Waste Management

Waste matters

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Overview

- Quick story of how waste management systems have developed in the UK;
- Globally;
- Waste management trends.

Industrial Revolution

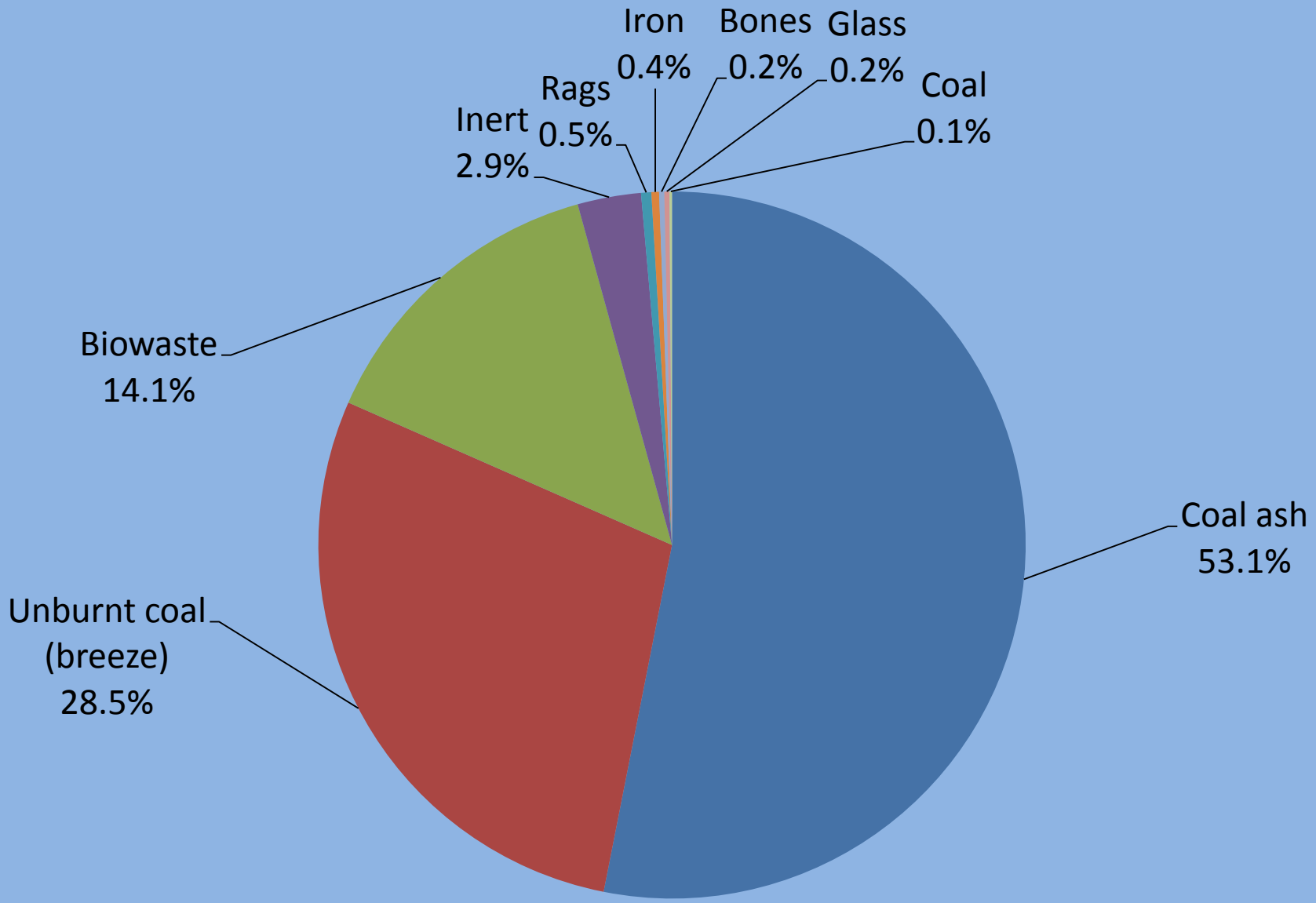
- Industrial Revolution (1750-1850) was a key moment in the management of waste;
- Industrialisation led to more waste being generated;
- Population of England and Wales doubled to 16.8 million between 1801 and 1850;
- Mass migration into the towns and cities – waste starts to impact on communities.

Early 1800s

- By 1800 London had an informal recycling system and organised waste collection system in place;
- High value of waste and a lack of council resources meant that councils started to contract out waste collection and sweeping services;
- Contractors would bid for yearly rights.

So what do you think they were collecting?

1890 composition (adapted from Velis *et al.*, 2009)



Dust Yard (Mayhew, 1862)

VIEW OF A DUST-YARD.

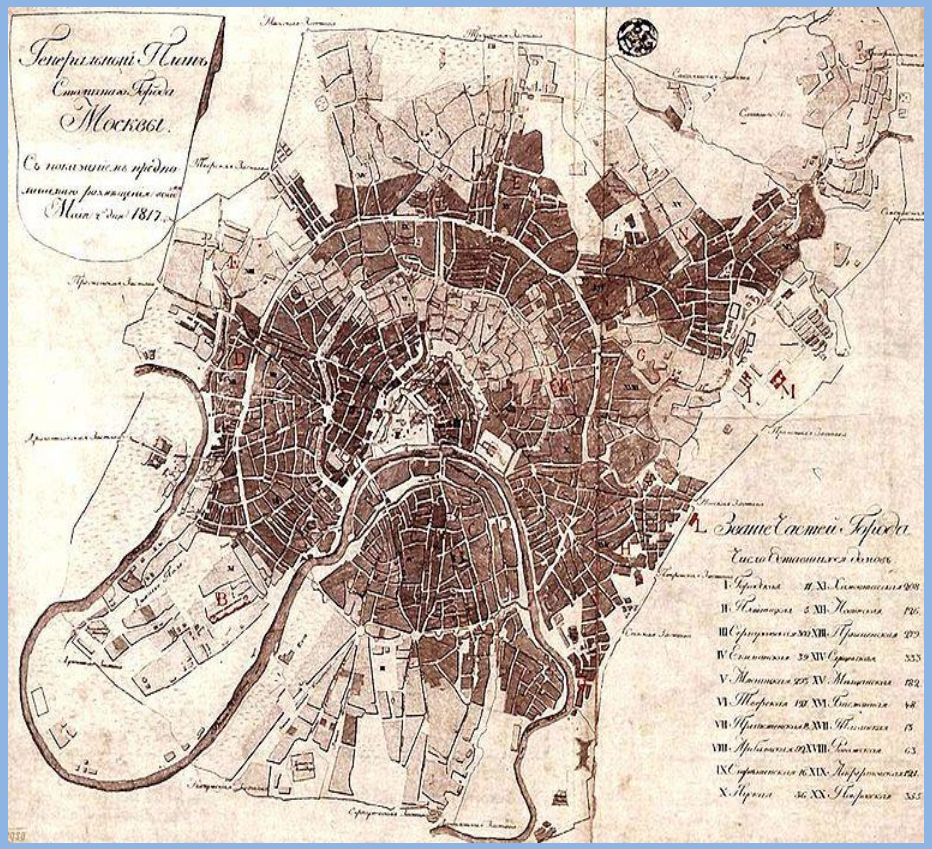
Examples

Item	Use
Ash	Mixed with clay for brick making
Small bits of coal	For brick burning
Biowaste	Poultry and pig feed
Broken pottery/ceramics	Road making, foundations
Shells	Fertilizer
Rags	Paper making
Fat and bone marrow	Soap and glue making
Dog waste	Tanning

Waste = Resource

Bricks

- High demand for bricks = meant high demand for dust;
- As early as 1814-1815 dust was being shipped to Russia to rebuild Moscow following the great fire of 1812;
- 1850s onwards drop in dust price – why?
- Increase in public sector collections.

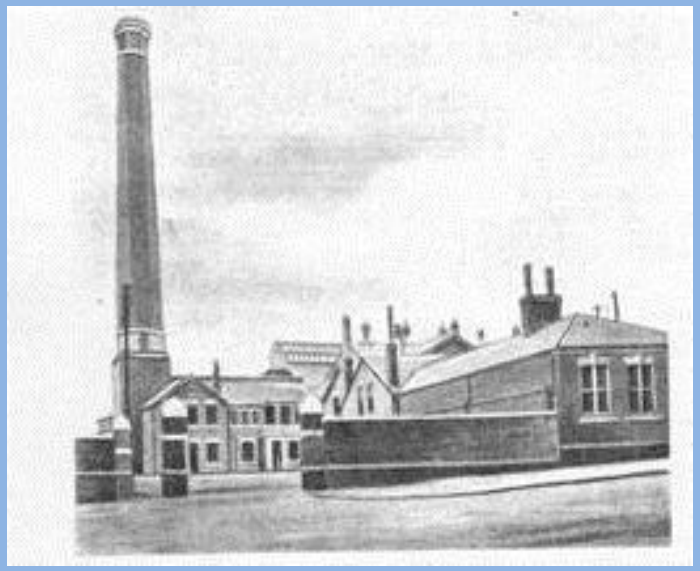


Public Health Act 1875

- Increased awareness in public health;
- Local authorities were formally given responsibility for the regular removal and disposal of waste;
- Also required householders to put their waste out in a moveable receptacle which local authorities would be required to empty weekly – the origins of the dustbin!
- What happened to the rubbish?

Local Government Board - 1915

- 221 authorities had ‘destructors’;
- 709 towns used dumps as their main way of managing waste;
- Unregulated – usually involved dumping waste on derelict land with some examples of filling in gravel/clay pits;
- Negative impacts on environment and communities.



World War 2 - salvage

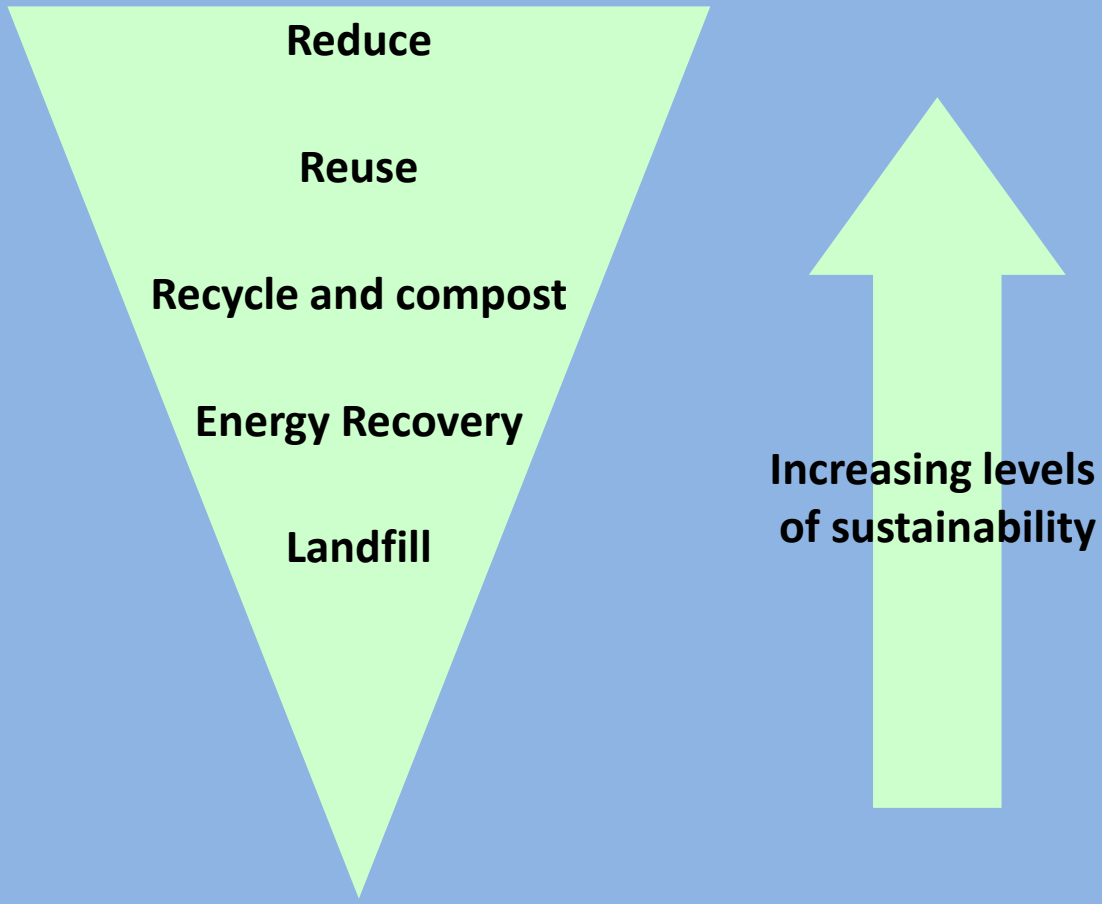
- By 1940 all large councils were required to establish collections for paper, metals, glass, bones and food;
- Communal food bins were placed throughout towns and used in pig farms as food;
- Nearly 9 million tonnes of salvage between 1939 and 1947.

1970s-1980s

- 90% of waste to landfill – lack of regulation and control;
- High profile events e.g.

- 1971 Friends of the Earth protest outside Schweppes;
- 1972 Nuneaton 36 drums of cyanide dumped at an old brickworks;
- 1975 Pitsea – two incompatible liquids dumped at a landfill site – creating a poisonous gas and killing the driver;
- 1977 leaching of chemicals from an old dumpsite to a housing development – Love Canal, New York.

Waste hierarchy



Late 1970s/80s

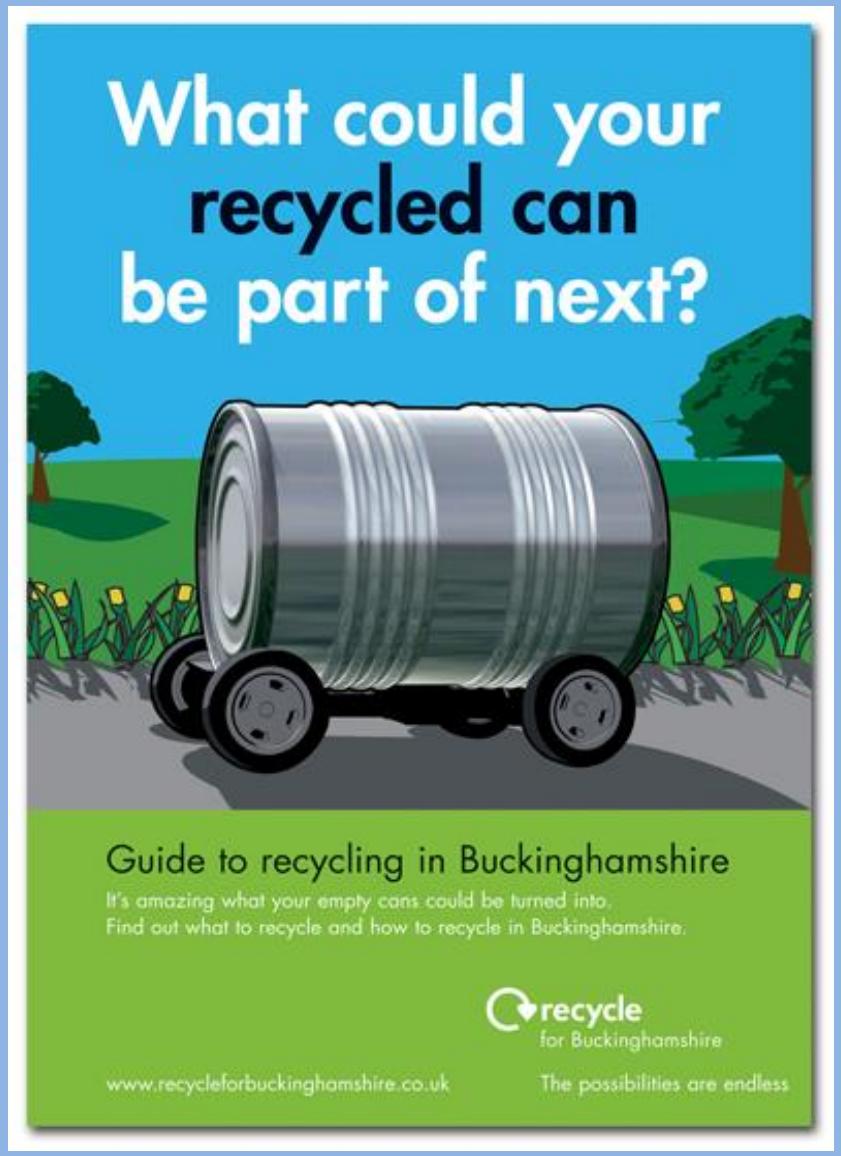
- 1977 first glass bottle bank, Barnsley;
- Late 1980s first kerbside recycling schemes start to be developed e.g. Milton Keynes and Sheffield;
- But landfill still dominates……

Sussex landfills

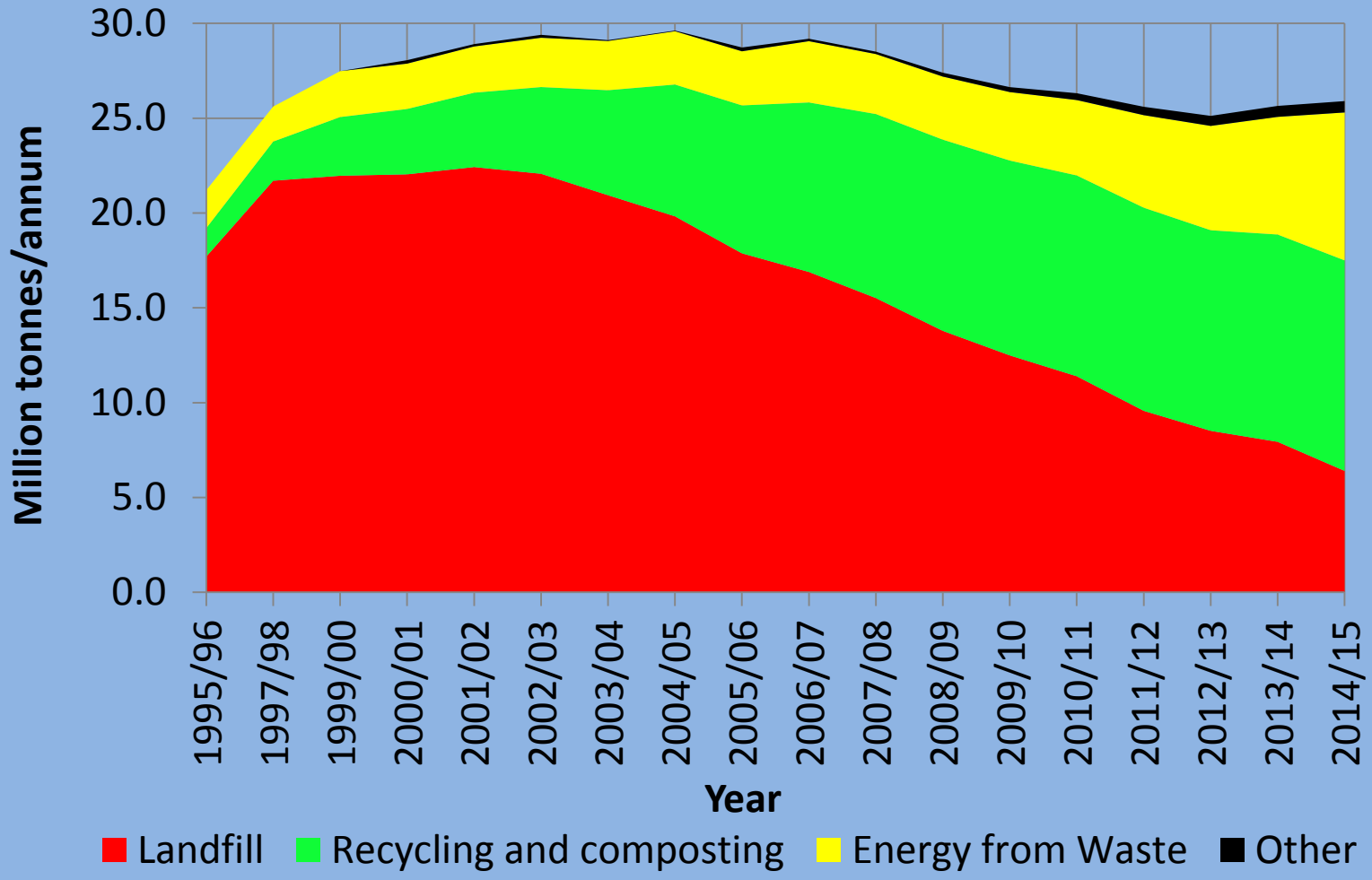
1990s/2000s

- 1996 Landfill tax;
- Waste Strategy 2000;
- Each local authority set statutory recycling and composting targets based on previous performance;
- Waste and Resources Action Programme (WRAP).

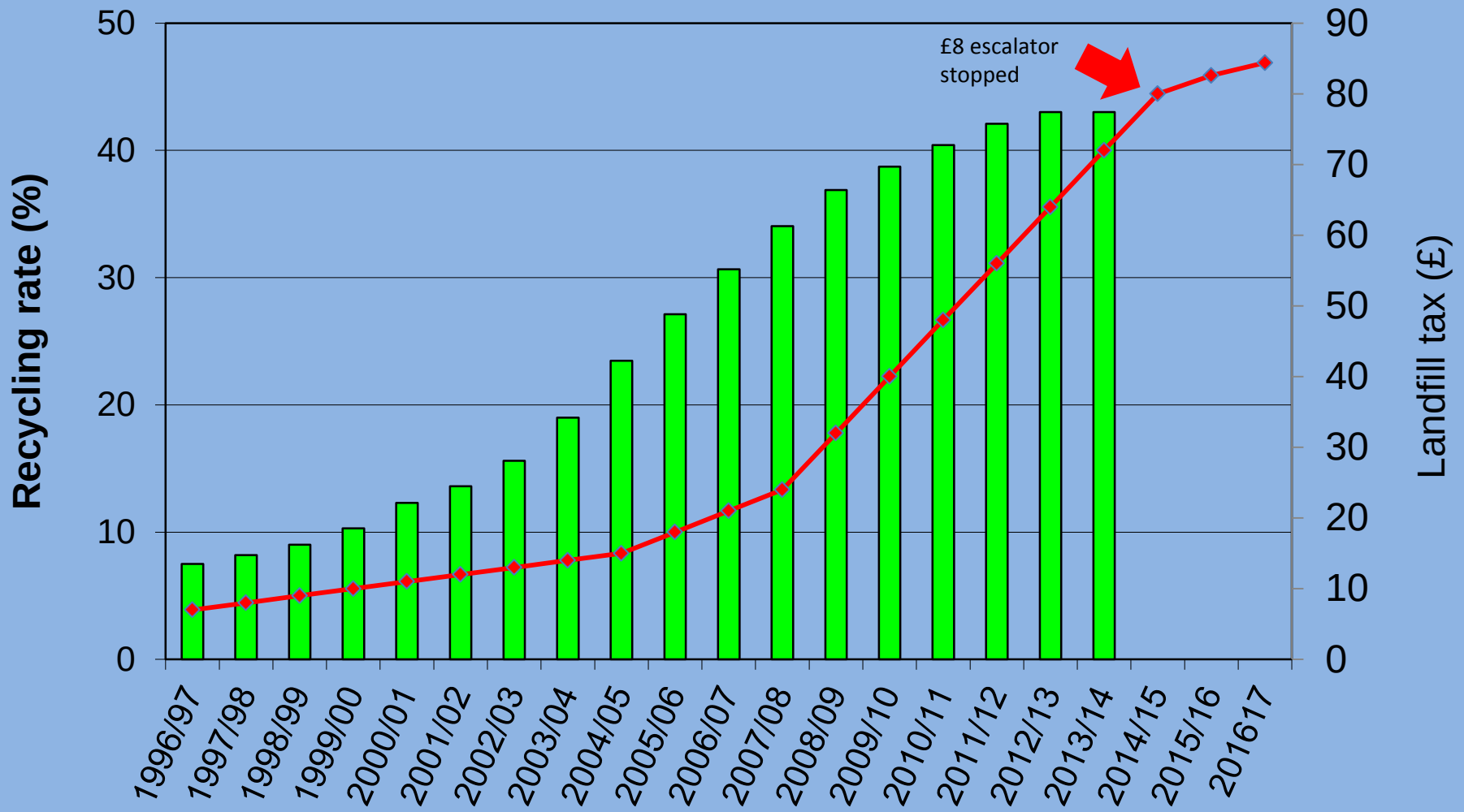
- Greater awareness of waste issue – 2004 Recycle Now campaign;
- Waste Recycling Bill 2003.



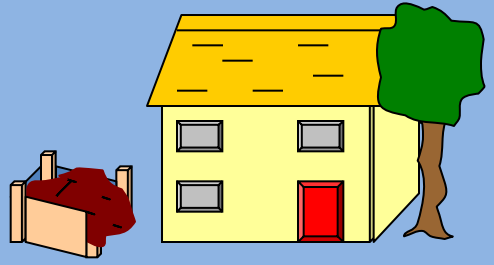
England LACW - management trends (DEFRA, 2015)



Recycling in England - LACW (DEFRA, 2015)



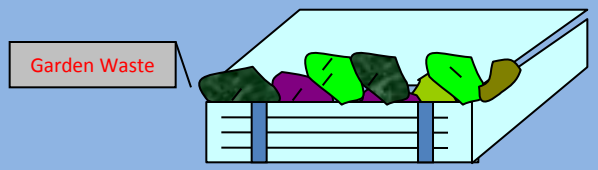
England Local Authority Collected Waste 2013/14 (DEFRA, 2014)



25.6 million tonnes

Kerbside

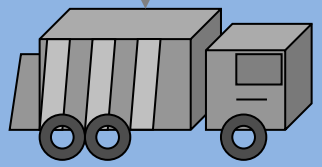
Other recycling (banks, 3rd sector)



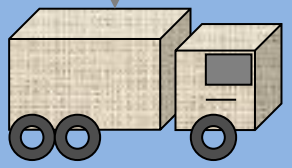
HWRC

Recycling

Rubbish



Rubbish collection

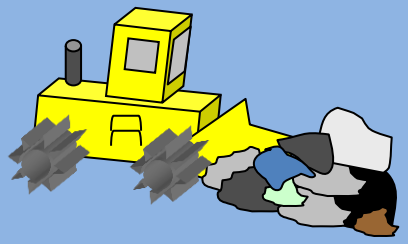


Other (bulky waste, litter bins)

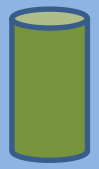
MRF/Transfer station

Total recycling and composting 42.6%

Incineration with EFW 4.2%

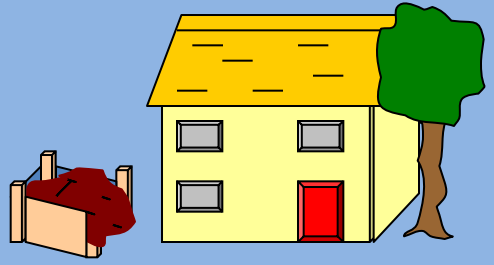


Landfill 30.9%



Other (MBT, AD) 2.3%

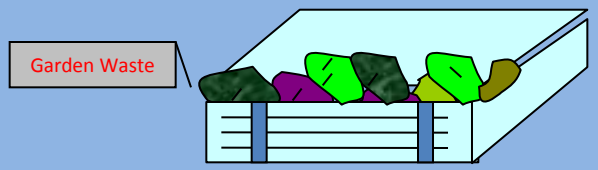
England Local Authority Collected Waste 2014/15 (DEFRA, 2015)



25.8 million tonnes

Kerbside

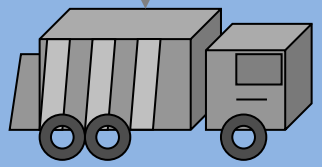
Other recycling (banks, 3rd sector)



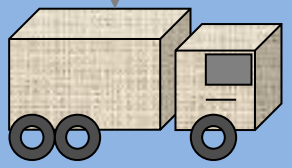
HWRC

Recycling

Rubbish



Rubbish collection

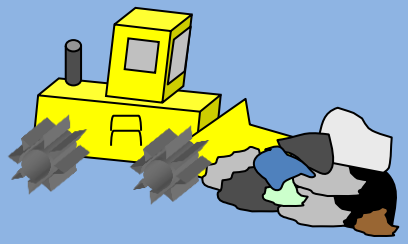


Other (bulky waste, litter bins)

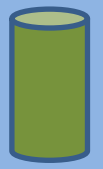
MRF/Transfer station

Total recycling and composting 42.9%

Incineration with EFW 30.1%



Landfill 24.6%



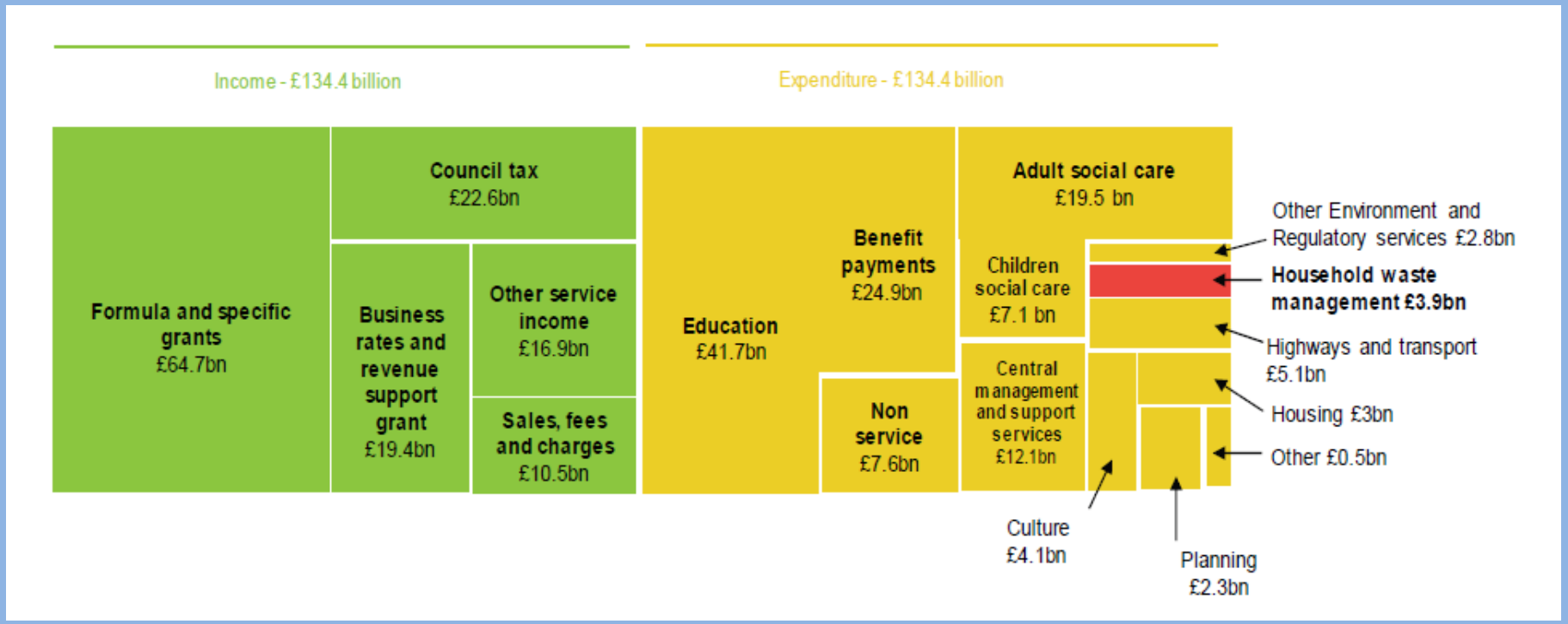
Other (MBT, AD) 2.4%

Local authority main expenditure/income 2012/13 (Audit Commission, 2014)

Local authority spend on waste

2001/02: £1.65 billion

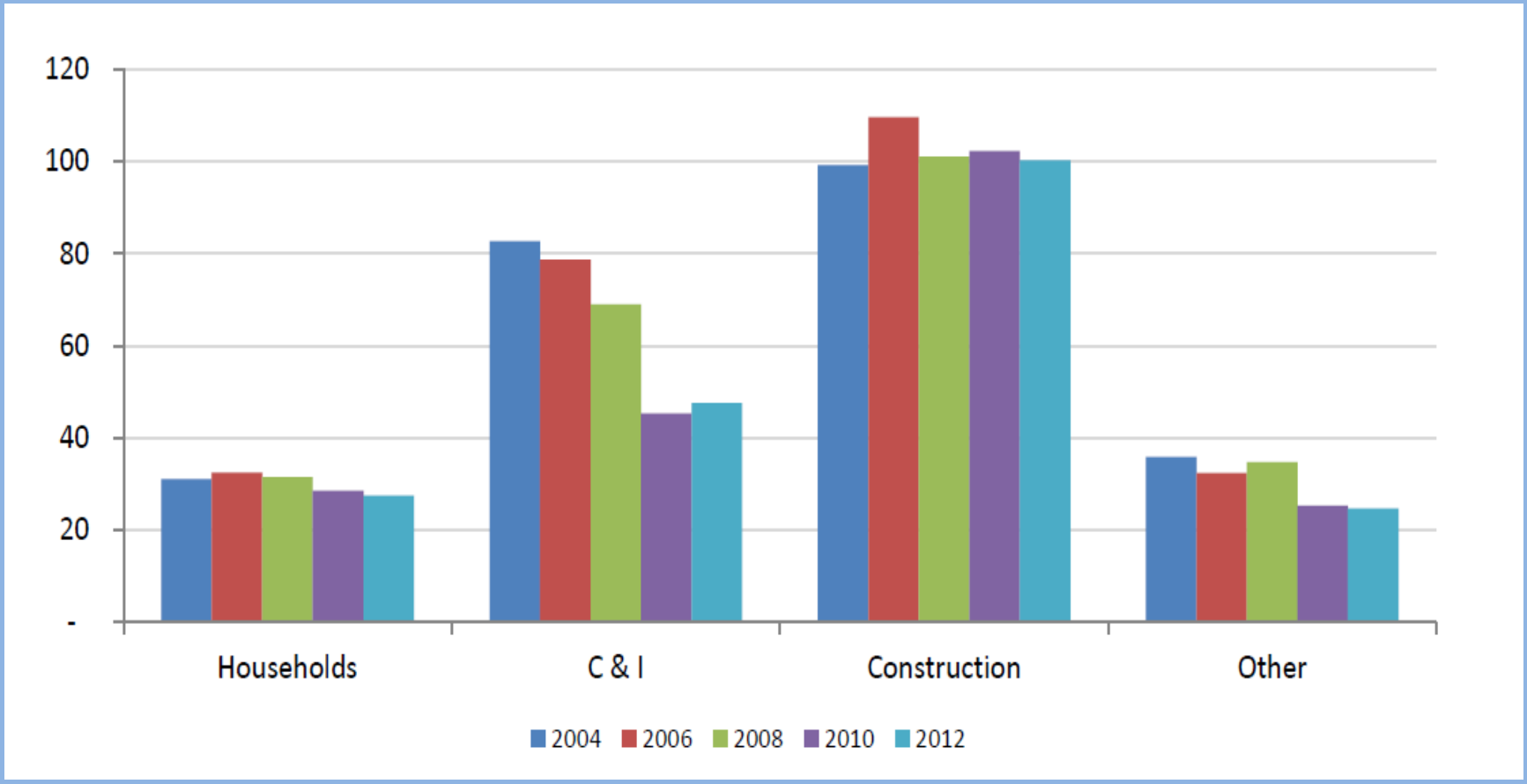
2012/13: £3.9 billion



Reasons for the increase in recycling

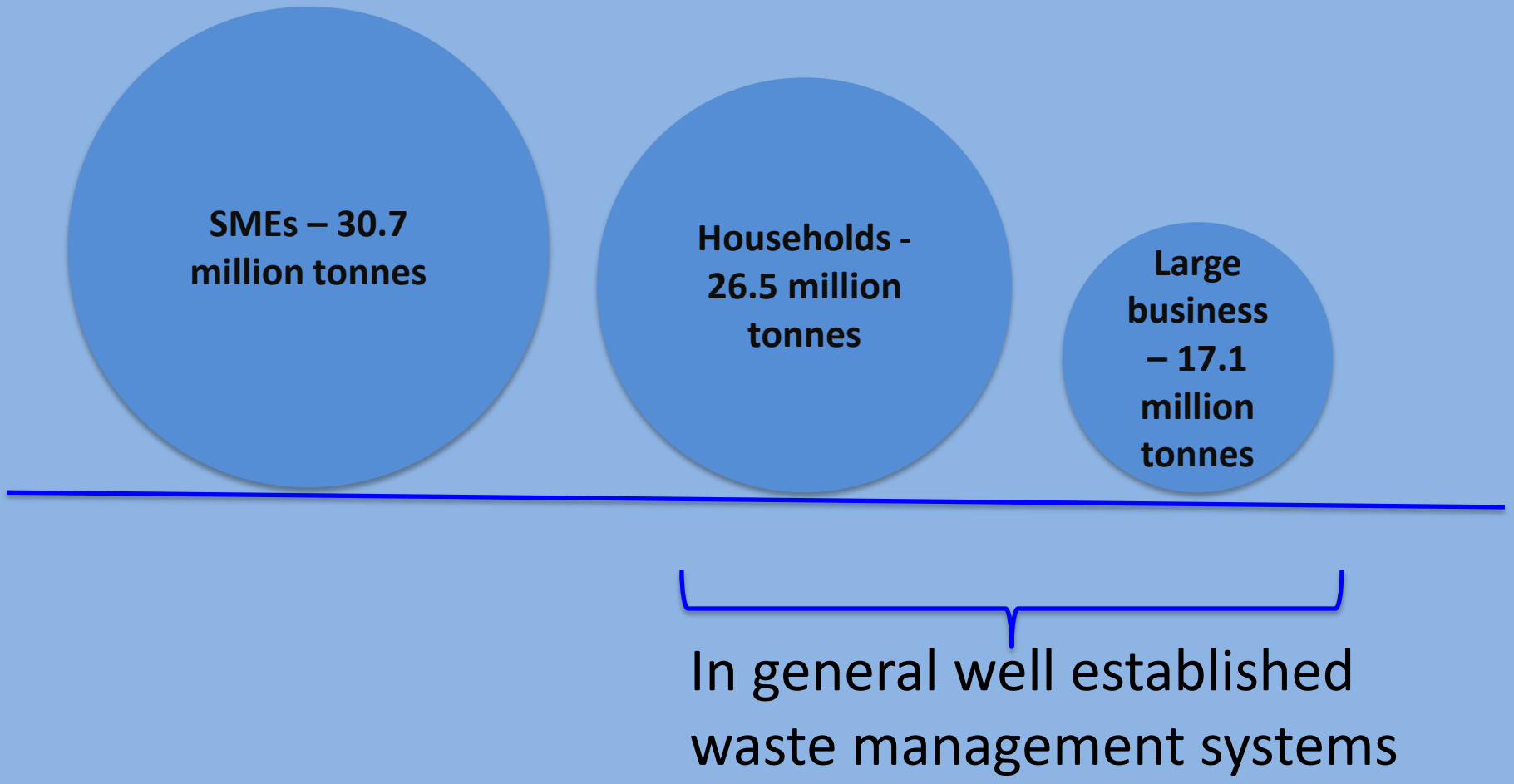
- From 2000 government start to take recycling seriously;
- Significant investment in improving services;
- Changes in the way in which we collect recycling – shift from bring sites to kerbside;
- More ‘sophisticated’ kerbside schemes – from paper only to multi material collections including biowaste;
- Setting up of WRAP and Recycle Now;
- Developing markets for materials;
- EU legislation: Landfill Directive – targets to reduce levels of waste to landfill and Waste Framework Directive;
- Landfill becoming increasingly expensive;
- Greater awareness of waste issues – is it acceptable to send valuable resources to landfill? Circular economy.

UK Waste arisings (DEFRA, 2015)

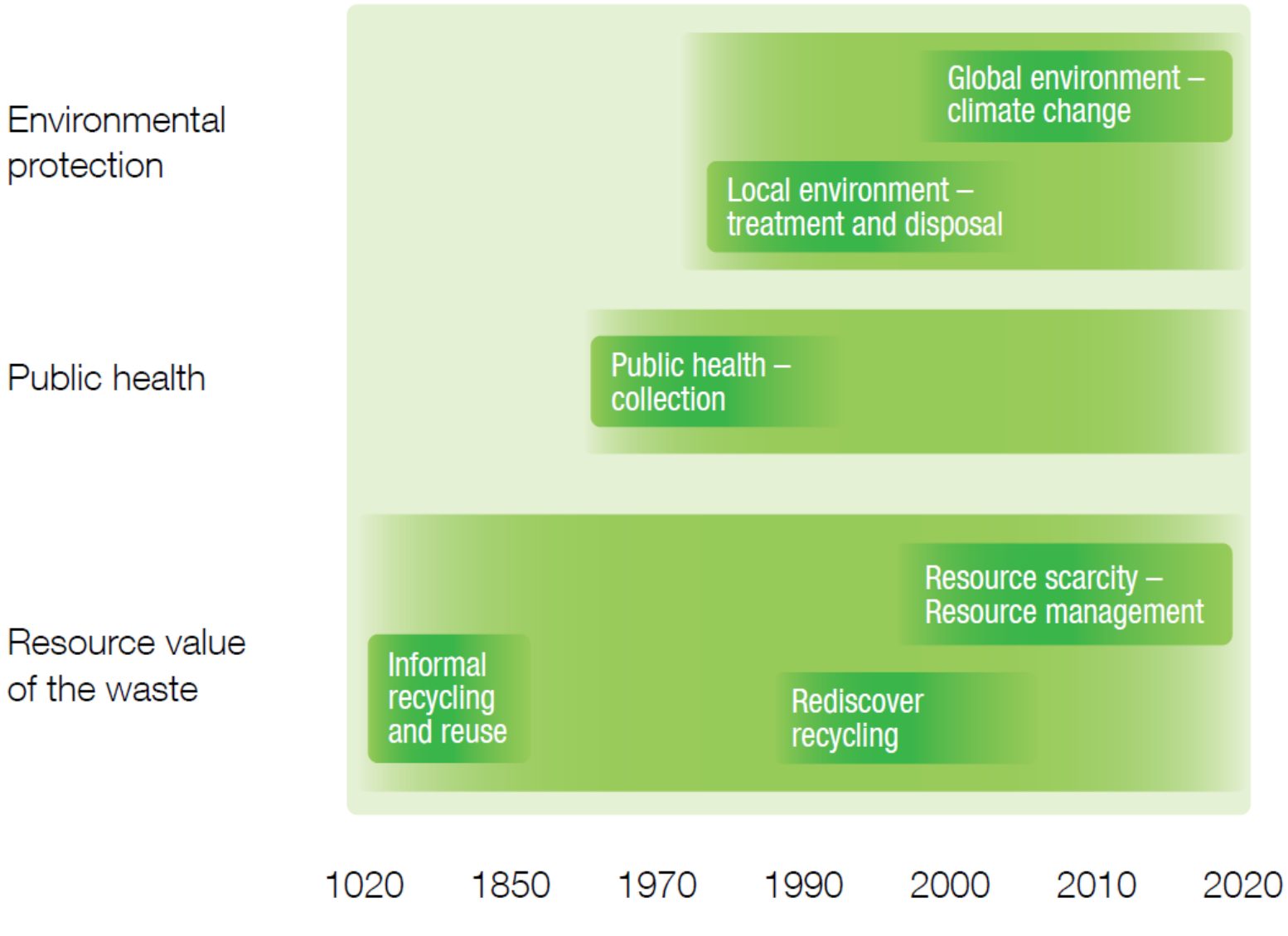


Total waste arisings in UK
2004 to 2012

Waste generation per annum in UK
(Jacobs, 2011, DEFRA 2015)



Timeline waste management in MEDC (UNEP, 2015)



Global picture - Bank of America Merrill Lynch (2013)

- World waste market currently worth $1 trillion (£650 billion) and could reach $2 trillion by 2020;
- Estimate waste volumes would double between 2005 and 2025, and then double again from 2025-2050;
- 70% of global waste is currently landfilled;
- Recycling rates low as 7% for industrial waste and 10% for municipal waste.

So how much waste is there?

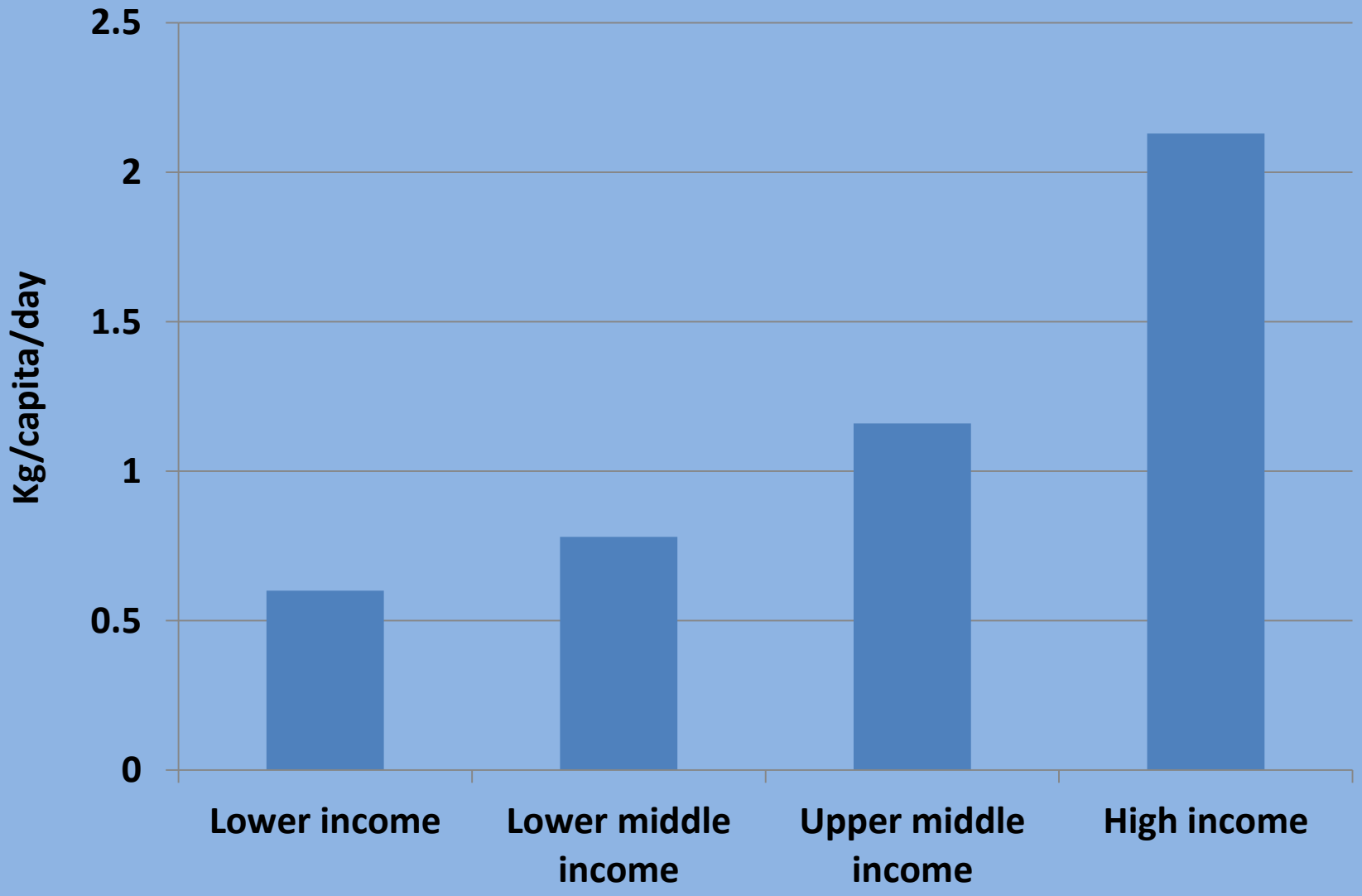
- *Chalmin & Gaillochet, 2009:*

- Worldwide - estimated 3.4-4 billion tonnes per annum.

- *Hoornweg & Bhada-Tata, 2012*:

- Worldwide (urban areas only) – estimated 1.3 billion tonnes per annum;
- Projected to reach 2.2 billion tonnes by 2025;
- Waste generation rates will more than double over the next 20 years in LEDC.

Waste arisings–urban waste *(Hoornweg & Bhada-Tata, 2012)*



UNEP Global Waste Outlook (2015)

- 2 billion people don't have access to basic waste collection;
- 3 billion to controlled waste disposal.

Worcester, South Africa

Santander, Colombia

So what are the impacts of dumpsites?

- Surface and ground water pollution;
- Soil contamination;
- Air pollution – release of methane;
- Fauna and flora;
- Uncontrolled burning – smoke can contain particulates, carbon monoxide and contaminant gases including dioxins – impacts on public health;
- Diseases transmitted by vectors e.g. Dengue fever and Malaria.

Health impact

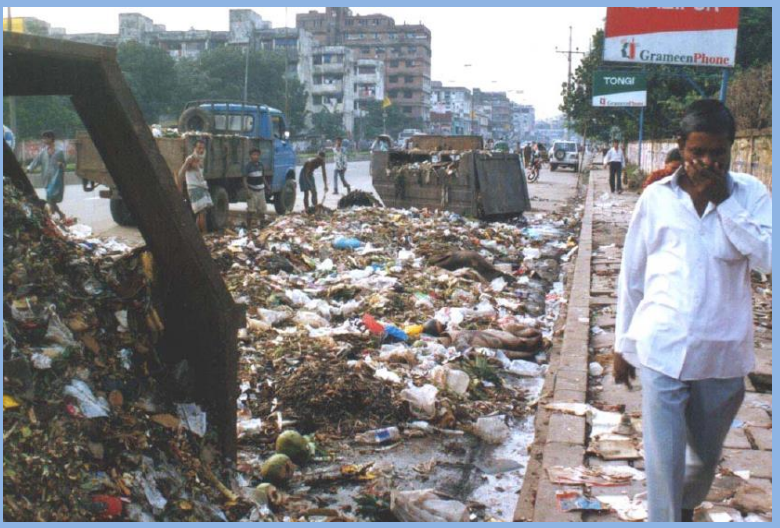
- Adan et al (1982) conducted research in scavenger communities. Found over 35 diseases including cholera, typhoid fever, skin disorders, pneumonia and malaria;
- Castillo (1990) research in Mexico City – average life expectancy of 39 years whilst general population 67 years.

Social cleansing - Colombia

- By end of 1994 over 2,000 scavengers had been killed as part of a social cleansing campaign;
- Some had organs recovered and sold for transplants – others sold to the University in Barranquilla for dissection.

Baguio, Philippines

Bangladesh and Ghana



UNEP Global Waste Outlook (2015)

UNEP Global Waste Outlook (2015)

CALL FOR ACTION

Waste management has strong linkages to a range of other global challenges: health, climate change, poverty reduction, food and resource security, sustainable production and consumption. The political case for action can be significantly strengthened when waste management is viewed as an entry point to address a range of sustainable development issues, many of which are difficult to tackle.

Sustainability

Climate change

Potential impact of improved waste management on reducing GHG emissions across the economy: 15-20%

Prevention of the **1.3 billion tonnes of food waste generated per annum** enough to feed all the undernourished people in the world twice over, could save **9% of total worldwide GHG emissions**

Diversion from disposal of biodegradable wastes prevents emissions of methane, a powerful greenhouse gas (GHG)

Reduction, reuse and recycling all displace virgin materials and products, and the GHG emissions in their manufacture

A clean city

- Where the solid waste management service works well
- A holistic approach is taken to managing all residuals

A successful city

- A healthy, pleasant and safe place to live
- A good place to do business and visit as a tourist
- Fosters a sense of community and belonging

Good governance

- The cleanliness of the city can be used as a proxy indicator of good governance

Enterprise and creating sustainable livelihoods

'Waste to wealth' projects in Africa have demonstrated that new waste services can be used as **a catalyst for sustainable livelihoods and economic development** in poor neighbourhoods of some of the world's poorest cities

2000-2010 in Europe **employment in waste and resource management doubled: > 2 million**

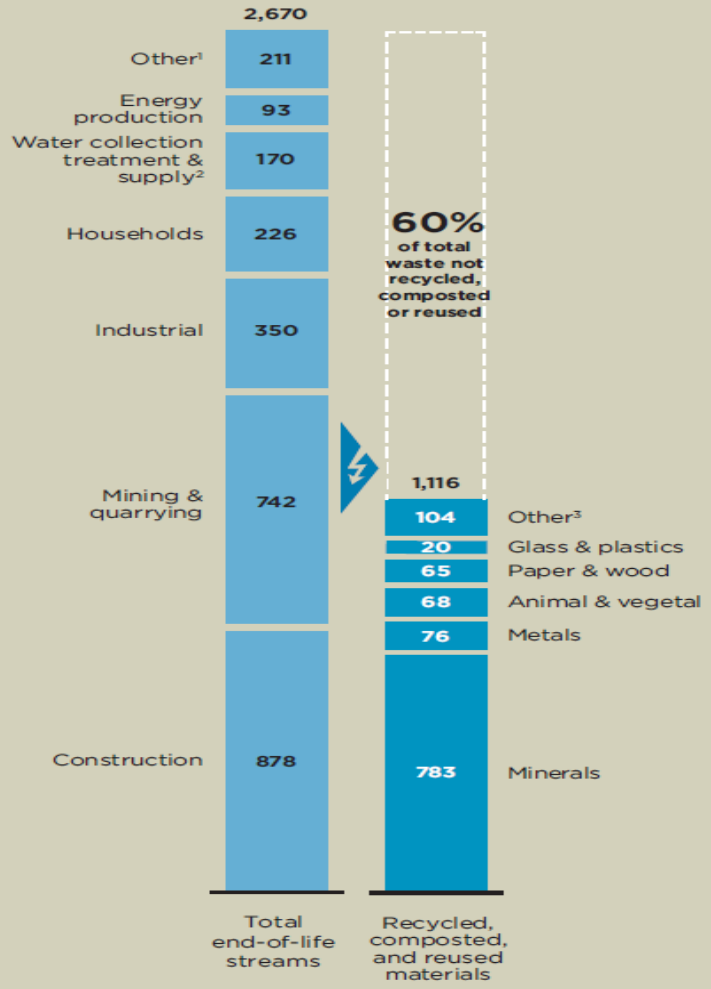
15-20 million people working in the small-scale entrepreneurial 'informal' waste sector worldwide

Estimate of worldwide potential for new jobs in the circular economy: 9 to 25 million


SUSTAINABLE DEVELOPMENT GOALS
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS

Material losses EU 27 (McKinsey & Company, 2012)

FIGURE 2
We are still losing enormous tonnages of material
Million tonnes, EU27, 2010E

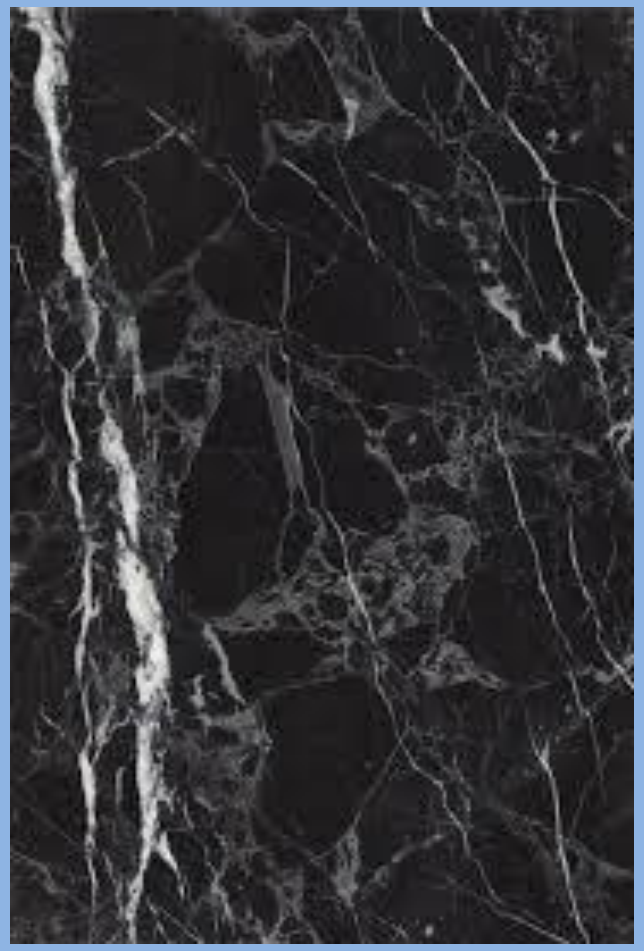


1 Includes services and agriculture, forestry & fishing
2 Also includes sewerage and other waste management activities
3 Includes used oils, rubber, textiles, household waste, chemical waste, and other non-specified

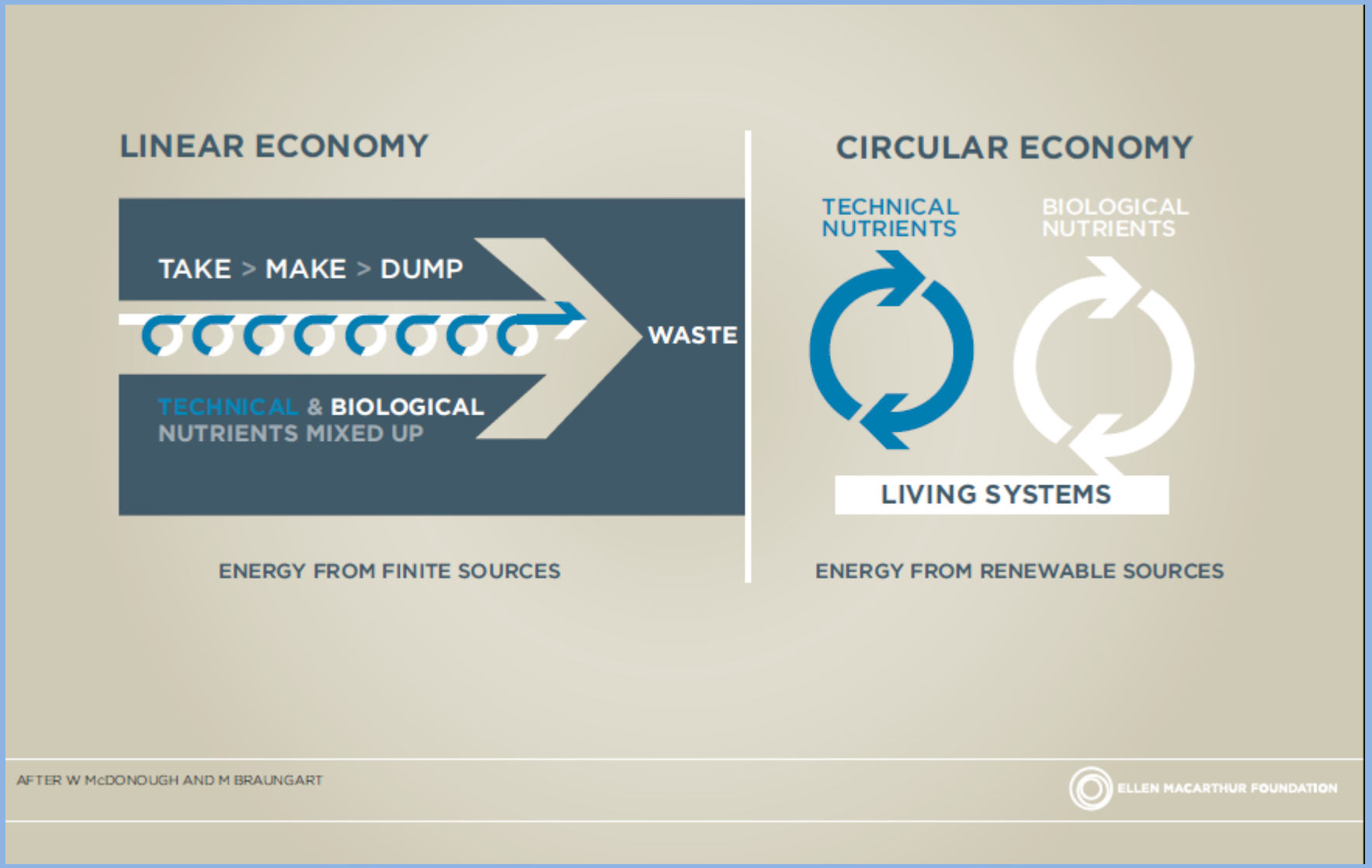
SOURCE: Eurostat waste statistics (2011)

Marble

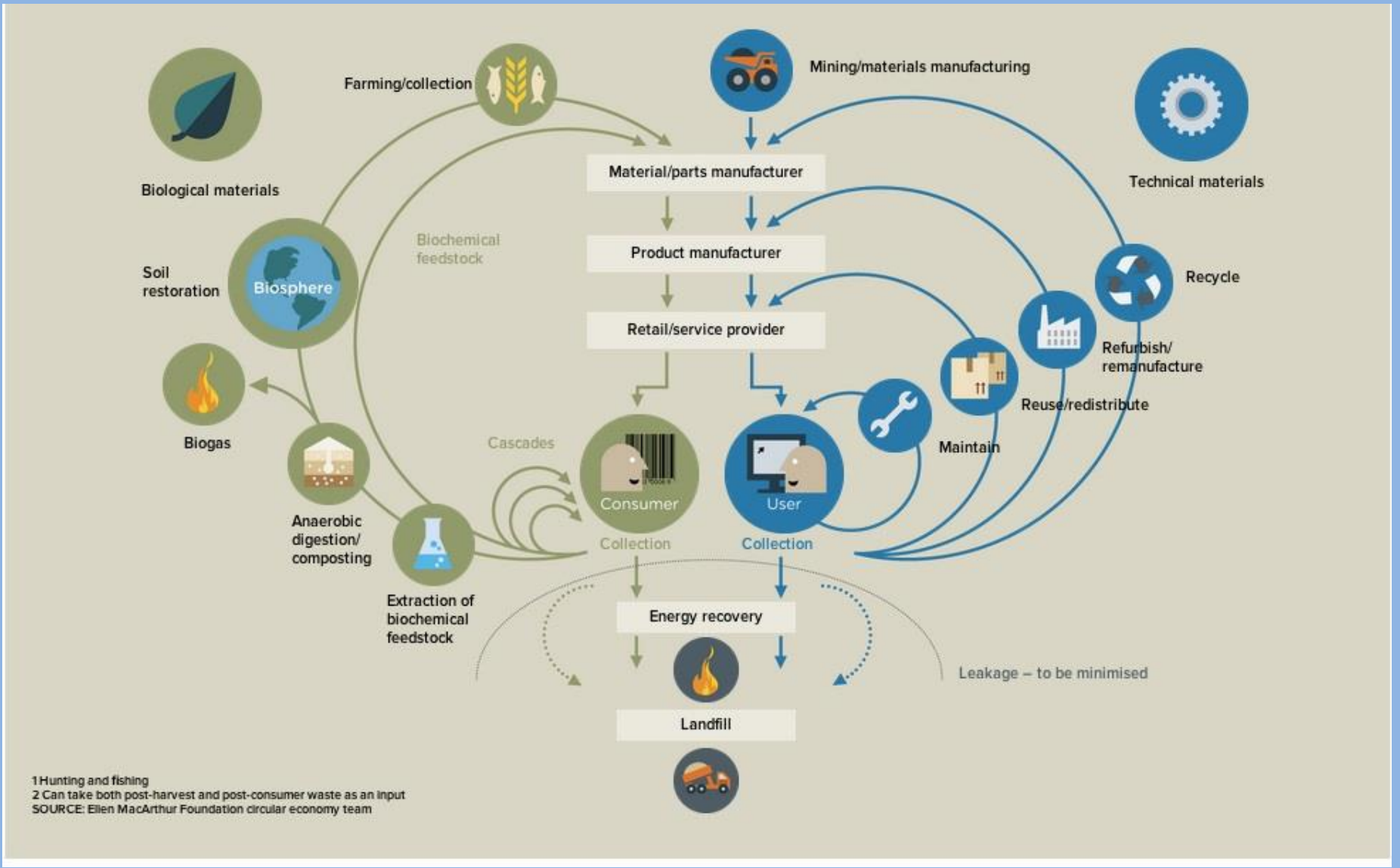
- High value items – some 70% of marble quarried is wasted due to prominent veins, inconsistent colouring or minor damage.



Linear Economy vs Circular Economy



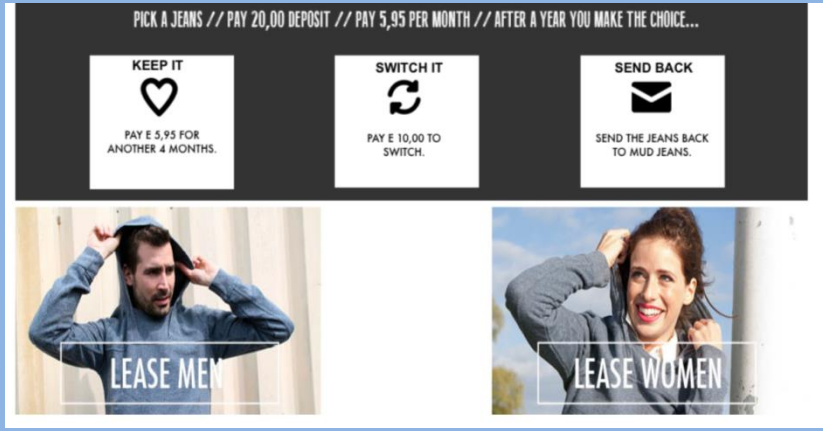
Circular economy



http://www.ellenmacarthurfoundation.org/business/circular-economy-diagram

WRAP & Green Alliance (2015) CE model could create 205,000 jobs by 2030.

Examples of circular economy being adopted

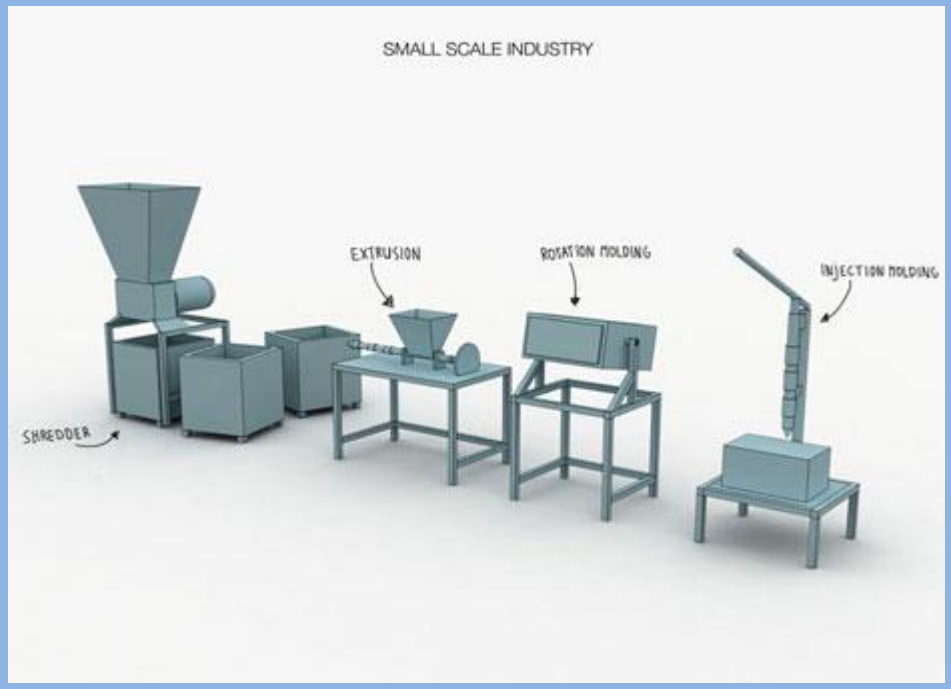


PHILIPS

CAT

http://www.ellenmacarthurfoundation.org/case_studies

Low cost local production



Job creation

- The South Africa Waste Management Strategy developed by the Department of Environmental Affairs (2012) target to create 69,000 new jobs in the waste sector.