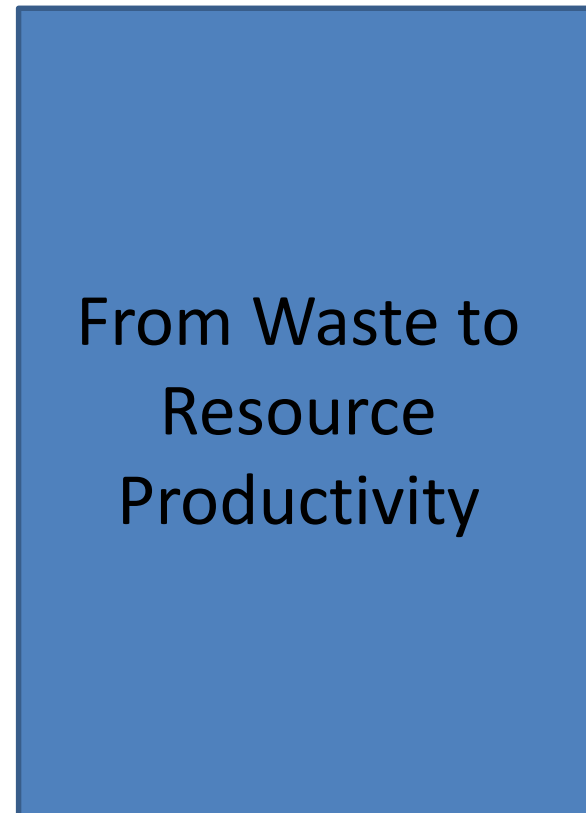
GCSA Annual Report



2014



2015



2016



Why waste, why now?

UK Waste facts

- **Every year each person:**
 - produces 3 tonnes of waste
 - ½ a tonne at home, 55% goes to landfill
- **Food waste:**
 - 10 million tonnes, enough to fill Wembley 9 times
- **Plastics:**
 - Predicted that by 2050 more plastic than fish in the oceans





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GCSA Annual Report 2016 – What's New?

- Authors
- Social/Natural sciences
- Policy
- Projects
- Artists





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From Waste to Resource Productivity – Our Vision

Why care about waste?

- Growth and productivity
- Resilience
- Resources and environment



Image: Pixabay



Growth and Productivity



- We need to move *From Waste to Resource Productivity*
- UK businesses more productive, more competitive
- Science and innovation driving growth



- Global food, water, energy demand all \uparrow >50% by 2050
- Driven by population growth and economic growth
- UK economy very interconnected: efficient but fragile
- Need to protect UK from commodity price volatility



Resources and Environment

- **Most key resources are finite**
- **Resource prices don't reflect full social costs (externalities)**
- **We therefore use them too fast**
- **Need to decouple economic growth from environmental damage**





Core Themes



- 1. Data**
- 2. Design out waste**
- 3. Services not ownership**
- 4. New technologies**
- 5. Consumer behaviour**



1. Data

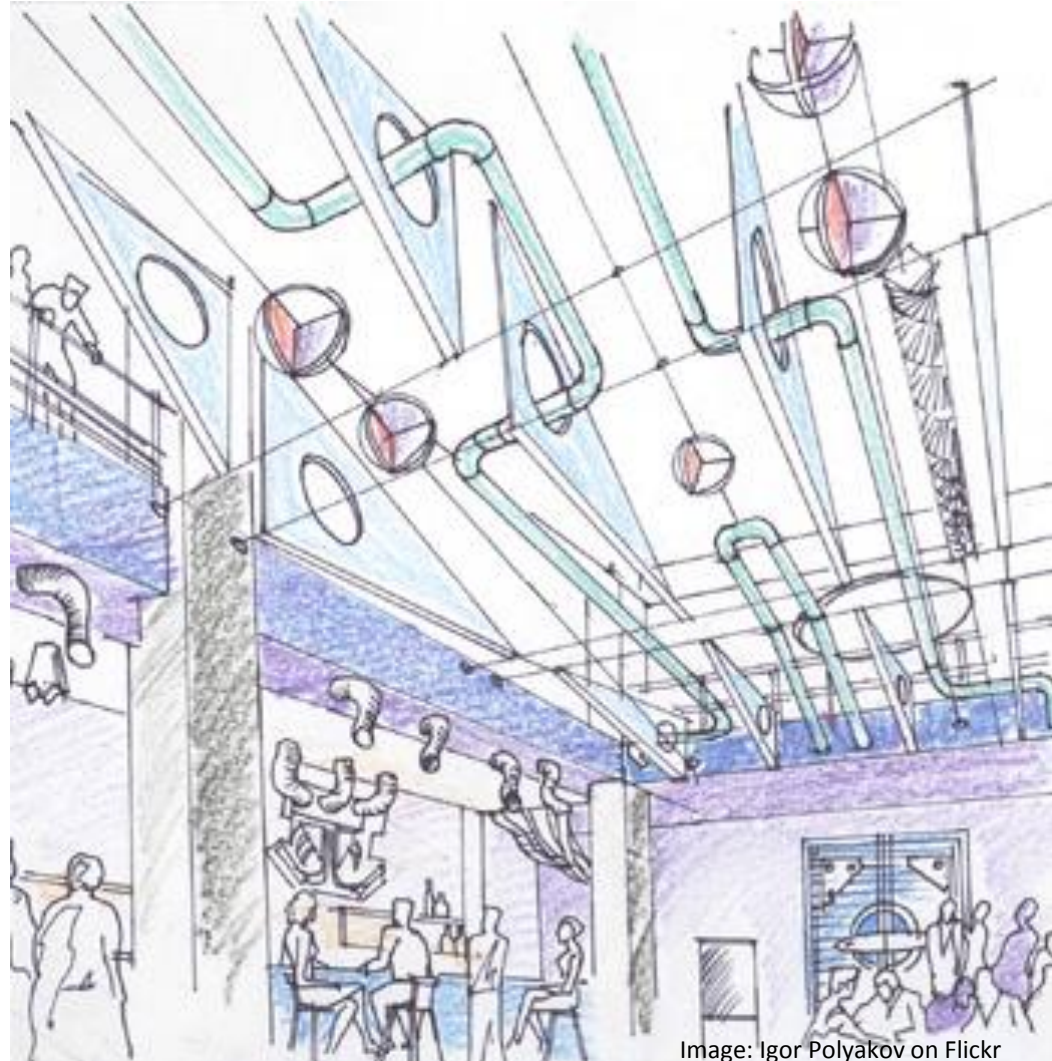
- We don't know enough about our economy: what materials, where, of what quality?
- Crucial for private and public sector
- Identify opportunities to raise our resource productivity





2. Design out waste

- **Product's design can determine how and when it becomes waste**
- **Need longer lasting products, easy to recycle**
- **How to incentivise business to do this?**
 - International markets
 - Cheap resources
 - Throw-away culture





3. Services not ownership

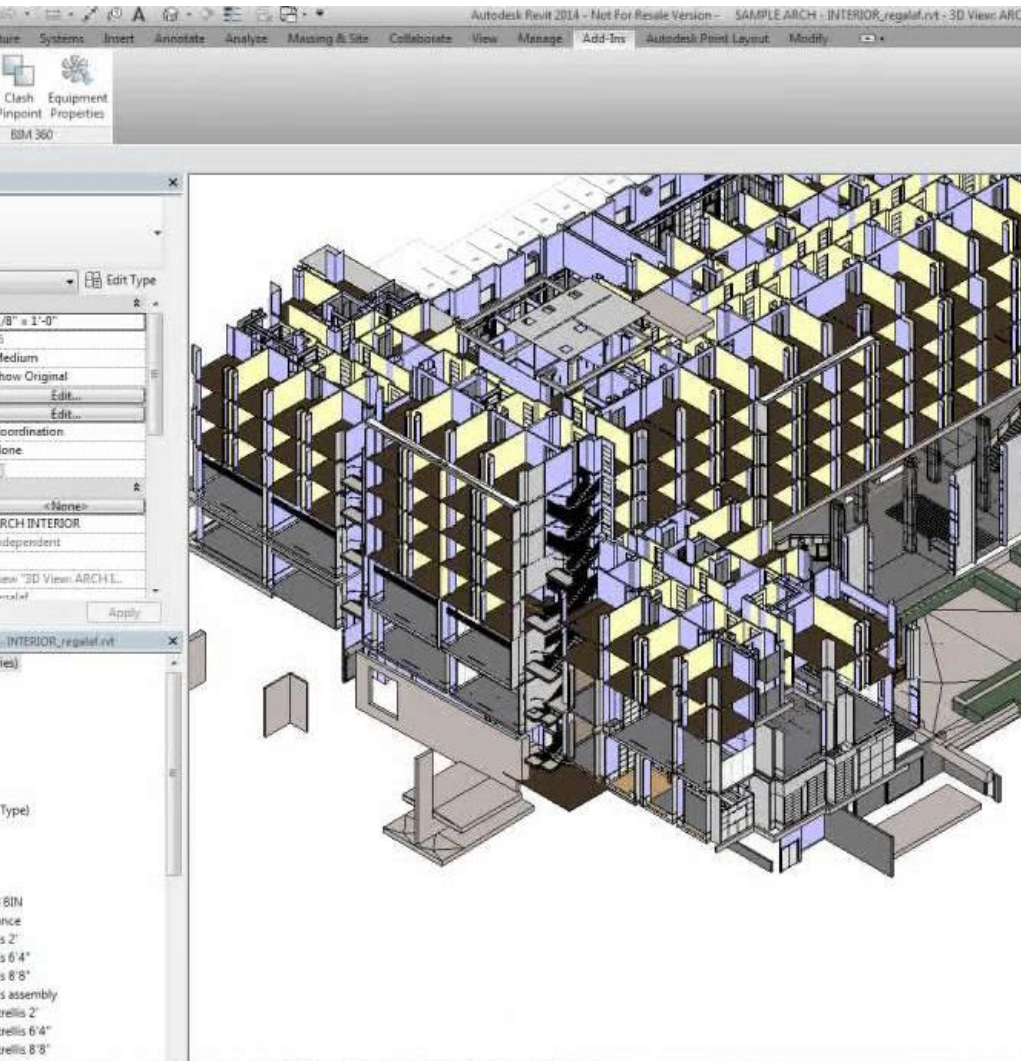
- We increasingly buy services not ownership
- Eg Rolls Royce sells power by the hour, not engines
- Many new business models ('the sharing economy')
- If businesses own goods, more incentive to use efficiently
- How to encourage this?





4. New technologies

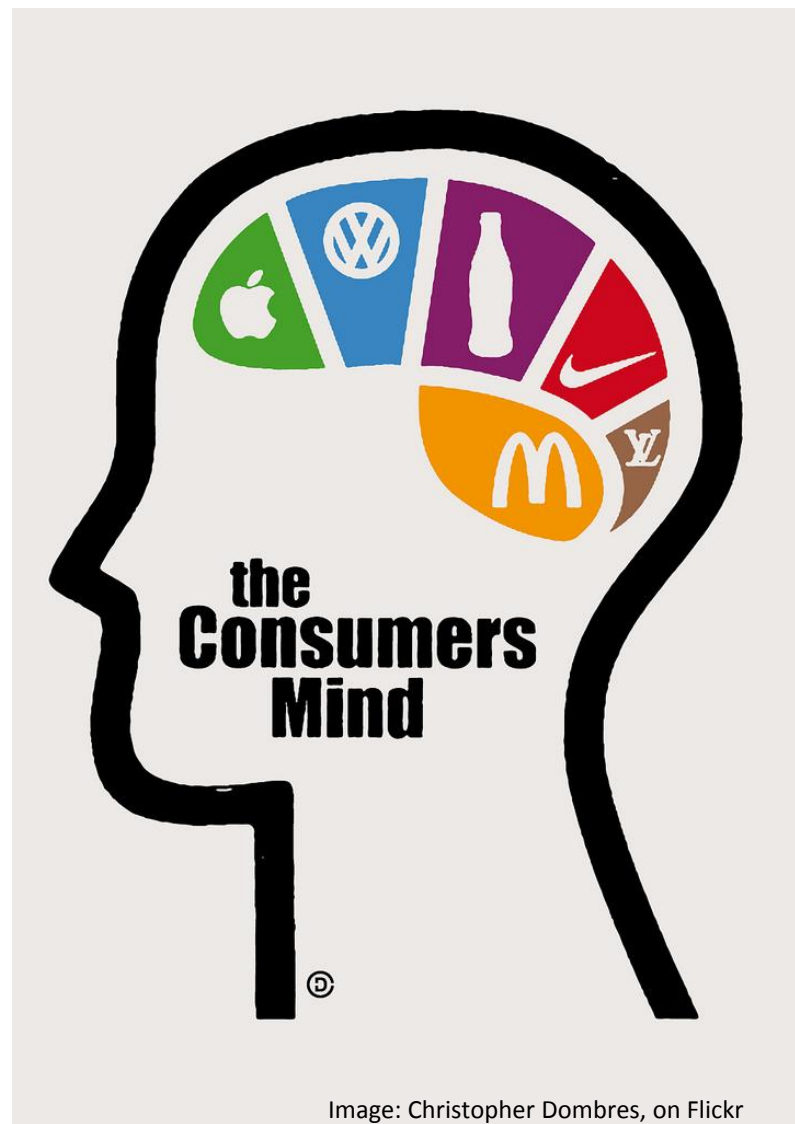
- Innovation changing what we can do
- Bioeconomy:
 - Valuable goods from agricultural bi-products
- Information technology:
 - Can ↑ productivity
 - Building Information Management: costs ↓20%





5. Consumer behaviour

- **Consumers respond to policy:**
recycling \uparrow to 45%
- **Long term zero-waste objective:**
will need new behaviours
- **Incentives:** need to be simple,
fair, effective
 - Waste \downarrow 30% if you pay at margin
- **Social norms:**
 - Waste like seat belts?





Report Structure

Introduction	Sectors	Lenses
What is waste?	Household and municipal	Citizens / consumers
The Data of Waste	Industrial and commercial	Business
Science and Technology spotlights	Agriculture	Cities
	Mining and resource extraction	Local authorities
	Construction and demolition	National government
		International



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The Final Product

Overview by Mark Walport and Ian Boyd - assess the evidence base and set out options for policy-makers



- **Impact**
- **Language**
- **Timescales**
- **Policy-palette**



From Waste to Resource productivity is about:

- Sustainable use of resources
- Harnessing science and innovation
- Economic prosperity
- Economic resilience

