Working together for a world without waste

Final Report

A methodology for quantifying the environmental and economic impacts of reuse

Project code: SAP134
Research date: 2010-2011

Date: November 2011

Our vision is a world without waste, where resources are used sustainably.

We work with businesses, individuals and communities to help them reap the benefits of reducing waste, developing sustainable products and using resources in an efficient way.

Find out more at www.wrap.org.uk

Written by: Keith James

Executive summary

Background

In 2009, WRAP published *Meeting the UK Climate Challenge: The Contribution of Resource Efficiency*. This showed that one of the best resource efficiency strategies for reducing greenhouse gas emissions was reuse[1]. It found that increasing reuse of key household products, such as clothes, household appliances and electrical equipment, could reduce UK greenhouse gas emissions by an average 4 million tonnes CO_2 eq per year between now and 2020.

Although the relative merits of waste management options further down the waste hierarchy (recycling, energy recovery, landfill) are well studied, the wider environmental and economic impacts of reuse are less understood. This is in part due to the complex nature of reuse activities and consumer behaviours, including:

- the need to assess multi-component products rather than single materials for recycling;
- uncertainty about what, if anything, is being displaced by the purchase of a reused item;
- how long we use products for;
- the recycling and disposal impacts which are being avoided by reuse.

In order to improve our understanding of the impact of reuse, WRAP identified a need for a clear and robust methodology for quantifying the current and potential future environmental and economic impacts of reuse. Such a methodology will enable users to calculate the impact of reusing a product of interest in a consistent way, and to explore options to improve the consequences of further reuse.

This methodology will also support the development of policies on reuse by Governments across the UK, all of whom are committed to increasing their focus on waste prevention, for which reuse is a key activity, and preparation for reuse, as indicated in Scotland's Zero Waste Plan, Wales' Waste Strategy 2009 – 2050: Towards Zero Waste, Northern Ireland's Waste Strategy 2006-2020 and the Review of Waste Policy in England.

Conclusions

WRAP has developed a specific methodology for quantifying the impacts of reusing products. This can be applied to a range of products using an accompanying excel-based tool to provide a consistent means of assessing the impacts of different activities.

A project steering group comprising WRAP's funders and representatives of organisations involved in reuse[2], has overseen the development of the methodology and tool.

The key characteristics of the methodology include guidance on

- system boundaries;
- product lifetimes and displacement effects of reuse;
- allocation of environmental or economic impacts to different parts of the supply chain;
- use of costs and prices, and;
- jobs and labour costs.

This is based on best practice in life cycle assessment and cost benefit analysis. The methodology also provides guidance on sourcing data for the model.

The methodology has been peer reviewed by Oakdene Hollins, and feedback has been incorporated.

[1] *"Reuse" covers reuse, repair and refurbishment*

[2] *Charity Retail Association, Community Reuse Network Scotland, Cylch, DEFRA, Furniture Reuse Network, London Community Resource Network, Realliance, Welsh Government*

The tool allows the calculation of three environmental indicators (greenhouse gas emissions, energy demand and resource depletion), and two economic indicators (number of jobs and cost impacts), as well as identifying where these occur in the supply chain.

The methodology and tool have been tested for specific clothing, furniture and electrical products. The outputs from the tool, including the mass flows, are captured in case studies (which are published separately to this report www.wrap.org.uk/benefitsofreuse). This showed that the methodology and tool functioned for all products. However, it highlighted the importance of good primary data. Common knowledge gaps for the products selected were the lifetime of the products and data on jobs in reuse organisations. This means that some results are sensitive to the primary data, and these sensitivities are indicated in the case studies.

Using the methodology

The aim of this methodology and accompanying tool is to help WRAP, its funders and partner organisations to quantify the key environmental and economic impacts of reuse. It can be used to:

- Identify products for future focus for reuse (e.g. if there is a low reuse rate but high potential benefit)
- Understand the trade-offs between different impacts of reuse
- Highlight opportunities for change within a reuse or disposal route
- Understand the reasons behind the results
- Provide supporting messages for reuse (in line with UK green claims guidance (DEFRA 2011))

It will also help WRAPs programmes to report their achievements as they move up the waste hierarchy.

Next steps

This methodology and tool is a first step in developing a better understanding of the impact of reuse.

The testing undertaken on specific products – see the case studies - has highlighted a range of data gaps. WRAP anticipates working with all stakeholders to identify improved primary data or undertaking research to fill the gaps.

The tool will also be used to quantify the impact of reusing additional products, and inform WRAPs programmes in the future.

Contents

Figures

Glossary

Business As Usual (BaU)	*Business as Usual reflects the mix of activity at the time of the assessment (i.e. the typical quantity of purchases, reuse, preparation for reuse, recycling, recover and landfill for a given time period)*
Cost-Benefit Analysis (CBA)	*Analysis which quantifies in monetary terms as many of the costs and benefits of a proposal as feasible, including items for which the market does not provide a satisfactory measure of economic value*. (HMT 2003)
Direct Employment Effects	*Changes in employment with a clear and immediate relationship between interventions and the creation, maintenance or improvement of jobs. Such outcomes occur mainly in the organisation making the intervention.*
Economic Life	*Period over which an asset (e.g. clothing, electrical item) is expected to be usable, with normal repairs and maintenance, for the purpose it was acquired, rented, or leased. Expressed usually in number of years, process cycles, or units produced, it is usually less than the asset's technical life, and is the period over which the asset's depreciation is charged. (businessdictionary.com)*
Functional Unit	*A quantified reference unit for the data in the study. All inputs and outputs of the product system are described with reference to this unit.*
Indirect Employment Effects	*Where direct employment effects have further secondary effects as a result of income multipliers or supplier effects. (CSES 2006)*
Life Cycle Assessment (LCA)	*Compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle (ISO14040:2006)*
Preparation for reuse	*Means checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing .* (Waste Framework Directive 2008)
Private costs	*Costs that are incurred to an individual or firm when they are carrying out the activities of consumption or production. They include costs of labour, rent, taxes and transfers, and with the costs of capital reflecting market rates.*
Psychological Life	*The period until which "a product that is still sound in terms of quality or performance becomes 'worn out' in our minds because a styling or other change makes it seem less desirable*" (Packard, 1960)
Reuse	*Any operation by which products or components that are not waste are used again for the same purpose for which they were conceived (i.e. dealing with waste prevention); (Waste Framework Directive 2008)*
Social costs	*The total costs of an activity to society. As such, the social cost excludes taxes and transfers which move money from one part of the economy to another, but do not add to or remove from the overall balance.*
Technical Life	*The period over which the product is designed to function (i.e. to the point at which it is 'worn out' or beyond repair).*

Acknowledgements

This methodology has been developed in conjunction with a steering group comprising representatives from a range of organisations involved in the reuse of a variety of products, as well as representatives of Government, enforcement agencies and private companies. I would like to acknowledge the invaluable input of the following individuals and organisations.

Craig Anderson, FRN
Emma Hallet, REalliance
Pauline Hinchion, CRNS (to March 2011)
Rhiannon Jones, Welsh Government
Nicola Leeds, DEFRA
Neil Lovelock, CRNS (March 2011)
Cristina Osoro Cangas, Charity Retail Association
Fay Skevington, DEFRA
Richard Thomas, Cylch
Matthew Thomson, London Community Reuse Network
Sarah Clayton, WRAP
Liz DixonSmith, WRAP
Gerrard Fisher, WRAP
Rachel Gray, WRAP
Sarah Gray, WRAP
Ariadna Janariz-Rodrigo, WRAP
Nick Kightley, WRAP
Peter Maddox, WRAP
Kimberley Pratt, Zero Waste Scotland
Mike Robey, WRAP
Laura Underwood, WRAP
Julie Taylor, WRAP Cymru

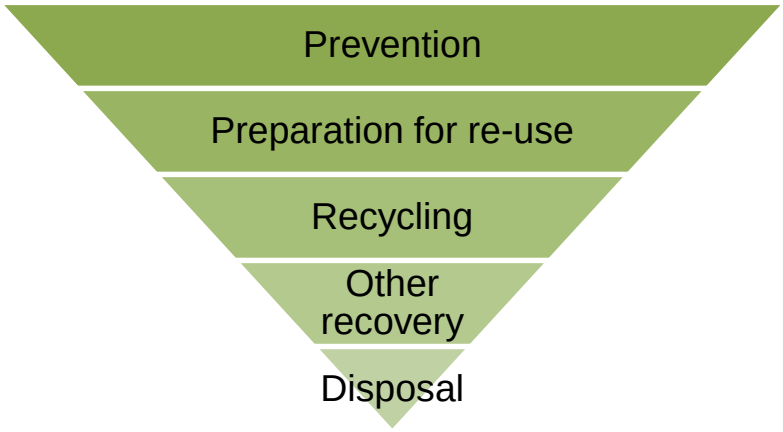
I would particularly like to thank and acknowledge the input of Eunomia Research and Consulting Ltd in developing the methodology for assessing the economic impacts of reuse, to which they contributed extensively.

I would also like to thank David Parker of Oakdene Hollins for formally reviewing the methodology, and both David Parker and Hudai Kara for reviewing the accompanying tool. Thanks also to Professor Tim Cooper at Nottingham Trent University for informally reviewing the methodology and his suggestions for improvement and to Caroline Lee-Smith (FRN) for the provision of a range of information. Finally, we would like to acknowledge the preliminary work carried out by Giraffe Innovation, Eunomia and SKM Enviros in shaping this project.

1.0 Background

Across the UK, Government waste strategies are increasingly focussed on waste prevention and reuse. Scotland's Zero Waste Plan, Towards Zero Waste in Wales, Northern Irelands Waste Strategy and the Review of Waste Policy in England all recognise a need to reduce the quantity of materials we consume and dispose of, moving waste management up the waste hierarchy, illustrated in figure 1.1.

Figure 1.1 The Waste Hierarchy



At a European Level, the Waste Framework Directive requires member states to develop Waste Prevention Programmes by 2013. This includes a requirement for Member States to "determine appropriate specific qualitative or quantitative benchmarks for waste prevention measures adopted in order to monitor and assess the progress of the measures".

The nature of these benchmarks is a matter for Government policy. However, it is also important for those engaged in prevention and reuse activities to understand the potential impacts of their work. Reuse is a core element of WRAPs activities and those of a range of organisations, and there is a need to understand how this activity could affect environmental and economic indicators.

WRAP has previously carried out a range of work to quantify the relative merits of alternate waste disposal options, such as the Environmental Benefits of Recycling (2006, 2010), DEFRA / DECC Company Greenhouse Gas Reporting Guidelines (annual updates) and the Scottish Carbon Metric (2011). This work has been valuable in informing waste management policy across the UK, the direction of WRAPs activities and the decisions made by the business community. However, to date little work has been carried out in the UK to identify the merits of reuse compared to alternative end-of-life options.

Compared with recycling, the environmental and economic impacts of reuse are more complex to quantify. This is for a variety of reasons, including the complexity of assessing products rather than materials, uncertainty over what is being replaced and for how long, and identifying the waste impacts that are being avoided.

WRAP therefore identified a need to develop a widely acceptable methodology for quantifying the impacts of reuse, both economic and environmental. This should enable recognition of the importance of reuse and assessment of potential initiatives in this area.

1.1 How to use this methodology

The aim of this methodology and the associated tool is to improve the knowledge base of WRAP and partner organisations by quantifying key environmental and economic impacts of reuse.

The methodology, and the results obtained through its use, can be used to:

- Identify products which future reuse efforts should focus upon (e.g. if there is a low reuse rate but high potential benefit);
- Provide supporting messages for use (in line with UK green claims guidance (DEFRA 2011));
- Identify potential trade-offs between different impacts of reuse and understand the reasons for these;
- Highlight opportunities for change within a reuse or disposal route;
- Provide understanding of the key issues that influence results.

It will also help WRAPs programmes to report their achievements as they move up the waste hierarchy.

This methodology provides specific guidance on quantifying the impact of reusing items. It should be read alongside existing standards on Life Cycle Assessment (LCA), and guidance on Cost Benefit Analysis (CBA) (See section 1.3). The methodology has been tested by calculating the impacts of reuse for eight specific products, which are commonly reused today. These have been developed into case studies. These are shown in Table 1 below.

Table 1.1 Product groups through which the methodology has been trialled

Categories	Specific products
Domestic Furniture	Sofa
	Dining table
Office Furniture	Desk
	Office chair
Electrical	TV
	Washing Machine
Clothing	Cotton shirt
	Jumper

The tool developed implements the methodology described herein and can be used to compare a number of scenarios and options. The intention is that additional products can be modelled through this tool in future.

1.2 Presentational Conventions

This document is laid out in an annotated format. In each section, the requirement is highlighted in bold, followed by explanatory text behind the principle. The secondary data sources advocated in the absence of primary data are summarised in Appendix 1.

The word "should" is used to express the recommendations of this methodology, with which the user has to comply in order to meet the minimum requirements. The word "may" is used in the text to express permissibility, e.g. as an alternative to the primary recommendation of the clause. The word "can" is used to express possibility, e.g. a consequence of an action or an event.

1.3 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies:

HM Treasury The Green Book http://www.hm-treasury.gov.uk/d/green_book_complete.pdf

ISO 14044, *Environmental management — Life cycle assessment — Requirements and guidelines*

Nicholls, J,. Lawlor, E., Neitzert, E., and Goodspeed, T., (2009) *A Guide to Social Return on Investment*, Cabinet Office, London http://www.thesroinetwork.org/publications/cat_view/29-the-sroi-guide-2009

2.0 Scope

The methodology describes the principles to be used in identifying the merits of reuse and preparation for reuse, compared to alternative end-of-life options. It supplements existing standards relating to Life Cycle Assessment by providing further guidance specific to issues associated with reuse of products. It also goes beyond this through the inclusion of economic issues and discussion of how these can be identified.

2.1.1 Selected Metrics and Conversion Factors

The methodology has been developed for the metrics shown in Table 2.1. The principles within the methodology are equally applicable to other indicators, although further indicator specific guidance may be required for these (e.g. exploring links to biodiversity).

2.2 Definition of Reuse

This methodology applies to legal definitions of reuse and preparation for reuse.

Article 3 of the 2008 European Waste Framework Directive (2008/98/EC) distinguishes reuse and preparation for reuse and provides the following definitions of reuse and preparation for reuse.

> 're-use' means any operation by which products or components that are not waste are used again for the same purpose for which they were conceived (i.e. dealing with waste prevention);
>
> 'preparing for re-use' means checking, cleaning or repairing recovery operations, by which products or components of products *that have become waste* are prepared so that they can be re-used without any other pre-processing .

Draft DEFRA Guidance (2010) clarifies this further, by stating that it is the intention that is important. Where "the substance or object is being transferred with the intention that it should continue to be used for its original purpose", it is not waste, even if it needs some cleaning, checking or repair. Where the item has been discarded as waste (e.g. at a Civic Amenity (CA) Site), it "will …remain waste until they have been subject to a recovery operation". This means that preparation for reuse only applies to items which have been discarded.

Scotland's Zero Waste Plan (2010) also clarifies that reuse activities are classified as waste prevention, and preparation for reuse is classed as recycling with regard to targets. Items donated to charity shops for example count towards waste prevention, not recycling, targets. The Scottish Government nonetheless note that the Waste Prevention Programme to be developed will include measures to promote preparation for reuse and how this might contribute towards Zero Waste Plan recycling targets.

The Recycling, Preparation for Re-use and Composting Targets (Definitions) (Wales) Order 2011 sets out the interpretation of the Welsh Government of preparation for reuse with particular regard to Local Authority Municipal Waste.

The Framework for Waste Prevention in Northern Ireland (EHSNI 2005) predates the Waste Framework Directive and does not discuss definitions of reuse or preparation for reuse.

Within this methodology, both reuse and preparation for reuse activities as defined by the Waste Framework Directive are considered. However, it should be noted that some reuse activities have been modelled as preparation for reuse because although the route may be different, the process is the same.

Direct exchange between individuals or via a third party e.g. eBay, a charity shop or second hand shop, is defined as reuse. Products which have become waste e.g. via a Civic Amenity site or Bulky Waste Collection are defined as preparation for reuse. Some products may also be donated and pass through the same site as preparation for reuse (e.g. items may be donated to furniture reuse organisations or may come from bulky waste collections). These have been included as preparation for reuse.

The boundary between reuse and preparation for reuse is important, but not essential in order to meet the project objectives since although their legal status may differ, there may in practical terms be a high degree of commonality between both routes. The output model simulates both reuse and preparation for reuse pathways according to the definition used in this document. Any cleaning, checking and repair carried out will be captured and modelled as appropriate.

2.3 General System Boundaries and Exclusions

Figure 2.1 below provides a general diagram showing the life cycle of products in their first and second life. The overall life cycle is made up of a series of unit processes (e.g. sale, repair, transport). Each unit process is linked to another. Inputs and outputs to each unit process can be identified and quantified (e.g. number of paid staff in a Charity Shop) and then allocated to the products, which pass through this process.

2.3.1 Geographical boundaries and Imported Products

The assessment of environmental impacts should consider effects across the life cycle of products wherever these occur (i.e. the scope is global).

In Life Cycle Assessment, the whole life cycle of a product is considered, regardless of where in the world the impact occurs.

The assessment of economic impacts should consider effects which occur within the UK only (i.e. the scope is national).

Cost Benefit Analysis (CBA) is a means of quantifying as many of the costs and benefits of a proposal in monetary terms as feasible, including items for which the market does not provide a satisfactory measure of economic value. There is no single recognised standard for CBA. It is common practice in CBA for boundaries to be set at a national level unless there are specific requirements for an international perspective.

In addition to national impacts, local employment and output effects, net of any local displacement effects, may be considered in parts of the appraisal where this is part of the project rationale. For example, a policy may aim to reduce the rate of unemployment in a particular deprived area, as opposed to reducing the rate of unemployment overall.

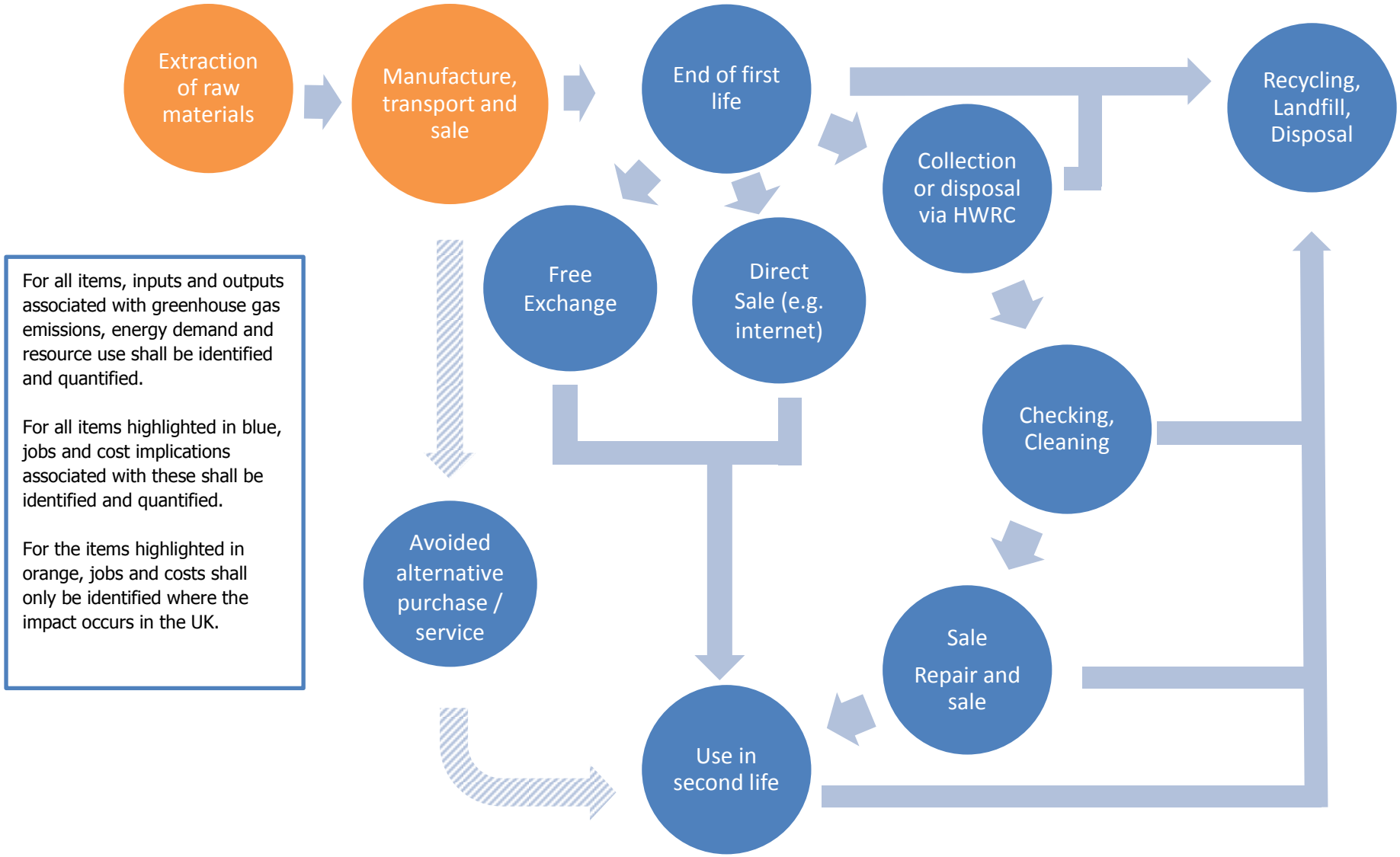
2.4 General System Boundaries and Exclusions

Figure 2.1 provides a general diagram showing the life cycle of products in their first and second life. The overall life cycle is made up of a series of unit processes (e.g. sale, repair, transport). Each unit process is linked to another. Inputs and outputs to each unit process can be identified and quantified (e.g. number of paid staff in a Charity Shop) and then allocated to the products which pass through this process.

Table 2.1 Selected Metrics

Indicators		Description	Conversion factors utilised
Environmental Indicators	Greenhouse Gas Emissions	Factors are expressed as Global Warming Potential (GWP) for a time horizon of 100 years (GWP100), in kg carbon dioxide equivalent / kg output	IPCC (2007) Climate Change 2007. IPCC Fourth Assessment Report. The Physical Science Basis. http://www.ipcc.ch/ipccreports/ar4-wg1.htm
	Energy Demand	This aims to investigate the energy use throughout the life cycle of a product or service. It is measured in Mega Joules (MJ) embedded in fossil fuel usage.	Frischknecht R., Jungbluth N., et.al. (2003). Implementation of Life Cycle Impact Assessment Methods. Final report ecoinvent 2000, Swiss Centre for LCI. Duebendorf, CH, www.ecoinvent.ch
	Resource Depletion	This impact category indicator is related to extraction of minerals and fossil fuels due to inputs in the system. The Abiotic Depletion Factor (ADF) is determined for the extraction of minerals and fossil fuels (kg antimony equivalents/kg extraction) based on concentration reserves and rate of deaccumulation.	CML 2001, an LCA methodology developed by the Centre of Environmental Science (CML) of Leiden University, the Netherlands. http://cml.leiden.edu/software/data-cmlia.html
Economic Indicators	Number of jobs	Full-time equivalent (FTE) jobs are defined as the total hours worked divided by the average annual number of hours worked in full-time jobs within the economic territory. One FTE job may represent several part time employees. Where positions are not paid (e.g. voluntary) this shall be identified separately	Eurostat (2008) National and Financial Accounts in Eurostat Communication and Information Resource Centre (CIRCA), Eurostat, Brussels. FTE average weekly hours for Charity Shops is 35 hours per week Sims (2010) Charity Shops Survey 2010
	Cost Impacts	Costs and benefits will be reported in 2010/11* sterling. As has been assumed in recent studies for Defra and DECC, prices follow inflation (i.e. real prices are held constant) *this should be replaced by the relevant year for future studies	Private costs (including taxes and transfers, and with the costs of capital reflecting market rates). Social costs (taxes and transfers removed). Cost of capital set at the Social Time Preference Rate used by HM Treasury The Green Book http://www.hm-treasury.gov.uk/d/green_book_complete.pdf
	To whom these accrue	Whilst net jobs and financial impacts are relevant, it is equally relevant to understand how these affect particular sectors	

Figure 2.1 General System Boundary for Assessment of the Impact of Reuse



3.0 Functional Unit

The functional unit selected within this methodology and tool is 1 tonne of items provided for reuse or recovered from the waste stream for reuse (e.g. via a civic amenity site or bulky waste collection).

Different products have different functions. In LCA, the functional unit should allow inputs and outputs to be related to a specific issue. The tool which is developed based on this model will allow this to be reinterpreted per unit (e.g. 1 T-shirt) or for a total mass flow (e.g. all T-shirts sent for reuse).

The functional unit includes items which are collected for reuse, but which are subsequently determined to be unfit for this purpose and discarded. The costs and environmental impacts of any subsequent treatment/disposal or recycling of will be attributed to the reuse activity.

As outlined in section 2.2, this study on reuse covers reuse with and without repair.

For energy using products, the use phase shall also be included, and the operational emissions for a reused item compared to a newly purchased item. The assumptions regarding energy efficiency for both items shall be clearly stated. For non-energy using items the use phase is excluded. This is to avoid double counting (e.g. attributing the impact of washing to both clothing and washing machines) and on the basis that other in use impacts are negligible (e.g. impact of using furniture).

3.1 Primary and Secondary Lifetimes

100% of the impact of extracting resources from the environment, manufacturing and transporting a product shall be allocated to the first life of the product.

Where possible, referenced data should be used to quantify the proportion of a reused product, which displaces a new item, reused item or nothing at all. This should also capture the anticipated or actual duration of the second life of a product. This may be sourced from bespoke or general surveys, questionnaires, market data or other sources.

In the absence of referenced data, any assumptions shall be clearly identified and sensitivity analysis conducted where this has the potential to be significant.

The purpose of this methodology is to understand the benefit of providing 1 tonne of a given item for reuse, and the avoided environmental and economic impacts associated with an alternative (i.e. no reuse). It therefore focuses on the first use (primary lifetime), and first reuse (secondary lifetime) of an item.

Products have a number of potential lifetimes. They have a technical lifetime (how long they work for), a psychological lifetime (how long people expect to keep them) and an economic lifetime (cost of maintenance versus cost of replacement). This is discussed further in section 3.1.1. below.

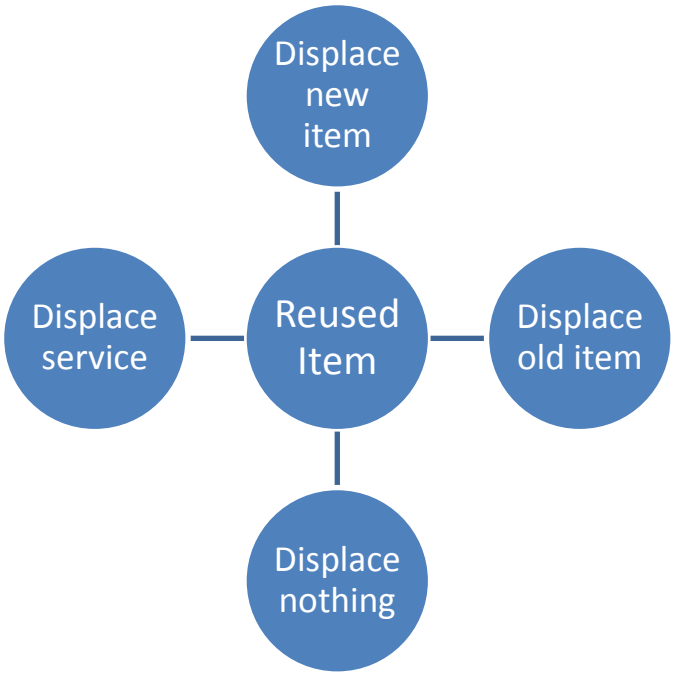
In this methodology, 100% of the impact of extracting resources from the environment, manufacturing and transporting a product are allocated to the first life. The alternative to this is to divide the impacts of producing a new item over the number of anticipated lives of that product. This is considered to be less robust (i.e. uncertainty over the number of potential life times) and suggests that a system is established to ensure reuse occurs, which is not the case. Within a reuse system, it would not be possible to know how many times an item had already been reused when it enters the system.

3.1.1 Displacement of products

Information on the propensity of an item to replace an alternate item or service should be gathered and used. Where this information is not available any assumptions should be clearly stated.

The propensity to replace new products depends on a range of factors. These include the condition of the product as well as the needs of the person in receipt of the reused item. In different circumstances, purchase of a reused item may replace a new item, an old item, a service (e.g. a laundrette) or nothing at all (i.e. it is additional, and if the person purchasing the item could not buy it as reused, they would not buy the item from new). Furthermore, items may change ownership with or without an accompanying financial transaction. This is illustrated in figure 3.1 below.

Figure 3.1 Ways in which reused items may displace alternatives



The difference between the technical life (theoretical maximum) and the psychological / economic life can be used to infer the length of the life in reuse. For example, if an item will function for ten years but is only retained for two years, it still has eight years of technical life left. In its second life it could therefore technically replace at least one new item. However, if a product has a technical life of twelve years, and is typically retained for only seven, it only has a maximum five years in its second life, and can therefore only substitute for a maximum of 71% (5/7) of a new product.

3.2 Alternative Scenarios and Supply Routes

Product lifetime extension through repair and remanufacture should be accounted for and data cited or assumptions clearly stated.

Where the lifetime of an item may be extended through repair or remanufacture, the anticipated lifetime for the product should be clearly stated and the rationale for this provided.

Assessment of reuse should clearly state the route through which the reused item is being transferred. Assessment of associated activities (e.g. transport distances, reject rates) should be based on primary data where possible. Where primary data is not used any assumptions should be clearly stated.

Any statements on the impact of reuse should clearly state the alternate option being considered.

The purpose of this methodology is to allow a comparison between scenarios of interest. These include:

- Business As Usual (current situation, including current reuse)
- 100% Direct Reuse (e.g. through Charity Retail, direct transfer, internet)
- 100% Preparation For Reuse (e.g. through Household Waste Recycling Centre or Bulky Waste Collection)
- 100% Recycling
- 100% Landfill
- 100% Disposal (current mix including landfill, energy recovery and recycling)

The reasoning behind these choices is to enable users to assess the relative merits of two options, as well as identifying the impact of the current situation. The Business as Usual Scenario may also be used for setting a baseline for current impacts of reuse.

As noted in section 3.0, the functional unit is 1 tonne of items sent to a route. Losses within this route are captured in the above descriptions.

4.0 Allocation of environmental impacts

Allocation shall be in line with the principles laid out in ISO14040.

Inputs and outputs to the reuse system should be allocated to the different products according to clearly stated procedures that should be documented and explained together with the allocation procedure.

For systems which produce a co-product and a waste (e.g. textile sorting to produce clothing for reuse, recycling and disposal) the ratio of reused items to alternative options should be identified and the inputs / outputs allocated to the reused items only

Where more than one product passes through a common process, the impact of that process must be attributed (i.e. divided on a rational and justifiable basis) to those products.

As in ISO14040, allocation shall be avoided wherever possible by breaking down the steps in the process as much as far as is feasible in order to limit unfounded attribution. Where this is not possible, the inputs and outputs of the system shall be partitioned between products "or functions in a way that reflects the underlying physical relationships between them; i.e. they should reflect the way in which the key inputs and outputs are altered by quantitative changes in the products or functions delivered by the system".

Finally, if this is not possible, economic valuation may be used.

As identified in section 2.1, impacts associated with raw materials used to create products have been attributed to the first use of that product. Materials associated with repair (e.g. replacement components) are attributed to the first reuse.

5.0 Costs and Prices

5.1 Cost and Prices of Goods

All financial values should be expressed in prices relating to a given year. The year for which financial data is collected and representative should be clearly stated and adjusted to the year of interest. In projecting future impacts, real prices should be kept constant over time (i.e. follow the rate of inflation) and discount rates identified.

The basis for the financial assessment may be based on private or social costs. The basis for the assessment shall be clearly stated.

The costs / benefits shall be attributed to the person / organisation to whom they accrue.

In this model, the only future stream of finance affected by reuse is waste management costs, whereby reuse delays the time at which an item enters the waste stream. These costs are discounted at the same rate as inflation.

Private Costs (Benefits)

Private costs take into account the costs and benefits which affect the bottom line of an individual or organisation. Individuals and organisations are subject to taxes and so these are included when considering the financial impact of an activity.

Social Costs (Benefits)

In social cost-benefit analysis, a wider measurement of the costs and benefits is used. Many reuse activities will have additional social impacts. For example, the purpose of an organisation may not necessarily be to divert items for reuse, but may be to provide training and employment opportunities based around repairing items. Social Return On Investment (SROI) is an impact measurement tool which seeks to comprehensively account for the impacts of an organisation's activities using a combination of narrative, qualitative and financial measures. The approach is recognised by the Scottish Government (undated) and the Cabinet Office.

Care must be taken not to double count costs and benefits if the social measure is used. Taxes and transfers are generally excluded as, in principle, they represent neither a social benefit nor a cost, but rather a transfer from one social group to another. For example, the landfill tax aims to cover the cost of environmental damage associated with sending waste to landfill (DoE and WO 1995). Adding avoided landfill tax savings to the avoided environmental damage would therefore lead to double-counting of the benefit of landfill diversion. However, externalities (social costs or benefits that influence the welfare of third parties without any monetary compensation) should be monetised wherever possible.

5.2 Labour Costs

Labour costs for organisations involved in reuse may fall into three categories, as outlined in figure 5.1 below.

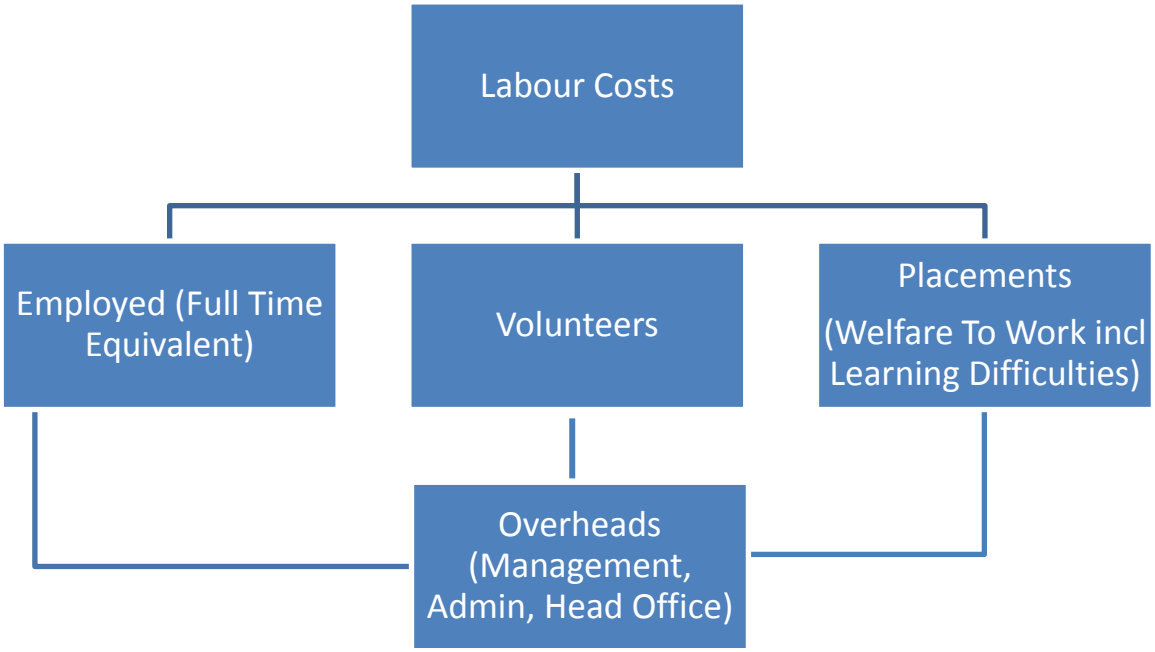
For staff in paid employment, wages should be used to represent the cost of labour. Where possible the cost of overhead (e.g. management, administration, head office labour) should also be included. Where these data do not exist, assumptions should be clearly stated. Full time equivalent (FTE) costs should be used to estimate the costs of employees' time to the employer, and should include pensions, national insurance and allowances, as well as basic salaries.

For volunteer labour and placement labour, an opportunity cost should be attributed, taking into account relevant wage rates as obtained from the Annual Survey of Hours and Earnings. In addition there will be a cost to the organisation for managing these staff and this should be included.

For placements, consideration should also be given to the benefit arising from these individuals gaining successful employment.

The cost of benefit payments avoided should be based upon the Department of Work and Pensions' Tax Benefit model tables (DWP 2010a).

Figure 5.1 Categories of labour cost associated with reuse



Two examples of prior research on Government savings in North Lanarkshire and Kent identified that commissioning high quality supported employment could yield savings to the Government of £6,894 and £3,564 per person supported per annum respectively. These figures are variable depending upon on assumptions related to tax and NI yield, day service cost and displacement of non-disabled people.

Current guidance from DWP (2007) recommends that these effects are acknowledged and their potential importance discussed, but not accounted for due to a lack of data and prior study. In this methodology, it is proposed that the gross avoided benefits relating to the proportion of trainees at reuse organisations who go on to successful employment are identified.

Both opportunity costs and actual costs are used within the model. Opportunity costs for volunteers are used on the premise that the availability of volunteers is not certain. Volunteer labour is often only available due to factors external to this methodology, such as the perceived need for time commitment and certain skills (Volunteering England, undated).

Counting financial benefits to more than one party (e.g. the individual, an organisation, government) is not considered double counting in SROI because the value is experienced separately by all three stakeholders (Nicholls et al, 2009). The same value to the same stakeholder should only be counted once.

5.3 Jobs, Displacement and Multiplier Effects

Direct and indirect effects on UK jobs should be assessed in determining overall impacts. The scope shall be clearly defined when discussing employment.

Employment intensities should be clearly related to the functional unit.

Primary data should be used where possible. Where assumptions have been made these should be clearly stated. Where assumptions have significant influence on the results, sensitivity analysis should be performed.

As identified in section 3.1.1, reused items may displace new items, old items, services, or nothing. Each of these alternatives is associated with differing levels of employment.

Jobs affected related to new goods may be within manufacturing, distribution and retail. For reused items jobs affected may be within collection, cleaning, checking and repair, and retail.

Attribution of changes in jobs in distribution and retail to reuse activities is more challenging than manufacture of goods, particularly where multiple product types are sold. At present, this is therefore excluded from the assessment. For the displaced purchases of new items, only the number of jobs displaced in the UK may be considered. This is based upon common approaches to CBA.

Indirect employment effects may arise where:

- additional incomes spent in local economies lead to an increase in demand for goods and services, in turn creating further jobs;
- a change in a business or project leads to changes in demand for local goods and services, ('supplier effects'), and;
- other indirect employment effects – arising, for example, from developments that enhance the attractiveness of an area to business supply chains (CSES 2006)

The employment intensity shall be allocated to the product under review in as per section 4.0 (i.e. on the basis of the mass / volume of an item, or economic value if mass cannot be identified). Data may be available in a variety of formats (e.g. per sub-process, per day or per item) and shall be reinterpreted to the functional unit.

As for costs, apportioning employment intensity to functional units might be difficult for reuse organisations. If data is not available on hours spent, the second choice would be to attempt to apply a weighting of overall costs based on the proportion of throughput that is composed of a specific type of item, either by value or by weight. Finally, in the absence of such data, estimates will be made on the basis of available information, and assumptions will be clearly documented. The overall approach to data sources and quality is described in section 7.0 below.

5.3.1 Onward Employment from Preparation for Reuse Organisations

One of the motivations for some organisations involved in preparation for reuse is to provide training to individuals who would otherwise be excluded from the mainstream job market. A recent survey of the reuse sector has identified that 64% of organisations that responded deliver training (Curran and Williams 2010). The provision of training makes it more likely that employment will subsequently be found, and this employment means that there will be an associated saving on social welfare payments for the previously unemployed.

Efforts have been made to attribute this benefit to the preparation for reuse route, albeit with associated uncertainty. In theory, for those in the 'Welfare to Work' category, obtaining employment means that Income Support/Job Seekers Allowance (IS/JSA), Housing Benefit (HB) and Council Tax Benefit (CTB) are no longer required. For a single adult (25 and over) or a Lone Parent (18 and over), the personal allowance, i.e. the maximum that could be claimed, is £65.45 per week for each of IS/JSA, HB and CTB (DWP 2010a). This sums to a maximum of £196 per week, or £10,210 per year.

However, whilst those on IS/JSA are automatically entitled to HB and CTB (Jin et al 2010), no evidence has been identified which shows how many people actually take up all of three of these, nor to what level (i.e. less than the maximum). Furthermore:

- The level of remuneration in new employment may not be sufficient to move entirely off all of these benefits;
- Individuals may be only temporarily employed, and then become unemployed once more;
- The employment of individuals trained by the reuse organisation may displace others from obtaining an employed position ('displacement'); and
- Those trained by the reuse organisation may have obtained a job had the reuse organisation not existed ('deadweight').

Given the uncertainties above, only the avoided IS/JSA have been considered. Approximately 50% of those out of work are unemployed for up to 6 months, 18% up to 1 year, and 32% over 1 year (ONS 2010b). Assuming that half of welfare to work placements would have been unemployed for 6 months and half for 12 months, this suggests a one-off benefit of £2553 per person gaining employment following a placement (£65.45 x 26 weeks x 50% + £65.45 x 52 weeks x 50%).

It is assumed that where displacement occurs, there is no consequential impact on employment levels (i.e. another person is not assumed to become unemployed). Deadweight is assumed to be minimal as participation in a training scheme indicates that the individual does not otherwise consider themselves able to gain paid employment.

This benefit is attributed on a per tonne basis to all items going through a preparation for reuse route, based on figures from FRN. The annual tonnage received by FRN members in 2009/10 was 41,113 tonnes. Using data from FRN and CREATE, it is understood that approximately one third of the 8,000 trainees within FRN gain onward employment each year. This equates to a benefit of 0.06 FTEs per tonne of products diverted through preparation for reuse.

6.0 Business As Usual Mass Flows

The current disposal routes for all items should be identified and quantified using nationally recognised statistics where possible.

This may be supplemented by sector-specific information.

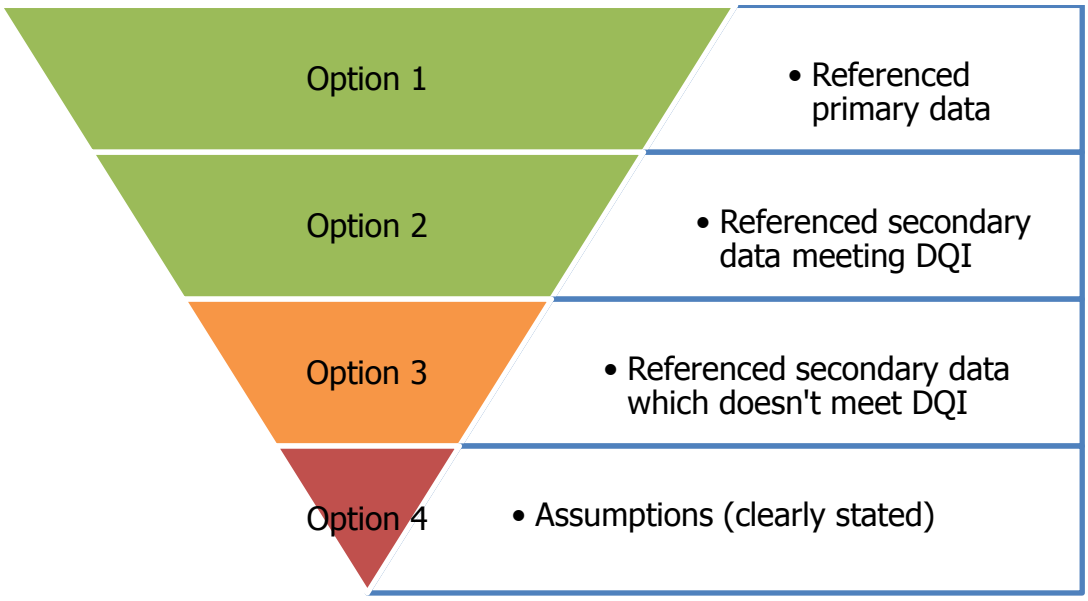
Information on product mass flows is essential to understanding the business as usual scenario, but is not required for other scenarios. Where a business as usual scenario is developed, the information sources used shall be clearly identified.

7.0 Data Sources

Data used in this methodology should meet the data quality indicators laid out in Table 7.1 below. Where data does not meet these requirements, it should be clearly identified.

A hierarchy of data sources should be used (as shown in Figure 7.1). The sources of all data used should be clearly stated.

Figure 7.1 Data Source Hierarchy



Data sources specific to particular items are identified within each material – specific chapter. In general, the recommended approach Appendix 1 below provides a list of recommended secondary sources of data. The sources which have been used in the case study reports have been highlighted in blue.

Table 7.1 Data Quality Indicators

Data Quality Indicator	Requirement	Comments
Time-related coverage	Data less than 5 years old	Ideally data should represent the year of study. However, the secondary data in material eco-profiles is only periodically updated.
Geographical coverage	Data should be representative of the products placed on the market in the UK	Many datasets reflect European average production or example local activities.
Technology coverage	Average technology	A range of information is available, covering best in class, average and pending technology. Average is considered the most appropriate but may not reflect individual supply chain organisations.
Precision / variance	No requirement	Many datasets used provide average data with no information on the range. It is therefore not possible to identify the variance.
Completeness	All datasets must be reviewed to ensure they cover inputs and outputs pertaining to the life cycle stage	
Representativeness	The data should represent UK conditions	This is determined by reference to the above data quality indicators
Consistency	The methodology has been applied consistently.	
Reproducibility	An independent practitioner should be able to follow the method and arrive at the same results.	
Sources of data	Data will be derived from credible sources and databases	Where possible data in public domain will be used. All data sources referenced
Uncertainty of the information	No requirement	Many data sources come from single sources. Uncertainty will arise from assumptions made and the setting of the system boundaries. These should be explored through sensitivity analysis where they have the potential to be significant.

8.0 Supplementary Information

8.1 Allocation of Charity Shop Impacts To Products

The annual Charity Shops Survey, published by Charity Finance (Sims 2010), provides information on the running costs associated with charity shops which participate in the survey. It also provides information on numbers of employees and volunteers associated with shops; collection and warehousing; area, district and regional level activities and; head office. Also included are the average hours worked by volunteers, which allows the number of volunteers to be expressed as FTEs.

The 2010 survey estimates that the income from non-donated goods (Christmas cards, bought in goods, donations and gift aid) accounts for 14% of income. As some of these items do not have a physical mass and for the others it is not known, 14% of the economic and environmental impacts of charity shops have been attributed to these items (i.e. 86% of impacts are divided amongst reused items).

Through the Charity Retail Association 2010 Stock Survey, estimates of the number of items of electrical items, furniture, clothing, rags, music / video, books, bric-a-brac sold per shop have also been identified, alongside the average sale price per item in that category. Although bric-a-brac, books, music and video are currently excluded, it is essential to quantify their throughput to allow impacts to be allocated to a tonne of product. Information from the Charity Retail Association also identifies the quantity of items donated which are sold through charity shops or sent for recycling or disposal.

The average income through the Stock Survey and the Charity Shops survey are £101,000 and £93,000 respectively. The difference may in part be explained by differences in the coverage of each survey.

An estimate of the weight of goods sold through charity shops has then been made through a two stage calculation. Whilst information on the volume and price of items sold is available the weight is not.

Average weights for products were estimated as shown in table 8.1 below. These were then multiplied by the quantity of products sold (Charity Retail Association 2010) to estimate a total weight passing through a charity shop.

Table 8.1 Average weights used in allocating the impact of charity shops

Product Group	Average weight (kg)	Reference
Electrical Items	17	Based on a Flat screen display 32-37" as a representative item sourced from FRN (2009) average weights list
Furniture	37	Based on a 2 seater sofa as a representative item, sourced from FRN (2009) average weights list
Clothing	0.37	Assumption, based on split of weights between T-Shirts and Jumpers.
Music / video	0.11	Based on weighing CDs and DVDs, (video cassettes weigh 250g)
Books	0.26	Based on a 500 page book 15cm*10cm ('average' paperback)
Bric-A-Brac	0.75	Assumption based on FRN (2009) average weights list and bags of bric-a-brac containing more than 1 item.

This suggests that an average Charity Shop sells 30 tonnes of products per annum, whilst a further 24 tonnes of items are unsuitable for reuse and are sent for recycling or other disposal. The inputs and outputs associated with Charity Shops (e.g. staff, energy use) have subsequently been attributed to the products sold on a weight basis.

8.2 Allocation of Preparation for Reuse Impacts To Products

Through a survey as part of this project, the Furniture Reuse Network and London Community Reuse Network provided average information on tonnage throughput and operating impacts (employment, volunteers, welfare to work, maintenance etc.) for organisations collecting, sorting, refurbishing and selling furniture and electrical items. As tonnage data was provided for these facilities, all impacts were divided by the tonnage of products passed on for use.

8.3 Information on Employment Intensities

Employment intensities for reuse activities were identified as described in the previous sections. For new goods, intensities are based on available information on UK manufacturing activity. As there does not appear to be any UK manufacture of televisions or washing machines, and so no displacement impacts are attributed to these products.

The UK clothing and textile industry employs 105,000 people (ONS, 2008), with an output of 697,000 tonnes. However, total UK consumption is 2 million tonnes. Therefore, per tonne consumed, 0.053 FTEs (170,000/2,000,000) are employed (which equates to 5.25 employees per 100 tonnes consumed).

For waste management activities, data sources used are as described in Appendix 1.

9.0 References

Beyer, S. (2008) *An evaluation of the outcomes in supported employment in North Lanarkshire*, North Lanarkshire Social Work Service

Charity Retail Association (2010) *Stock Survey*

CML (2001), *CML-IA Characterisation Factors*, Centre of Environmental Science (CML) of Leiden University, the Netherlands. http://cml.leiden.edu/software/data-cmlia.html

CSES (2006) *Study on Measuring Employment Effects* http://ec.europa.eu/regional_policy/sources/docgener/evaluation/pdf/empleffect06.pdf

Curran, A. and Williams, I.D. (2010) The role of furniture and appliance reuse organisations in England and Wales. *Resources, Conservation and Recycling*, 54, 692-703

DEFRA (2011) *Green Claims Guidance* http://www.defra.gov.uk/environment/economy/products-consumers/green-claims-labels/

DEFRA (2010) *Draft Guidance On The Legal Definition Of Waste And Its Application* http://www.defra.gov.uk/corporate/consult/waste-definition/100118-waste-condoc.pdf

DEFRA / DECC (2010) *Guidance on how to measure and report your greenhouse gas emissions* http://www.defra.gov.uk/environment/economy/business-efficiency/reporting/

Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:312:0003:0003:EN:PDF

DoE and WO (1995) *Making Waste Work - A strategy for sustainable waste management in England and Wales*, DoE, London

DWP (2007) *Review of the DWP Cost Benefit Framework and how it has been applied. Working Paper No 40 – a report of research carried out by the Policy Studies Institute on behalf of the Department for Work and Pensions*. Page 38 Available at http://research.dwp.gov.uk/asd/asd5/WP40.pdf

DWP (2010) *Tax Benefit Model Tables, 2010*, as corrected, available at http://statistics.dwp.gov.uk/asd/index.php?page=tbmt

EHSNI (2005) *Framework for Waste Prevention in N I* http://www.doeni.gov.uk/wonderfulni/txt/index/waste-home/wasteprevention_2.pdf

EU (2008) *Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives*. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:312:0003:0003:EN:PDF

Eunomia (2002) *The Size of the UK Recycling and Re-use Industry,* WRAP, Banbury

Eurostat (2008) *National and Financial Accounts in Eurostat* Communication and Information Resource Centre (CIRCA), Eurostat, Brussels. http://circa.europa.eu/irc/dsis/nfaccount/info/data/esa95/en/een00473.htm

Frischknecht R., Jungbluth N., et.al. (2003). *Implementation of Life Cycle Impact Assessment Methods*. Final report ecoinvent 2000, Swiss Centre for LCI. Duebendorf, CH, www.ecoinvent.ch

FRN (2009) *Average Weights List* http://www.frn.org.uk/images/stories/FRN_2009_Average_Weights_List.pdf

HM Treasury (2003) *The Green Book* http://www.hm-treasury.gov.uk/d/green_book_complete.pdf

IPCC (2007) *Climate Change 2007. IPCC Fourth Assessment Report. The Physical Science Basis*.

http://www.ipcc.ch/ipccreports/ar4-wg1.htm

ISO 14044 (2006) *Environmental management — Life cycle assessment — Requirements and guidelines*

Jin, W., Levell, P., and Phillips, D., (2010) *A Survey of the UK Benefit System* Institute for Fiscal Studies http://www.ifs.org.uk/bns/bn13.pdf

Kilsby, M and Beyer S. (2010) *A financial cost: benefit analysis of Kent Supported Employment: establishing a framework for analysis – interim report*. Kent Social Services

Murray R, (1998) *Reinventing waste, towards a London waste strategy*, Environment Agency

Murray, R., (1999) *Creating wealth from waste*, DEMOS

Nicholls, J,. Lawlor, E., Neitzert, E., and Goodspeed, T., (2009) *A Guide to Social Return on Investment*, Cabinet Office, London http://www.thesroinetwork.org/publications/cat_view/29-the-sroi-guide-2009

ONS (2011) *Annual Business Survey (ABS) Data Section C Manufacturing* http://www.statistics.gov.uk/StatBase/Product.asp?vlnk=15361

ONS (2010a) *Annual Survey of Hours and Earnings (ASHE).* Available at http://www.statistics.gov.uk/statbase/product.asp?vlnk=13101

ONS (2010b) *Labour Force Survey (LFS) data on unemployment by age and duration and sex* http://www.statistics.gov.uk/STATBASE/Product.asp?vlnk=8272

Packard, V. (1960). *The Waste Makers*. Pelican; Harmondsworth

Recycling, Preparation For Re-use and Composting Targets (Definitions) (Wales) Order 2011 http://www.legislation.gov.uk/wsi/2011/551/made

Scottish Government (undated) *Social Return On Investment)* http://www.scotland.gov.uk/Topics/People/15300/SROI

Scottish Government (2010) *Zero Waste Plan Annex A Zero Waste Targets and Data Needs* http://www.scotland.gov.uk/Publications/2010/06/08092645/6

Sim, J (2010) *Charity Shops Survey 2010*, Civil Society, London

Volunteering England (undated) *From Barriers To Bridges - Involving a broader range of volunteers* http://www.volunteering.org.uk/resources/goodpracticebank/Core+Themes/equalopportunitiesdiversity/diversity-overview

WRAP (2006) *Environmental Benefits of Recycling* www.wrap.org.uk

WRAP (2010) *Environmental Benefits of Recycling – 2010* Update www.wrap.org.uk

WRAP (2010) *Gate Fees Report* http://www.wrap.org.uk/recycling_industry/publications/gate_fees_2010.html

Zero Waste Scotland (2011) *Scottish Carbon Metric* http://www.zerowastescotland.org.uk/carbon_metric/carbon_metric.html

Appendix 1 Suggested Secondary Data Sources

Item / Issue	Preferred source	Alternative Source	Third choice
Environmental Data (all items)	International or nationally recognised databases (e.g. Ecoinvent, WRATE)	Published LCAs and other reviewed assessments	Unreviewed publications assumptions
Cost of collection of bulky waste	In 2010 WRAP surveyed LA websites to identify average unit costs for collection of bulky waste.	Assumption	
Cost of disposal	WRAP (2010) Gate Fees Report http://www.wrap.org.uk/recycling_industry/publications/gate_fees_2010.html		
Cost of CA Collection	National Average Data	Data for a given LA or organisation (e.g. wastesavers)	Assumption
Cost of other collection (e.g. in residual waste)	National Average Data	Data for a given LA or organisation (e.g. wastesavers)	Assumption
Site rental, utility and maintenance data	Charity Retail Association (Primary Data from Survey) Representative organisation (e.g. FRN Cylch, Oxfam Wastesavers) (Primary Data from survey)	Data for example operations	Assumption
Labour costs Preparation for Reuse (employed, volunteer & welfare to work)	Representative organisation (e.g. FRN Cylch, Oxfam Wastesavers) (Primary Data from survey)	Data for example operations	Assumption
Cost of Customer Drop Off	Representative organisation (e.g. FRN, Cylch, Oxfam Wastesavers) (Primary Data from survey)	Data for example operations	Assumption
Cost of Doorstep Collection	Representative organisation (e.g. FRN, Cylch, Oxfam Wastesavers) (Primary Data from survey)	Data for example operations	Assumption
Cost of Dedicated reuse banks	Representative organisation (e.g. FRN, Cylch, Oxfam Wastesavers) (Primary Data from survey)	Data for example operations	Assumption
Cost of Other Collection	Representative organisation (e.g. FRN Cylch, Oxfam Wastesavers) (Primary Data from survey)	Data for example operations	Assumption
Revenue generated from sale of reused goods (Reuse	Survey data collated by reuse organisations	Expert opinion / sample of reuse organisations	Assumptions

Item / Issue	Preferred source	Alternative Source	Third choice
Network)			
Price of displaced (New) Goods	Market survey data	Price based on price comparison websites	Assumption
Cost of running charity shop	Sim, J (2010) *Charity Shops Survey 2010*, Civil Society, London		
Cost of free exchange	Primary Data from organisations facilitating free exchange	Assumption	
Cost of paid exchange	Primary Data from organisations facilitating paid exchange	Assumption	
Price of Reused Goods (Charity)	Charity Retail Association (Primary Data from Survey)	Expert opinion / sample of reuse organisations Oakdene Hollins report Recycling of low grade clothing waste, 2006	Assumption
Price of Reused Goods (Online)	WRAP (2011) *Quantifying Online Exchange*, prepared by Resource Futures, WRAP, Banbury		
Labour cost of waste management routes (landfill, energy recovery, recycling)	Aulakh, S., and Thorpe, L., (2011) *From Waste Management to Resource Recovery: A Developing Sector*, BIS; London Murray R, (1998) *Reinventing waste, towards a London waste strategy*, Environment Agency Murray, R., (1999) *Creating wealth from waste*, DEMOS	MacGillivray, A., (2010) *More jobs, less waste*, Friends of the Earth, London (based on Murray)	
Labour cost of manufacture of new goods	Nationally recognised Sector Data (total employment, throughput of products) Economic & Labour Market Review (ELMR)	Published reports (e.g. from Trade Associations)	Assumptions
Labour for bulky waste collection	Representative organisation (e.g. FRN, Cylch, Oxfam Wastesavers) (Primary Data from survey)	Assumptions	
Labour of CA Collection, doorstep collection, reuse banks, other collection	Representative organisation (e.g. FRN, Cylch, Oxfam Wastesavers) (Primary Data from survey) AWC residual – National Assembly for Wales (2001)		
Labour composition data (employed, volunteer,	Representative organisation (e.g. FRN, Cylch, Oxfam Wastesavers) (Primary Data from survey)		

Item / Issue	Preferred source	Alternative Source	Third choice
welfare to work, learning difficulties))			
Labour cost of checking, cleaning and repairing items	Representative organisation (e.g. FRN, Cylch, Oxfam Wastesavers) (Primary Data from survey)		
Labour costs of charity retail	Sim, J (2010) *Charity Shops Survey 2010*, Civil Society, London		
Employment intensity of manufacture of new goods	Nationally recognised Sector Data (total employment, throughput of products) Economic & Labour Market Review (ELMR)	Published reports (e.g. from Trade Associations)	Assumptions
Employment intensity of collection of bulky waste	Primary data from relevant Local Authorities, Waste Management Companies, Social Enterprises as appropriate	Secondary data from published reports (e.g. national studies)	Assumptions
Employment intensity of checking, cleaning and repairing items	Representative organisation (e.g. FRN, Cylch, Oxfam Wastesavers) (Primary Data from survey)	Assumption	
Employment intensity of charity retail	Sim, J (2010) *Charity Shops Survey 2010*, Civil Society, London		
Primary Lifetime	Market Data (e.g former Market Transformation Programme information).	Manufacturers Data (example product)	Assumption
Secondary Lifetime	Survey data of recipients of reused items	Assumption	
Displacement	Survey data of recipients of reused items	Assumption	
Cost of Benefit Payments	DWP (2010) Tax Benefit Model Tables, 2010, as corrected, available at http://statistics.dwp.gov.uk/asd/index.php?page=tbmt		
Multiplier Effects for Jobs	Eunomia (2002) *The Size of the UK Recycling and Re-use Industry,* WRAP, Banbury		
Mass Flow Data:	Online Exchange: WRAP (2011) *Quantifying Online Exchange*, prepared by Resource Futures, WRAP, Banbury National / Trade data on sales	Assumption	

Waste & Resources Action Programme

The Old Academy
21 Horse Fair
Banbury, Oxon
OX16 0AH

Tel: 01295 819 900
Fax: 01295 819 911
E-mail: info@wrap.org.uk

Helpline freephone
0808 100 2040

www.wrap.org.uk/benefitsofreuse

recycle