



Department
for Environment
Food & Rural Affairs

Waste Prevention Programme for England

Overview of Evidence – A rationale for waste
prevention in England

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Global Resources

- We rely upon the world's resources for everything from food and water to transport and communication.
- But pressure on these resources is growing especially as industrialisation and population growth continue to increase.



It took 130,000 years for the Earth's population to reach 800 million around 1780. Now, the global population grows by almost 800 million people every 10 years.



By 2030 there will be 3 billion more middle-class consumers in the global economy.

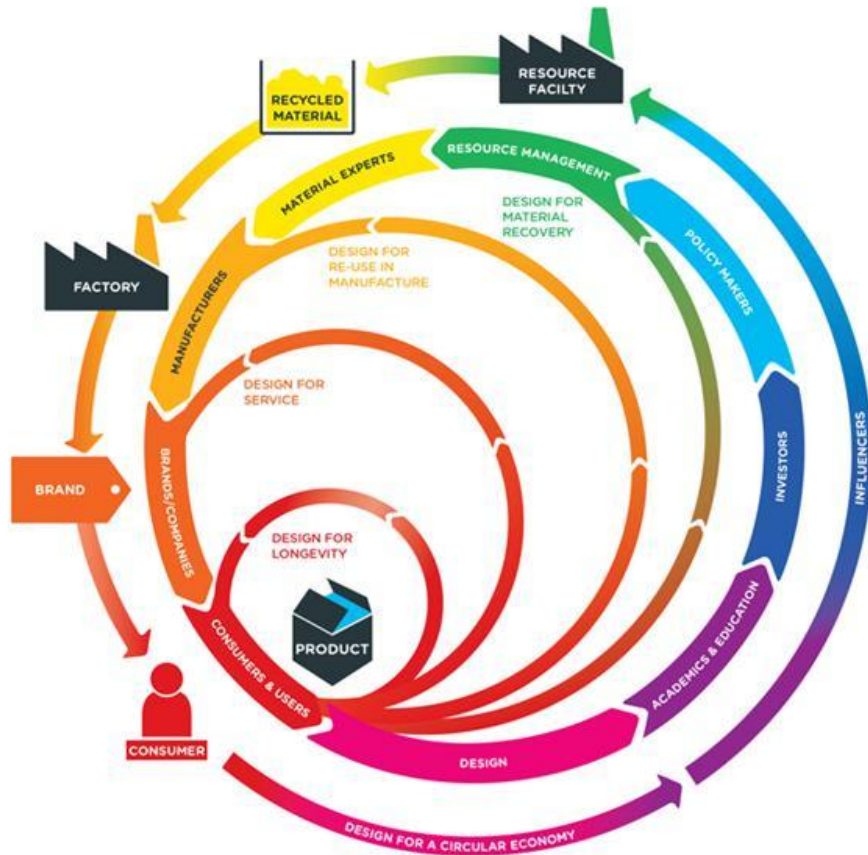
Demand for steel is set to rise by 80% between 2010-2030.



On current trends, over the next 20 years humans will use 40% more water than they do now.

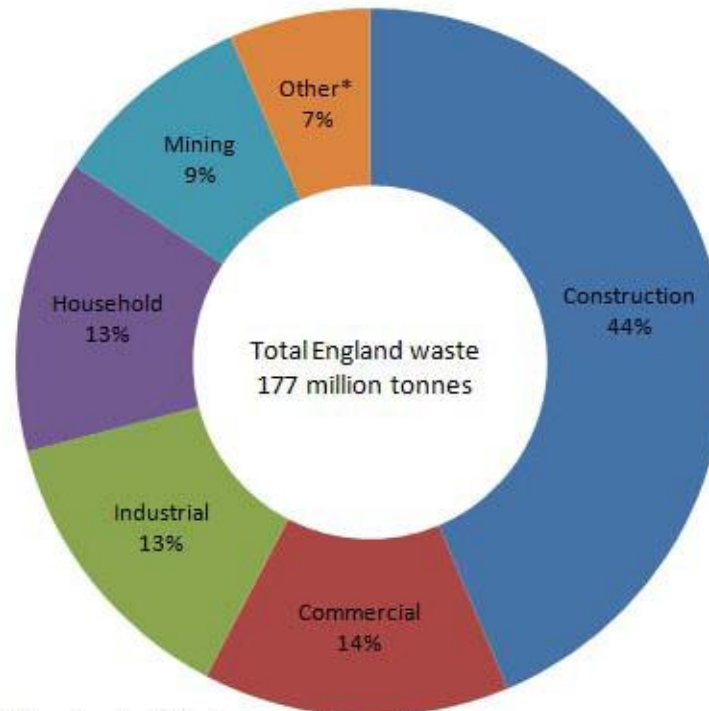
The average cost of drilling for oil has doubled over the last decade.

The Circular Economy



- Within the current linear model, resources are extracted from the earth for production and consumption on a one-way track with limited intent to reuse or actively regenerate the natural systems from which they have been taken. This means that valuable resources are constantly being lost.
- A circular economy is an alternative to a traditional linear economy (make, use, dispose) in which we keep resources in use for as long as possible, extract the maximum value from them whilst in use, then recover and regenerate products and materials at the end of each service life.

Waste in the UK



*Agriculture, forestry, fisheries and dredging spoils

Waste production in the UK is declining.
In 2010, 177 million tonnes (Mt) of waste were produced in the UK, continuing the downwards trend in waste arisings which peaked at 526 Mt in 2004.

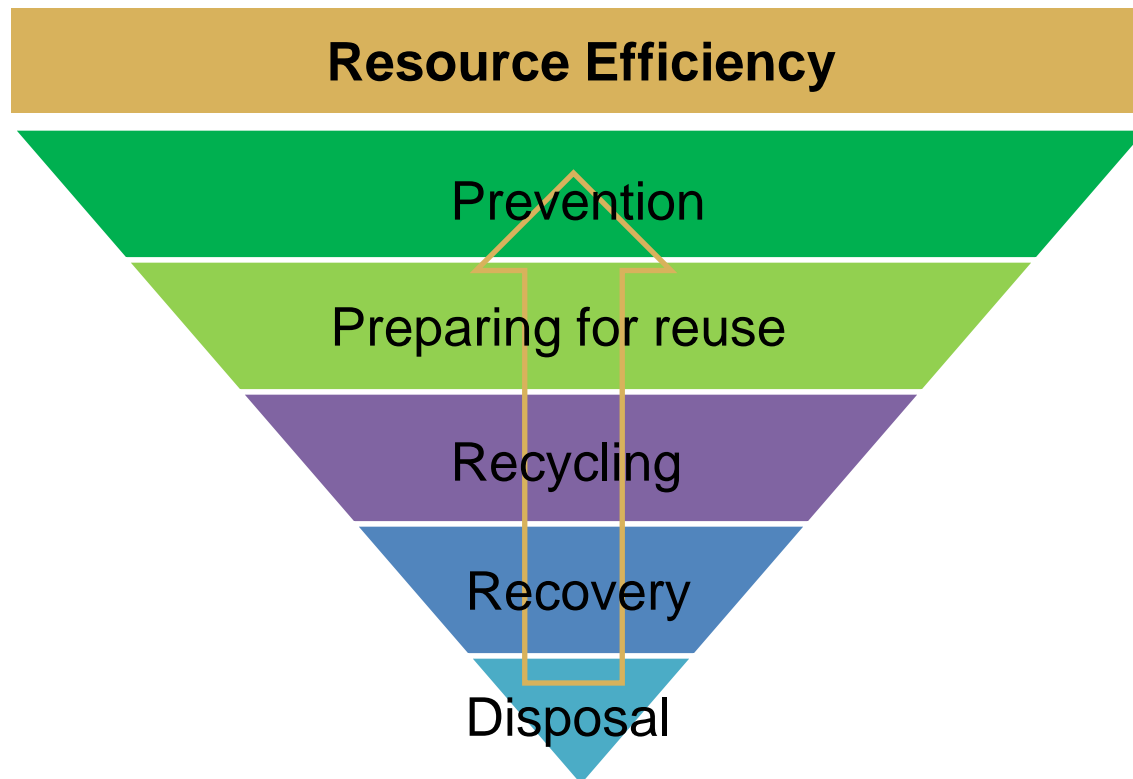
How the UK Compares

- On average we produce 465 kg of waste, per person, per year (2010) in the UK, down from a peak of 603 kg in 2004.
- Compared to the EU15 countries, the UK produces the 9th lowest quantity of waste per person.
- In the US, 730 kg of municipal waste was produced per person in 2010, over a third more than is produced per person in the UK (533 kg).

Total Waste Generated Per Person (2010)		
	EU 15 Countries	Kg per Capita
1	Finland	313
2	Ireland	387
3	Belgium	429
4	Sweden	431
5	Denmark	439
6	Germany	444
7	France	452
8	Greece	460
9	United Kingdom	465
10	Spain	504
11	Portugal	514
12	Italy	537
13	Netherlands	546
14	Austria	551
15	Luxembourg	760

The Waste Hierarchy

The waste hierarchy, classifies waste management practices in order of environmental impact. Prevention is sited at the top of the hierarchy and actions which prevent waste should be considered as a priority in any resource management system.



Waste Prevention



Waste prevention is defined in the revised Waste Framework Directive as measures taken before a substance, material or product has become waste, that reduce:

- (a) the quantity of waste, including through the reuse of products or the extension of the life span of products
- (b) the adverse impacts of the generated waste on the environment and human health, or
- (c) the content of harmful substances in materials and products.

In addition, 'preparing for reuse' is defined as checking, cleaning or repairing recovery operations, by which products or components of products *that have become waste* are prepared so that they can be reused without any other pre-processing.

Why Prevent Waste?

Environmental

Preventing waste not only avoids the carbon emissions that are emitted when waste is treated or disposed of, but also the emissions that are associated with the production of goods. By reducing the level of waste that has to be treated there may also be positive impacts on air quality and local quality of life.

Financial

By reducing the waste created in the production of goods and services, businesses can increase the amount they produce for a given level of inputs. This makes the UK economy more productive in the long run. Opportunities for innovation and growth also exist by designing products/services to make better use of resources and minimise waste.

Societal

Using materials in a more sustainable way also has the potential to create more employment and training opportunities and offer longer product lifetimes and a greater range of consumption models to consumers.

Producer Savings

When producers create less waste they can reduce the resources required to manage that waste and devote those resources to more productive uses.

Consumer Savings

When consumers reduce the amount of waste they generate, they often get better value from the products; the savings they realise can boost consumer demand for other goods and services.

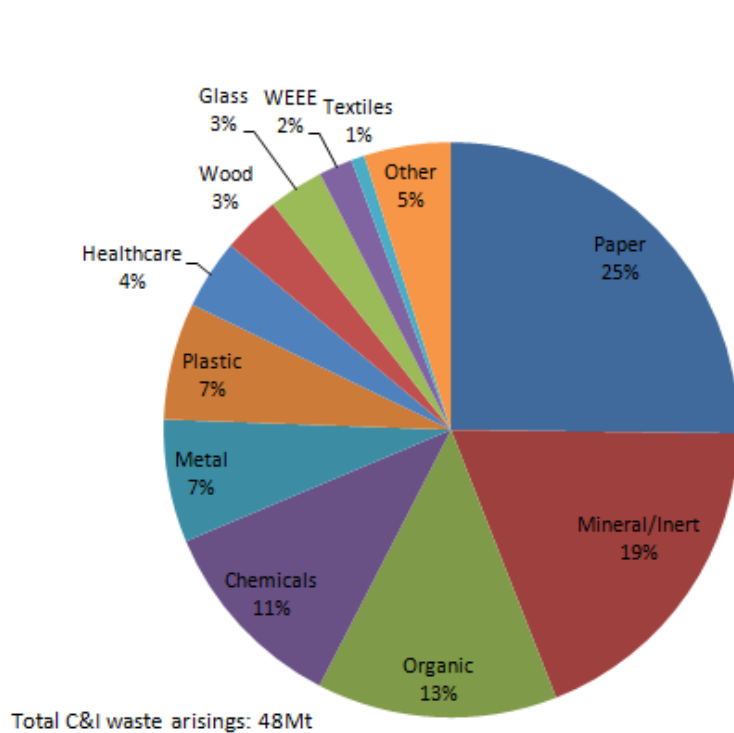
New Industries

Some prevention and reuse activities depend on the development of new practices and technologies, which could lead the way to new market opportunities, new jobs and economic activity.

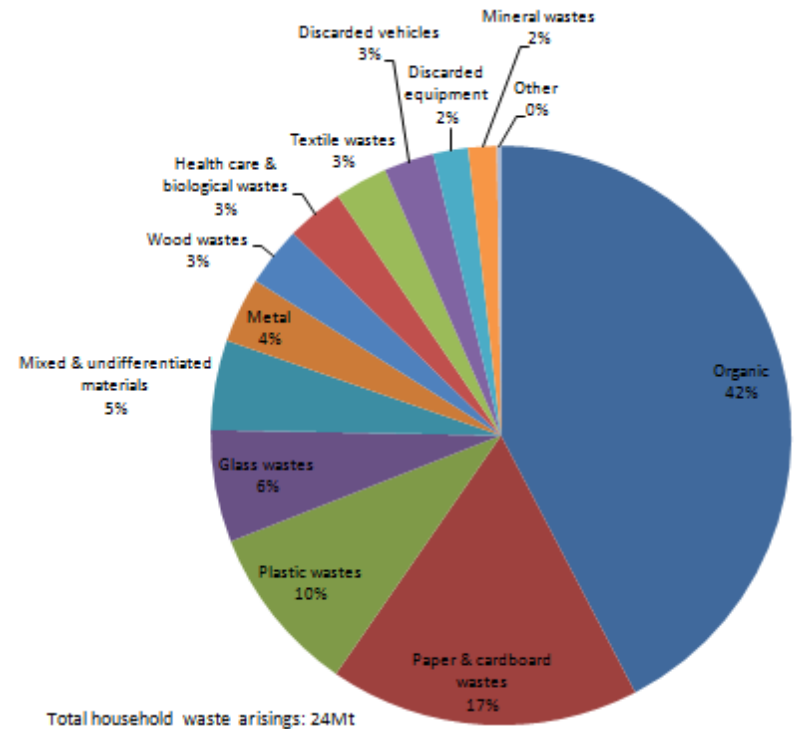
LA Savings

Local councils can benefit from the cost savings resulting from a decrease in the amount of waste which needs to be collected and managed.

Waste Composition in England

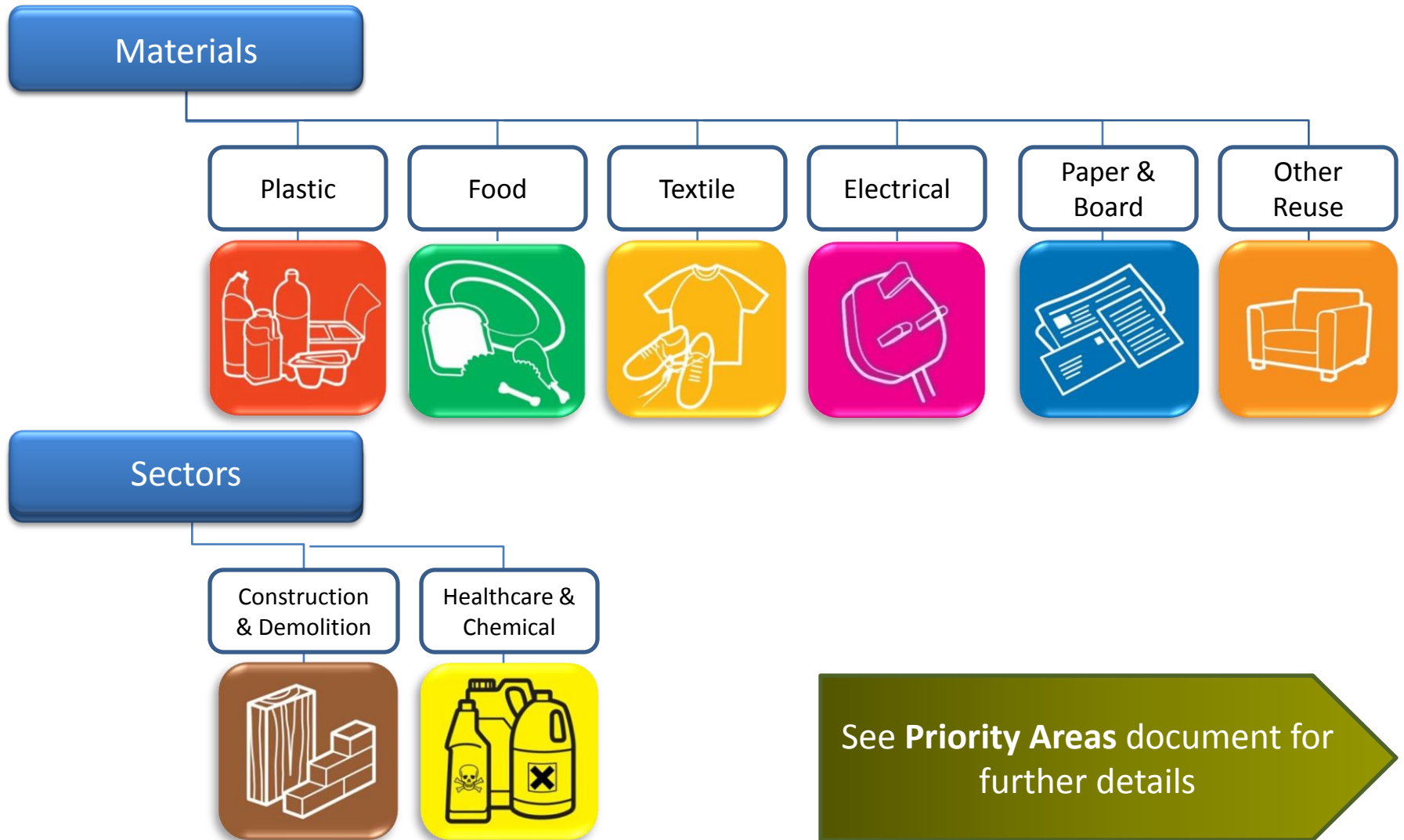


Composition of commercial and industrial waste in England, by weight (Defra, 2010)



Composition of household waste in England, by weight (Defra, 2010)

Priority Areas



See **Priority Areas** document for further details

Potential Impacts of Waste Prevention

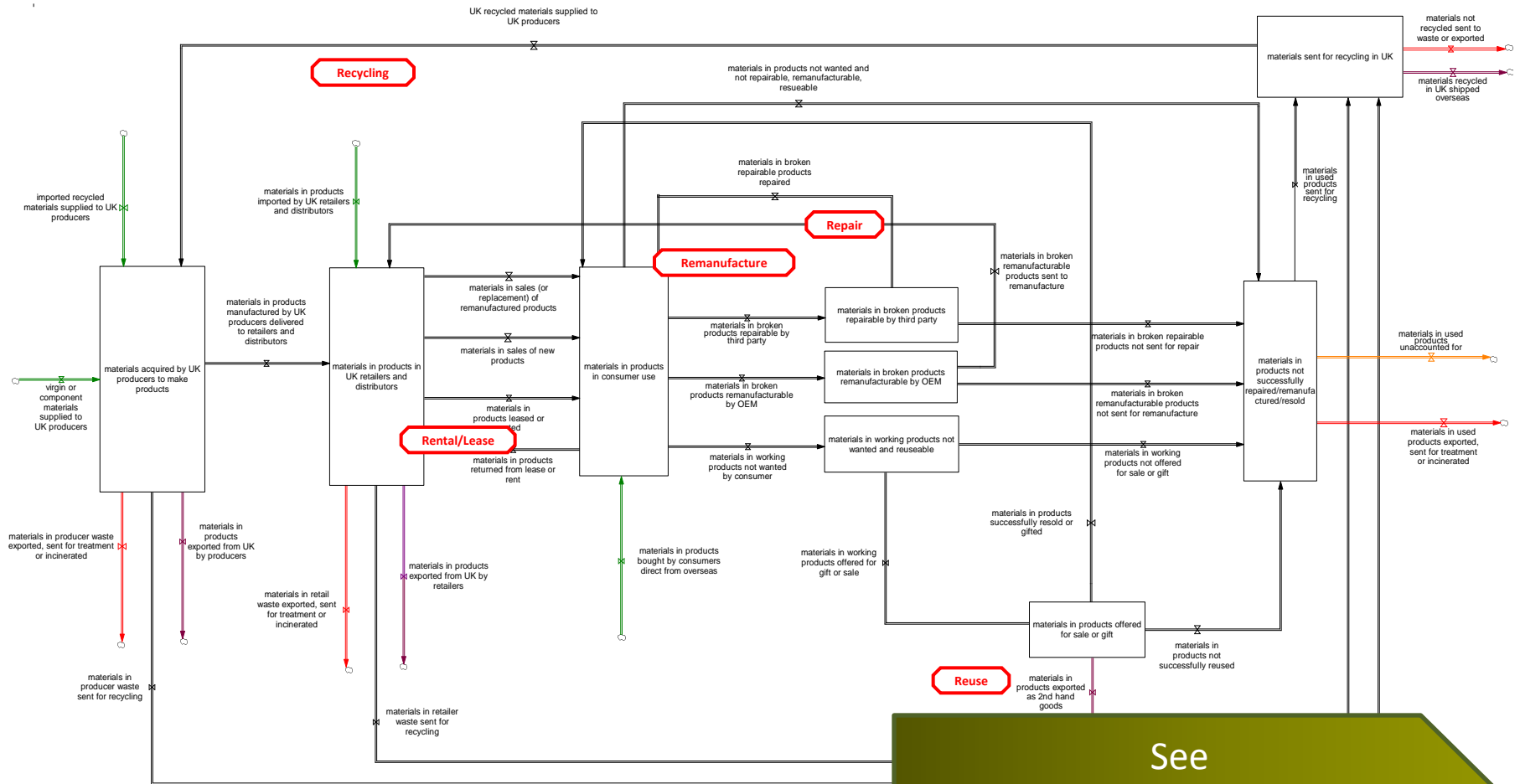
- Economic assessment of Waste Prevention Actions for Priority Wastes (Defra, 2012) used marginal abatement cost curves (MACC) to assess the potential for savings through a selection of different waste prevention actions.
- The report indicated a total potential material saving of 58 million tonnes, a carbon saving (CO₂ equivalent) of 100 million tonnes and a financial saving of approximately £60 billion, annually.
- Together food waste, construction and textiles account for 89% of the total potential savings by weight, 75% by financial value and 95% by carbon (CO₂e) impacts.
- Of those actions considered as part of this work, the greatest benefits for WEEE and furniture relate to increasing reuse by focussing on increasing supply of quality second hand products through improved collections and better information for consumers on product availability and product quality.



Waste Prevention Model

- Using system dynamics (SD) Defra has modelled the key drivers of waste generation and opportunities for prevention throughout the economy
- Taking a material and product focus, the model combines a materials flow map (see next page) describing the flows of materials and 7 dynamic sub-models which drive the flow of materials through the system
- The consumption of products demanded by consumers was identified as a key driver of the flow of materials, this in turn drives the supply of materials (virgin or recycled, imported or exported)
- Five waste prevention “pathways” were explored along which products move back into use, delaying waste generation – repair, reuse, remanufacture, lease and rental, material recovery
- Waste prevention practices within the supply chain include design for repair, material efficiency, producer responsibility, reuse, manufacture; some of which enable the pathways mentioned in the point above.

Material Flows Map



See
Waste Prevention Model
 document for detail

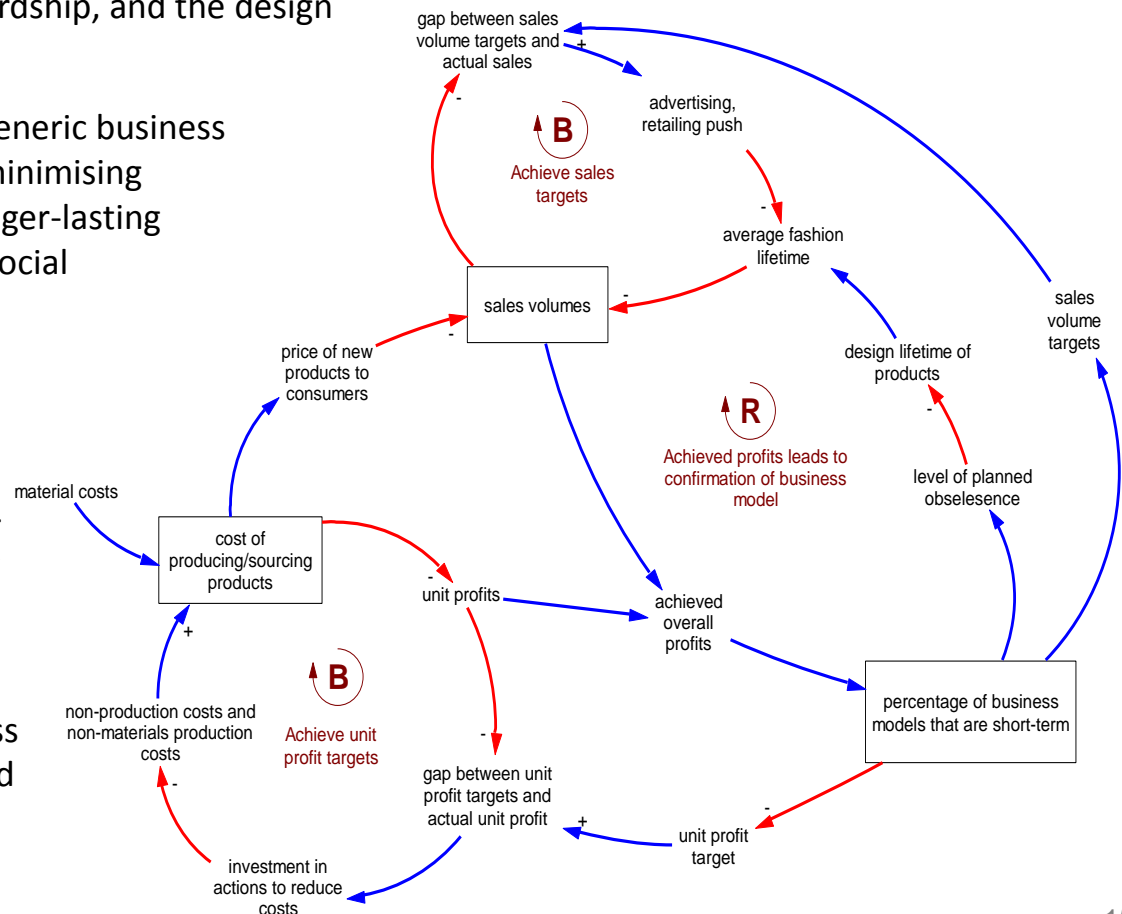
Example Sub-Model: Business Models and Design

The Business Models and Design sub-model describes several factors that affect the lifetime and volume of new products sold: the price of new products to consumers, product stewardship, and the design and fashion lifetime of products.

‘Short-term business model’ represents a generic business model that focuses on short-term profits, minimising investment in longer-term goals such as longer-lasting products, customer loyalty, and corporate social responsibility.

In the main reinforcing loop (R), the proportion of businesses following a short-term business model drives the unit profit and sales volume targets (balancing loops – B); in turn increasing profits and reinforcing this type of business model.

More sustainable business models can co-exist, decreasing the ‘percentage of business models that are short-term’. This would lead to increased average design lifetime and producer responsibility.



Benefits of Waste Prevention

There are several benefits of waste prevention, for example:

Between now and 2020, WRAP estimates that electronic products purchased in the UK will total around 10 million tonnes and include precious metals, with a total estimated market value of £1.5 billion*

UK hospitality sector (hotels, pubs, restaurants and quick service restaurants) could save £724 million a year by tackling food waste

By diverting 2.7 million items of furniture and electrical items for reuse, the Furniture Reuse Network provides training for over 15,000 trainees and is able to assist close to one million low income households each year.

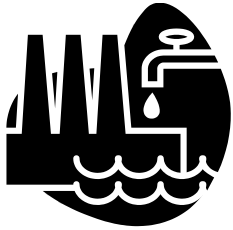
A 5kg reduction in plastic waste per person, per year, could be achieved by using reusable water bottles.

By taking simple steps to produce less waste, which pay back within a year, could save UK businesses £18 billion

Waste paper could be reduced by up to 130,000 tonnes if 15% of households displayed a "NO JUNK MAIL" sticker on their letter box

*Correct as of 2013

Why the Benefits of Waste Prevention May Not Be Realised



Environmental Externalities

Consumers and businesses fail to take into account the environmental costs of their decisions



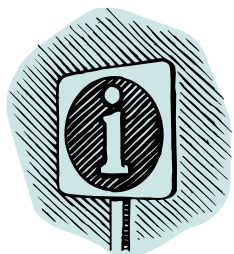
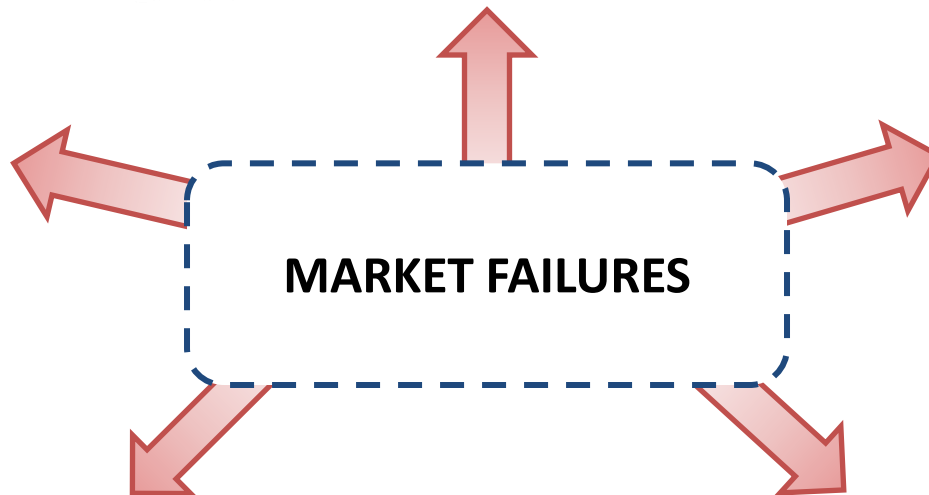
Financial

Some waste prevention actions require an initial investment before benefits can be realised



Regulatory

Unintended consequences of regulation could inhibit waste prevention and reuse



Information/Behaviour Failures

Consumers and businesses may not be aware of or underestimate the value of waste prevention

Split Incentives

Those who take action to reduce waste may not be the same as those who benefit from reduced disposal costs



Barriers and Motivations for Businesses (I)

Factors influencing the waste prevention behaviour of businesses

- Opportunities for competitive advantage, increased productivity, efficiency and cost-savings
- Compliance with legislation and reducing the risk of prosecution
- Leadership and positive corporate culture encourage waste prevention
- Waste management costs do not always reflect the true cost of waste disposal costs may be too low to motivate many businesses
- Attention often focussed on end-of-pipe solutions rather than improvements in resource efficiencies and productivity
- Targeting and quality of business support
- Lack of resources (time, staff, financial) are barriers, particularly for SMEs. The financial barrier is less to do with actual costs of waste prevention but lack of understanding of these costs
- Positive (and negative) environmental attitudes

Barriers and Motivations for Businesses (II)

Actions that can be taken to effect change

- Standards designed for voluntary use which though regulations may become compulsory
- Labelling to enable consumers and purchasers regarding environmental or sustainable choices
- Procurement can be a tool for internal change (e.g. where an organisation chooses to buy or switch an existing product which results in less waste); or as a driver of external change (e.g. where an organisation collaborates with, or influences suppliers to change)
- Commitments and voluntary agreements
- Communication provides a tool for change; increasing uptake of waste prevention through awareness raising and driving long term behaviour change
- Business support through waste minimisation clubs where groups of businesses within the same sector or given geographical area that work together to achieve savings in waste minimisation
- Adopting measures which minimise waste, for example through good housekeeping procedures and material efficiency or systems/production methods which have lower environmental impacts
- Product/service innovation, for example through product design, leasing, extended life, reuse, remanufacture as well as minimising the overall environmental damage of products

These can also give rise to new business models

Actions in Practice

[Airbnb](#) supports the rental of spare bedroom space to private travellers.
[Warp it](#) allows internal staff or staff between companies to sell unwanted items and buy needed items.
[erento](#) is a portal that allows B2B and B2C hiring of many products and tools, and the hiring out of own tools and products.
[Streetbank](#) is a free online portal that shows products and skills available within a local neighbourhood.
[Swapstyle](#) allows swapping of clothes and bags for free through an online portal.
[ecomodo](#) is an online portal that allows people to lend or hire their own products to other people.

Collective Consumerism

Shifting from ownership of products to enable the collaborative consumption of services.

[Rolls Royce](#) sell their engine's thrust as 'power by the hour', which includes full in-use monitoring, servicing, repair, remanufacture and replacement. A Shade Greener offer a '[Boiler for Life](#)' scheme. They install, maintain and service a new boiler for a weekly fee.
[Digital lumens](#) provide intelligent lighting systems that reduce lighting-related energy use by up to 90%. As of 2013, they plan to offer their solutions

as a service rather than an equipment sale.
[Bandvulc](#) sell 'road grip' (tyre support system) rather than tyres for articulated lorries.

[Interface FLOR](#) sell 'flooring services' through their evergreen lease option. Floor tiles are designed biomimicrially for remanufacturer once they wear out.

[Xerox](#) sell contract 'print services' rather than printers. Printers are designed to be remanufactured and reduce waste in operation (e.g. cartridge free).

Incentivised Return & Reuse

Encourages customers to return used items for an agreed value. Customers return products via a convenient system. Collected products are refurbished and sold for re-use on appropriate markets.

X

Product Service Innovation

Providing a service based upon delivering performance outputs – linked to products or services. The product may be designed for long life, short life or a mix depending upon the optimum output requirements. Products could also be designed for disassembly, remanufacture and reuse.

Long Life

Products are designed to have a long life time with durability, reducing consumption.

[Amazon](#) trade-in allows users to trade in their books or video games for an Amazon gift voucher. The product is then made available for resale.
[Mazuma Mobile](#) offer same day payment for used mobile phone handsets which are then refurbished for sale or recycled.

X The common feature of these models is that they **extend product life, conserve resources and prevent materials from becoming waste.**

Taking it Further...



Collaborative Consumerism

Valued at £330bn globally and £22.4bn in the UK. It is estimated that UK consumers currently participating in the sharing economy, benefit from £4.6bn savings and earnings.

Barriers to further uptake

Trust is a key inhibiting factor for both lending and borrowing. This reflects both the novelty of the practice to many consumers and the need for effective tools to ensure that assets are protected.

Other barriers include practical limitations such as proximity to the product or service and ensuring that there is a critical mass of businesses and consumers engaged.



Incentivised Return & Reuse

Billions of pounds worth of unused electrical products (e.g. laptops and TVs) and garments are estimated to

be in UK households, trading these effectively could contribute up to £2 billion to UK GDP. WRAP research indicates that householders would welcome the opportunity to deal with major brands and retailers to trade-in and purchase used products.

Barriers to further uptake

To gain consumer trust model needs to be adopted by major retailers

Businesses need evidence that selling used products will not harm overall income

Uncertainty over used products regulatory treatment of may deter some

Taking it further...



Product Service Innovation

Product Service Innovations have the potential to drive major shifts towards more sustainable production and consumption patterns.

Barriers to further uptake

Developing consumer acceptance for new consumption models

Overcoming logistical and organisational barriers to transforming business behaviours and actions

Developing the necessary infrastructure and skills to support the transition to a more service based system of provision and consumption

Motivating uptake for models when the benefits are often deferred or non-linear and predicated on product re-design or changes to consumer norms.

Identifying the benefits of different models and evaluating the impacts of innovative practice.



Long Life

Business gain additional benefits through, e.g. extending and diversifying the services attached to products; strengthening consumer relationships and brand loyalty; retaining access to valuable raw materials

Consumer Patterns

Since the
1950s

...the way people consume goods and services in the UK has changed considerably. At this time, mass market household electrical goods first became available to the average householder; today, on average, each person buys 3 new electrical items each year.

The way consumers purchase goods has also changed over a short time...

Since
2000

....the amount Britons have spent shopping on the internet has risen from a yearly total of £0.8bn to an estimated £58.8bn in 2010*.

And in
2020?

Consumers will be able to choose from an ever increasing range of products and services that fully meet their needs but through design maximise resource productivity and minimise waste.

* according to the IMRG Capgemini e-Retail Sales Index

Reuse Evidence

- In 2012 it was estimated that in England (excluding cars) more than 500 million second-hand items are purchased each year, with a collective weight of more than 2.4 million tonnes
- The study suggested that 29% of products and items exchanged for second-hand use are textiles, 18% are electrical and 13% furniture
- The majority of people purchase second-hand items online, through for examples, online auctions and markets or from charity shops
- People typically pass on or sell second-hand items to friends, family, colleagues or donate them to charity shops and via door-to-door collections
- In more than 40% of exchanges (of WEEE, furniture or textiles in the study), the purchase of a second-hand item was found to prevent the purchase of a new item
- If an item cannot be sold over half of the sample would still store it, whilst a little under a third would throw it out

Barriers and Motivations for Households (I)

Factors influencing the waste prevention behaviour of householders

- Low awareness of waste prevention actions; people have a tendency not to think about waste at the time of purchase, being more focussed on the disposal i.e. recycling
- Many people think that waste prevention is recycling; when asked participants in a study were asked to list the waste prevention activities they undertook, only 7% were actually waste prevention (as opposed to treatment) activities
- In our minds 'waste' is strongly linked to disposal activities (and often recycling) as opposed to say shopping habits – which make it hard to spot opportunities to prevent waste in our daily lives.
- People tend to feel that they are powerless and therefore unable to address the amount of waste they generate or that it is “someone else’s responsibility”
- There may be a lack of interest or sense of apathy around waste prevention
- Waste prevention can be (perceived as) inconvenient and/or costly
- Some social norms do not favour waste prevention e.g. replacing goods when still useful in order to have the 'latest' model

Examples of Practical Barriers

...to reuse

- Almost a third of us do not believe our items are worth donating
- There is a lack of consistent acceptance criteria for items offered for reuse
- Quality of new items on the market has a later impact on reuse

...to refillable products

- History of poorly designed and impractical refillable products
- UK homes are less suited to storing large, bulk containers

...to reducing food and drink waste

- Issues with appropriate storage/packaging
- Lack of cooking skills and time (e.g. purchasing food with more packaging)
- Few opportunities to refill water bottles instead of buying new

...to reusable products

- Reusable products can be seen as more difficult and time consuming to use than a disposable alternative (e.g. nappies)

...to using electrical items for longer

- The cost and availability for repair
- The ability to repair items (e.g. availability of spare parts)
- The speed with which technology changes and/or becomes obsolete

Plus...

- Perceptions over the safety and hygiene of previously owned items
- Practical constraints may exist which “limit the extent to which consumers can make low-waste purchasing choices”

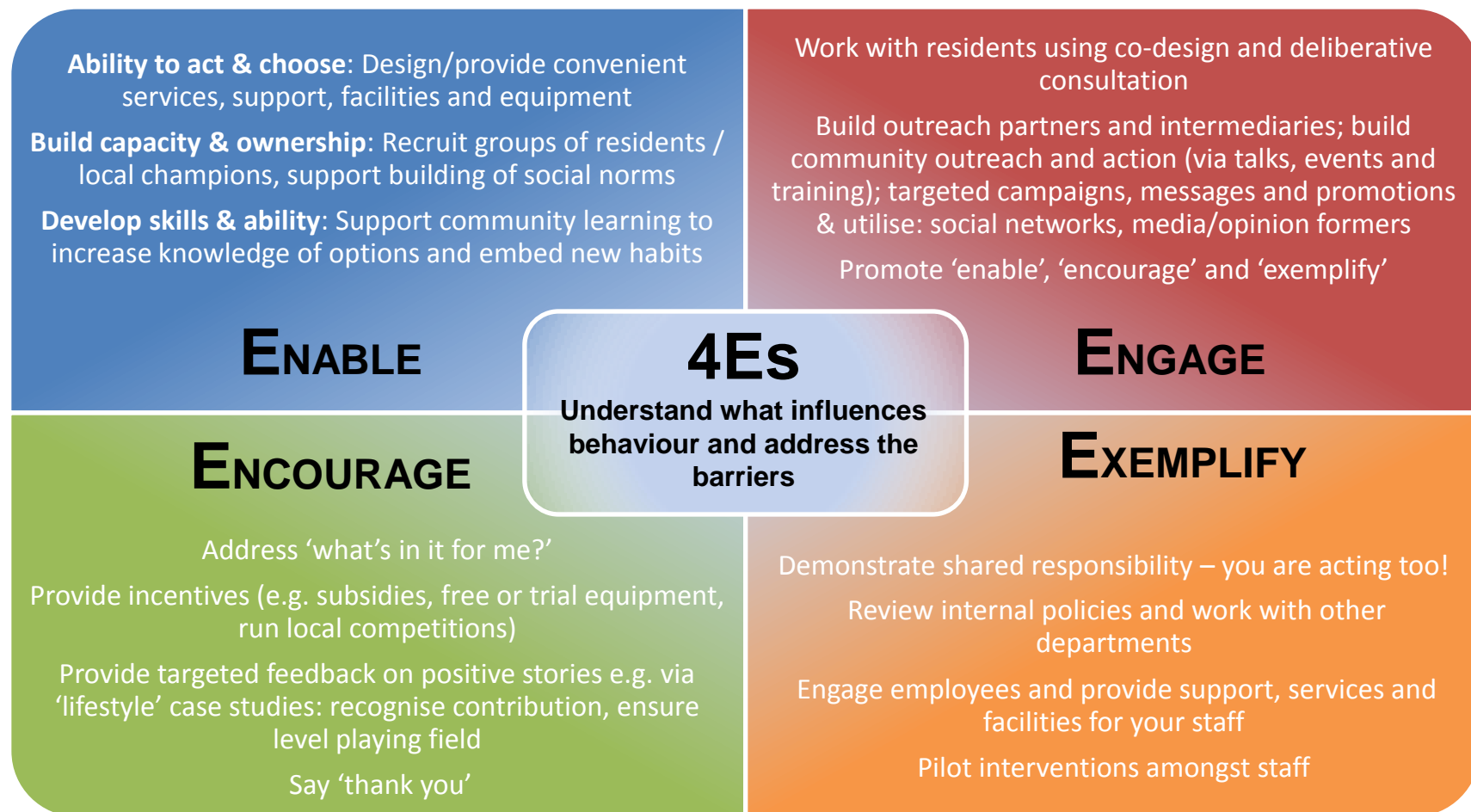
Barriers and Motivations for Households (II)

Motivation for waste prevention behaviours of householders

- Householders might engage with waste prevention in order to save money for example by avoiding buying some products, making alternative purchases or maintaining and repairing items that they already own
- For some people minimising our impact on the environment and using resources more efficiently is very important ; they feel that waste prevention activities, like wasting less food are the *right* things to do
- Often knowing or seeing that others take action can create a sense that our own contributions are worth the effort, for example donating, purchasing and using second-hand goods
- Many people have the confidence, know how and skills to carry out waste prevention behaviours, and can further prevent waste by borrowing, hiring or sourcing second-hand and recycled items (e.g. borrowing or hiring electrical goods, choosing second-hand furniture and clothing, using local hire/ share and swap schemes for tools etc.)

Facilitating Behaviour Change

Defra's behaviour change framework, the 4 'Es', tells us that for each behaviour, there are many factors which need addressing simultaneously to facilitate change. Behaviour change interventions need to reflect this complexity by providing a 'package' of measures.



Household Waste Prevention in Action



Household Waste Prevention in Action

Our aim is to improve the environment and protect human health by supporting a resource efficient economy, reducing the quantity and impact of waste produced whilst promoting sustainable economic growth.

Defra, 2013

The Programme's objectives are to:

- encourage businesses to contribute to a more sustainable economy by building waste reduction into design, offering alternative business models and delivering new and improved products and services
- help businesses recognise and act upon potential savings through better resource efficiency and preventing waste, to realise opportunities for growth
- encourage a culture of valuing resources by making it easier for people and businesses to find out how to reduce their waste, to use products for longer, repair broken items, and enable reuse of items by others
- support action by central and local government, businesses and civil society to capitalise on these opportunities.

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