Best Practice in Waste Prevention, Reuse, Recycling and Recovery

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1 Introduction

Birmingham City Council appointed Ricardo Energy & Environment to compile examples of best practice in reduction, reuse, recycling and recovery of waste, drawn from other cities in the UK, Europe and internationally. This information will be used to support the Council's ambitions, stated in its future waste strategy programme draft paper, for the city to:

- Maximise waste as a resource
- Minimise waste
- Recover useable materials
- Optimise energy; and
- Recycle everything else,

Birmingham is one of the largest local authorities in Europe, with a population of just over 1 million, which is expected for grow by 150,000 by 2031. The City Council has responsibility for removing waste from almost 420,000 households across the city. This amounts to just under 250,000 tonnes of domestic waste per year. With commercial waste included, the total municipal arisings in 2013/14 were approaching 494,000 tonnes. Birmingham City Council will be re-commissioning a new waste contract to begin in 2019. Birmingham is a city with considerable ambitions for sustainability and the future approach to how waste is managed in the city will play a key role in achieving this goal.

Effective waste management represents an 'opportunity' for a city and is a fundamental element that underpins its economic growth. Successful cities will need to transition to a circular economy model, one where technical and biological materials form part of a complex cycle, rather than a linear *produce-consume-dispose* chain.

A modern city's waste management system should aim to:

- Protect health and the local environment
- Reduce emissions from waste and mitigate GHG emissions from other sectors
- Generate jobs
- Help meet a city's resource demands and conserves critical materials
- Produce energy and fuel for power generation, transport, heating and cooling
- Ensure nutrient recovery for agricultural supply chains

This is recognised in the vision of the Birmingham Green Commission. Launched in 2013, the vision is aimed at delivering a comprehensive programme of work to make Birmingham a leading green city. In the Birmingham Green Commission plans, waste and resources management is just one component of targets in climate change adaptation, carbon reduction, green jobs growth and innovation.

The ambition for the new waste contract takes into account maximising resources, minimising waste and putting people at the heart of change and is working to ensure:

- Birmingham will have a sustainable, localised and integrated city waste solution managing its own energy and resources.
- Birmingham is an aspirational city that avoids the creation of waste and maximizes its utilisation.
- All stakeholders and citizens are involved in maximising shared social, environmental and economic value and minimising waste.

2 How to use this document

This document is not intended to be read as a report from cover to cover (although it can be), but to act as a digest of examples of waste prevention, reuse, recycling and recovery.

The first section of the document contains a brief overview of each part of the waste hierarchy, including a focus on some key waste streams relevant to each section.

The second section is a compendium of examples of waste prevention, reuse, recycling and recovery, with one example per page. Each of these sections has a dashboard from where the reader choose which examples to read, depending on their own interests in particular measures or waste types.

Each example contains a link back to the section dashboard from where another example can be selected and navigated to. Finally, each section dashboard contains a link back to this page so that the reader can then move on to a different part of the waste hierarchy.

	Waste Prevention
	Reuse
	Recycling
	Recovery

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3 Overview of Waste Prevention, Reuse, Recycling and Recovery

3.1 Waste Prevention

Preventing waste means reducing the amount of waste produced, decreasing the hazardous content of that waste and reducing its impact on the environment. Quite simply if you create less waste, you consume fewer resources and you don't have to spend as much money to recycle or dispose of your waste.

Reducing waste generation is the foremost priority of the waste hierarchy, but is often challenging to achieve. The roadmap to a resource-efficient Europe[1] emphasises that a higher priority needs to be given to incentivising waste prevention. Strategies and programmes for waste prevention are operating widely across the globe to promote public awareness of waste prevention and to specifically reduce the generation of certain waste streams. Strategies deployed include informational, promotional, regulatory and practical measures designed to encourage the prevention of waste.

The examples of waste prevention provided in this document includes a range of waste prevention measures, which are specific and distinct from wider waste management strategies, and which target a variety of waste streams. Examples include:

- **Waste Prevention Campaigns**

Campaigns have been developed to increase awareness of consumers in order to change their behaviours to become more environmentally sustainable by generating less waste. Campaigns can provide information through a range of communication channels including television, literature and social media. The Waste & Resources Action programme (WRAP), through its 'Recycle Now Partners2' Resource Library, hosts a huge variety of communications template materials which are free to download. Examples from around the world of waste prevention campaigns are included in the examples given.

- **Defra Waste Prevention Fund**

Through funding from Defra, the Innovation in Waste Prevention Fund (England) was an initiative to generate more action in waste prevention measures. Specifically, the fund supported communities in areas of waste prevention, reuse and repair activities, working in partnership with local communities. The Fund was implemented for two rounds, with round 1 from May to September 2014 receiving 79 applications from which 10 were successful in achieving part of the funding. Round 2 ran from November 2014 to February 2015 and received 66 applications, from which 6 were successful. A third round of the Fund was axed due in anticipation that it would not generate any new ideas. Overviews of the successful schemes are included in the examples.

- **Food Waste**

One-third of all food produced in the world is lost or wasted from farm to fork, according to estimates calculated by Food and Agriculture Organization of the United Nations (FAO 2011). As a result, in the UK food waste has become a major public policy issue. According to the House of Lords, consumers in industrialised countries waste almost as much food as the entire net food production of sub-Saharan. Africa[3]. They also highlight that the global carbon footprint of wasted food has been estimated as more than twice the total greenhouse gas emissions of all road transportation in the United States. It is against this backdrop that there have been a number of initiatives to stop food being wasted in the first place.

The examples included look at how consumers can prevent food waste. However, it is not only consumers who create food waste as it mainly occurs during production or post-harvest processing, e.g. when crops go unharvested or produce is thrown out during processing, storage or transport. The

[1] http://ec.europa.eu/environment/resource_efficiency/about/roadmap/index_en.htm Accessed on 14/12/15
[2] http://www.wrap.org.uk/content/resources-local-authority-communications Accessed on 14/12/15
[3] House of Lords Counting the Cost of Food Waste: EU Food Waste Prevention http://www.parliament.uk/documents/lords-committees/eu-sub-com-d/food-waste-prevention/154.pdf Accessed on 14/12/15

FAO has produced a comprehensive "tool-kit"[4] which contains recommendations on how food loss and waste can be reduced at every stage of the food chain. This is supported by the work in the UK undertaken by WRAP, which has developed a range of actions to drive out waste in food & drink manufacturing and retailing[5]. In addition WRAP delivers the government funded Courtauld Commitment[6] which is a voluntary agreement aimed at improving resource efficiency and reducing waste within the UK grocery sector.

Textiles

There are a number of major environmental issues associated with the textile industry including high energy and water usage (in the production of fibres and the laundry use-phase), the use of toxic chemicals, the release of chemicals in waste water (wet pre-treatment, dyeing, finishing and laundry) and the inefficient disposal of solid textile waste that arises in the manufacturing/production stage and at end-of-life.

In addition there is forecast resource scarcity, in particular of two of the key fibres used in the textile industry, cotton and polyester, which together represent over 85% of global fibre production[7].

The types of scheme highlighted in the examples provided for reduction in use and production of textiles will assist in limiting the use of raw materials and the hazardous environmental impact of textile fibre production, both upstream and downstream.

Packaging

Packaging is an essential part of what we buy as it protects the goods from the point of production to when they are used in the home, and can play an important part in extending the period when food products are safe to eat and at their best. However it is estimated that between a quarter and a third of all domestic waste is packaging and therefore its prevention is extremely important if we are to reduce waste. The examples included are specifically for consumers, but it should be noted that there is a lot of work being done with the packaging industry. WRAP has produced a series of factsheets and information leaflets to inform local authorities and partners about the work being done to optimise packaging[8].

Paper

Despite our ambition to work in paperless offices, 12.5 million tonnes of paper and cardboard are used annually in the UK, with the average person in the UK getting through 38kg of newspapers per year[9]. Pulp and paper is the third largest industrial polluter of air, water and soil. Chlorine-based bleaches are used during production which results in toxic materials being released into our water, air and soil. When paper, similar to other biodegradable materials, decomposes in landfill in the absence of oxygen, it emits methane gas which is 23 times more toxic than CO_2[10]. However by using recycled paper it can reduce these impacts by producing 73% less air pollution than if it was made from raw materials. Examples are included on ways that paper waste can be prevented.

Alternative Resource Efficient Business Models

Examples are provided which highlight the opportunities to use alternative resource efficient business models as a means of waste prevention. The general idea of an alternate resource efficient business model is to look at other ways of providing consumer products. For example a consumer could purchase a service (e.g. laundry) so reducing their own need to own physical products (in this case a washing machine), thus over time reducing the quantity of waste (in this case waste electrical and electronic equipment (WEEE)). This type of approach can also motivate product re-design which can improve the productivity of the materials used and ultimately lead to significant waste prevention benefits.

WRAP[11] further defines the alternative business models as:

[4] Reducing the food wastage footprint (http://www.fao.org/docrep/018/i3342e/i3342e.pdf) Accessed on 14/12/15
[5] http://www.wrap.org.uk/content/driving-out-waste-food-drink-manufacturing-and-retailing Accessed on 14/12/15
[6] http://www.wrap.org.uk/node/14507 Accessed on 14/12/15
[7] http://www.circle-economy.com/projects/sector/circular-textiles-program-2/ Accessed on 14/12/15
[8] http://www.wrap.org.uk/content/local-authorities-and-packaging-waste-prevention Accessed on 14/12/15
[9] http://www.recycling-guide.org.uk/facts.html Accessed on 14/12/15
[10] http://www.theworldcounts.com/stories/Paper-Waste-Facts Accessed on 14/12/15
[11] http://www.wrap.org.uk/content/innovative-business-models-0 Accessed 14/12/15

- *Service Systems* – Providing a service based upon delivering performance outputs that are linked to products or services. Products could also be designed for disassembly, remanufacture and reuse.
- *Hire and leasing* – long term hire and leasing to drive a longer service life and to increase product durability.
- *Collaborative consumption* – rental of products or services between organisations.
- *Incentivised return and reuse* – encouraging the return of used items through take-back or reuse schemes.
- *Asset management* – improving the internal management of items, by collection, reuse, and refurbishment or resale.
- *Collection of used products* – Collection by a service provider to ensure products/materials are passed on to an appropriate reuse system.
- *Long life* – Products designed to have a long life time with durability, reducing consumption.
- *Made to order* – Production is managed to minimise material requirements and avoid potential losses from over-stocking products.

3.2 Reuse

Reuse is becoming a priority area for many local authorities as it now forms a key target for waste management that also supports waste prevention and the development of a closed loop approach for priority materials and products.

Reuse is increasingly recognised as the 'new recycling' as it cuts across several themes including the low carbon agenda, resource security, poverty alleviation and job creation, and moves action up the waste hierarchy offering significant opportunities to BCC. Textiles, furniture and WEEE form the bulk of reuse work in the community and they are also key target materials for diversion from waste because they have the highest levels of embodied carbon.

A wide range of best practise reuse schemes have focused upon a number of initiatives across a variety of waste streams, and include:

- **Household Waste Recycling Centres (HWRC)**

Household waste recycling centres (HWRC) or civic amenity sites (CA sites) are facilities that are provided by a local authority where the public can dispose of household waste. They provide facilities for recycling and, increasingly frequently, reuse for members of the public. Examples are included where these are contributing to reuse.

- **Community Reuse Schemes and Networks**

Community reuse networks have been established throughout the UK and play a major role in supporting their member's often small local charities. They provide opportunities for members to share resources, bulk buy items and jointly sell products such as textiles for higher prices. They can develop shared storage, transport, repair workshops and retail.

- **Furniture**

According to the Furniture Reuse Network (FRN) 10 million household items are sent to landfill every year, of which 3 million could be reused. Furniture reuse is a well-established service which the examples included demonstrated.

- **WEEE**

Every year, people in Britain throw away nearly half a million tonnes of electrical items. WRAP[12] has identified that in many instances products are being thrown away when they are in full working order and could be diverted for reuse and resale. They go on to state that the value of the discarded products and materials is estimated to run into millions of pounds each year, and whilst the accuracy of these estimates is difficult to assess with any degree of certainty, they are reliable as 'order of magnitude' estimates. Examples of WEEE reuse schemes are included.

- **Reuse and Repair Shops**

[12] http://www.wrap.org.uk/sites/files/wrap/WRAP%20WEEE%20HWRC%20summary%20report.pdf Accessed 14/12/15

A variety of shops have been developed with community benefits offering opportunities for communities to learn retail skills and customers to benefit from cheap goods and examples are included.

- **Construction and Demolition Waste**

The recycling of construction and demolition (C&D) waste is largely seen as a success in the UK, particularly in relation to major schemes where rubble is typically crushed and graded for reuse on site. However, there is still a challenge in maximising the recycling or reuse of mixed building waste, particularly from smaller projects where perhaps there is limited space for enough skips to separate out waste. Examples of how C&D wastes can be reused have been included.

3.3 Recycling

The topic of recycling is complex and vast, and there are many examples of different types of recycling schemes and initiatives across the world. Examples in the document include alternative collection systems, technologies for specific materials, and incentives, campaigns and fiscal measures.

3.4 Recovery

Prior to disposal, the least preferred option in waste management is recovery, i.e. recovering further value from resources. This is most often achieved by the recovery of energy from waste, through a thermal conversion process. Energy recovery can be maximised by utilising both power and heat, and increasingly we are seeing developments in conversion of waste derived fuels in to intermediary fuels such as syngas, and further conversion in to vehicle fuels. The examples included in this document include both thermal, mechanical and biological technology examples.

4 Waste Prevention Dashboard

	Measure/Material						
	Waste Prevention Campaigns	**Food Waste**	**Textiles**	**Packaging**	**Paper**	**Green waste**	**Alternative Resource Efficient Business Models**
Examples	*Household waste minimisation campaign in Malta*	*The Real Junk Food Project, International*	*Clothes Library, Sweden*	*Reducing Packaging Waste in Italy and Switzerland*	*Campaign to prevent paper waste in France*	*Brighton Community Composting Co-op*	*White goods maintenance plan, UK*
	Business Waste Prevention in Ireland	*Food waste prevention measures in Portugal*	*Promotions to prevent textile waste in the USA*	*Enforcement of disposable ban in Munich*	*Campaign to prevent paper waste in businesses in Brussels*	*Composting bins in Brent and Hillingdon*	*Streetbank, UK wide*
	Waste Prevention Strategy in Helsinki	*Community food waste prevention café, Wales*		*Sharing City, Seoul, Korea*			
	Waste prevention education in schools, Estonia	*Food waste minimisation campaign in Malta*		*Product Labelling in Luxembourg*			
	Reusable nappy campaign, Milton Keynes	*Social Supermarket, London*					
	Defra waste prevention fund Round 1	*Food Waste Trial Town*					
	Defra waste prevention fund Round 2	*Food banks in Italy*					

4.1 Waste prevention campaigns

Household waste minimisation campaign in Malta	
Location	Malta
Type of measure	Education
Target audience	Households, Schools
Type of waste	MSW
Context	The project was set up to provide training in household waste minimisation, separation methods, techniques and practices to job seekers. As a result, participants were upskilled to help enhance their employment opportunities, with their new skills used to educate households and other interested entities.
Objectives	The main objectives of the project was to educate within the areas of waste minimisation, separate collections for households and proper use of bring-in and civic amenity sites.
Outcomes	The projects outcomes on direct waste minimisation was not available, although there was an upward trend in recyclable material collected from the bring-in sites for the duration of the project. Other wider benefits were through providing training to job seekers, increasing their access to the jobs market, increasing interest in environmental employment and increasing environmental awareness amongst residents.
Further information	http://www.prewaste.eu/index.php?option=com_k2&view=item&id=257&Itemid=101 Accessed 11 December 2015

Business Waste Prevention in Ireland	
Location	Ireland
Type of measure	Business support and award scheme
Target audience	Businesses
Type of waste	All
Context	The Green Business Initiative (GBI) provides support to businesses through a waste audit tool, helping to divide wastes by type, volume and source, allowing monitoring of any changes. A benchmarking tool allows the business to compare their efficiency against European averages. The scheme also provides telephone and on-site assistance. Green Hospitality is an Internationally recognised hospitality environmental certification label/award. To achieve this recognition requires GHP to set quite strict standards and for certified members to implement and maintain them.
Objectives	The Green Business Initiative (GBI) supports the goals of the National Waste Prevention Programme by providing businesses with tools and guidance on resource efficiency in three areas: waste, water and energy. It is a publicly funded enterprise that makes the business case for efficiency, focusing on bottom line savings and the benefits of environmental recognition. The National Waste Prevention Programme in Ireland was launched in 2004 aiming to raise awareness and provide technical assistance and financial support for waste prevention.
Outcomes	Within the first year, 190 hotels joined the Green Hospitality Awards initiative, 80 of which achieved bronze, silver or gold accreditation depending on the scores awarded against a set of criteria. Through the prevention of waste and recycling efforts each hotel saved between €5,000 and €45,000 preventing over 4,000 tonnes of waste going to landfill.
Further information	http://ec.europa.eu/environment/waste/prevention/pdf/GreenBusiness_IE_Factsheet.pdf Accessed 11 December 2015 http://greenbusiness.ie/ Accessed 11 December 2015

Waste Prevention Strategy in Helsinki	
Location	Helsinki, Finland
Type of measure	Multiple
Target audience	Consumers and Businesses
Type of waste	All
Context	The Helsinki Metropolitan Area Council Waste Prevention Strategy aims to increase public awareness of the need in waste prevention.
Objectives	A number of tools to help businesses and the public to reduce and prevent waste generation were provided, consisting of; • Best practice dissemination – online communication platform which identifies best practice in waste prevention. • Information campaigns – Waste prevention information provided for schools and other training programmes. Includes a strategy to specifically target households. • Waste benchmarking for businesses – Free online waste benchmarking tool to help businesses accurately assess their waste generation. Companies who achieve excellent waste reduction are awarded a 'Saver of Natural Resources' title which can be displayed on company products.
Outcomes	Approximately 500 enterprises used the benchmarking tool. Surveys of households showed that the information has helped change attitudes towards waste and increased the value of waste prevention.
Further information	http://ec.europa.eu/environment/waste/prevention/pdf/Helsinki_Factsheet.pdf Accessed 11 December 2015

Waste prevention education in schools, Estonia	
Location	Estonia
Type of measure	Education
Target audience	Schools
Type of waste	All
Context	A new pilot school programme for children aged 7-19 was released in 2009 during the European Week for Waste Prevention and entitled 'Let's do it with Ferda'. The mascot 'Ferda' is a gloved puppet used for younger pupils with the pilot programme containing three key aspects.
Objectives	The content of the pilot programme is separated into three components of a site visit, lectures and workshops. The site visit is either to a waste treatment facility, landfill or recycling centre to demonstrate the types of waste being produced and their destination. Lectures consisted of specialist advice on waste prevention, reuse and recycling as well as how to act environmentally friendly, such as shopping smartly and buying long lasting products. Workshop examples were children 'tuning' their used clothes which they bring in from home.
Outcomes	Participation rates were very high for the pilot programme and the knowledge of waste prevention increased amongst children. The physical workshops were said to be the most beneficial, learning practical skills.
Further information	http://www.prewaste.eu/index.php?option=com_k2&view=item&id=250&Itemid=101 Accessed 11 December 2015

Reusable nappy campaign, Milton Keynes	
Location	UK, Milton Keynes
Type of measure	Campaign
Target audience	Consumers
Type of waste	Household – Nappies
Context	For families with new-born babies; disposable nappies were stated as making up half of their household waste. Each child will use on average 4,000 to 6,000 nappies by the age of two and a half, contributing over a tonne of waste to landfill. This is largely due to disposable nappies taking 500 years to fully decompose to the environmental impacts, the associated disposal cost in Milton Keynes was estimated at £400,000 per year.
Objectives	With population growth expected, a guide was created for parents to switch to reusable nappies, detailing local information on suppliers and laundry services. A real incentive was a cash back system where families who invested over £60 receiving £35 to £40 back on their purchase.
Outcomes	The use of reusable nappies saved families up to £500 per child, or more if used on subsequent children. In Milton Keynes and other programmes, through support from WRAP, between 2004 and 2006 23,000 nappies were prevented or diverted from landfill. Awareness of the environmental impact of disposable nappies grew, with many local incentives created.
Further information	http://ec.europa.eu/environment/waste/prevention/pdf/Real%20Nappies_Factsheet.pdf

Round 1 - Defra Waste prevention Fund applications	Description
Action for children	A new scrap store for North Devon and Torridge, offering new sources of employment training to volunteers, whilst also ensuring the locally sourced materials are not wasted.
Changing lives in Cheshire (CLiC)	A RePaint project run by CLiC where collected reusable paints are redistributed to individuals, charities and anybody in need. Last year CLiC employed 22 people, delivering 3,995 training hours and supported over 2,000 families by providing affordable furniture.
Community Action Dacorum	A repair shed in Hemel Hempstead brings men aged 50+ together to stay healthy and happy through making, mending and learning. The scheme offers free community repair days and shares skills on home repair and reuse of items.
Devon County Council	The Council set up a reuse forum and appointed a designated coordinator. Community kits for clothes swaps and 'give and take' days were organised as well as promoting the use of an online directory.
Hampshire County Council	Additional capacity to provide a reuse and repair centre for the Hampshire Furniture Reuse Network. This included an education facility to focus on sustainability and resource efficiency.
Havering Council	In collaboration with the Restart project, the starting blocks were set for an electrical repair workshop and training events.
Leicestershire & Rutland Reuse Network	Employment of a reuse coordinator and purchase stock management system as part of the wider reuse plan for the area.
Tandridge District Council	The roll out of a new kerbside collection to include textiles, small domestic appliances, batteries and printer cartridges for reuse.
The Restart Project	Development of a 'fixometer' app to measure the impacts of electrical repair workshops. The Restart Project through community and workplace events encourages and empowers people to use their electronic items for longer, by sharing repair and maintenance skills.
The Vine Project	A pop up bus service offering reuse and repair services for largely household based objects, textiles and electrical products.
Link	http://www.wrap.org.uk/sites/files/wrap/IWPF%20Round%201%20projects%20May%202015.pdf Accessed 11 December 2015

Round 2 - Defra Waste prevention Fund applications	Description
Create UK Ltd	Collecting white goods such as fridges from empty housing association properties, refurbishing and then reselling to new tenants at affordable prices. The project intends to provide training placements whilst closing the loop for white goods.
Fareshare South West	Redistribution of edible food from events such as Glastonbury. The project is also developing a tool kit for other organisations to redistribution food from other events.
Garage Sale Trial Foundation	Scheme to support communities to hold garage sales on the same day across various towns and regions. The sales would be held by households, community centres and schools for example.
Keep Britain Tidy	Supporting primary schools to set pupil run reuse shops in East London as an easy and affordable way to exchange outgrown clothing. The pupils will run the initiative to provide wider educational awareness.
Re-considered Ltd	Using surplus fruit and vegetables from wholesale market and local growers to create a unique range of preserves centred on seasonality and local cultures and flavours.
Link	http://www.wrap.org.uk/sites/files/wrap/IWPF%20R2%20projects%2016%20June%202015.pdf Accessed 11 December 2015

4.2 Food waste

The Real Junk Food Project, International	
Location	UK, Europe, Australia
Type of measure	Café using surplus food
Target audience	All consumers
Type of waste	Food waste
Context	The Real Junk Food Project is a global network of 'pay as you feel' cafes. Food that was destined to become waste is intercepted and used to produce healthy meals in a network of cafes. Food is received from a variety of sources, including allotments, food banks, restaurants, cafes, food photographers, events and functions.
Objectives	Food waste avoidance, providing access to food for all.
Outcomes	Diversion of food waste from landfill, maximising value in food. The 'Pay As You Feel' concept allows patrons to give back either financial donations, their time, energy or skills as a way of accessing the food, and to understand the value of the produce. There is already a Real Junk Food Project café in Birmingham - http://www.projectdirt.com/project/14740/ Accessed 11 December 2015
Further information	http://therealjunkfoodproject.org/ Accessed 11 December 2015

Food waste prevention measures in Portugal	
Location	Portugal
Type of measure	Incentive
Target audience	Restaurants
Type of waste	Food Waste
Context	The Menu Dorse Certa Project allows participating restaurants to adopt best practice in terms of food waste prevention measures. After initial monitoring of the waste produced from restaurants, if applicable in accordance to the criteria, restaurants were rewarded with a 'Dorse Certa' certificate. Each individual restaurant had to go through a number of stages before being awarded their certificate, which have been summarised below: • Registration phase. • Initial diagnoses – evaluating the baseline of environmental impact and food stock management systems. • Training and good practice on food waste prevention. • Final diagnoses – evaluation of post awareness phase, to assess if there has been improvement. • Awarding of certificate, if applicable. • Monitoring phase.
Objectives	• Promoting behaviour change and environmental and dietary habits; • Promote food waste reduction in restaurants • Raise awareness to the importance of good practices, regarding: purchasing, inventory management; nutritional and environmental aspects
Outcomes	• Waste quantities reduced: 1350 tonnes food waste/year prevented • Cost savings • CO_2 savings
Further information	http://www.prewaste.eu/index.php?option=com_k2&view=item&id=292&Itemid=101 Accessed 11 December 2015

Community food waste prevention café, Wales	
Location	Fishguard, Wales
Type of measure	Transition Café
Target audience	Consumers
Type of waste	Food
Context	There are a number of surplus food schemes in the UK, however the Transition Bro Gwaun's surplus food project differs as carbon reduction is stated as its main aim. Whilst food banks and other similar projects redistribute longer life, ambient food such as pasta and rice, the Transition Café creates meals and preserves from short life products. Such examples being through using fruit, vegetables, bakery items etc.
Objectives	Volunteers and staff collect perfectly good food from local businesses and people who would otherwise throw the food away. The collected food is then made into healthy meals and takeaways, with the menu changing frequently depending on the food brought in. Food is often collected from within a 15 mile radius to keep food miles and emissions low.
Outcomes	On average 600 kg of food is prevented from going to landfill each month, with carbon savings of 21 tonnes per year. The Café has become a community hub where 'green' topics are often the discussion with other social benefits through providing training and work experience.
Further information	http://www.transitionbrogwaun.org.uk/transition-cafe/ Accessed 11 December 2015

Food waste minimisation campaign in Malta	
Location	Malta
Type of measure	Campaign and Education
Target audience	Households
Type of waste	Food
Context	The National Statistical Office in Malta state that 22% of food purchased is wasted, with estimates that domestic waste consists of 56% food waste and averages at 2.5 kg per person per week. Over 12 kg of food is consumed on average per person per week.
Objectives	According to Malta's Waste Prevention Management Plan food waste is primarily a result of understanding of 'best before' and 'use by' labelling as well as storage information. The Waste Prevention Management Plan sets a number of targets such as raising awareness through public campaigns.
Outcomes	The Waste Prevention Management Plan aims to monitor compliance by conducting or publishing: • Awareness surveys of the importance of reducing food waste. • Surveys to establish the number of committed food waste savers. • A five year survey by the National Statistics Office to determine the amount of domestic food waste.
Further information	EEA (2015) Waste Prevention in Europe – the status in 2014 www.eea.europa.eu/publications/waste-prevention-in-europe.../download Accessed 18 January 2016

Social Supermarket, London	
Location	London
Type of measure	Social Supermarket
Target audience	Low Income
Type of waste	Food and Drink
Context	Following the success of a pilot scheme in South Yorkshire, the UK's first full scale social supermarket opened in 2013. Further social supermarkets are planned.
Objectives	The supermarket sells surplus food and drink to people on the verge of food poverty for up to 70% less than high street prices. The shop works on a membership basis, involving 750 members who live locally and on income support. The products available are from the leading supermarkets and brands.
Outcomes	In addition to the environmental benefits, social support is also provided through tackling the problem of surplus food by giving it social purpose.
Further information	http://www.theguardian.com/society/2014/dec/15/social-supermarket-community-shop-opens-london

Food Waste Trial Town	
Location	Swadlincote, UK
Type of measure	Trial
Target audience	Community
Type of waste	Food
Context	The town of Swadlincote was picked by Sainsbury's to trial a food waste initiative as part of the retailer's £10 million 'Waste Less, Save More' project. The initiative saw 189 towns submit over 1,000 ideas for preventing waste in an attempt to win a £1 million investment from Sainsbury's. Ideas were centred on talking bins, community orchards and growing mushrooms from used coffee waste. A judging panel eventually chose Swadlincote as the winner.
Objectives	The town will now test the ideas and technology to reduce food waste in 2016 by 50%. Projects suggested were introducing 'artificial noses' which are able to detect when food is still edible, a competition to find the most food efficient residents and soup recipes made from the most commonly wasted food.
Outcomes	The findings from the initiative will be used as a 'blueprint' to be implemented across towns in the UK with a further £10 million over the next five years. Through using WRAPs figures, Sainsbury's predicts that by achieving a 50% reduction goal could save residents an average of £700-£350 on their food bills per year. This would save Swadlincote families a total of £1,168,650 a year. With the results applied to the wider country, this could translate to a collective savings of £9.3 billion per year.
Further information	http://resource.co/article/swadlincote-chosen-sainsbury%E2%80%99s-food-waste-trial-town-10684 Accessed 18 January 2016

Food banks in Italy	
Location	Italy
Type of measure	Food bank
Target audience	People in need
Type of waste	Food Waste
Context	The 'Food Bank' in Italy has been running since 1989 and today is a network of 21 not for profit organisations. The Marche Food Bank operates in the Marche Region to recover food for people in need.
Objectives	The scheme aims to intercept food before it becomes a waste, extracting social benefits through supporting people in need. Economic benefits by giving away surplus food, with no longer marketable materials being saved from becoming a waste. The project saves the wastage of useful resources with environmental benefits of reducing waste to landfill, lowering associated emissions and overall lessening environmental impacts.
Outcomes	In 2010, the Marche Food Bank had helped 26,000 people and over 2,000 tonnes of food had been distributed, with a strong increase compared to the results of 2009.
Further information	http://www.prewaste.eu/index.php?option=com_k2&view=item&id=360&Itemid=101 Accessed 11 December 2015

4.3 Textiles

Clothes Library, Sweden	
Location	Sweden
Type of measure	Clothes library
Target audience	Households, Community
Type of waste	Textiles
Context	Swedes consume 15 kg of textiles per year, with 3 kg given to charity, 8 kg thrown away and the rest accumulated in other ways. The import of cloths and textiles has increased 40% over the past 10 years.
Objectives	The clothes library (Lånegarderoben) works as a normal library where you borrow clothes instead of books. Here you renew your wardrobe without increased consumption. Membership costs €40 for 6 months allowing you to borrow three items for three weeks at a time. Washing instructions are given and any ruined or damaged items have to be replaced.
Outcomes	Currently there are 150 active members and 150 casual, but numbers were said to be increasing. Statistics were hard to quantify in terms of waste prevented but the scheme brings other wider social benefits.
Further information	http://www.ambiente.regione.marche.it/Portals/0/Ambiente/Rifiuti/PW_Traduzione/036_Pre_waste_36_SE_Clothes_Library_24_09_2012.pdf Accessed 11 December 2015

Promotions to prevent textile waste in the USA	
Location	USA
Type of measure	Promotion
Target audience	Householders
Type of waste	Textiles
Context	Textile waste is estimated at nearly 4 million tpa in the USA, comprising 4.5% of household waste. In the EU, only 25% of the 5.8 million tonnes of textile waste is reused or recycled by industry. With clothing manufacturing using synthetic fibres derived from oil, preventing and extending the use of textiles would hold a number of benefits.
Objectives	A project entitled Swap-O-Rama-Rama in the USA promotes a 'do it yourself' attitude to help prevent textile waste. Attendees bring a small donation to a community event (to help finance) and any items of clothes. These are then added to a communal pile which participants can select from. The event also provides the following workshops aimed at waste prevention: • DIY shops – learning techniques such as sewing and modification. • Individual stations – where participants can work on items under supervision from a supervising designer. • Fashion show of reused and modified clothing.
Outcomes	After an initial event in 2005 there are now regular events across the US and Australia.
Further information	http://ec.europa.eu/environment/waste/prevention/pdf/Swaporamarama_Factsheet.pdf Accessed 11 December 2015

4.4 Packaging

Reducing Packaging Waste in Italy and Switzerland	
Location	Italy and Switzerland
Type of measure	Promotion
Target audience	Consumers
Type of waste	Packaging and food waste
Context	An initiative to reduce packaging waste, whilst at the same time offering lower cost products. Through Eco-Points located within certain sections of supermarkets, a new way of shopping was proposed. The Eco-Points offer everyday products such as pasta, rice, cereal, nuts, coffee etc. through bulk, direct dispensers.
Objectives	The aim of the scheme was to encourage shoppers to only buy the necessary amounts of food required, and to reduce packaging waste using direct dispensers so that food can be taken away in reusable and returnable packaging.
Outcomes	Savings for the consumer were stated as being between 10% and 70% compared to the price of packaged products. Packaging was significantly lowered as a result of the using reusable containers. In 30 stores across Italy and Switzerland it was predicted that the scheme saved over a million packages over a year period. Using the example of the village of Oulx, 2,700kg of products have been sold in bulk, saving around 12,300 packages.
Further information	http://ec.europa.eu/environment/waste/prevention/pdf/Ecopoint_crai_Factsheet.pdf Accessed 15 December 2015

Enforcement of disposable ban in Munich	
Location	Munich, Germany
Type of measure	Enforcement
Target audience	Consumers / Events
Type of waste	Disposables
Context	Since 1991 a by-law in the city of Munich forbids the use and sale of disposables (tableware, cups etc.) and drinks packaging on land owned by the city. This scheme applies to events such as weekly markets in the Olympic Stadium and the popular Oktoberfest.
Objectives	Disposable items are replaced by reusable ones, which consumers have to pay a deposit for and get back when they return the items (similar schemes have recently been implemented within the UK at sports stadia). With smaller events, the city cooperates with a company who offer the possibility to rent crockery and dishwasher equipment.
Outcomes	The scheme has significantly reduced waste being produced from events. The volume of waste produced by events between 1991 and 2004 in the city fell by over 50%. The Oktoberfest event, which attracts thousands of people from all over the world, produced 11,000 tonnes of waste in 1990, which was reduced to 550 tonnes in 1999.
Further information	http://www.prewaste.eu/index.php?option=com_k2&view=item&id=255&Itemid=101 Accessed 15 December 2015

Campaign to reduce packaging waste in fast food restaurants, Korea	
Location	Korea
Type of measure	Campaign
Target audience	Businesses – fast food restaurants
Type of waste	Business – disposables
Context	In urban areas of Korea, up to 30% of waste originates from fast food restaurants. The Korea Zero Waste Movement Network (KZWMN), a conglomerate of NGOs focused on reducing disposable materials and food waste from this resulting area.
Objectives	Stores were required to charge for plastic bags and offer deposit refunds for those that bring their own bag. A similar scheme ran for reusable cups in the workplace and helped to contribute to the 'no disposables campaign' targeting fast food restaurants. KZWMN brought together representatives of the major retailers to discuss the industries waste problems. Chains such as 'Lotteria' were called upon to: • Use non-disposable cups and cutlery. • Not use plastic or coated paper materials. • Not put paper liners on trays. • Provide refillable condiments (ketchup etc.). • Offer free soft drinks to customers who bring their own mug.
Outcomes	Legislation was brought in to help restrict the use of disposables, with a further small levy placed on disposable cups in restaurants to ensure they are returned for recycling. Lotteria responded to this by serving drinks in reusable plastic cups, preventing the need to recycle and preventing the generation of waste.
Further information	http://ec.europa.eu/environment/waste/prevention/pdf/No%20Disposables%20Korea_Factsheet.pdf Accessed 15 December 2015

Product Labelling in Luxembourg	
Location	Luxembourg
Type of measure	Promotion
Target audience	Consumers
Type of waste	Hazardous and packaging
Context	A product labelling initiative was launched entitled the 'Clever Akafen' or 'Clever Shopper' to promote products with a low ecological impact. At first, the scheme was limited to paints, batteries and low energy bulbs. However, further products such as detergents were planned to be incorporated in the future.
Objectives	All products must confirm to a set criteria to achieve the label. Such examples being that packaging must be made from recyclable material and the product must have no, or low levels of dangerous substances.
Outcomes	The scheme was well perceived with a wide number of stores signing up to the product labelling initiative.
Further information	http://ec.europa.eu/environment/waste/prevention/pdf/Luxembourg_Factsheet.pdf Accessed 15 December 2015 http://www.sdk.lu/index.php/en/ Accessed 15 December 2015

4.5 Paper

Campaign to prevent paper waste in France	
Location	France
Type of measure	Information
Target audience	Householders
Type of waste	Paper
Context	Unaddressed or junk mail represents 1 million tpa of waste in France. This averages at 15 kg per household per year, accounting for 5% of household waste. The waste stream consists principally of leaflets, catalogues and free classified advertisement papers, with the unaddressed advertisements in France estimated to be worth €2.6 billion.
Objectives	As part of the French National Waste Prevention Plan, the Ministry of Ecology and Sustainable Development launched a campaign drawing attention to the reality of this waste issue. A key feature of the campaign was operation 'Stop Pub', in which the Ministry of Energy and Environment produced a post box sticker expressing the resident's will not to receive unaddressed mail. The initiative aimed to directly reduce junk mail in household waste; stimulate public engagement in household waste prevention and discourage the market for unaddressed mailings.
Outcomes	Half of French citizens live in a district where the original 'Stop Pub' stickers are available. In 2004, the first year of the initiative, there were requests for 2.6 million stickers. Many organisations personalised or designed their own post box sticker, a further 1.5 million of which were printed. More than 70% of sticker users were satisfied with the results and received significantly less junk mail.
Further information	http://ec.europa.eu/environment/waste/prevention/pdf/Stop_Pub_Factsheet.pdf Accessed 15 December 2015

Campaign to prevent paper waste in businesses in Brussels	
Location	Brussels
Type of measure	Education
Target audience	Businesses
Type of waste	Paper
Context	In the Brussels Capital Region, 54% of jobs are administrative based. Despite technological advancements, large quantities of paper are still being used and wasted. Indeed, the region produces approximately 60,000 tonnes of waste paper and cardboard from office activities each year. Some 340,000 people work in the Capital Region with each employee consuming 50kg of printed paper per year.
Objectives	In 2010 a dematerialisation project was set up as part of a waste management and waste prevention plan. The project included coaching sessions to organisations over a period of months to focus on training and raising awareness of the waste. A communication campaign was also launched which included free information and tools for organisations.
Outcomes	The results from participating companies concluded a 15% - 25% paper reduction, achieved by 25 companies (with an average of 18%). This equated to paper waste prevention of just over 75 tonnes.
Further information	http://www.prewaste.eu/index.php?option=com_k2&view=item&id=286&Itemid=101 Accessed 15 December 2015

4.6 Green waste

Brighton Community Composting Co-op	
Location	Brighton
Type of measure	Community green waste recycling
Target audience	Households and businesses
Type of waste	Green Waste
Context	The BCCC is a successful social enterprise launched in 2005 and provides an affordable, local centred solution for 'green' waste recycling. The BCCC has a very low environmental impact, using small scale efficient machinery combined with the considerable 'carbon capture' gains in the composting process.
Objectives	Provision of a local green waste collection service to households
Outcomes	• Low operational miles • Local recycling • Locally made quality products • Local employment and training
Further information	http://www.brighton-compost.coop/ Accessed 15 December 2015

Composting bins in Brent and Hillingdon	
Location	London – Brent and Hillingdon
Type of measure	Practical
Target audience	Households
Type of waste	Green Waste
Context	Since 2001 over 9,000 composting bins were distributed to Brent residents and since 2005 almost 4,500 have been provided to residents in Hillingdon.
Objectives	As well as the environmental benefits the schemes were stated as proving good value for money.
Outcomes	In Hillingdon, over 5 years the compost bins created 2,223 tonnes of organic material. If this had been sent to landfill it would have cost £222,000. In Brent, 4,877 tonnes of material was predicted with saving costs of £487,000.
Further information	http://www.hounslow.gov.uk/waste_prevention_strategy_2011_2015.pdf Accessed 15 December 2015

4.7 Alternative Resource Efficient Business Models

White goods maintenance plan, UK	
Location	UK wide
Type of measure	Repair and maintenance contracts for white goods
Target audience	Public sector, consumers
Type of waste	White goods (WEEE)
Context	Samson Maintenance provides a maintenance and repair service to householders and businesses for appliances such as washing machines and dishwashers. The idea behind the Samson service is that the choice/ responsibility/ deliberation over whether to scrap an appliance instead of repairing it, is taken away from the organisation, and the decision is made by the underwriters on the basis of a robust mathematical calculation, which includes the appliance age, brand, type, cost price, and current condition. Due to this, any decision made to condemn an appliance will be the correct decision, and will therefore eliminate any risk of condemning an appliance that should in fact have been repaired. This will greatly reduce the number of appliances ending up in landfill, as well as saving the user time and money.
Objectives	Maximises the life cycle of appliances, diverts waste from landfill, saves costs on replacement, avoidance of virgin raw material
Outcomes	Samson can save its clients very large amounts of money and dramatically cut administration costs. This is especially true for clients with large stocks of white goods, for example universities, hospitals and other public sector organisations. The cash savings come in the form of appliances being covered for repair and replacements costs. Other benefits: • If a new machine is required, Samson arranges for the supply, delivery and installation of the new equipment • Samson keeps track of all engineers and repair progress and will investigate any delays, thus freeing up staff time • Users benefit from savings in manpower & staff time as all the usual administration is taken care of by Samson • Samson uses approved local repairers and can even use repair companies currently working with Progress • Reduced costs in obtaining new equipment when an old appliance cannot be repaired, due to Samson's contribution towards the new equipment. • Increase in staff efficiencies, as all repair requests are channelled through one single portal, regardless of where in the country the breakdown occurs.
Further information	http://www.appliancehelpline.co.uk/maintenance-plan Accessed 15 December 2015

Streetbank, UK wide	
Location	UK Wide
Type of measure	Alternative Resource Efficient Business Model
Target audience	Consumers, householders
Type of waste	Household goods, appliances, tools, services
Context	Streetbank is a website which facilitates the sharing of household items and services in local communities.
Objectives	The aim of Streetbank is to: 1. Give things away – find a grateful neighbour for stuff you no longer need 2. Share things – like ladders and drills, that go unused much of the time 3. Share skills – like DIY, languages and gardening, that neighbours might need help with
Outcomes	Friendlier neighbourhoods, money saved and less waste ending up in landfill.
Further information	http://www.streetbank.com/about?locale=en-GB Accessed 15 December 2015

Sharing City, Seoul, Korea	
Location	Seoul, Korea
Type of measure	Alternative Resource Efficient Business Model, Sharing economy
Target audience	Householders
Type of waste	Clothes, furniture, household items, car sharing
Context	Government programme supports and encourages the collaborative economy in the South Korean capital. The government policy has supported a range of initiatives including: • Open Closet - non-profit business that rents outfits donated by people who no longer have use for them. • Norizzang, a company dedicated to recycling old furniture • Hanintel, a project that connects South Korean travellers with compatriots overseas who can offer accommodation • SoCar, a vehicle-sharing company • Tool libraries • Zipbob – meal sharing platform
Objectives	Create a sharing economy - to make better use of existing resources, both in the city and among its citizens, through sharing: "The goal is to solve some of the problems that arise in a society ruled by untamed capitalist consumerism: from the growing traffic jams to the increased number of suicides, pollution and the high cost of housing. They all can be mitigated by sharing."
Outcomes	Open Closet lends nearly 6,000 outfits and shoes donated by more than 1,000 people to almost 20,000 users. When admitting a business into the Sharing City stable, in addition to compliance with certain requirements - such as being a small or medium-sized concern or having undertaken a minimum number of social activities - CCKorea takes into account the social value of the proposals it receives.
Further information	http://www.sustainablecities.eu/local-stories/seoul-city/ Accessed 15 December 2015

5 Reuse Dashboard

Measure/Material									
	Household waste	**Community reuse**	**Furniture**	**WEEE**	**Tools and Paint**	**Construction & Demolition waste**	**Industrial waste**	**Wood**	**Textiles**
Examples	*Household Waste Recycling Centre (HWRC) and Reuse Shop, Leeds*	*Reuse Network, Manchester*	*Sofa Project, Bristol*	*Public Sector reuse network – WARP-it*	*Tools for Self-Reliance*	*Construction waste reuse, Swansea*	*Industrial Symbiosis, UK*	*Community Wood Recycling, UK network including Birmingham*	*School uniform reuse, Wales*
	Bicycle reuse scheme at HWRC, Bucks	*Swap shops, Oxfordshire*	*Furniture Reuse Network, UK*	*Household WEEE repair, London*	*Community RePaint network*	*Construction and Demolition waste reuse, London*	*Industrial Symbiosis, Denmark*	*Wood reuse, USA*	*Trashion Show, US*
	HWRC Reuse Shop, Norfolk	*Reuse and repair shops, Vienna*	*North Ayrshire Council Waste Strategy*		*Newlife Paints*	*Trade waste bring sites, Wales*			*Fashion Recycling Week, London*
		Reuse shops, Flanders	*Bulky waste reuse, Surrey*			*Exchange and resale of construction materials, Hungary*			*Dress for Success UK*
		Reuse competition, Austin, USA							
		Revolve Reuse Quality Standard, Scotland							
		Remakery, London							
		Student equipment reuse, Bristol							

5.1 Household waste

Household Waste Recycling Centre (HWRC) and Reuse Shop, Leeds	
Location	Leeds
Type of measure	Household Waste Recycling Centre (HWRC) and Reuse Shop
Target audience	Households
Type of waste	All
Context	The Leeds City Council (LCC) area has 9 HWRCs, most of them recently redeveloped including the East Leeds HWRC at Seacroft, which was identified as a redevelopment priority. The redeveloped site included a reuse shop which was opened along with the site in August 2011.
Objectives	The reuse shop was decided to only be offered to the third sector, allowing for a wider range of social benefits. LCC's legal department advised to manage the reuse shop through a lease agreement rather than contracting arrangements in place for other onsite reuse shops run by third sector organisations. After bidding the winner was Revive Leeds. Although the contract was for a lease, in reality it was a partnership approach. The overall aim was to cover the costs of the centre so that no costs were incurred by the council. The shop needs to earn around £2000 per week to break even, with the aim to achieve around £3000. It has 2 full time and 2 part time staff, with volunteers and young people completing community payback to help unload, sort and move items. A lease requirement was to hold a meet and greet service to intercept users before getting to the disposal area.
Outcomes	The shop is diverting around 5 tonnes of waste from landfill per month, including 316 items of furniture in November 2011 alone. Around 300-500 bric-a-brac items are sold each week, although the council is awaiting decisions on agreed weights. 80% of electrical items donated are working and saleable according to PAT testing staff.
Further information	http://www.wrap.org.uk/sites/files/wrap/INH0449_HWRC_Guide_%20final.pdf Accessed 15 December 2015

Bicycle reuse scheme at HWRC, Buckinghamshire	
Location	UK
Type of measure	HWRC
Target audience	Households
Type of waste	Bulky Waste – Bicycles
Context	Ten HWRCs are located within Buckinghamshire which help residents to reuse and recycle unwanted bulky household waste. Reusable products are then sold by South Bucks Hospice who are situated at two of the HWRCs.
Objectives	A project involves rescuing suitable bicycles which are then sent to a prison for restoration and maintenance. The experience gained by inmates helps them towards qualifications, with the bikes being sold and money going to the South Bucks Hospice.
Outcomes	Between July 2012 and May 2013 the following items were recovered: • 45,271 household items – bikes being the third most popular. • 4,172 bikes – over half being refurbished and sold. • 7,255 electrical items – topping the list of rescued items.
Further information	http://www.fccenvironment.co.uk/assets/files/pdf/case-studies/bike-reuse-case-study.pdf Accessed 15 December 2015

HWRC Reuse Shop, Norfolk	
Location	Norfolk
Type of measure	HWRC Reuse Shop
Target audience	Households
Type of waste	All
Context	Norfolk houses 19 HWRC's collecting a variety of materials and household waste. In 2007, 18 of the 19 HWRC's were taken over by May Gurney.
Objectives	Norfolk County Council and May Gurney agreed to increase reuse at the sites by setting up reuse shops. The aims were to reuse bric-a-brac and other household goods by selling to local people, provide a good customer experience and contribute to the reuse/recycling rate of the site.
Outcomes	In 2007/08 reuse at the HWRCs was 20 tonnes which increased to 139 tonnes in 2008/09 and 410 tonnes in 2009/10. Gross savings were stated as £29,930 with net saving of £13,530 when taking into account of the performance bonus to May Gurney.
Further information	http://www.wrap.org.uk/sites/files/wrap/Case_study_3_-_Norfolk.pdf Accessed 15 December 2015

5.2 Community Reuse Schemes and Networks

Reuse Network, Manchester	
Location	Manchester
Type of measure	Reuse Network
Target audience	Households
Type of waste	WEEE
Context	The Greater Manchester Waste Disposal Authority WEEE reuse schemes were run in partnership with local civil society organisations between 2012/13.
Objectives	The schemes collected 813 items, weighing 43 tonnes. Overall, 582 of the resulting materials were deemed reusable or repaired, allowing for 30.7 tonnes of WEEE waste to be diverted and made available for reuse back into the community. The remaining 28% was recycled.
Outcomes	In total 67% of the reusable WEEE items were sold and found new homes, delivering cost savings, based on landfill tax alone, of £1,965. Other social benefits delivered by the scheme include assisting low income households, providing training and employment opportunities and generating revenue in support of the civil society organisations.
Further information	https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/264912/wpp-case-study-household-waste.pdf Accessed 15 December 2015

Swap shops, Oxfordshire	
Location	Oxfordshire
Type of measure	Swap shops
Target audience	Households
Type of waste	All
Context	The Community Action Group Project is a voluntary network consisting of over 50 groups across Oxfordshire. The groups coordinate and arrange events and projects to take action on issues such as waste, transport, food and energy. The network is the largest in the UK and runs over 365 events a year with over 60,000 local residents attending.
Objectives	The Community Action Group held 85 swap shops in 2012/13.
Outcomes	Over 11,000 people swapped and reused items, resulting in diverting over 38 tonnes of items away from landfill, including over 1,500 electrical items.
Further information	https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/264912/wpp-case-study-household-waste.pdf Accessed 15 December 2015

Reuse and repair shops, Vienna	
Location	Vienna, Austria
Type of measure	Repair and service centre
Target audience	Unemployed, householders
Type of waste	Electrical equipment
Context	R.U.S.Z (Reparatur und Service Zentrum – Repair and Service Centre) is a special initiative where jobless people are trained to repair goods at affordable prices. Items most predominant in the scheme are electrical household goods and appliances.
Objectives	The scheme created a high demand for repair services and sowed the seeds for the Repair Network Vienna, a network of some 60 repair companies.
Outcomes	The research and development unit of R.U.S.Z developed a method for reducing water and energy consumption of old washing machines by 20%. As a result, energy efficiency class C devices could be upgraded to class A which had a number of benefits.
Further information	http://www.prewaste.eu/index.php?option=com_k2&view=item&id=272&Itemid=101 Accessed 15 December 2015

Reuse shops, Flanders	
Location	Flanders, Netherlands
Type of measure	Reuse shops
Target audience	General public
Type of waste	Clothing, household items, furniture, books and bicycles
Context	The system of reuse centres originated from the Netherlands and was imported into Flanders in the early 1990s. The centres collected, sorted, repaired and sold a wide range of discarded products. Goods are systematically collected through pickup at home services and delivery, before being sorted into saleable and non-saleable groups. These are then thoroughly checked, repaired or refurbished and finally sold.
Objectives	Social aspects of the scheme include job opportunities for long-term unemployed people and raising the importance of reuse and recycling amongst the community. A number of centres have created additional sections such as bicycle repair workshops. About 80% of the reuse centres comply with the quality label, guaranteeing that sold products are of sufficient quality. An initiative of the reuse centre provides a 'revise' guarantee label for up to 6 months on second hand electrical equipment. The reuse centres depend a lot on subsidies from the Flemish Government, which was in the region of €930,000 in 2005. Quantitative objectives are set to ensure strategic development with yearly surveys carried out to keep the centres on track and encourage growth.
Outcomes	In 2008, 47,218 tonnes of reusable items were diverted from the waste stream, increasing by 10% compared to the year before in 2007. Almost half of the incoming goods were reused, which was also an increase of 10% compared to 2007. Of the collected items, 82% were made up of furniture, EEE and textiles. In 2015, the reuse centres aspire to a collection rate of 10kghh/y of which at least 50% is effectively reused and increase to reach 4,000,000 paying customers.
Further information	http://www.prewaste.eu/index.php?option=com_k2&view=item&id=393:reuse-centres-in-flanders&Itemid=50 Accessed 15 December 2015

Revolve Reuse Quality Standard, Scotland	
Location	Scotland
Type of measure	Quality Standard
Target audience	Consumers
Type of waste	Household items
Context	Revolve is a quality standard for shops who sell second hand goods. To achieve accreditation, a shop must commit to continuously meet a number of high standards. Revolve trains and checks to make sure that the high standards are continuously being met.
Objectives	The objective for Resolve is to make it easier, more inviting and safer for everyone to buy second hand items. Shops are continually tested on customer care, shop layout, how they prepare and test goods for reuse as well as health and safety aspects.
Outcomes	The initiative aims for the Resolve logo to be recognised so that when you are buying from a reuse shop, you know that it is committed to quality, safety tested products and excellent customer service.
Further information	http://www.revolvereuse.com/ Accessed 15 December 2015

Reuse competition, Austin, USA	
Location	Austin, USA
Type of measure	Incentive / Innovation
Target audience	Entrepreneurs
Type of waste	All
Context	The City of Austin has created an award of $10,000 for a social entrepreneurs who can turn raw materials into viable enterprises.
Objectives	The first 'reverse pitch' competition launched in November 2015 and aims to turn valuable raw materials that are currently leaving local businesses, non-profits and institutions as waste into the foundation of new social enterprises.
Outcomes	The winner will be selected in December 2015 and judged upon the business viability, sustainability impact, economic impact and social impacts.
Further information	https://www.austintexas.gov/news/city-offer-innovation-prize-reuse-endeavors Accessed 10 December 2015

Remakery, London	
Location	London UK
Type of measure	Reuse
Target audience	Local residents
Type of waste	• Wood, board and sheet materials • DIY supplies including paints, hardware, tools, ceramic tiles and mosaic • Gardening tools and supplies • Textiles: on the roll, scraps, and soft (clean) furnishings • Other art and design materials • Bicycle parts and tools
Context	The Remakery provides an affordable workspace and access to materials for – local residents, makers, artists and businesses – then use them to create products, enterprises and opportunities and develop new skills.
Objectives	The Remakery's aims are to help divert valuable waste materials away from landfill and to support the local community to increase their skills, confidence and employment opportunities
Outcomes	Remakers use the facilities to create products and develop their businesses and skills
Further information	http://remakery.org/about-us/ Accessed 10 December 2015
Return to Reuse Dashboard	

Student equipment reuse, Bristol	
Location	Bristol
Type of measure	Campaign
Target audience	Students
Type of waste	All
Context	The Bristol Big Give is a collaboration between the two universities in Bristol and Bristol City Council to collect unwanted items donated by students living in halls of residences and privately owned accommodation when they move out.
Objectives	The materials collected are then donated to over a dozen charities, as well as increasing awareness of responsible waste management. A vast array of items have been collected including kitchenware, clothes, food, sports equipment and books. As well as donation points on campus, deposit sites are strategically placed around the city.
Outcomes	Overall in 2014 students donated over 72 tonnes of reusable goods, in turn this could had a value of up to £180,000 for local and national charities.
Further information	http://lovewhereyoulivebristol.co.uk/bristol-big-give/ Accessed 10 December 2015

5.3 Furniture

Sofa Project, Bristol	
Location	Bristol
Type of measure	Practical
Target audience	Householders, businesses
Type of waste	Household and office furniture, appliances.
Context	Named from the acronym to Shift Old Furniture Around, 'SOFA' is a charity which collects good quality furniture and appliances from local households and businesses. Household furniture and appliances are collected from households on a daily basis. The items are brought back to the charity's premises, and in the case of electrical appliances fully refurbished, before being made available at a low a price as possible in SOFA's retail outlets. These can then be delivered to the new owners. SOFA also run a furniture repair workshop and an electrical workshop. The electrical workshop has the potential to repair and refurbish up to 100 major appliances a week. This will be a mixture of items collected from households, items that are bought in from retail operations (the ones that are taken away when a new machine is purchased) and those that are purchased from manufacturers (graded) having been returned as a result of damage or failure under warranty. The office furniture operation is capable of accepting large deliveries of redundant office furniture which may be generated as the result of an office closure or refurbishment. SOFA can also take on office clearances. The furniture is made available for small businesses, charities or for home offices at very reasonable prices. Any items that cannot be reused or re-manufactured are fully recycled. SOFA also operate a hire facility, which is used on a regular basis by TV and film companies for set design. To support all of these activities, SOFA work with other organisations to offer work placements and experience to those, who, for a number of reasons are currently excluded from the job market.
Objectives	Reuse of furniture, landfill diversion, job creation
Outcomes	• Diversion from landfill and unnecessary recycling by collecting unwanted furniture and electrical appliances from households and businesses and then extend their life through reuse. • Provision of work placements and volunteering opportunities to those currently excluded from employment. • Providing help to those in need by supplying low cost household items through retail activities and in partnership with other charities SOFA supply items free to those most in need.
Further information	http://sofaproject.org.uk/ Accessed 15 December 2015

Furniture Reuse Network, UK	
Location	UK
Type of measure	Network
Target audience	Low income
Type of waste	Furniture
Context	The Furniture Reuse Network (FRN) works with over 300 reuse charities to support people in need whilst reducing waste in the process through the act of reuse. 103,000 tonnes of waste is saved from landfill by its members. A number of case studies are provided with this focus looking upon the Furniture Recycling Project (FRP) in Gloucestershire.
Objectives	The FRP provides reuse furniture and tested electrical equipment in a safe, clean and affordable manner to low income households. A 16-18 year old education and training programme is ran for those who are not in employment, education or training.
Outcomes	As well as the associated environmental benefits. The training programme works with up to 60 people per year for a period of 6-12 months to get them into college, apprenticeships of full time employment, leaving with improved confidence and new skills. In 2012 the scheme won a Big Society Award for individuals and organisations whose innovative and dedicated work improves the lives and strengths of the community.
Further information	http://www.frn.org.uk/casestudiesmembers/292-furniture-recycling-project.html Accessed 15 December 2015

North Ayrshire Council Waste Strategy	
Location	North Ayrshire
Type of measure	Waste Strategy
Target audience	Households
Type of waste	Furniture and White Goods
Context	As a part of North Ayrshire Council's 2012-2016 Waste Strategy the council developed an agreement with Cunninghame Furniture Recycling Company to collect and redistribute unwanted furniture and white goods from landfill. The Council is one of the first local authorities to develop a reuse target in its strategy.
Objectives	The Council project aimed to collect and redistribute unwanted furniture and white goods from landfill through using an accredited shop. To achieve value for money the Council tendered their requirements through Procurement Scotland.
Outcomes	Cunninghame Furniture Recycling Company operates a free of charge donation collection system, which has collected over 360 tonnes of furniture from over 2500 collections. The company has successfully reused, recycled or holds in stock 90% of the furniture items donated, along with carrying out over 990 house clearances. In addition to void cleans and estate maintenance jobs as contractors, a generated income has been made of £174,000. The company has also sold in excess of 5,700 items of furniture and white goods, assisting 2850 low income families to furnish their homes on a low budget and generated £190,000 of income from sales of furniture and recycled goods.
Further information	http://awards.cosla.gov.uk/wp-content/uploads/2015/03/Maximising-Resouces-in-North-Ayrshire.pdf Accessed 15 December 2015

Bulky waste reuse, Surrey	
Location	Surrey
Type of measure	Reuse Network
Target audience	Households
Type of waste	Bulky Waste
Context	The Surrey Reuse Network (SRN) is a co-ordinated network that is able to share resources for bulky waste collection. The SRN is now the main supplier of goods to Surrey's Local Assistance Scheme (LAS), the crisis fund for people in real hardship. Each individual Furniture Reuse Organisation (FRO) involved stated an increase in their own returns, resulting in being able to help more people.
Objectives	Through combining resources, the joint FROs have been able set up a single number and online booking system for collections and run joint communication campaigns.
Outcomes	The scheme currently diverts circa 600 tonnes of furniture from landfill each year, seeing a rise of 22% in 2012-13 compared to 2011-12. Assistance has been provided to over 5,000 low-income households as well as offering volunteering and work based training opportunities.
Further information	http://www.wrap.org.uk/sites/files/wrap/Surrey%20case%20study%20in%20template%20draft%205%20FINAL.pdf Accessed 15 December 2015

5.4 Electrical Equipment (WEEE)

Public Sector reuse network – WARP-it	
Location	UK, US, Australia, Canada
Type of measure	Reuse Network
Target audience	Businesses, Local Authorities, Universities
Type of waste	Furniture and electrical equipment
Context	WARP-it is an online portal which operates in the UK, US, Australia and Canada The portal facilitates the redistribution of surplus resources such as furniture and IT equipment either within an organisation, such as a university or hospital, or to other organisations. Unused or unwanted resources are matched with those requiring resources, both avoiding the disposal or recycling of unwanted items and avoiding the unnecessary purchase of new equipment. An example of how this has scheme has been used is at Sunderland City Council which underwent a restructure in 2010 that led in the closure of buildings across the city. As a result, large quantities of office based resources such as furniture, equipment and supplies became redundant.
Objectives	Rather than sending the items to landfill, the council utilised the WARPit reuse scheme to make costs savings. When members of staff need to buy furniture or other materials they first use the scheme to see if the resources are located in any other departments.
Outcomes	Over 1000 staff now use the WARPit reuse scheme at SCC, which produced savings of over £400,000 in two and a half years. The savings were used to further enhance the scheme by employing a WARPit officer. As a result, 150 tonnes of supply chain carbon emissions were avoided and 50 tonnes of waste were saved through waste minimisation. Overall, the programme claims to have saved its UK users 1,540 tonnes of CO_2, diverted 517 tonnes of waste from landfill, achieved £396,465 in donations to charity and over £3.6 million in cost savings.
Further information	https://www.warp-it.co.uk/sunderland-city-council.aspx Accessed 15 December 2015

Household WEEE repair, London	
Location	London
Type of measure	Repair
Target audience	Households
Type of waste	WEEE
Context	Electronic waste is one of the fastest growing waste material streams. The Restart Project is a social enterprise that encourages and empowers people to use their electronics longer through repair and maintenance.
Objectives	Through community and workplace events, the Restart Project engages participants to expand the lifetime of their equipment.
Outcomes	A very recent organisation, the Restart Project has been recognised by TalkTalk's Digital Heroes, as well as by the London Sustainable Development Commission. Other recognitions have been received by the Transition Network, Unltd, Lloyds Bank Social Entrepreneurs Programme and the project even featured on the BBC.
Further information	https://therestartproject.org/ Accessed 15 December 2015

5.5 Tools

Tools for Self-Reliance	
Location	UK
Type of measure	Tool reuse
Target audience	UK based charity working to help relieve poverty in Africa.
Type of waste	Unwanted tools and sewing machines
Context	Tools for Self-Reliance aims to empower people living and working in developing countries so that they can better participate in the development of themselves and their communities. One means of doing this is by providing tools and training. Tools for Self-Reliance work with local partners to provide training and business development support.
Objectives	Tools for Self-Reliance collect and refurbish tools donated throughout the UK, with the aim that they can be redistributed in Africa in order to enable people to participate in training, learn a trade and to contribute their communities.
Outcomes	Thousands of tools are refurbished every year by over 700 volunteers acting on behalf of Tools for Self-Reliance nationwide, diversion of unwanted tools from landfill.
Further information	http://www.tfsr.org/publications/tfsr_publications/groups_bulletin/ Accessed 18 January 2016

5.6 Paint

Community RePaint network	
Location	UK
Type of measure	Reuse Network
Target audience	Households
Type of waste	Paint
Context	Every year the UK sells over 300 million litres of paint, of which it is estimated that approximately 50 million litres are unused, stored at home or thrown away.
Objectives	The community RePaint national network has over 75 schemes and is sponsored by Dulux.
Outcomes	In 2014 the network saved over 446,000 litres of paint going to waste, with donations being made from households and businesses. A total of 300,000 litres of paint was redistributed to 3,382 community groups, charities and voluntary organisations reaching over 34,000 people in social need. As a result, the network provided many social, environmental and economic benefits.
Further information	http://www.communityrepaint.org.uk/ Accessed 15 December 2015

Newlife Paints	
Location	UK
Type of measure	Reuse
Target audience	Householders/ Businesses
Type of waste	Interior and exterior grade emulsion. Products in the pipeline include, wood undercoat and primer, satin and gloss and fence paints.
Context	Defra estimates that approximately 50 million litres of paint are disposed by landfill or incineration each year. With production and sales growing Newlife Paints Ltd are increasing the amount of waste paint reclaimed year on year.
Objectives	Newlife Paints Ltd is based in Ford, West Sussex. They professionally reprocess waste water-based paint back into a premium grade emulsion. All products in their paint range guarantee a minimum 50% recycled content, made up from waste paint diverted from landfill or incineration.
Outcomes	Newlife Paint, backed by Sussex Business Partnership, launched to market at the end of 2009. In the first year of production, Newlife reprocessed approx. 100 plus tons of waste paint.
Further information	www.rebornpaints.co.uk Accessed 15 December 2015

5.7 Construction and Demolition Waste

Construction waste reuse, Swansea	
Location	Swansea, Wales
Type of measure	Reuse Centre
Target audience	Industry
Type of waste	Construction
Context	In the UK the construction industry uses approximately 420 million tonnes of materials and products every year, generating 120 million tonnes of waste. The Building Research Establishment estimates that 13% of this waste is new and unused materials. With funding from the Welsh Government, Constructing Excellence in Wales was able to work with partners to develop infrastructure to redistribute surplus goods from the industry to worthwhile causes.
Objectives	Materials that end up in the waste stream are often surplus to requirements due to a potential number of factors: • Over ordering and minimum order requirements. • End of line stock items. • Small defects. • Damage to packaging. Recipro Wales provides the infrastructure to allow construction companies to donate these surplus items. The facility is able to accept large quantities of material which are stored and distributed to good causes (charities, community projects, schools and not for profit organisations).
Outcomes	The benefits to the scheme were environmental, through avoiding landfill and saving CO_2, which all recipients receiving a report detailing the CO_2 savings. The scheme saves money by freeing up space on site and in warehouse by donating items, avoiding disposal costs with good causes able to access the materials for only a small administration fee. Finally, through donations to good causes, benefits are felt by the wider community.
Further information	http://www.cewales.org.uk/waste/reciprocity-cardiff/ Accessed 15 December 2015 http://www.recipro-uk.com/ Accessed 15 December 2015

Construction and Demolition waste reuse, London	
Location	Olympic Park, London
Type of measure	Industrial Reuse
Target audience	Industry
Type of waste	Construction and Demolition
Context	The London Olympic Games in 2012 utilised sustainable initiatives through the reuse of materials from demolition to build the new Olympic Park. Situated in one of London's most underdeveloped areas, the creation of the Olympic Park aimed to trigger more positive development as a result.
Objectives	The majority of the land was industrial and poor quality housing, with the creation of the Olympic Park reusing the materials coming from the demolition and cleaning of the area. Prior to demolition, surveys were undertaken to determine the quantities and types of materials to develop a site waste management plan. The plans included specific targets for reuse and recycling of material.
Outcomes	An example of reuse was that any trees that had to be removed were processed and used as timber as well as existing stone and granite reused for paving and other features. The reuse of materials also significantly reduces the need of transporting construction material resulting in cost savings.
Further information	http://www.dac.dk/en/dac-cities/sustainable-cities/all-cases/waste/london-olympic-park-is-recycling-building-materials/ Accessed 15 December 2015

Trade waste bring sites, Wales	
Location	Wales
Type of measure	Trade Waste Bring Sites
Target audience	Industry
Type of waste	C&D
Context	In 2005/06 12.2 million tonnes of waste was produced by the construction and demolition sector in Wales, of which 431,000 were arisings from general builders. These waste materials contribute significantly to the ecology of Wales. A roadmap of how Trade Waste Bring Sites (TWBS) could be utilised was developed.
Objectives	TWBS were stated as being a useful tool in which unused and unwanted waste material can be reused and disposed of in a more environmentally friendly way. The programmes is being delivered by Constructing Excellence in Wales (CEW) on behalf of the Welsh Assembly Government's waste programme to ensure that 85% or more of the construction and demolition waste produced in Wales is reused or recycled.
Outcomes	The benefits of the roadmap were stated as increasing recycling from construction SMEs, reducing fly tipping, increasing the quantity of materials recycled and promote closed loop recycling.
Further information	Constructing Excellence Wales Trade Waste Bring Sites Roadmap - http://www.cewales.org.uk/current-programme/trade-waste-bring-site/ Accessed 15 December 2015

Exchange and resale of construction materials, Hungary	
Location	Hungary
Type of measure	Promotion
Target audience	Businesses
Type of waste	Construction and Demolition
Context	According to the United Nations Environmental programme 40-50% of raw materials are used in manufacturing building products. In Hungary, only 1-2% of construction materials are reused.
Objectives	The Independent Ecological Centre in Hungary developed a website which allowed users to exchange and resell used construction materials. The main objective was to reduce the amount of construction waste being sent to landfill and better utilisation of resources.
Outcomes	On average 5 new advertisements are announced every day and over 1500 annually. On a yearly basis the website is believed to achieve 21,000 visitors, and is particularly successful in the trade of bricks and tiles.
Further information	http://ec.europa.eu/environment/waste/prevention/pdf/Nemsitt_hu_Factsheet.pdf Accessed 15 December 2015

5.8 Industrial waste

Industrial Symbiosis, UK	
Location	UK
Type of measure	Symbiosis
Target audience	Industry
Type of waste	Industrial
Context	Industrial symbiosis explores the interaction between the environment, the economy, and industry to promote the sharing of materials. Thus, to reduce and prevent waste from occurring.
Objectives	The National Industrial Symbiosis Programme (NISP) was developed in 2005 as an independent facilitator to help businesses come together and find uses for unwanted materials. The overall objective was to divert waste going to landfill and give benefits to companies through reduced disposal costs and new commercial opportunities
Outcomes	Since 2005, the NISP programme has diverted more than 5.2 million tonnes of industrial waste to landfill, preventing the use of 7.9 million raw materials and 9.4 million tonnes of industrial water. Cost savings to members were in the region of £131 million and generated £151 million in new sales.
Further information	http://ec.europa.eu/environment/waste/prevention/pdf/NISP_Factsheet.pdf Accessed 15 December 2015

Industrial Symbiosis, Denmark	
Location	Kalundborg, Denmark
Type of measure	Industrial symbiosis
Target audience	Industry
Type of waste	Mixed
Context	Waste products from industries are used as products to fuel other industries. Excess steam from the power station is exported to the combined district heat and power supply and two other local companies. The other companies use the steam as an incoming heat source before exporting the condensed steam back to the power station for cooling the plant. A refinery supplies excess gas to local industries as an input energy source and by-products are used to form industrial plaster.
Objectives	To create a group of businesses with symbiotic relationships
Outcomes	Direct economic benefits to the involved companies and environmental benefits through waste reduction and reducing need for virgin materials.
Further information	http://www.dac.dk/en/dac-cities/sustainable-cities/all-cases/waste/kalundborg-industrial-symbiosis---waste-makes-resource/ Accessed 15 December 2015

5.9 Wood

Community Wood Recycling, UK network including Birmingham	
Location	UK wide
Type of measure	Network and service provider
Target audience	Householders, businesses
Type of waste	Wood
Context	The National Community Wood Recycling Project (NCWRP) was founded in 2003 to help set up and develop a nationwide network of wood recycling social enterprises.
Objectives	Community Wood Recycling aims to see as many wood recycling enterprises set up as possible through a network of franchises. Modelled on the multi-award-winning Brighton & Hove Wood Recycling Project (also known as The Wood Store Brighton), the aim of these enterprises is to: • Save resources by rescuing and re-using waste timber that would otherwise be landfilled (or at very best downcycled into woodchip). • Create sustainable jobs, as well as training and volunteering opportunities, for local people – especially those who might find it difficult to get into or back to employment.
Outcomes	In 2014, 11,500 tonnes of wood was collected, more than 40% of which was reused. This reuse included separating/repairing pallets, providing the community with wood for DIY and building projects, making a huge range of wood products and through the sale of sacks of firewood and kindling during the winter. During 2014, the nationwide enterprises provided training and work experience places for more than 600 local unemployed people, many of whom went on to find permanent employment within the network, or in a related profession.
Further information	http://www.communitywoodrecycling.org.uk Accessed 15 December 2015

Wood reuse, USA	
Location	Alameda County, USA
Type of measure	Promotion and Education
Target audience	Industry
Type of waste	Wood
Context	Although the county boasts strong recycling rates, finding viable markets for the reuse of wood waste presented challenges for local businesses. The Environmental Protection Agency (EPA) became aware of the need for additional data and information on wood waste reuse and recycling.
Objectives	The objective of the pilot approach was to gather data on wood waste markets to decrease the likelihood of landfill disposal and help to create reuse partnerships. The following task helped to work towards this objective: • EPA negotiated with businesses to explore the waste wood produced and its quality as well as barriers within the county to recycling and reuse. • EPA developed outreach material to supply to business outlining the benefits of reuse and the objective of the project. • Database of potential partners for businesses to use. Further outreach conducted to investigate more detail into the waste wood and assess the interest in businesses forming partnerships.
Outcomes	The pilot project diverted approximately 396 tonnes of waste wood away from landfill annually. A number of companies saved money through finding reuse methods instead of disposal. An example being that a gift box manufacturer save approximately $30,195 a year through reusing 84 tpa of wood boxes. Emission reductions were also reported through the reduction in vehicles transporting wood waste to landfill. A furniture company stated that GHG reduction was equivalent to removing 100 vehicles off the road due to reusing and recycling 396 tonnes of waste wood from the company.
Further information	http://www.stopwaste.org/sites/default/files/Documents/epa_woodwaste_finalreportcasestudy.pdf Accessed 15 December 2015

5.10 Textiles

School uniform reuse, Wales	
Location	Pontypridd, Wales
Type of measure	Promotion
Target audience	Schools
Type of waste	Textiles
Context	A council led initiative called re-uniform allows parents to recycle their child's old school uniform and purchase 'like new' recycled, washed and cleaned uniforms at less than 60% of the original price.
Objectives	The scheme was piloted in Pontypridd High Scholl and proved to be a success with each re-uniform event selling out fast.
Outcomes	The average cost of a school branded item is around £70, with the re-uniform project selling 'like new' products for around £5 each, allowing for valuable savings.
Further information	http://www.amgen-cymru.com/news_view.php?id=158 Accessed 15 December 2015

Trashion Show, US	
Location	Boston, US
Type of measure	Promotion
Target audience	Consumers / Students
Type of waste	Textile
Context	The MIT Trashion Show first started in 2011 and is an annual event aiming to promote sustainable awareness in Boston. The show is ran by an undergraduate committee on sustainability.
Objectives	Greater awareness is raised through reusing and recycling unconventional materials into high-fashion design pieces. Judges for the show are selected from across the university's campus and the wider city of Boston. Designs are critiqued on originality, recyclability and appearance.
Outcomes	The most recent show featured designs made of autumn leaves, trash bags and an old robot built for a student project. In addition to the show, guest lecturers from industry, non-profits and academia speak about promoting sustainability. The Trashion Show was stated as continuously growing each year, spreading more awareness.
Further information	http://news.mit.edu/2015/mit-trashion-show-1218?utm_source=Sailthru&utm_medium=email&utm_campaign=Issue:%2015-12-21%20Waste%20Dive%20Newsletter&utm_term=Waste%20Dive Accessed 15 December 2015

Fashion Recycling Week, London	
Location	London
Type of measure	Promotion
Target audience	Schools / Universities
Type of waste	Textile
Context	H&M teamed up with London College of Fashion's Centre for Sustainable Fashion, to launch the first nationwide Fashion Recycling Week which ran from the end of August to the beginning of September.
Objectives	Students from the fashion schools were tasked to interpret British cities and create new window installations using clothes donated through H&Ms garment collection initiative. The initiative works through reusing unwanted clothes to reduce waste within the fashion industry.
Outcomes	The scheme reused and recycled 97% of the clothes and textiles collected into new products such as insulation for cars and into new garments to keep in the fashion loop. During the Fashion Recycling Week itself, giant collection boxes were located in the Covent Garden Piazza for customers to leave their wares, with student creations displayed in windows across H&M stores in the country.
Further information	http://www.vogue.co.uk/news/2015/08/06/h-and-m-fashion-recycling-week-launches Accessed 15 December 2015

Dress for Success UK	
Location	London
Type of measure	Reuse
Target audience	Works with a diverse range of groups of women, including job centres, prison groups, homeless shelters and domestic violence shelters
Type of waste	Textiles
Context	Dress for Success is programme which works to provide women with business suits for attending interviews. Stylists are employed to select the best outfits on a client-by-client basis, giving the women a chance to obtain the most suitable selection for their personal needs.
Objectives	Aims to help disadvantaged women to a state of economic independence
Outcomes	The economic independence of disadvantaged women
Further information	www.dressforsuccess.org
Return to Reuse Dashboard	

6 Recycling Dashboard

	Example							
Measure/Material	**Collection systems**	*Troliblocs recycling container system*	*Three-weekly collections, Rochdale*	*Three-weekly collections, Bury*	*Restrictions on residual waste collections, Cardiff*	*Fife, Four-weekly collection trial*		
	Alternatives to kerbside collection	*Public Recycling Containers, Barcelona*	*Barcelona Green Dot System for non-recyclable waste*	*ROAR - Robot-based Autonomous Refuse handling*	*'Tweeting' Trash Containers, Finland*	*Vacuum Waste Collection, USA*	*Mobile Phone Apps, USA*	*Cash for Trash, Netherlands*
	Reward schemes	*Trading of recyclables, Mexico City*	*Recycling Incentive schemes, UK*	*Reward schemes, Oxford*	*Reward schemes, Teignbridge*	*Reward schemes, Australia*		
	Recycling on the Go	*Recycling on the Go, London*	*Recycling on the Go, Bexley, London*	*Drinks cans recycling, Exeter*				
	Litter	*Litter collection, London*	*Litter collection, various UK locations*					
	Pay As You Throw and Fines	*Pay as you throw, Italy*	*Pay as you throw, Switzerland*	*Pay as you throw, Guernsey*	*Fines, Wales*			
	HWRC;s and deposit return scheme	*HWRC's, Warwickshire*	*Deposit return scheme, Northern Ireland*	*Deposit return scheme, Scotland*	*Deposit return scheme, Alberta, Canada*	*Recycling charge for mattresses, USA*		
	Communications	*Recycling communications scheme in Flats, London*	*Recycling communications scheme, Australia*	*Recycling communications scheme, Bristol*	*Recycling communications scheme, Isle of Bute*			
	Wood	*Wood recycling, UK*						
	Street sweepings	*Street sweeping recycling, Warwickshire*	*Street sweeping recycling, Dorset*	*Street sweeping recycling, Wolverhampton*				
	Tyres	*Tyre Recycling, Cambridgeshire*	*Tyre recycling for construction industry, UK*	*Tyre recycling for playing surfaces, UK*				

	Used Cooking Oil	*Collection of used cooking oil, Barcelona*	*Recycling of used cooking oil, UK*	*Cooking oil recycling, London*				
	Absorbent Hygiene Products	*Absorbent Hygiene Products recycling, New Zealand and UK*	*Absorbent Hygiene Products recycling, London*					
	Mattresses	*Mattress recycling, London*						
	Food waste	*Food waste recycling, Milan*	*Food waste recycling, South Australia*	*Food waste recycling, Toronto*				

6.1 Household waste

6.1.1 Collection Systems

Trolibocs recycling container system	
Location	Conwy
Type of measure	Recycling container system
Target audience	Households
Type of waste	All household waste streams
Context	In 2014 10,000 homes in Conwy received a Trolibocs recycling container system. This is wheeled trolley on which three boxes can be stacked and then wheeled out to the front of the property on collection day as you would do with a wheelie bin. Paper goes in the top box; plastic, cans and drink cartons go in the middle box; and glass and cardboard in the bottom box.
Objectives	Make recycling more convenient, increase participation and quality of recyclate, increase recycling rates.
Outcomes	The initial pilot reported positive feedback from houses who participated and there was also an increase in the amount of waste recycled. For this reason, in August 2015, Conwy County Borough Council approved the roll-out of the new recycling container to all to all other homes still on boxes and bags, a further 41,000 homes.
Further information	http://www.conwy.gov.uk/section.asp?cat=10355&Language=1 Accessed 20 January 2016

Three-weekly collections, Rochdale	
Location	Rochdale, UK
Type of measure	Collection system – 3 weekly collections
Target audience	Households
Type of waste	All household waste streams
Context	The scheme involves a weekly food and garden waste collection, and three weekly refuse and recycling collections. In 2014/15, Rochdale had a recycling rate well below the national average and collection and disposal costs for residual waste are £306.62 per tonne. The Council is looking to save £1 million and it has calculated that in order to do this it must reach a recycling rate of 45% by 2017. The service is costing the Council £690,000 to introduce and this consists of £132,000 on re-routing, additional vehicles and staff; £180,000 on publicity and education; and £378,000 on food waste caddies and liners. Local Green Points has been commissioned to visit all of the Borough's 88,000 households to promote the service changes.
Objectives	To achieve a 45% recycling rate by 2017
Outcomes	Impact not yet known
Further information	http://www.rochdale.gov.uk/recycling-and-bins/Pages/Questions-and-answers-about-new-bin-collection-service.aspx Accessed 12 December 2015

Three-weekly collections, Bury	
Location	Bury, UK
Type of measure	Collection system – 3 weekly collections
Target audience	Households
Type of waste	All streams
Context	The scheme involves a fortnightly food and garden waste collection, and three weekly refuse and recycling collections. The Council will continue to offer at least one collection each week. Residents can sign up for a free email reminder to notify them when to put out each stream for collection.
Objectives	The service has been introduced as part of the 'Bury Zero Waste Strategy' and the targets include a 55-60% recycling target by March 2015 and >60% target by March 2016; reduce carbon emissions; and save >£800,000 per annum in waste treatment and disposal costs.
Outcomes	In 11 months, residual waste tonnage fallen by 16.7% avoided disposal costs of £860,000 - average recycling rate expected to reach 54%, up from 47%
Further information	https://councildecisions.bury.gov.uk/documents/s4160/Waste%20Strategy%20-%20final%20version.pdf Accessed 12 December 2015 http://resource.co/article/three-weekly-collection-bury-produces-immediate-results-10353 Accessed 12 December 2015 http://www.letsrecycle.com/news/latest-news/bury-council-to-move-to-three-weekly-collections/ Accessed 12 December 2015

Restrictions on residual waste collections, Cardiff	
Location	Cardiff, UK
Type of measure	Collection system
Target audience	Households
Type of waste	Residual waste
Context	'Stay out of the black…move into the green' campaign. At the end of July 2015 some households were limited to 3 red striped bags per fortnight to dispose of residual waste and other areas have seen smaller refuse bins. Extra bags are charged at £1.85 plus a £10 collection charge.
Objectives	To reduce the amount of residual waste householders presented for collection and to increase the amount of recycling.
Outcomes	Upward trend in recycling after 2 months but unpopular with residents. Comparing Aug to Sept stats to last year, tonnage or recyclable material increased by 11% with food waste up 15%% - food waste caddy requests up.
Further information	http://www.cardiffnewsroom.co.uk/index.php/archive/383-stay-out-of-the-black-campaign-is-working Accessed 12 December 2015

Fife, Four-weekly collection trial	
Location	Fife
Type of measure	Collection system
Target audience	Households
Type of waste	Residual waste
Context	Landfilling of waste currently costs the authority £10 million per year. The authority have estimated that over half of the residual waste currently disposed of could be recycled. Therefore a pilot scheme was launched in September 2015 to collect residual waste from households on a 4-weekly schedule.
Objectives	The authority have estimated that they can save £350,000 a year in the short term from if the options being trialled are fully rolled out. This will rise to £900,000 of annual savings after 2021 when the ban on landfilling of biodegradable municipal waste comes into force in Scotland.
Outcomes	There is no reported outcomes as yet - the trial will be undertaken for at least 9 months alongside extensive monitoring to record recycling rates and to respond to customer feedback.
Further information	http://www.letsrecycle.com/news/latest-news/fife-launches-four-weekly-collection-trial/ Accessed 16 January 2016

6.1.2 Alternatives to kerbside collections

Public Recycling Containers, Barcelona	
Location	Barcelona, Spain
Type of measure	Innovative Public Recycling Containers
Target audience	Householders and businesses
Type of waste	Residual waste and source separated recyclables
Context	In 2010, Barcelona's Environmental Department introduced new waste recycling containers which are designed for easy use by the city's whole population. The containers include identification elements to make it easier for all people to locate and distinguish between them in public spaces. Each waste category is associated with a colour: organic – brown, general waste – grey, cardboard and paper – blue, plastic packaging – yellow and glass – green. Containers are lined up in the same order everywhere to make it easy for the blind or visually-impaired to identify them. They also have tactile markers indicating the type of waste collected by each container.
Objectives	Taking part in the recycling waste collection is the first step in dividing household waste and a civic gesture which contributes to preserving the environment. Waste can be reused by recycling it, so it can become a resource and provide environmental and social benefits for everyone. In the context of public awareness campaigns, the City Council is promoting actions and tools to accompany the citizens in improving household waste collection through educational activities and training which are addressed at the public and groups from the city.
Outcomes	There are containers for each one of them located citywide in order to make waste management easier: tins, glass, paper and cardboard, organic and remains. All citizens have recycling collection containers located less than 100 meters from their home.
Further information	http://www.psfk.com/2010/02/barcelonas-innovative-public-recycling-containers.html 18 January 2016

Barcelona Green Dot System	
Location	Barcelona, Spain
Type of measure	Practical
Target audience	Householders and businesses
Type of waste	Waste that does not fit in to 5 main categories of recycling
Context	In addition to on-street recycling centres, Barcelona has a network of more than 21 neighbourhood 'green dots', two mobile 'green dots' at schools and two mobile 'green points for recyclable waste that can't be thrown into street bins. The green dots and green points are locations of containers that can be used of to dispose of waste that can be recycled but not via the usual on-street recycling bins. The City Council has an online Green Dots browser to help you find the closest green dot to your area depending on the waste you want to recycle.
Objectives	By using this service we contribute to improve the recycling process and help preserving the environment
Outcomes	Providing easy access for the collection of non-core recyclables.
Further information	http://ajuntament.barcelona.cat/ecologiaurbana/en/services/the-city-works/maintenance-of-public-areas/waste-management-and-cleaning-services/household-waste-collection Accessed 16 January 2016

ROAR - Robot-based Autonomous Refuse handling	
Location	Developed in Sweden
Type of measure	Innovation
Target audience	Households
Type of waste	MSW
Context	Volvo Group is currently working on a joint project with Chalmers University of Technology and Malardalen University in Sweden, Penn State University in the US and the waste recycling company of Renova. The project is investigating the development of a robot that interacts with refuse trucks and its driver to carry out bin collections.
Objectives	The project is called ROAR, for Robot-based Autonomous Refuse handling. The objective is for a robot, with the aid of instructions from the trucks operating system to quietly collect refuse bins in neighbourhoods, bring them to the refuse truck and empty the contents.
Outcomes	The main purpose of ROAR is to demonstrate how in the future the use of smart machines could assist a broad range of activities in society.
Further information	http://www.volvogroup.com/group/global/en-gb/_layouts/CWP.Internet.VolvoCom/NewsItem.aspx?News.ItemId=150979&News.Language=en-gb Accessed 16 December 2015

'Tweeting' Trash Containers, Finland	
Location	Developed in Finland
Type of measure	Innovation
Target audience	All
Type of waste	All
Context	Envo are developing containers which contain sensors installed inside to monitor the quantities of waste, calling for pick-up when the container is full.
Objectives	Envo's solution reaches savings of up to 50% in costs, increasing service quality and avoiding waste bin overflows and excess fleet utilisation. The data can also be more accurately used to predict when bins are likely to be full and need emptying.
Outcomes	The scheme is still in early development, however beneficial cost savings have already been identified. Envo's idea has raised $26.1 million in funding since 2012. The company had a pilot programme in Rotterdam that involved the collection of paper and board and selling them onwards for recycling. The system proved to be twice as effective as the existing one.
Further information	http://www.politico.eu/article/does-your-trash-tweet/ Accessed 16 December 2015

Vacuum Waste Collection, USA	
Location	USA
Type of measure	Innovation
Target audience	Households
Type of waste	MSW
Context	There are more than 100 automated vacuum waste collection (AVAC) systems used around the world. Particularly in city centres, residential areas, airports and theme parks.
Objectives	The uptake of the system in the US has said to be slow. Although, a recent announcement has been made for an AVAC system with a capacity of 25 tonnes of waste per day to be built to serve part of the Hudson Yards, a mixed use multi-billion dollar project being developed in New York City.
Outcomes	Better air quality and climate resilience can be achieved through AVAC systems compared to traditional truck based collection systems. Through the elimination of trucks, GHG emissions are reduce as a result. AVAC systems are also resilient through extreme weather conditions such as hurricanes and flooding with a lifespan of over 50 years.
Further information	http://www.environmentalleader.com/2015/08/25/vacuum-waste-collection-offers-better-air-quality-climate-resiliency/ Accessed 16 December 2015

Mobile Phone Apps, USA	
Location	USA
Type of measure	Innovation
Target audience	Households
Type of waste	MSW
Context	Municipalities in the US have developed mobile phone apps to aid waste management services.
Objectives	Similar schemes exist in the UK when collection dates and other information can be supplied in a mobile phone app, reducing customer queries. Rubicon Global have created an app which allows users to schedule a pick-up from their smart phones, similar to the taxi pick-up app of Uber.
Outcomes	The initiative is still in the early stage and under development.
Further information	http://www.wastedive.com/news/how-mobile-apps-are-allowing-trash-and-tech-to-collide/401958/ Accessed 16 December 2015

Cash for Trash, Netherlands	
Location	Netherlands
Type of measure	Practical
Target audience	Householders
Type of waste	Household Waste
Context	Cash for Trash is an innovative collection method for separated household waste. With Cash for Trash, people are given a sum of money per kilogram of household waste which is handed in, separated, to the Cash for Trash recycle shop. Cash for Trash began in September 2013 in Rotterdam.
Objectives	The aims of Cash for Trash are: • Ambition to make waste valuable • Modern, fun – mobile shops • Targeted at areas where kerbside collections not possible – high rise buildings • Use of humour – 'waste of money' stickers on residual waste bins • Creates jobs • Pays people for the recyclables they bring in They work in collaboration with local authorities, focussing on high rise areas, and believe they are complementing the local authority recycling system and not competing with it. They pay staff – not subsidised.
Outcomes	• Average income of €25-30 per year, but some people earn far more as they actively collect waste from others to bring to the shops • Generate revenue from sale of recyclables, plus deals with local authorities – they pay per tonne of what it would have cost them had the waste been landfilled
Further information	See video at: http://cashfortrash.mobi/ Accessed 16 December 2015

6.1.3 Reward Schemes

Trading of recyclables, Mexico City	
Location	Mexico City, Mexico
Type of measure	Material trading
Target audience	Residents
Type of waste	Dry recyclables and WEEE
Context	Mexico City established a market whereby residents can trade dry recyclables for freshly grown food from local farms. The market operates on the second Sunday of each month and residents bring segregated material streams to the market which they trade for coupons which can be exchanged for food onsite. Each person may deliver a minimum of 1kg and a maximum of 10kg each market day. The government sells the recyclables collected and pays above market price for the farm produce. The sale of recyclables does not cover the cost of the produce and the shortfall is covered by tax payers.
Objectives	To increase the amount of material recycled following the closure of one of the main landfill sites in the area.
Outcomes	The initiative processes 12 tonnes of waste on each market day. Residents' perceptions were changed and they now see the materials as a valuable resource.
Further information	http://www.dac.dk/en/dac-cities/sustainable-cities/all-cases/waste/mexico-citys-trash-for-food-market/ Accessed 16 December 2015

Recycling Incentive schemes, UK	
Location	UK Local Authorities, including Bexley, Havering and Kingston
Type of measure	Incentives
Target audience	Households
Type of waste	All
Context	The Local Green Points scheme motivates households in waste prevention, reuse and recycling activities.
Objectives	A web platform provides communications whilst also providing incentives and rewards which can be tailored to local needs. An example from Havering, points earned through the scheme can be redeemed at their local leisure centres.
Outcomes	The Havering scheme launched in January 2014 and has over 25,000 members. Green points can also be spent on over 1,000 sustainable products in the Green Rewards eShop or donated to local charities.
Further information	http://www.localgreenpoints.com/ Accessed 16 December 2015 http://www.localgreenpoints.com/custom/upload/Press%20Coverage/CIWM%2019062015.pdf Accessed 16 December 2015

Reward schemes, Oxford	
Location	Oxford, UK
Type of measure	Reward Scheme
Target audience	Residents
Type of waste	Dry Recyclables
Context	The Council received £350,000 of funding from DCLG to implement a 3 year recycling rewards scheme entitled '*Blue Bin Premier League'*. The City was split into 8 areas with a league table of area recycling rates published and the area improving it's recycling the most each month winning a community prize to the value of £400. The community prize is chosen from a list of schemes determined by local ward councillors and in addition two household prizes are awarded (vouchers for local businesses and leisure services to the value of £30 each). Registered residents within the winning area will be able to nominate a community project from the pre-selected list.
Objectives	The aim of the project is to boost recycling performance and also enhance community morale. In addition the scheme is hoped to provide positive media coverage and enhance resident-council relations.
Outcomes	Scheme only introduced in October 2015
Further information	http://www.oxford.gov.uk/Library/Documents/Waste%20and%20Recycling/Blue%20Bin%20Recycling%20League%20Terms%20and%20Conditions.pdf Accessed 16 December 2015

Reward schemes, Teignbridge	
Location	Teignbridge, UK
Type of measure	Reward Scheme
Target audience	Residents
Type of waste	Dry Recyclables
Context	The Council has launched a '*Recycling Together Rewards'* scheme. Residents are challenged with keeping their residual waste bin free of food waste and dry recyclables. Participants register on-line and are issued with stickers to display on their residual waste containers. Each month, two prizes of £100 and eight runner-up prizes of £25 will be awarded to householders and their nominated community group will receive the cash equivalent. At the end of the scheme, the group with the greatest number of supporters will win a £1,000 prize. The Council received £40,000 of funding from DCLG to implement the scheme.
Objectives	The aim of the project is to boost recycling performance and to reduce contamination.
Outcomes	Scheme only introduced in October 2015
Further information	https://www.teignbridge.gov.uk/recyclingrewards Accessed 16 December 2015

Reward schemes, Australia	
Location	Frankston, Australia
Type of measure	Reward scheme
Target audience	Householders
Type of waste	Food waste
Context	The '*Halve Garbage Waste Programme'* has 1000 participants and they are provided with either a free compost bin or subsidised wormery to deal with their food waste. Participants of the scheme receive $20/year discount on their residual waste charge.
Objectives	To increase levels of home composting and therefore reduce the amount of residual waste collected.
Outcomes	200 hh with an average of 5kg of waste a week reduced to 2.95kg after 3 weeks.
Further information	http://www.dac.dk/en/dac-cities/sustainable-cities/all-cases/waste/frankston-compost-makes-cities-greener/ Accessed 16 December 2015

6.1.4 Recycling on the go

Recycling on the Go, London	
Location	London, UK
Type of measure	Recycling
Target audience	Residents, visitors and commuters
Type of waste	Mixed dry recyclables
Context	Islington Council introduced recycling on the go bins along areas with high footfall, including its busiest shopping high street and outside tube and train stations. The containers have a similar footprint and life expectancy to conventional litter bins. The scheme was communicated to residents through the quarterly Borough newsletter.
Objectives	To increase the amount of recycling tonnage diverted from landfill and to act as a highly visible reminder of the Borough's recycling commitment by allowing residents to recycle on the go what they would recycle at home.
Outcomes	Compositional analysis of the units showed a 53% recycling rate and a capture rate of 74%. Placing recycling bins in isolation resulted in higher levels of contamination within the recyclables compared to placing the containers next to conventional litter bins. Newspapers accounted for 46% of the recycling collected but a high level of paper remained within the residual waste stream (34%).
Further information	http://www.islington.gov.uk/services/rubbish-recycling/recycle/recycle-on-go/Pages/default.aspx Accessed 16 December 2015 http://www.wrap.org.uk/sites/files/wrap/ROTG_ENG_Case_Study_ISLINGTON_2P.pdf Accessed 16 December 2015

Recycling on the Go, Bexley, London	
Location	Bexley, London, UK
Type of measure	Recycling
Target audience	Residents, visitors and commuters
Type of waste	Mixed dry recyclables
Context	The London Borough of Bexley has introduced a number of different types of recycling on the go bins. These include adapted litter bins for mixed recyclables which sit alongside traditional litter bins; node bins for mixed recyclables which are positioned to serve both the nearby flats and shoppers and passers-by; commuter recycling banks outside key transport stations for the collection of newspapers and magazines; and park recycling bins for bottles and cans.
Objectives	To enable residents to recycling on the go as well as at home and to improve overall recycling performance by capturing additional materials for recycling.
Outcomes	The system has not yet been in place long enough to assess outcomes.
Further information	http://www.bexley.gov.uk/recyclingonthego Accessed 16 December 2015

Drinks cans recycling, Exeter	
Location	UK
Type of measure	Recycling
Target audience	Residents, visitors and commuters
Type of waste	Cans
Context	Chartman Group with support from Every Can Counts is introducing a trial of recycling on the go can bins at a petrol station forecourt near Exeter. 3% of cans purchased in the UK are from petrol stations. Chartman is hoping to introduce containers to all eight of its sites in early 2016, should the initial trial be successful. Every Can Counts has supported by providing promotional material and liaising with Chartman's existing waste collection contractor.
Objectives	Target recycling on the go as 44% of drinks cans are consumed outside of the home
Outcomes	Not yet known
Further information	http://www.ciwm-journal.co.uk/petrol-forecourt-recycling-pilot-sims-to-capture-drinks-can-on-the-go/

6.1.5 Litter Collection

Litter collection, London	
Location	London, UK
Type of measure	Litter collection
Target audience	Residents, visitors and commuters
Type of waste	Street litter
Context	'Neat Streets' is a collaborative initiative between Hubbub, Westminster City Council, INCPEN, Veolia, Lucozade Ribena Suntory, Packaging Federation, Metal Packaging Association, Packaging and Film Association, PlasticsEurope, British Plastics Federation, and The Can Makers. As part of the 'Neat Streets' initiative a range of novel ways to help tackle litter have been trialled in Villiers Street, London. 1. Musical Butts – a musical cigarette collection pole 2. Vote with your butt – cigarette disposal containers with separate compartments to allow smokers to vote by placing their butt in the chosen compartment. The bins featured a different sports question each week. 3. Message bin a bottle – those correctly using bins were celebrated with medals, music and enthusiastic praise. 4. Butts out – Giant cigarettes were used to highlight the problem of smoking related litter and portable ashtrays were handed out to smokers. The ashtrays were also stocked at nearby retailers. 5. Gumdrop on-the-go – small gum disposal containers were handed out to passers-by for return to a local collection point to be entered into a competition. Gumdrop Ltd then recycled the chewing gum into new rubbers and plastics. 6. My street is your street – gallery of 50 faces holding a placard declaring 'my street is your street' was exhibited in the stations, on the streets and in local businesses. 7. Talking rubbish – litter bins which thanked people for disposing of their waste. 8. Chew is it? – Poster installations where people were encouraged to stick their chewing gum in a specific place to gradually reveal a message or picture.
Objectives	To reduce the amount of on-street litter
Outcomes	26% drop in litter over 6 months
Further information	https://www.hubbub.org.uk/neat-streets

Litter collection, various UK locations	
Location	London, Birmingham, Breckland, Manchester, Prudhoe, Margate, Wirral and Essex, UK
Type of measure	Litter collection
Target audience	Residents, visitors and commuters
Type of waste	Street litter
Context	The project has been operated in seven locations across the UK. The project has involved the installation of bins, dubbed 'charity collection pots' in main shopping centres. Visitors had the opportunity to raise up to £450 for a local charity in each of the three months of the project. More litter in the bin + less on the ground = more money for the charity concerned.
Objectives	Reducing street litter
Outcomes	Birmingham has seen a 30% decrease in litter picked from streets where the bins are located and the same trial in Essex saw a litter reduction of over 42%
Further information	http://www.keepbritaintidy.org/binitforgood/2347 http://www.keepbritaintidy.org/bin-it-for-good/2461/2/1/999/ http://www.keepbritaintidy.org/birmingham-city-council-and-retail-birmingham-bin-it-for-good/2564/2/1/999/3

6.1.6 Pay as you throw and fines

Pay as you throw (PAYT) is a usage-pricing model for disposing of waste. Users are charged a rate based on how much waste they present for collection to the municipality or local authority. This can be done by weigh, volume, or frequency.

Pay as you throw, Italy	
Location	Treviso, Italy
Type of measure	Pay as you throw
Target audience	Households
Type of waste	Residual waste
Context	Contarina SpA provides a kerbside collection of recyclables, a separate collection of food waste, and residual waste collections. The company charges residents an annual fee for a set number of collections of residual waste and additional collections are charged on a 'pay-as-you-throw' basis.
Objectives	To increase the amount of material recycled and reduce the amount of residual waste presented for collection.
Outcomes	85% recycling rate
Further information	http://www.letsrecycle.com/news/latest-news/pay-as-you-throw-aids-contarina-85/

Pay as you throw, Switzerland	
Location	Zurich, Switzerland
Type of measure	Pay as you throw
Target audience	Residents
Type of waste	Residual waste
Context	Single use plastic bags known as Zuri-Sacks can be purchased from supermarkets for the disposal of residual waste. These bags must then be deposited in collection bins. Residents who do not present their waste correctly can be fined 250 CFH.
Objectives	To increase the amount of material recycled and reduce the amount of residual waste presented for collection. The bags act as an incentive to prevent, reuse, recycle and compost waste, rather than pay to dispose of it as residual waste.
Outcomes	During the period 1992-2005, Zürich succeeded in reducing waste production from 140,000 tonnes to 100,000 tonnes a year
Further information	http://www.dac.dk/en/dac-cities/sustainable-cities/all-cases/waste/zurich-zuri-sack--popular-rubbish-sack-policy/

Pay as you throw, Guernsey	
Location	States of Guernsey
Type of measure	Pay as you throw
Target audience	Households
Type of waste	Residual waste and recycling
Context	From 2017, Guernsey proposes to charge residents on the basis of the amount of waste they produce on a per bag basis. This will involve changing current legislation and require parishes to award contracts to undertake the collections. The original proposed date of mid-2016 has been pushed back to accommodate this. To encourage more recycling and waste minimisation behaviour, recycling bags would cost around 50p and residual waste bags £1.50 to £2 per bag.
Objectives	To reduce waste production and encourage participation in recycling
Outcomes	Service not yet in place
Further information	http://resource.co/article/guernsey-pay-you-throw-plans-delayed-10535

Fines, Wales	
Location	Wales, UK
Type of measure	Fines
Target audience	Residents
Type of waste	Residual waste
Context	Rhondda Cynon Taff has introduced a system whereby residents are fined if they exceed the Council's stated maximum amount of residual waste. The rules are as follows: • If a resident has a 240 litre bin, no additional black bags will be accepted. • If a resident has a 120 litre bin (standard issue), 1 black bag will be allowed. • No container - 4 black bags – excluding ash waste. Properties with more than one bin will have any excess containers removed. Additional black sacks will not be collected and residents may receive a visit from the Council's Enforcement and Awareness Officers. Repeat offenders will receive a £75 fine.
Objectives	To reduce the amount of residual waste presented for collection and to increase the amount of recycling.
Outcomes	The recycling rate increased from 49.3% to 53.8%
Further information	http://www.rctcbc.gov.uk/en/environmentplanningandwaste/rubbish,wasteandrecycling/toomanyblackbags!/toomanyblackbags!.aspx http://www.letsrecycle.com/news/latest-news/wales-recycling-rate-passes-56/

6.1.7 HWRCs and Deposit Return Schemes

HWRC's, Warwickshire	
Location	Warwickshire, UK
Type of measure	Recycling - HWRC
Target audience	Households
Type of waste	Household waste and recycling – batteries, textiles, garden waste, residual waste, plastics, WEEE, glass, cardboard, light tubes, hardcore and rubble, paint, scrap metal, used engine oil, carpet, paper, shoes, wood, furniture, household chemicals, plasterboard.
Context	Lower House Farm was built as a joint development between Staffordshire County Council and Warwickshire County Council, with design and construction costs shared 50:50. Operating costs are split proportionally based on the waste throughput per tonne and the percentage number of visitors from each respective authority. The site has an on-site reuse shop run by Age UK Warwickshire and an adjoining waste transfer station which accepts kerbside-collected municipal waste. The site cost £3.5 million to develop and can process 100,000 tonnes of waste per annum. The first planning application was submitted in 2008 and consented in 2009, and the second application went before the Regulatory Committee in October 2010 in light of land swap deal.
Objectives	Warwickshire County Council's Waste Strategy includes a number of objectives which are directly supported by the Lower House Farm site, in particular: • To increase the reuse of materials through the installation of a reuse shop; • to reduce reliance on landfill; and • minimise, so far as is practicably possible, the distance that waste is transported throughout the County.
Outcomes	Highly Commended in the GO John McClelland Collaborative Procurement Initiative of the Year Award for Non Health organisations is: Warwickshire County Council. Meanwhile the scheme was a finalist in the National Recycling Awards 2014 in Efficiency Initiative of the Year category as well reaching the finals of the Awards for Excellence in Recycling and Waste Management 2014 in the Design of a Waste Management Facility category.
Further information	http://lowerhousefarmhwrc.wordpress.com/ www.warwickshire.gov.uk/lowerhousefarm

Deposit return scheme, Northern Ireland	
Location	Northern Ireland
Type of measure	Deposit Return Schemes
Target audience	Purchasers of cans and plastic bottles
Type of waste	Dry recyclables – cans and plastic bottles
Context	Under the proposal, customers pay a small cash deposit when they buy a drinks can or bottle and get the deposit back when they return the item to a collection point. Suggested deposits would be 10p to 20p per item depending on the volume of the container. The service would be administered through the use of reverse vending machines.
Objectives	To improve recycling performance by incentivising container return.
Outcomes	Service not yet implemented
Further information	http://www.letsrecycle.com/news/latest-news/northern-ireland-to-consider-bottle-deposit-scheme/

Deposit return scheme, Scotland	
Location	Scotland, UK
Type of measure	Deposit Return Schemes
Target audience	Purchasers of cans and plastic bottles
Type of waste	Dry recyclables – cans and plastic bottles
Context	Under the proposal, customers pay a small cash deposit when they buy a drinks can or bottle and get the deposit back when they return the item to a collection point. A feasibility study on the introduction of a deposit return system in Scotland was undertaken by Zero Waste Scotland. The implementation costs were estimated to be £15 million and running costs £29 million per year.
Objectives	To improve recycling performance by incentivising container return.
Outcomes	Service not yet implemented. The costs of the service would be offset by the sale of the recovered material, unclaimed deposits and fees from producers. However, the Packaging Recycling Group Scotland has stated that it is fundamentally opposed to the schemes introduction.
Further information	http://www.zerowastescotland.org.uk/content/deposit-return-system-feasibility-study http://www.prgs.org.uk/write/MediaUploads/PRGS_May_2015.pdf

Deposit return scheme, Alberta, Canada	
Location	Alberta, Canada
Type of measure	Deposit Return Schemes
Target audience	Purchasers of beverage containers
Type of waste	Plastic drinks bottles, aluminium cans, tetra Pak containers, wine boxes and juice pouches, glass bottles, other metal cans
Context	Customers pay a small cash deposit when they buy a drinks can or bottle and get the deposit back when they return the item to a collection point. For containers sized 1 Litre or less the deposit is 10 Cents (6.5p) and containers greater than 1 Litre, 25 Cents (16p)
Objectives	To encourage recycling by incentivising consumers to collect their containers for recycling
Outcomes	Albertans returned 83.3% of their beverage containers to a depot in 2014
Further information	http://www.bcmb.ab.ca/ http://www.bcmb.ab.ca/download/BCMB%20Recycling%20Guide.pdf

Recycling charge for mattresses, USA	
Location	California, Connecticut and Rhode Island, USA
Type of measure	Recycling Fee
Target audience	Households
Type of waste	Mattresses
Context	Consumers are charged for the cost of recycling mattresses through a recycling fee charged to the consumer at the point of purchase. In Connecticut for example, purchasers are charged a $9 recycling fee. A $2 reimbursement is given to those depositing mattresses at specific participating facilities. A combination of manual and mechanical means are used for dismantling the mattresses.
Objectives	To reduce the number of mattresses which end up in landfill
Outcomes	More than 80% of the components making up the mattress are recycled with the remaining fraction used for a Solid Recovered Fuel. Steel springs are extracted and sent for recycling, foam is used for producing carpet underlay, wood is processed into mulch and fibre is reprocessed into filters for industrial equipment.
Further information	http://byebyemattress.com/ Accessed 15 December 2015

6.1.8 Communications

Recycling communications scheme in Flats, London	
Location	London, UK
Type of measure	Recycling communications scheme
Target audience	Households in flats
Type of waste	Dry recyclables
Context	Prior to commencement of the communications campaign, the London Borough of Bexley undertook a data gathering exercise to determine what current attitudes to recycling were and what barriers to participation existed. This involved undertaking surveys and visual inspections of containers. In addition the Council held focus groups to discuss the key issues raised in the surveys. The key barrier to communicating with the residents was language, so the Council translated literature into the two predominant languages – Polish and Punjabi, and provided pictorial illustrations within the leaflets. The Council supported this with a door stepping campaign and spoke to over 5,000 residents.
Objectives	To increase the use of recycling services for flats through clear communications and greater resident participation; and decrease contamination in recycled material collected from flats through explanation of the correct participation methods.
Outcomes	Increased recycling rate by 3.5%. Committed recycler rate rose from 27% to 63%. The average fill rates of the paper and cardboard bins on estates of high-rise flats rose to 75% from 62%.
Further information	http://www.wrap.org.uk/sites/files/wrap/BCLF_Bexley_15.09.08.5864.pdf Accessed 16 December 2015

Recycling communications scheme, Australia	
Location	Bankstown, Australia
Type of measure	Recycling communications scheme
Target audience	Households
Type of waste	Dry recyclables
Context	Bankstown City Council introduced a '*Recycle Right!'* contamination reduction trial. With contamination rates as high as 30%, an active research trial was undertaken to test the effectiveness of different communication strategies. Nine different approaches were trialled, ranging from postcards and bin hangers to getting residents to sign a pledge to recycle correctly.
Objectives	To reduce contamination rates to below 10%.
Outcomes	The most effective strategies in reducing overall contamination were those which included installation of feedback posters and the *'I Pledge'* agreement.
Further information	http://www.environment.act.gov.au/__data/assets/pdf_file/0010/576919/ACT_MUD_Report_FINAL_21_Feb_2012.pdf Accessed 16 December 2015

Recycling communications scheme, Bristol	
Location	Bristol, UK
Type of measure	Recycling communications scheme
Target audience	Households
Type of waste	Dry recyclables and food waste
Context	115 mini recycling centres (MRCs) were installed at to provide communal recycling points at flats. This was supplemented by a door to door outreach campaign to approx. 6,000 residents. Each property also received a reusable sack to store their recycling in within their properties. Following the success of the dry recycling communications scheme, the Council introduced a similar initiative for cardboard and food waste recycling. At suitable existing MRCs, cardboard and food waste bins were introduced and a further door-stepping campaign carried out. Households were supplied with kitchen caddies for storing their food waste in their kitchens and free compostable caddy liners were offered at libraries.
Objectives	To improve recycling participation and capture from flats to an equivalent of 75kg per household per year.
Outcomes	Recycling tonnage increased 77% in the period following introduction of the MRCs. The average amount of recyclables collected from each property rose from 44kg at the beginning of the scheme to 75kg two years following introduction.
Further information	https://www.culvercity.org/~/media/Files/PW/EnvironmentalOps/Multifamily%20Recycling%20ReportFINAL11302012%202.ashx Accessed 16 December 2015

Recycling communications scheme, Isle of Bute	
Location	Isle of Bute, Scotland
Type of measure	Recycling communication
Target audience	Households
Type of waste	All streams
Context	The Isle of Bute is Scotland's second Zero Waste Town. Fyne Futures, a community organisation dedicated to promoting environmental sustainability on the Isle of Bute will receive £200,000 from Zero Waste Scotland to implement a range of initiatives over the next two years. These initiatives include: • The launch of an enhanced recycling collection trial in the Bush/Serpentine area, to deliver recycling kits to over 500 households with the objective of increasing the current 40% participation rate to 90%. A larger variation of plastic types will be accepted and kerbside textile collection will be offered; • The introduction of a pilot food waste collection service with up to 50 households and a training hub for food composting; • Additional recycling facilities; • The launch of a community engagement programme to raise awareness of the multiple benefits of waste prevention and increase volunteers; • The launch of a programme aimed at local businesses to help them to make changes necessary to prevent waste and increase resource efficiency; • A project to set up the facilities needed to launch a collection and reuse service for used and waste electrical equipment (UEEE and WEEE) • Increasing the quantity and quality of the recyclable goods collected, including biodegradable waste
Objectives	To assist Scotland in achieving the 70% recycling target and waste reduction target of 15% by 2025.
Outcomes	Not yet known
Further information	http://www.fynefutures.org.uk/blog/isle-of-bute-scotlands-first-zero-waste-island/ Accessed 16 December 2015

6.2 Wood

Wood recycling, UK	
Location	Bromley, Stapleford Tawney, Gravesend, St Albans, High Wycombe, Haywards Heath, Brighton, Milton Keynes, Chichester, Abingdon, Hastings, Southampton, Leicester, Chippenham, Birmingham, Bristol, Derby, Weston-Super-Mare, Newport, Taunton, Sheffield, Hull, Manchester, Preston, Middlesbrough, Newcastle, Glasgow, UK
Type of measure	Recycling
Target audience	Construction and demolition waste
Type of waste	Wood
Context	The National Community Wood Recycling Project was founded in 2003 and has developed a network of wood recycling social enterprises.
Objectives	To produce recycled wood products which meet the British Standards Institution Publically Available Specification 111 for processing wood waste (PAS 111). To reuse waste timber products to reduce wood waste. To create sustainable jobs and volunteering opportunities for local communities.
Outcomes	In 2014 over 11,500 tonnes of waste was collected, 40% of which was reused. The project has repaired pallets, provided materials for community DIY and building projects, produced items of furniture and produced firewood and kindling which is sold within the local community. In 2014 the project provided training and work experience placements to more than 600 local unemployed people. In 2014 13,911 tonnes of wood was collected and services were delivered across 14,628 volunteer days by 679 volunteers.
Further information	http://www.communitywoodrecycling.org.uk/ Accessed 16 December 2015 http://jericho.org.uk/wood-recycling/ Accessed 16 December 2015

6.3 Street Sweepings

Street sweeping recycling, Warwickshire	
Location	Warwickshire, UK
Type of measure	Recycling
Target audience	Local authority
Type of waste	Street sweepings and gully material
Context	50,000 tonne per annum capacity soil washing plant which treats 50 tonnes of waste per hour. The plant uses a two-step treatment process; the first stage uses screens and magnetic separators to remove large items such as twigs and stones and ferrous metals, the second stage uses a washing process to sort the material into sands, silts and aggregates.
Objectives	To reduce the amount of street cleansing and gully emptying waste which is disposed of to landfill.
Outcomes	85 – 90% diversion from landfill. 10% of the material is organic and is composted; 20% consists of aggregates; 60% consists of material suitable for landfill restoration; 5% leachate, 5% mixed residue and precious metals extracted from the dust including platinum, palladium and rhodium.
Further information	http://www.veolia.co.uk/sites/g/files/dvc636/f/assets/documents/2014/10/ST_factsheet.pdf Accessed 16 December 2015

Street sweeping recycling, Dorset	
Location	Dorset, UK
Type of measure	Recycling
Target audience	Local authority
Type of waste	Street sweepings and gully material
Context	30,000 tonne per annum capacity soil washing plant which treats 50 tonnes of waste per hour. The plant uses a two-step treatment process; the first stage uses screens and magnetic separators to remove large items such as twigs and stones and ferrous metals, the second stage uses a washing process to sort the material into sands, silts and aggregates.
Objectives	To reduce the amount of street cleansing and gully emptying waste which is disposed of to landfill.
Outcomes	75% of the material is recycled as aggregate. There is also organic and light weight material which is dewatered and then composted. This material can only be classed as a CLO (compost like output) so is presently only suitable on restoration projects. Organic content normally accounts for 20% of the material. The remaining 5% of material is a flocculated sludge which is dewatered. The water is recovered and reused and the remaining sludge has to go to landfill.
Further information	http://www.thisiseco.co.uk/Street_Sweeping.html Accessed 16 December 2015

Street sweeping recycling, Wolverhampton	
Location	Wolverhampton, UK
Type of measure	Recycling
Target audience	Local authority
Type of waste	Street sweepings and gully material
Context	40,000 tonne per annum capacity soil washing plant which treats 15 tonnes of waste per hour. The facility includes a full water treatment system, bespoke material feed hopper, and RotoMax 60R high attrition system.
Objectives	To reduce the amount of street cleansing and gully emptying waste which is disposed of to landfill.
Outcomes	An estimated 98% of the road sweepings treated by the plant will be recycled for use in products including sand, washed aggregate and compostable material.
Further information	http://www.cdenviro.com/case-studies/32/sita-uk-reduce-waste-to-landfill-with-road-sweepings-and-gully-arisings-plan Accessed 16 December 2015

6.4 Tyres

Tyre Recycling, Cambridgeshire	
Location	Cambridgeshire, UK
Type of measure	Symbiosis
Target audience	Industry
Type of waste	Tyres
Context	The Cambridgeshire Guided Busway scheme, once completed, will be the world's longest busway covering over 25km. To provide the guideway with good drainage a suitable material had to be selected to fill the 40,000 cubic metres between the tracks. To meet the projects original requirements, over 60,000 tonnes of material was required. A variety of recycled materials were investigated before settling on shredded tyres.
Objectives	Shredded tyres confirming to the British Standards Institution Publically Available Standard 107 for tyre recovery (PAS 107), provided fantastic drainage, were in good supply and must be recycled by law. Approximately 45 used tyres were needed per cubic metre for drainage, resulting in 1.8 million tyres being recycled and used for the Guided Busway.
Outcomes	A green choice, 60,000 tonnes of virgin materials were saved and CO_2 reductions of 6,120 tonnes. In addition, water savings totalled 1,440 tonnes which resulted in significant project cost savings.
Further information	http://www.wrap.org.uk/sites/files/wrap/3394%20-%20Guided%20Busway%20never%20tyres%20of%20being%20green.pdf Accessed 16 December 2015

Tyre recycling for construction industry, UK	
Location	UK
Type of measure	Recycling
Target audience	Commercial
Type of waste	Used tyres
Context	Baling of used tyres into blocks for use in the construction industry.
Objectives	Use of end of life tyres to produce URRO Blocks (tyre blocks) to the British Standards Institute Publically Available Standard for tyre bales (PAS108).
Outcomes	Produce a construction product that can be utilised instead of aggregate, clays or concrete.
Further information	http://www.wrap.org.uk/sites/files/wrap/8%20-%20UK%20Waste%20Tyre%20Management%20-%20May%202006.pdf Accessed 16 December 2015 http://www.robmorrisgroundworks.co.uk/environmental-services/ Accessed 16 December 2015 http://www.angloenvironmental.com/ Accessed 16 December 2015 http://www.solutionmanagement.com/NTD/index.html Accessed 16 December 2015 http://www.tirecgroup.co.uk/about.htm Accessed 16 December 2015 http://www.tyrebales-uk.co.uk/ Accessed 16 December 2015

Tyre recycling for playing surfaces, UK	
Location	UK
Type of measure	Tyre recycling
Target audience	Commercial
Type of waste	Used tyres
Context	Use of recycled tyres to supply material for the manufacture of artificial playing surfaces.
Objectives	To produce fine quality rubber crumb from used tyres. The companies utilise bespoke production plants to clean, granulate and grade the material.
Outcomes	300 tonnes of recycled product will be supplied by Murfitts Industries to Tiger Turf Australia who will use the material to lay 19,000m^2 of playing surface. The pitches will be compliant with FIFA regulations. Murfitts reclaims over 11 million post-consumer tyres per year which are used to produce premium granulated rubber for use in products such as sports tracks, pitches and courts, and play area surfaces. Tyre Renewals uses a shredding plant to granulate and sort used tyre material. One of the primary outputs of their process is Star-Track, a riding surface derived from the processed tyres.
Further information	http://www.wrap.org.uk/sites/files/wrap/8%20-%20UK%20Waste%20Tyre%20Management%20-%20May%202006.pdf Accessed 16 December 2015 http://www.murfittsindustries.com/the-plant/ Accessed 16 December 2015 http://www.tyre-renewals.co.uk Accessed 16 December 2015 http://www.tyrerecovery.org.uk/ Accessed 16 December 2015

6.5 Used Cooking Oil

Collection of used cooking oil, Barcelona	
Location	Barcelona
Type of measure	Campaign
Target audience	Households
Type of waste	Cooking Oil
Context	In 2010 Barcelona implemented recycling centres dubbed 'Green Points' and was able to capture 195,136 litres of oil. However, this is still just 2.5% of the oil used each day.
Objectives	In an effort to capture more oil, city officials have handed out free 'OilPots' to get more residents to deposit the material for eventual reuse. The scheme aims to capture as much of the used cooking oil as possible, in turn keeping from contaminating local water and opening up other end of life options.
Outcomes	The OilPot itself features a built in filter to separate lingering food. A screw top and handle allows for convenient storage and portability to Green Points.
Further information	http://inhabitat.com/barcelona-promotes-kitchen-oil-recycling-by-giving-out-free-oilpots/ Accessed 16 December 2015

Recycling of used cooking oil, UK	
Location	Southampton, Wales and Liverpool, UK
Type of measure	Recycling
Target audience	Catering and food manufacturing sectors
Type of waste	Used cooking oil
Context	Olleco has three oil processing sites and the UK's largest biodiesel manufacturing plant. The company collects used cooking oil from businesses which is then processed into biodiesel. The biodiesel plant in Liverpool is powered by outputs from its anaerobic digestion facility which treats manufacturing food waste.
Objectives	To deliver total resource recovery through the supply of new oils, the collection of waste oil and the conversion of waste oil into biodiesel.
Outcomes	Production of EN14214 EU specification biodiesel that is ISCC certified. Achieve a 90% carbon saving compared to standard fossil diesel.
Further information	http://www.olleco.co.uk/ Accessed 16 December 2015 http://www.ewaba.eu/about-us/ Accessed 16 December 2015

Cooking oil recycling, London	
Location	London, UK
Type of measure	Recycling
Target audience	Households
Type of waste	Cooking Oil
Context	'*Unblocking the Community'* is a bring bank oil recycling system established in London by Proper Oils. Householders can take their used oil to collection points across London which Proper Oils collects and refines into biodiesel. Proper Oils is the named supplier of bio diesel to Richmond Council. Proper Oils encourages local residents to become 'Ambassadors' for the service. The 'Ambassadors s' are tasked with talking to others about the scheme, promoting it on social media and assisting those less able to participate in the scheme. Additionally, community organisations can take on the role of 'Champion' and to set up a recycling point in their area. Cash prizes are then available for the community organisation that sets up the most successful recycling point.
Objectives	The scheme aims to capture as much of the used cooking oil as possible, in turn keeping from contaminating local water and opening up other end of life options.
Outcomes	The service currently has 15 collection points
Further information	http://www.properoils.co.uk/unblocking-the-community/ Accessed 16 December 2015

6.6 Absorbent Hygiene Products

Absorbent Hygiene Products recycling, New Zealand and UK	
Location	Canterbury, New Zealand and Rochester, UK
Type of measure	Recycling
Target audience	Households
Type of waste	Absorbent Hygiene Products
Context	Envirocomp's facility shreds the AHP with green waste than plastics are removed, leaving compostable material. Compost produced by the process is used for land restoration and the plastics are presently incinerated. The AHP will be supplied by Cannon Hygiene, Envirocomp's sister company in the UK and in New Zealand, material from domestic properties is also part of the service. Nappies and other AHP waste are processed with green waste through a HotRot composting unit. Once shredded, the AHP and green waste mix is fed into the plant and treated through an in-vessel composting process. The material is treated for a duration and at a temperature sufficient to kill pathogens and the final product can be used for non-food agriculture, leisure areas and other general compost uses.
Objectives	AHP is estimated to account for 2 – 4% of landfill volumes and the plant has been designed to reduce waste to landfill.
Outcomes	24% of New Zealanders now have access to a chargeable AHP recycling service. Envirocomp utilises a network of drop-off points in supermarket car parks where service users can deposit their pre-paid bags. In addition, a collection service is provided to commercial customers. The Canterbury plant processes 15,000 nappies per day.
Further information	http://envirocomp.uk.com/ Accessed 16 December 2015

Absorbent Hygiene Products recycling, London	
Location	London, UK
Type of measure	Recycling
Target audience	Households
Type of waste	Absorbent Hygiene Products
Context	Knowaste has submitted plans to develop a new AHP recycling plant in West London to recycle 36,000 tonnes of waste per year. The site is planned for opening in 2017. AHP waste is shredded and then passed through a sterilisation process, fibres are extracted and the remaining plastics continue to a granulation and washing process. Once washed, the plastics are pelletised for use in the manufacture of new plastic products.
Objectives	To help local authorities meet their recycling targets and reduce carbon impacts by up to 70%.
Outcomes	The Knowaste process can recycle 97% of the incoming AHP waste.
Further information	http://hayes180.knowaste.com/ Accessed 16 December 2015

6.7 Batteries

Battery recycling, Finland	
Location	Finland
Type of measure	Innovation
Target audience	Households
Type of waste	Batteries and Accumulators
Context	AkkuSer Ltd have created a profitable business from recycling batteries and accumulators used in wireless products. The company processes most of the rechargeable batteries and battery waste generated from Finland and Estonia, whilst also half of this waste being generated from Norway and Sweden.
Objectives	The recycling method of dry technology is said to be unique. The technology allows sorting of the material into valuable metals which are suitable for the electronics industry and their restoration for reuse. The method allows for products to be made with the materials from batteries without the need for chemicals, heat or incineration.
Outcomes	The process reduces the loading onto the environment, with over 90% of the recyclable material being reused. It was stated that no environmentally harmful CO_2 emissions or waste is generated during the process.
Further information	http://www.eco-innovation.eu/index.php?option=com_content&view=article&id=191:material-flow-eco-innovation-sustainable-solution-to-reuse-batteries-and-accumulators&catid=57:finland Accessed 16 December 2015

6.8 Mattresses

Mattress recycling, London	
Location	London
Type of measure	Recycling
Target audience	Households
Type of waste	Mattresses
Context	London Reuse Network was awarded £132,000 in 2014 to establish a mattress recycling centre. The facility will be able to process 60,000 mattresses per annum and will create 6 local jobs.
Objectives	To recycle 90% of mattresses delivered to the facility
Outcomes	No outcomes reported as yet
Further information	http://www.londonreuse.org/mattress-recycling-centre/ Accessed 16 December 2015

6.9 Food waste

Food waste recycling, Milan	
Location	Milan, Italy
Type of measure	Recycling
Target audience	Households
Type of waste	Food waste
Context	Twice weekly collection of food waste. Properties were assessed to determine whether suitable storage for food waste bins existed. Refuse bin chutes were mapped and closed.
Objectives	Reduce the amount of residual waste and increase recycling
Outcomes	Capturing more than 90kg of food waste per person - Milan recycling rate gone from 35% to over 50% in less than 4 years, with food waste accounting for 40% of recycling. Residual waste collections were reduced. Capture rate of food waste is now 86%. Customer satisfaction with the service is over 90%.
Further information	https://www.london.gov.uk/moderngov/documents/b10746/Minutes%20-%20Appendix%202%20-%20Food%20Waste%20in%20Milan%20Wednesday%2009-Jul-2014%2014.00%20Environment%20Committee.pdf?T=9 Accessed 16 December 2015

Food waste recycling, South Australia	
Location	South Australia
Type of measure	Recycling
Target audience	Households
Type of waste	Food waste
Context	12 month household food waste collection pilot, largest trial of its kind trialling 3 collection systems
Objectives	• To test the co-collection of food waste as part of an existing fortnightly garden waste collection • Assess response to a fortnightly residual waste collection compared to a weekly collection • Assess the effectiveness of different caddy choices
Outcomes	Highest recovery rate achieved with bio basket scheme - 4.3kg per week or 74% of total household food waste - 81% participation rate with 64% supporting changes to reduce residual waste collection.
Further information	http://www.environment.act.gov.au/__data/assets/pdf_file/0010/576919/ACT_MUD_Report_FINAL_21_Feb_2012.pdf Accessed 16 December 2015

Food waste recycling, Toronto	
Location	Toronto, Canada
Type of measure	Recycling
Target audience	Households in multi-dwelling units
Type of waste	Food waste
Context	Toronto operated a kerbside collection service for food waste with a 90% capture rate and overall city-wide landfill diversion rate of 58%. The City operates an 'all or nothing' policy to waste collection and participation in food waste collection services are mandatory. If any building owner refuses to allow the introduction of food waste collection containers, the City can withdraw all waste services from that premises.
Objectives	To determine whether food waste collections from multi-dwelling units would be viable and if the City could achieve a 70% landfill diversion rate.
Outcomes	Participation rates were lower than for the kerbside service but overall the trial was successful. The City is now rolling out collections to all multi-dwelling units and hopes to reach a 70% landfill diversion rate once the scheme is fully rolled-out.
Further information	http://www.environment.act.gov.au/__data/assets/pdf_file/0010/576919/ACT_MUD_Report_FINAL_21_Feb_2012.pdf Accessed 16 December 2015 http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=cb60d187c3b02410VgnVCM10000071d60f89RCRD&vgnextchannel=ceed433112b02410VgnVCM10000071d60f89RCRD Accessed 16 December 2015

7 Recovery Dashboard

	Recovery method						
	Energy recovery	**Energy recovery with district heating**	**Advanced Thermal Treatment**	**Thermal recovery of other materials**	**Recovery - Biological**	**Recovery - MBT**	**Recovery - Mechanical**
Examples	*Energy recovery (heat and power), London*	*Energy recovery with district heating network, Copenhagen*	*Advanced Thermal Treatment, Japan*	*Co-firing of tyres, Rugby*	*Anaerobic Digestion, Oxfordshire*	*MBT with biodrying treatment, Belgium*	*Mechanical sorting, Netherlands*
	Energy recovery (heat and power), Copenhagen	*Energy recovery with district heating network, Linkoping, Sweden*	*Gasification, Finland*	*End of life plastics*	*Containerised AD, Southampton*	*MBT with dry AD, Spain*	*Mechanical sorting, Germany*
	Energy recovery (power), Oxfordshire	*Energy recovery with district heating network, Amsterdam*		*Energy recovery from waste wood, Sheffield*	*Anaerobic Digestion of industrial effluents, Denmark*		
	Energy recovery, Singapore	*Energy recovery with district heating / cooling network, Barcelona*		*Used cooking oil*	*Biomethane for vehicle fuels, Bristol*		
	Energy recovery (power), Exeter						
	Energy recovery (power), Isle of Man						

7.1 Recovery - Thermal

Energy recovery (heat and power), London	
Location	Edmonton, North London
Type of measure	Energy from waste (EfW) conventional moving grate
Target audience	Households and commercial operators
Type of waste	MSW and C&I waste
Context	Conventional EfW plant built in 1972 which will be replaced with a new facility by 2025. The plant has had significant investment to enable a 50 year life time, including significant upgrades to meet new legislation.
Objectives	To replace the existing EfW plant with a new 'state of the art' large scale EfW facility sized at 550,000 tpa.
Outcomes	The existing plant generates 236.5 GWh power per year and serves 1.7m residents in N. London. The new development will have a small 15MWth district heating system.
Further information	http://www.northlondonheatandpower.london/ Accessed 10 December 2015

Energy recovery (heat and power), Copenhagen	
Location	Copenhagen, Denmark
Type of measure	Amager Bakke - EfW conventional moving grate by Volund.
Target audience	Municipalities
Type of waste	MSW
Context	New EfW plant to replace aging existing unit in Copenhagen built in 1972. Amager is a new EfW plant which will form part of the Copenhagen EfW network. It is intended to be a technical 'tour de force' but will not be cheap. The plant is due to open in 2017.
Objectives	'State of the art' large scale EfW plant sized at 400,000 tpa. The plant will utilise more than 100% of the fuel's energy content, has a 28% electrical efficiency rate, reduces sulphur emissions by 99.5%, and minimizes NOx emissions to a tenth, compared to the former plant.
Outcomes	Capacity of producing 386 GWh of electricity per annum with heat supply capacity of 190MWth, can be optimised for either heat or power. The plant will supply a minimum of 50,000 households with electricity and 120,000 households with district heating. Steam data is estimated at 440 degrees and 70 bars, which will double the electrical efficiency compared to the former plant. The plant features a roof-wide artificial ski slope which will be open to the public.
Further information	http://www.volund.dk/~/media/Downloads/Brochures_-_WTE/Amager_Bakke_-_Copenhagen_-_Denmark.pdf Accessed 10 December 2015

Energy recovery (power), Oxfordshire	
Location	Ardley, Oxfordshire, UK
Type of measure	EFW conventional moving grate by CNIM
Target audience	Households and commercial operators
Type of waste	MSW and C&I waste
Context	Local authority based plant providing energy recovery in Oxfordshire, but also has a significant merchant capacity. The facility began operation in 2014, treating 300,000 tonnes of non-recyclable waste each year. It will divert at least 95% of Oxfordshire's residual municipal waste away from landfill and generate enough electricity to power around 38,000 homes.
Objectives	Medium sized plant with conventional technology
Outcomes	Generates approximately 200GWh power per annum. A successful and well promoted local authority based plant also with significant merchant capacity. The architectural treatment is bold, rural location does limit heat use opportunities.
Further information	https://www.viridor.co.uk/our-operations/energy/energy-recovery-facilities/ardley-erf/ Accessed 10 December 2015

Energy recovery, Singapore	
Location	Singapore
Type of measure	Up to 60% recycling with thermal treatment of residual waste
Target audience	Municipalities
Type of waste	MSW
Context	5.5 million inhabitants spread over 700 km² of islands
Objectives	Adopt innovative technology to maximise energy recovery, minimise ash & land use. Due to land constraints, Singapore's National Environment Agency understands the importance of waste reuse and disposal.
Outcomes	Energy from waste generates 912 GWh of power per annum. A new >1M tpa plant will be operating by 2019.
Further information	http://www.sustainablecitiescollective.com/embarq/1050616/friday-fun-how-create-tomorrow-s-green-cities-today-s-garbage Accessed 10 December 2015

Energy recovery (power), Exeter	
Location	Exeter, UK
Type of measure	Combustion through Tiru oscillating kiln technology.
Target audience	Households
Type of waste	MSW including bulky waste such as mattresses
Context	Small scale EfW for city of Exeter (60,000 tpa)
Objectives	To provide a community sized residual waste treatment solution which would more easily gain public acceptance.
Outcomes	Capacity of producing 24 GWh of electricity heat per year. The Exeter plant is located deep within the urban environment and is therefore well located to enable local heat use. Small size does mean high gate fee. A mechanical shredder is installed to chop up bulky waste such as mattresses before thermal treatment.
Further information	https://viridor.co.uk/our-operations/energy/energy-recovery-facilities/exeter-erf/ Accessed 10 December 2015

Energy recovery (power), Isle of Man	
Location	Isle of Man, UK
Type of measure	EfW conventional moving grate by CNIM
Target audience	Municipalities
Type of waste	MSW & hazardous
Context	Provides residual waste treatment for the Isle of Man (pop. 85,000)
Objectives	To provide an architectural solution which makes a positive statement. The plant treats MSW and has a separate high temperature treatment facility for hazardous waste.
Outcomes	Capacity of producing 39 GWh of electricity per year. The Isle of Man plant is the opposite of the 'big industrial box'. The striking architecture adds cost (at least £1m even for a small plant) but can help with public perception.
Further information	http://www.sita.co.uk/services-and-products/local-authority-customers/public-private-partnerships/isle-of-man Accessed 10 December 2015

7.1.1 Recovery with energy networks

Energy recovery with district heating network, Copenhagen	
Location	Copenhagen, Denmark
Type of measure	Energy recovery with district heating network
Target audience	Householders
Type of waste	Municipal Solid Waste
Context	The Copenhagen district heating network is the most extensive in the world, running over 50km across the city linking CHP, peak load and EfW plants.
Objectives	Like many other European countries, Denmark has radically changed its waste management strategies in the last 10 to 20 years. Landfills, which used to be the general solution, now only accept only 3% of Copenhagen's total rubbish. As an alternative, 39 % of all material the city collects is incinerated in "waste to energy" plants that generate power for thousands of households and make use of the valuable energy contained within the city's residual waste.
Outcomes	In addition to incinerating 39% of collected materials for energy, Copenhagen also recycles 56 % of them according to the motto: less waste, more separation. The system is able to achieve such a high percentage of recycled materials because it is flexible - taking into consideration the different needs and habits of every citizen and business along with their different time schedules. The improvement of Copenhagen's recycling system alone has reduced its CO_2 emissions by 40,000 tons since the system's initial implementation. Perhaps most importantly, the city has been working to promote waste reduction by influencing consumer habits. This may include making products with less packaging more attractive or available, encouraging the reuse of products, establishing composting schemes, or organizing other activities that can minimize waste.
Further information	http://www.dac.dk/en/dac-cities/sustainable-cities/all-cases/waste/copenhagen-waste-to-energy-plants/ Accessed 10 December 2015

Energy recovery with district heating network, Linkoping, Sweden	
Location	Linkoping, Sweden
Type of measure	Energy Recovery
Target audience	Municipality owned facility
Type of waste	Municipal and C&I waste
Context	Linköping is a city of 148,000 inhabitants in the South of Sweden. Tekniska verken i Linköping (TVAB) is a regional multi-utility company which is owned by the Municipality of Linköping. TVAB converts in the region of 600,000 tonnes of waste per year into power and heat. Household waste is collected from 75,000 households, either in biogas powered vehicles, or by automated vacuum systems in blocks of flats. Food waste is segregated in to green plastic bags, which are then placed by householders in to their residual waste bins. Sophisticated optical sorting technology then segregates the green bags from the remaining residual waste in a sorting plant within the city. The sorting plant is an integrated part of the Garstad EfW facility which treats the residual waste stream.
Objectives	To provide a local waste management solution, and to utilise waste as a cheaper fuel for district heating scheme.
Outcomes	The Garstad EfW facility provides 1070 GWh of district heating and 112 GWh of electricity to the city per year. 95% of all buildings in the city are connected to the district heating network. Householders receive energy bills from TVAB, just as they would from any other utility company, but the key difference is substantially lower energy bills as a result of local energy production from waste produced within the city. This integrated waste management system has resulted in a 55% reduction of CO_2 with renewable fuels accounting for 72% of the city's heat and power demand.
Further information	See Case Study 11 in case study document pack

Energy recovery with district heating network, Amsterdam	
Location	AEB Amsterdam
Type of measure	Energy recovery with district heating network
Target audience	Householders and businesses
Type of waste	MSW, C&I
Context	AEB has provided heat to Amsterdam since 1993, the network is currently connected to 20,000 residential equivalent units.
Objectives	AEB has a 30 year agreement to supply heat to the city municipality. AEB relies on imported waste to fill plant to capacity and meet customer heat supply requirements. This enables a very low gate fee.
Outcomes	Capacity of producing 957 GWh of electricity and 156GWh heat per year (2013).
Further information	http://www.aebamsterdam.com/ Accessed 10 December 2015

Energy recovery with district heating / cooling network, Barcelona	
Location	Barcelona, Spain
Type of measure	Energy recovery with district heating / cooling network
Target audience	Householders and businesses
Type of waste	MSW, C&I
Context	The network provides heat and cooling utilising surplus heat from the adjacent Tersa Waste to Energy plant in nearby Sant Adrià de Besòs.
Objectives	The district of Sant Marti was created in 2000 and is currently the second most highly populated district in Barcelona, it is a densely populated area (20,466 inhabitants/km^2) and contains a variety of different buildings with different heating and cooling demands.
Outcomes	Cooling is provided by means of a series of absorption chiller units supported by electrically-driven chiller units.
Further information	http://www.tersa.cat/en/waste-to-energy_1566 Accessed 10 December 2015

7.1.2 Advanced thermal treatment

Advanced Thermal Treatment, Japan	
Location	Japan, approximately 50 locations
Type of measure	Waste direct melting systems offered by Japanese companies such as Kobelco and NSENGI.
Target audience	Municipalities, merchant operators
Type of waste	MSW converted to RDF
Context	Direct melting systems comply with stringent Japanese environmental requirements on ash quantities and emissions to air. Well established in Japan, the technology has developed from the steel making industry.
Objectives	To 'destroy' the waste and produce low emissions.
Outcomes	Produces low quantities of ash (as a clinker), plant electrical efficiency is gradually increasing so that the technology is more commercially viable in Europe.
Further information	A 280,000 tpa merchant facility using Kobelco technology is currently being developed in Walsall. http://www.bhenergygap.co.uk/projects/walsall/overview/ Accessed 10 December 2015

Gasification, Finland	
Location	Finland
Type of measure	Lahti II / Velmat gasification process
Target audience	Municipalities
Type of waste	Solid Recovered Fuel (SRF)
Context	Kymijärvi II is the world's first gasification plant that utilises solid recovered fuel (SRF). A large and technically advanced plant that couples gasification with high electrical efficiency. Requires high CV SRF.
Objectives	To build the highest possible efficiency ATT plant, with cost as a secondary consideration.
Outcomes	Processes 250 ktpa of SRF with rated output to produce 50 MW of electricity and 90 MW of district heat. Has been operating since 2012 and is reported to have good availability since teething problems in year 1. The proposed Biossence Hooton Park development on Merseyside will use similar technology.
Further information	http://www.lahtigasification.com/power-plant Accessed 10 December 2015

7.1.3 Tyres

Co-firing of tyres, Rugby	
Location	Cemex, Rugby, UK
Type of measure	Cement kiln co-fired on waste derived fuel products
Target audience	Commercial and household waste producers
Type of waste	Used tyres and other wastes with a high calorific value
Context	The Cemex plant in Rugby is the largest in the UK, producing 1.8M tonnes of cement. Large quantities of heat are required in the cement production process.
Objectives	Increasing the use of waste derived fuels as part-replacement for fossil fuels to heat cement kilns is key to improving environmental performance.
Outcomes	In 2007 Cemex was granted a permit by the cement industry regulator, the Environment Agency, to use tyres as part-replacement for coal to fuel the cement kiln in Rugby. Data shows a marked reduction in certain emissions from the chimney when tyres are in use. Most notably, oxides of nitrogen which affect air quality, have decreased by 40%.
Further information	http://www.cemex.co.uk/rugbycommunity.aspx#sthash.guj2ZmzN.dpuf Accessed 16 January 2016

7.1.4 End of life plastics

Plastics to diesel	
Location	Avonmouth, Bristol
Type of measure	Suez Environment end of life plastics to diesel
Target audience	Households, merchant operators
Type of waste	End of life plastic which cannot be recycled
Context	End of life plastics have no recycling value, indeed they will need disposed of at cost.
Objectives	Suez Environment has built a demonstration scale plant to extract value from this waste product. When in full operation, the Avonmouth facility will have the capacity to convert 6,000 tonnes of non-bottle plastics, such as yoghurt pots and meat trays, into 4.2 million litres of diesel per year.
Outcomes	Is currently producing small quantities of diesel to specification but is in delay while this innovative process is developed. Like many bio refining technologies of this type, commercial demonstration is at a very early stage and is experiencing delivery challenges.
Further information	http://www.mrw.co.uk/news/pioneering-plastics-to-fuel-plant-delayed/8685333.article# Accessed 16 December 2015

7.1.5 Wood waste

Energy recovery from waste wood, Sheffield	
Location	Sheffield, UK
Type of measure	EON waste wood combustion
Target audience	Municipalities, merchant operators
Type of waste	Wood waste
Context	Treats wood waste grades B and C which is chipped off site
Objectives	Feedstock is 200,000 tonnes per annum of locally sourced recycled waste wood
Outcomes	Generates 236GWh power per annum and provides heat to local homes and businesses on the site of a former coal fired power plant. Sheffield Is EON's third waste wood facility and has been generating power for around 18 months. Capex of £120m.
Further information	https://www.eonenergy.com/About-eon/our-company/generation/planning-for-the-future/biomass/blackburn-meadows Accessed 15 December 2015

7.1.6 Used Cooking Oil (UCO)

Used cooking oil	
Location	Strabane, Northern Ireland
Type of measure	Collection of used cooking oils for conversion to biodiesel for city transport
Target audience	Restaurants and other commercial operators who use cooking oil for food preparation.
Type of waste	Used cooking oil
Context	Frylite, based in Strabane NI, provide both fresh cooking oil and collect UCO all in one delivery process. Frylite have also considered combining a food waste collection service with their waste oil service. Once the UCO is collected, companies such as Argent process UCO into high quality biodiesel, including deodorisation of the product. The UCO to biodiesel conversion process is straight forward and well established.
Objectives	To collect a waste that can be problematic if not disposed of correctly (e.g. tipped into sewers where some cooking oils (which solidify at ambient temperature) cause blockages and process it into a useful product. Biodiesel from UCO is considerably cleaner burning than petro diesel and if produced to the correct standard, can be used in engines without modification.
Outcomes	UCO is currently the largest source of biodiesel in the UK.
Further information	http://frylite.com/waste-oil-collection/ Accessed 15 December 2015

7.2 Recovery (Biological)

7.2.1 Food waste

Anaerobic Digestion, Oxfordshire	
Location	Cassington, Oxon, UK
Type of measure	Agrivert Anaerobic Digestion
Target audience	Households, merchant operators
Type of waste	Food waste, liquid wastes and effluents
Context	Anaerobic digestion of food waste collected by Oxford County Council.
Objectives	To produce biogas which is converted to power and to recover organic waste material in the form of digestate to British Standards Institution Publically Available Standard for anaerobic digestate PAS110.
Outcomes	The facility processes over 50,000 tonnes of solid and liquid organic wastes a year, generating 2.1MW of electricity and producing a bio-fertiliser. The Cassington AD plant has been operating since 2010 and was one of the first food waste AD plants in the UK.
Further information	http://www.agrivert.co.uk/products-and-services/case-studies/cassington-ad-plant Accessed 15 December 2015

Containerised AD, Southampton	
Location	University of Southampton Science Park (USSP), UK
Type of measure	SEaB Flexibuster containerised AD
Target audience	Commercial and household food waste producers
Type of waste	Kitchen food waste, cooking oil, spent alcoholic drinks and garden waste
Context	A micro AD solution for treating organic waste
Objectives	To enable food waste to be processed next to producers and the outputs of power, heat and digestate to be made available.
Outcomes	An 8kW combined heat and power unit (CHP) processes an average of 105 m3/day of biogas providing approximately 57MW of electricity per annum. Through the generation of energy and the elimination of waste disposal costs, the unit produces net energy revenues of around £20,000 per annum.
Further information	http://seabenergy.com/products/mb400/ Accessed 15 December 2015

Biomethane for vehicle fuels, Bristol	
Location	Avonmouth, Bristol
Type of measure	Bus powered by compressed biomethane produced from waste
Target audience	Commercial and household food waste producers
Type of waste	Sewage sludge and food waste
Context	Biomethane from anaerobic digestion of sewage sludge and food waste powers a regular bus service in Bristol.
Objectives	To demonstrate that biomethane from waste can be cleanly and safely operated on a regular bus service.
Outcomes	The 40-seat “Bio-Bus” can travel up to 186 miles on one tank of gas, which takes the annual waste of around five people to produce.
Further information	http://www.theguardian.com/environment/2014/nov/20/uks-first-poo-bus-hits-the-road Accessed 15 December 2015

7.2.2 Industrial effluent

Anaerobic Digestion of industrial effluents, Denmark	
Location	Denmark
Type of measure	Novozymes A/S - Anaerobic digestion of industrial effluents
Target audience	Distilleries and chemical works
Type of waste	Waste effluent with a high organic content
Context	The plant treats wastewater from the Novozymes production facilities in Kalundborg, as well as a waste stream of a high COD content (waste sprit and formic acid) from the nearby Novo Nordisk production facility.
Objectives	Capacity of producing 21 GWh of electricity and 26 GWh heat per year
Outcomes	Novozymes facility uses enzymes to optimise the anaerobic digestion process
Further information	http://www.novozymes.com/en/Pages/default.aspx Accessed 15 December 2015

7.3 Recovery (Mechanical and Biological Treatment)

MBT with Wet Anaerobic Digestion (AD)

To date wet AD has been the predominant digestion process used within MBT plants. Whilst wet AD technology is proven it has been shown to be problematic when used with organic materials extracted from residual municipal waste. High levels of physical contamination including glass, grit, inerts and plastics have caused blockages, higher wear rates, lower gas yields and process failures which have resulted in many MBTs with wet AD operating less effectively than expected and a number being closed including high profile sites in Barcelona and Lancashire. Therefore, examples of MBT with wet AD have not been included as best practice as they have not consistently demonstrated that they can be used effectively to treat residual waste.

7.3.1 MBT using Aerobic Treatment

MBT with biodrying treatment, Belgium	
Location	Geel, Belgium.
Type of measure	Shredding of incoming residual waste followed by biological drying of the waste and post sorting to extract recyclates, SRF and organic fractions.
Target audience	Residual MSW from the Geel municipality.
Type of waste	Residual MSW
Context	Long term contract awarded by the municipality to treat 180,000 tpa of residual household waste to generate SRF via biological drying and mechanical refinement. This was plant was commissioned in 2004. The processes use enclosed boxes for undertaking the biological drying.
Objectives	Diversion of waste from landfill and increased recycling.
Outcomes	The MBT treats 180,000 tpa of residual waste to manufacture SRF and extract some recyclates. Increased quality requirements for recyclates are increasing the challenges of successfully managing and marketing these materials.

7.3.1.1 MBT with dry anaerobic digestion

MBT with dry AD, Spain	
Location	Valladolid, Spain.
Type of measure	Sorting of residual MSW to extract recyclates, RDF and organic fractions. The organic fraction is composted and a proportion is sent to dry AD to generate electricity to power the composting plant. The plant is provided by Strabag.
Target audience	Valladolid residual MSW.
Type of waste	Residual MSW.
Context	Valladolid awarded a long term contract to FCC to treat 200,000 tpa of residual MSW. The residual waste is sorted to extract recyclates, RDF and an organic fraction. 15,000 tpa of the organic fraction is first treated via dry AD to generate electricity to power the composting the plant. The organic fractions are then mixed together for composting and post refining to produce a compost which can be used back on the land.
Objectives	Diversion of waste from landfill and increased recycling.
Outcomes	The 200,000 tonnes is separated into recyclates, RDF and organic fraction. The fraction sent to dry AD is used to generate sufficient green energy to power the composting plant.
Further information	http://www.cti2000.it/Bionett/BioG-2005-007%20MBT_AnnexD0.0009%20G-J%20(Final).pdf Accessed 15 December 2015

Mechanical sorting, Netherlands	
Location	Lelystad, Netherlands.
Type of measure	Mechanical sorting of the residual and commercial waste to extract the organic fraction which is then treated via dry AD and composting. The dry AD process generates biogas for conversion into electricity and heat. The heat is used back within the process to assist in the composting process. The process is designed and operated by Orgaworld.
Target audience	Lelystad municipality.
Type of waste	Residual MSW.
Context	Orgaworld designed the plant to originally compost source separated organic waste. This was then modified to add the dry AD plant and enable residual waste to be processed and generate green energy.
Objectives	Diversion of waste from landfill, increased recycling and generation of green energy.
Outcomes	The plant receives 85,000 tpa of residual and commercial waste which is mechanically pre-treated and the processed via dry AD and then composting to stabilise the organic material before it is used back on the land.
Further information	http://www.calrecycle.ca.gov/publications/Documents/1275/2008011.pdf Accessed 15 December 2015

Mechanical sorting, Germany	
Location	Kaiserslautern, Germany.
Type of measure	Mechanical sorting of the residual and commercial waste to extract the organic fraction which is then treated via the DRANCO dry AD and composting. The dry AD process generates biogas for conversion into electricity and heat. The heat is used back within the process to assist in the composting process.
Target audience	Kaiserslautern municipality.
Type of waste	Residual MSW.
Context	DRANCO designed and constructed the plant to accept 25,000 tpa with 20,000 tpa into the dry AD process. The plant commenced operations in 1999 and generates biogas for conversion into renewable electricity.
Objectives	Diversion of waste from landfill, increased recycling and generation of green energy.
Outcomes	The plant receives 85,000 tpa of residual and commercial waste which is mechanically pre-treated and the processed via dry AD and then composting to stabilise the organic material before it is used back on the land.
Further information	http://www.ecopol-project.eu/en/communication/highlights__case_studies?a=viewItem&itemid=289 Accessed 15 December 2015

Appendices

Appendix 1: Best Practice Database

Appendix 2: Case studies

Appendix 1 – Best Practice Database

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