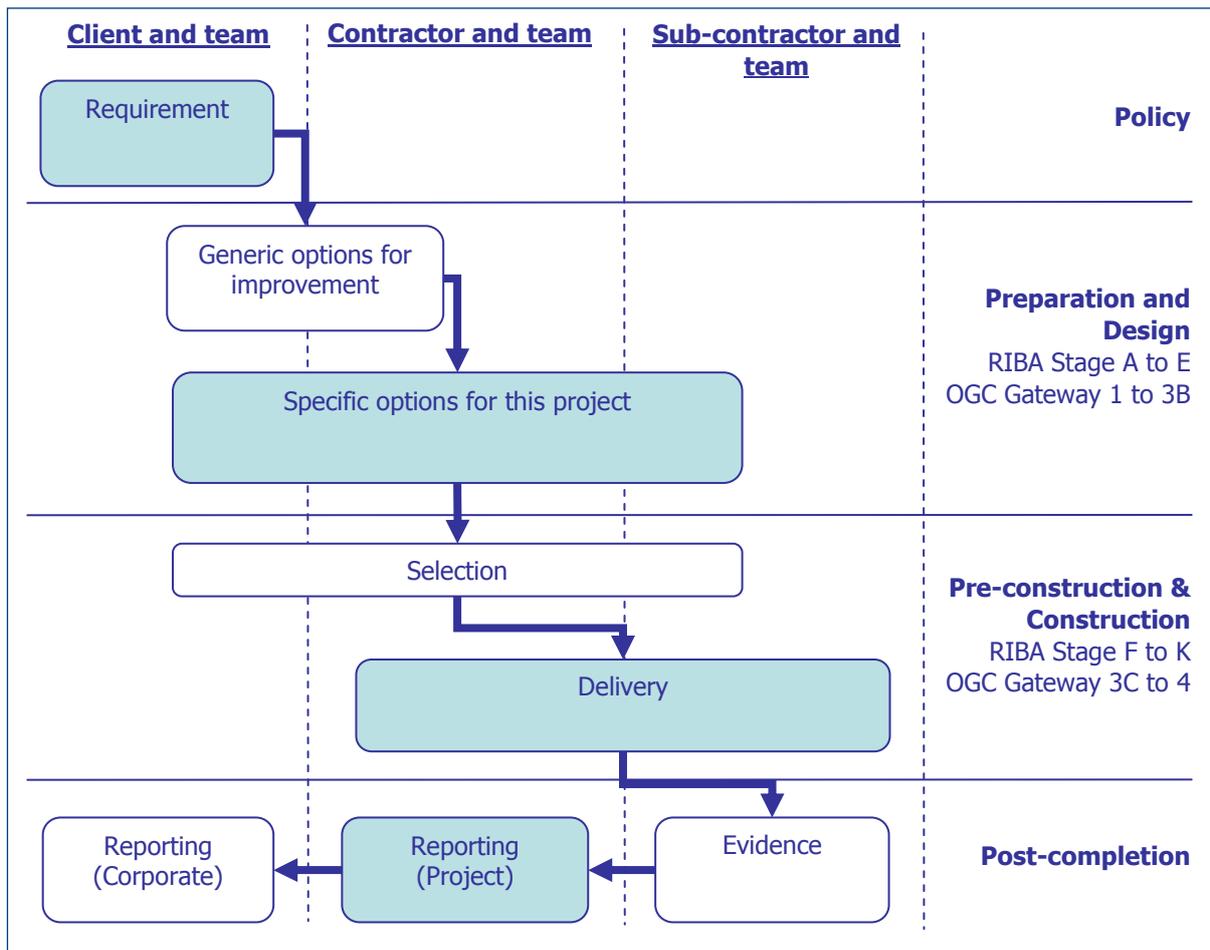


Construction procurement guidance

Delivering higher recycled content in construction projects



Guidance for clients, design teams and contractors

WRAP helps individuals, businesses, and local authorities to reduce waste and recycle more, making better use of resources and helping to tackle climate change.

Written by:



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Scope and objectives

This guide is for construction clients, developers, designers, contractors and public bodies. It shows that requiring projects to exceed a minimum level of recycled content is commercially sensible, good for the environment and achievable at no additional cost. It is based on five years of project assessment, and provides advice on the:

- benefits of setting requirements;
- practicalities of implementing good practice;
- process for measuring and improving project performance; and
- tools and other resources which are available to help.

This guide also highlights the direct relationship between achieving higher recycled content targets and the industry drive to meet the halving waste to landfill target.

This information is supported by detailed guidance on setting and meeting requirements, including guidance at each stage of a project. The requirements for higher recycled content can easily work with other sustainability measures adopted for the project.

The WRAP publication "Achieving good practice Waste Minimisation and Management" provides complementary advice on setting requirements for waste reduction and recovery. This and other resources are available at www.wrap.org.uk/construction.

Box 1: Sector leaders taking action

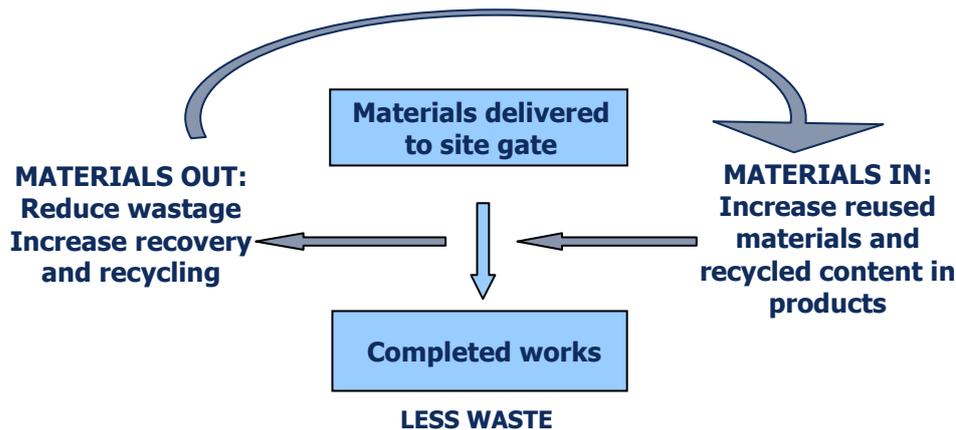
- The Scottish Government has asked all public bodies in Scotland to set 10% recycled content as a minimum standard in major public sector projects in Scotland. Councils including Aberdeen, Glasgow, Midlothian, South Ayrshire and the Shetland Islands have already taken action, as has Scottish Water.
- The Central Procurement Directorate in Northern Ireland issued recycled content guidance in February 2006.
- The Welsh Assembly Government has set a 10% recycled content target in major regeneration projects and Welsh Health Estates applies a KPI and target in health sector procurement.
- The Olympic Delivery Authority has adopted minimum standards of at least 20% (by value) of materials used in the permanent venues, to be from recycled content for London 2012.
- In England, the Building Schools for the Future programme, Defence Estates, the National Offender Management Service and hospital PFI projects such as Bristol Southmead and Hillingdon have all adopted KPIs and benchmarks for recycled content.
- Property developers and retailers including British Land, Hammerson, John Lewis Partnership, Marks and Spencer and Stanhope have also set recycled content targets.
- Councils including Bristol, Greenwich, Islington, Lancashire, Leeds, Newcastle, Nottingham, Sandwell and Sheffield have set recycled content tender requirements in schools PFI, as have Leeds Metropolitan and Worcester Universities.
- Minimum recycled content standards have been adopted for regeneration by South West England and Yorkshire Forward Regional Development Agencies, Leeds Holbeck and Raploch Urban Regeneration Company.

1.0 Overview

Using more reclaimed and recycled material in construction is a powerful way of making a contribution to sustainable development by diverting materials from landfill and limiting the depletion of finite resources.

Contractors and designers can make major improvements in materials efficiency relatively easily, by minimising waste generation in construction, maximising the proportion that is recycled, reusing materials and selecting construction products with a higher recycled content.

Figure 1: Material efficiency in the construction process



1.1 Securing benefits

Construction clients, developers, public bodies and planning authorities are increasingly setting requirements for reused and recycled content on their projects. Benefits include the ability to:

- demonstrate performance against corporate responsibility and sustainability policies without incurring a cost premium;
- reduce materials cost – for example where locally reprocessed demolition materials are cheaper than virgin materials;
- meet the requirements of planning authorities;
- provide a competitive edge through differentiation;
- show commitment to recycling and good practice in the public sector;
- make reclamation and recycling more economic;
- satisfy the values held by employees;
- complement other aspects of sustainable design; and
- respond to and pre-empt public policy initiatives.

1.2 Applying good practice

Use of recycled content can be increased for all forms of construction, including civil engineering, new build and refurbishment. The process of setting and meeting requirements is simple and is applicable to any of the major procurement routes used in the UK including PFI/PPP. As increasing the recycled content of a project relies on the use of products containing higher levels of recycled material in place of equivalent products containing less, therefore good practice need have no impact on project design or inappropriately restrict freedom of choice.

In addition, there is no need to use unfamiliar or untested materials, and there should be no increase in costs of materials. This is because many of the products with higher levels of recycled content are:

- from mainstream manufacturers;
- available in high volumes; and
- cost competitive with, and subject to the same testing arrangements as, equivalent products containing less recycled material.

WRAP maintains a database of the recycled content of commonly used construction products (available to search or download at www.wrap.org.uk/rcproducts), and provides a guide to the use of reclaimed products.

Numerous case studies have shown that, in a project, most of the potential to increase recycled content typically lies in the top 5 to 10 'Quick Win' opportunities (e.g. blockwork, concrete, etc) specific to that project. Therefore, it is not necessary to try to review large numbers of product options to make a major difference. As a result, setting and meeting a requirement for higher levels of recycled content should incur minimal effort on the part of the project team.

1.3 Setting a requirement

In accordance with practice adopted by leading bodies in both the public and private sectors, it is recommended that construction clients and developers should include the following form of requirement in their project procurement: a minimum outcome and a request for good practice. See a typical example taken from the WRAP publication "Procurement requirements for reducing waste to landfill" below:

Box 2: Example requirement – Client and Principal Contractor Action 1C: Project-level targets

"Our design and construction project teams will be required to:

- *implement Site Waste Management Plans throughout the design and construction period that comply with regulatory requirements (where applicable) and include in such Plans project-specific targets for waste recovery and reused and recycled content (below) and for waste reduction;*
- *measure and report progress against the corporate KPIs for the quantity of waste produced and the quantity of waste sent to landfill (measured in tonnes per £100k construction value¹) [using the WRAP W2L Reporting Portal² and guidance – delete reference as necessary];;*
- *recover at least [70% – state target] of construction materials, and aim to exceed [80% – state target];*
- *recover at least [80% – state target] of demolition and excavation materials (where applicable), and aim to exceed [90% – state target]; and*
- ***ensure that at least [15% – state target] of total material value derives from reused and recycled content in new construction, select the top opportunities to exceed this figure without increasing the cost of materials, and report actual performance.***

Project teams shall forecast waste quantities and reused and recycled content and set targets for waste reduction from an early design stage (for instance by using WRAP's Outline Designing out Waste Tools and Net Waste Tool³)."

There is ample evidence to demonstrate that requiring a minimum of 10 to 15% recycled content by value for the project overall (i.e. not per product) is widely achievable. Indeed, WRAP's case studies illustrate that most projects exceed 10% recycled content with minimal effort. By adopting the available opportunities to increase recycled content through the use of cost competitive, readily available products (i.e. 'good practice'), levels exceeding 15–20% are common. Even higher levels are achieved in infrastructure projects.

¹ Construction value is the price in the accepted tender or, if there is no tender, the cost of labour, plant and materials, overheads and profit.

² Accessible at www.wrap.org.uk/reportingportal

³ The Outline Designing out Waste Tools will be available in autumn 2009. The Net Waste Tool is freely accessible at www.wrap.org.uk/nwtool.

While a benchmark of 10 to 15% could be considered modest, it instils the process of measuring and considering recycled content within the project. When coupled with a requirement to achieve 'good practice', e.g. following identification of the top 5–10 Quick Wins^{4,5}, this instruction has the effect of necessitating action by the project team even if the baseline level of recycled content for the selected design is shown to be greater than the minimum requirement.

By stipulating that project teams focus on options with no cost premium, the client can help to ensure that 'heavy' products such as recycled aggregates are not transported excessive distances with adverse cost and environmental impacts⁶.

In this way, improved performance can be achieved whilst retaining flexibility to take account of the economic, technical and environmental circumstances of the specific project. Experience from case studies has also shown that it is easy to incorporate requirements for recycled content in a wider basket of sustainability standards for a construction project.

1.4 Making it simple

To help project teams to assess, increase and report on the recycled content of their projects, WRAP has developed the **Net Waste Tool**. This is a free resource available online at www.wrap.org.uk/nwtool. The tool can be used on a range of project types to:

- estimate the baseline performance of the project;
- identify the most significant Quick Win opportunities;
- record how each Quick Win is being addressed in the project (i.e. whether or not it is being pursued); and
- produce preformatted reports that demonstrate how a recycled content requirement is being met.

In addition to the tool and products guide, WRAP's construction portal www.wrap.org.uk/construction contains extensive information covering all aspects of materials use in construction, including: case studies, reference guides, information on site waste management and on managing specific waste streams.

⁴ Refer to the Glossary regarding the use of the term Quick Wins in procurement documentation.

⁵ As an example, the environmental assessment scheme used by Defence Estates awards credits for implementing at least three or five of the top ten Quick Wins on a project.

⁶ Information on the relative environmental impact of using recycled content in construction is available at www.wrap.org.uk/document.rm?id=4497

2.0 Why take action?

2.1 Introduction

The construction sector is the largest consumer of materials in the UK, and the largest producer of waste. More efficient use of materials would make a major contribution to reducing the environmental impacts of construction, including carbon emissions, landfill and the depletion of finite natural resources. This would also contribute to the economic efficiency of the sector and of the UK as a whole.

Major improvements can be made relatively easily and without increasing cost, by:

- minimising the overall creation of waste resulting from e.g. over-ordering and inefficient design;
- reducing the quantity of material sent to landfill during the construction process by effective waste management;
- recycling materials already on site into the new construction; and
- using more recycled materials and mainstream products with higher recycled content, including recycled content (such as glass and plastic) not necessarily sourced from construction and demolition waste.

Taking action in each of these areas will enable construction projects to reduce their “net waste” and work towards waste neutrality, i.e. using sufficient reclaimed and recycled materials to compensate for the wastage of virgin materials⁷.

As a result, construction clients and developers are increasingly looking to set requirements for waste reduction and reuse, good practice in site waste management and the adoption of higher reused and recycled content. They see this as a relatively simple and measurable way of making a difference which can be easily incorporated within wider sustainability standards for a project.

2.2 Policy context

Government has set out to reduce construction waste to landfill for economic and environmental reasons. A number of national initiatives have been launched recently to help in this regard including:

- a target for halving construction, demolition and excavation waste to landfill by 2012, relative to 2008, adopted in England by the Government’s Strategy for Sustainable Construction 2008, building on the Waste Strategy for England 2007;
- the Zero Waste Scotland policy goal;
- the Welsh Assembly Government’s plan to move towards becoming a zero waste nation;
- the Northern Ireland Waste Strategy 2006-2020, which includes a commitment to SMART targets for construction waste by 2010 and the recovery of 75% of all construction wastes by 2020;
- Site Waste Management Plan Regulations which became mandatory in England from April 2008; and
- the Strategic Forum’s sector-wide Construction Commitments.

2.2.1 Construction Commitments: Halving Waste to Landfill (W2L)

To promote best practice throughout industry, and to drive this right through the supply chain, WRAP launched a sector-wide voluntary commitment in October 2008. This commitment builds on targets adopted by the Strategic Forum and the Strategy for Sustainable Construction and focuses on a sector-specific target for waste: achieving a 50% reduction in construction, demolition and excavation waste sent to landfill by 2012 (from a 2008 baseline). The Scottish Government and various Whitehall Departments have signed up to the Commitment and the Welsh Assembly Government has proposed a 75% reduction target for 2020.

⁷ All material consumption (including the use of materials from recycled sources) has environmental as well as financial impacts and, as a result, wastage rates must be reduced and not simply offset through greater use of recycled materials found in new products.

The W2L Commitment is a voluntary agreement with signatories from all levels of the supply chain, including:

- clients;
- contractors;
- designers and consultants;
- manufacturers and suppliers; and
- waste management contractors.

Signatories commit to “playing their part” in contributing towards the sector goal; this would include committing to the following actions:

- set a target for reducing waste to landfill;
- embed the target within corporate policy and processes;
- set corresponding requirements in project procurement and engage with our supply chain;
- measure performance at a project level relative to a corporate baseline; and
- report annually on overall corporate performance

The voluntary agreement provides a framework and standard form of measurement for delivering a reduction in waste to landfill. Voluntary W2L commitments are now being made by an increasing number of clients, developers and contractors, with signatories’ actions including setting a requirement for increasing the recycled content in their projects. For information on exemplars, visit the WRAP website at www.wrap.org.uk/construction.

2.2.2 Site Waste Management Plan Regulations 2008 (England)

New legislation came into effect in England on 6 April 2008 requiring all construction projects with a contract value in excess of £300k to have a Site Waste Management Plan (SWMP). The requirements are somewhat more stringent for projects over £500k. [The Welsh Assembly Government and Scottish Government are both considering how they will introduce policy measures on site waste management.]

A SWMP is a document that identifies how waste arising during the construction process is to be managed, and ultimately reduced or recycled. This ‘waste’ includes construction, demolition and excavation arisings. Legislation in England places legal duties on both the client and the main contractor.

To be legally compliant, the SWMP should be developed before starting on site and should include:

- headline information about the project (location, date etc.);
- the name of an individual responsible for waste;
- a forecast of the quantity of waste that will be generated, identified by material type;
- a set of clear actions to reduce waste, and to increase the level of recycling; and
- the end destination for each waste stream and the recovery rate that will be achieved.

Only focusing upon legal compliance limits the value derived from the SWMP. Real improvements (including cost reductions) can be achieved when the plan is used to drive change throughout the project. To do this, the SWMP should be discussed from the earliest (project initiation) stage of the project and then throughout the design and construction phases. WRAP provide advice on good and best practice opportunities at each stage of a project and have developed a model SWMP template that includes a self assessment tool⁸.

2.2.3 Landfill Tax and Aggregates Levy

Limited landfill capacity has led to increased costs of waste disposal. This includes both gate fee and an escalator on Landfill Tax. Additionally, the extraction of virgin quarry materials is subject to an aggregates levy that is ultimately passed on as cost in the price of construction materials and products. Although designers are not directly involved in the cost management of projects, it is important that they have awareness of the costs associated with waste.

⁸ The template SWMP can be downloaded from www.wrap.org.uk/swmp

Landfill Tax has to be paid on all waste sent to landfill unless the waste is specifically exempt:

- At present (FY2009/10), the standard rate of landfill tax is £40 per tonne. Budget 2009 announced that the £8 per annum increase in Landfill Tax would continue in 2011, 2012 and 2013. By 2013, therefore, Landfill Tax on non-inert waste will rise to £72 per tonne.
- The lower rate of Landfill Tax rate applying to inactive waste will be frozen at £2.50 per tonne for 2010-11. This waste makes up around 42% of construction waste, and includes: glass, brick, concrete, some soils and aggregates.

Box 3: Why take action on waste	
Environmental	<ul style="list-style-type: none"> ■ Construction consumes one quarter of UK material resources and generates one third of waste ■ Existing landfill capacity will be used up within a few years in many regions
Economic	<ul style="list-style-type: none"> ■ Each year, over £1.5bn of construction products are wasted in England and Wales through wastage allowances ■ By moving from baseline to good practice wastage, project teams could save between 0.25 and 0.5% of construction value (varying by project type), net of implementation cost (in addition to cost savings from designing out waste, reusing materials and reducing disposal costs)
Reputation	<ul style="list-style-type: none"> ■ Leading clients and contractors are adopting targets to reduce W2L as part of their policy on Corporate Responsibility ■ A reputation for sustainability, evidenced by measurable performance, increasingly provides a market edge – for example when tendering, securing tenants or applying for planning permission
Policy	<ul style="list-style-type: none"> ■ The Strategy for Sustainable Construction sets a target of halving construction, demolition and excavation waste to landfill by 2012 in England ■ The Scottish Government has a policy commitment to a Zero Waste Scotland ■ The Welsh Assembly Government is targeting a 75% reduction in construction, demolition and excavation waste by 2020 ■ The Northern Ireland Waste Strategy 2006-2020 includes a target for 75% of all construction waste to be recovered by 2020 ■ Landfill Tax is set to increase further
Sector support	<ul style="list-style-type: none"> ■ The Strategic Forum for Construction has launched a set of Construction Commitments for voluntary agreement by organisations throughout the supply chain – these Commitments are intended to help deliver a series of outcomes by 2012, including action on waste ■ Other sector bodies including the UK Contractors Group, UK Green Building Council, British Property Federation and British Council for Offices all support a commitment to reduce W2L

2.3 Benefits of asking for higher recycled content

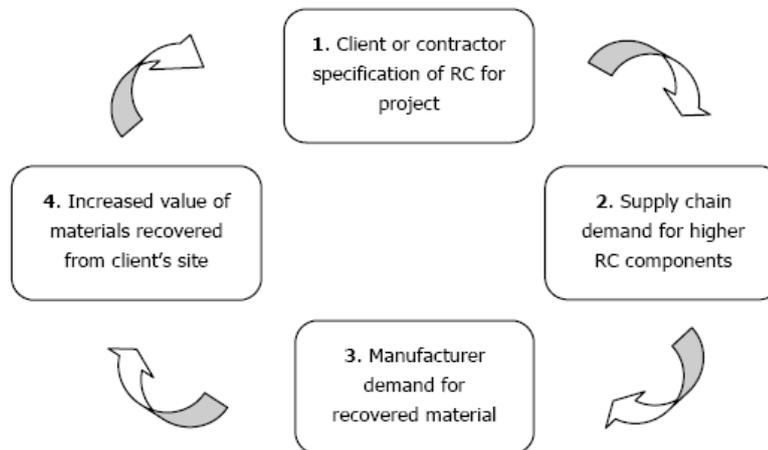
Increasing the proportion of the materials used in a project that come from a recycled source is a relatively simple, practical and cost-neutral way of showing a measurable contribution to more sustainable construction. Key benefits include:

- **enhanced reputation** – being able to quantify performance against corporate responsibility and sustainability policies helps gain the approval of external stakeholders and employees;
- **driving down the cost of waste management** – in the longer term, the increased use of recycled material will enhance its value and thereby make it more cost effective to recycle (as is the case with most metals);
- **meeting planning requirements** – planning authorities are increasingly setting conditions for environmental performance as part of the development process;
- **competitive differentiation** – both developers and contractors can demonstrate how they will support a prospective client’s sustainability objectives;

- **leadership** – providing a mechanism for public bodies to show their commitment to recycling and sustainable procurement;
- **reducing materials costs** – reusing materials and products or the use of locally sourced construction and demolition waste is often cheaper than using virgin materials;
- **complementing other aspects of sustainable design;** and
- **responding to and pre-empting public policy** – those organisations that respond to the thrust in public policy for sustainable construction will be in an advantageous position in comparison with those that wait until they are compelled to act by legislation.

Using more recycled material in construction is a particularly attractive option because it is easy to do and need not impact the design, specification or cost of a project. Simply by selecting commonly available products that have above-average recycled content, it is possible to be significantly more efficient in the use of natural resources without compromising cost, quality or construction programmes. The Net Waste Tool can be used to undertake recycled content analysis – see Section 4.1.1 for more details.

Figure 2: Self-reinforcing benefits of specifying and measuring reused and recycled content (RC) on construction projects



Clients and contractors who specify and measure the use of recovered material (reused and reclaimed materials, higher recycled content) will help to increase the demand for recovered materials, which in turn will make it easier and more economical to dispose of wastes generated on a project without resorting to landfill.

Box 4: What is recycled content?

Recycled content is defined in ISO 14021:

'Recycled content is the proportion, by mass, of recycled material in a product or packaging. Only pre-consumer and post-consumer materials shall be considered as recycled content, consistent with the following usage of the terms:

- *Pre-consumer material: Material diverted from the waste stream during a manufacturing process. Excluded is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it.*
- *Post-consumer material: Material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose. This includes returns of material from the distribution chain'.*

A product that is actively reused (e.g. is removed and replaced or is moved to another location rather than simply left *in-situ*) is credited at 100% reused content by value. The material value of reused materials is either the purchase price, or if materials are not purchased (e.g. are reused onsite) is taken as the value of an equivalent new product if procured on the open market.

Non-waste by-products such as blast furnace slag and flue gas desulphurisation gypsum, as well as other materials that have been recovered from the waste stream, can be classed as recycled content*.

* WRAP guidance on calculating and declaring recycled content in construction products is available at www.wrap.org.uk/document.rm?id=4939.

It is not widely appreciated that many new building products already contain a significant proportion of recycled material. For example, different mainstream brands of concrete block contain between 0% and 70% or more recycled content. Many other mainstream products also contain significant amounts of material that have been recovered from the waste stream (aggregates, glass, plastics, wood, etc), as shown in Table 1.

Table 1: Examples of the range in recycled content found in commonly used construction components

Product type	Option with lower recycled content	Option with higher recycled content
Dense block	0%	Hanson Conbloc (up to 70%)
Wall insulation	0%	Superglass Superwall Cavity Slab (>80%)
Concrete roof tile	0%	Lafarge – various, e.g. Grovebury (17%)
Ceiling tiles	>10%	Armstrong tiles (28-52%)
Intermediate floors	50-70%	Sonae – Sonaefloor (90-95%)
Floor coverings – safety	0%	BSW Regupol Everroll rubber flooring (80%)



2.4 Contribution to sustainable construction

There are three key areas where the development and construction industry needs to increase its efficiency: energy, water and use of materials. Figure 3 highlights the various ways in which efficient use of materials directly contributes to greater sustainability in construction.

Figure 3: Materials selection and use is a key element of sustainable construction

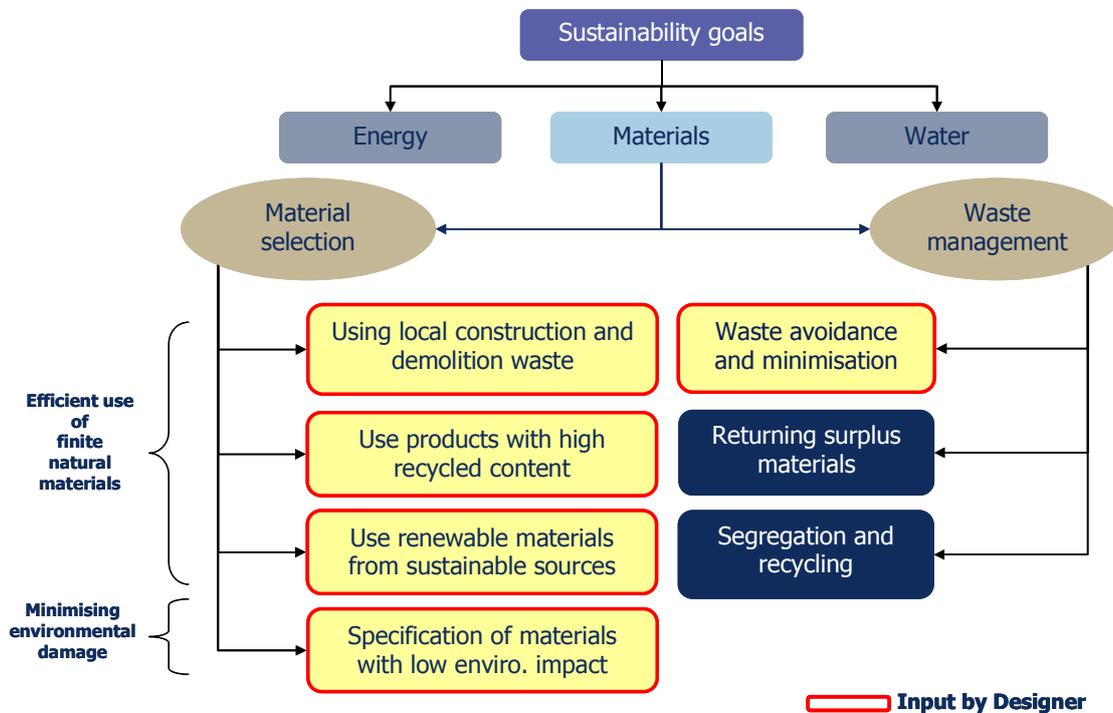


Figure 3 shows that there are two important stages of sustainable materials selection:

1. **Minimising environmental damage:** This involves the evaluation of the environmental impacts of alternative design specifications based on data on the life-cycle impacts of generic materials used in these specifications. An example of this would be to review specification options against those rated within BRE's Green Guide to Specification and to try to select specifications that are +A-rated (i.e. those with lowest life-cycle impacts based on industry-average data).
2. **Using materials efficiently:** Using products that have above-average levels of recycled content, or utilising locally available recovered materials, will conserve virgin materials, reduce minerals extraction and decrease landfill. This approach will further reduce the environmental impacts of even '+A-rated' specifications by out-performing the industry average.

Life-cycle assessment by the Building Research Establishment (BRE) shows that, **on average, adopting higher recycled content reduces overall environmental impact** in each product category for which data are available⁹. Across a range of case studies, adopting good practice also decreased overall carbon emissions associated with each project.

The importance of reducing consumption of virgin materials is illustrated by the WWF report 'One Planet Living'. This study identifies the need for a two-thirds reduction in European consumption of fossil fuels and virgin materials to achieve a sustainable and globally equitable level. By minimising the amount of waste generated during construction, maximising the proportion of unavoidable waste arisings that are recycled whilst simultaneously using recycled materials from other sectors (e.g. glass and plastic), the construction sector can make a major contribution to achieving this goal.

⁹ Information on the relative environmental impact of using recycled content in construction is available at www.wrap.org.uk/document.rm?id=4497

Box 5: How is the recycled content of a building measured by value?

Recycled content by value is a function of the material value of a component, the quantity used and the percentage of the component by mass that is derived from recycled content. Thus, if a material costs £100 per m² and has 20% recycled content by mass, the recycled content by value of 10 m² would be:

$$£100 \text{ (per m}^2\text{)} \times 10 \text{ (m}^2\text{)} \times 20\% = £200$$

By summing the recycled content by value of all the components in a building and dividing this by the total material value of all the components in the building, it is possible to estimate the total percentage of recycled content by value for the building.

The Table below provides an example of how recycled content by value would be calculated for a whole building.

Component	Quantity	Material rate (excluding labour)	Material value	Recycled content by mass	Recycled content by value
Bricks	2,000	£250/1000	£500	15%	£75
Dense blocks	50m ²	£8/m ²	£400	50%	£200
Plasterboard	50m ²	£2/m ²	£100	80%	£80
Insulation	20m ²	£10/m ²	£200	80%	£160
Type I fill*	100m ³	£10/m ³	£1,000	100%*	£1000
Other items			£2,000	0%	£0
Total (£)			£4,200		£1,515
Total (%)					36% (£1,515/£4,200)

Note * in this example, the Type I fill used in the project is from reused demolition waste; it is therefore considered to be 100% 'recycled' and its cost is taken as being equal to the purchase price of an equivalent quantity of product from the open market. (units and prices are purely illustrative).

This method of project-level evaluation by value has the benefit of only requiring readily available data on materials costs and quantities together with data on the recycled content percentage by mass for component products (for which WRAP holds reference data). WRAP's Net Waste Tool (freely available at www.wrap.org.uk/nwtool) automates this process using standard cost plan data as the input. As a result, estimation can readily be done by cost planners and quantity surveyors.

On any project, most of the potential to increase the total recycled content typically lies in the top 5 to 10 product substitutions specific to that project. Therefore the overall recycled content can be calculated by assuming standard industry practice for most products, and inserting project-specific values only for those products where good practice is deliberately being selected.

3.0 Setting a requirement for recycled content

Setting a minimum standard for recycled content as a construction project outcome is a straightforward process¹⁰. However, as with any new performance requirement, it is important to understand the implications of setting a requirement and to communicate it clearly to those who will be responsible for its delivery. This Section provides guidance on setting a suitable requirement and building it into the project procurement and delivery process.

3.1 What to ask for

The first step when requiring recycled content is to determine the form that the requirement should take. Generally speaking, requirements should relate to the whole project/building and:

- be set at 10-15% recycled content by value as a minimum¹¹;
- encourage identification of the most significant opportunities to increase recycled content, such as the top 5–10 potential Quick Wins or equivalent options; and
- ask for improvement above baseline practice, while maintaining cost neutrality.

Example wording which could be included within Pre-Qualification Questionnaires (PQQs) and Invitations to Tender (ITTs) can be seen below, taken from the WRAP publication "Procurement requirements for reducing waste to landfill¹²":

Box 6: Example wording to be included in PQQ's and ITT's

Pre-Qualification Questionnaire

- 1. What experience, if any, does your firm have in forecasting waste arisings and identifying and implementing options to reduce construction waste?*
- 2. What experience, if any, does your company have in preparing or contributing to a Site Waste Management Plan at the design stage which results in quantified reductions in waste to landfill?*
- 3. What experience, if any, does your company have in evaluating reused and recycled content and specifying construction materials containing higher recycled content as well as reused materials?"*

Invitation to Tender

"We require designers to respond to this tender specifically listing:

- a) how you will identify, prioritise and select options to increase reused and recycled content, design out waste and set targets for waste reduction on this project;*
- b) how you will communicate and embed information into the Site Waste Management Plan;*
- c) issues which you consider to be the main barriers to meeting our Waste to Landfill target, and your proposed solutions; and*
- d) how you will maximise the use of demolition, in situ and excavation materials. [delete as appropriate]"*

While a benchmark of 10-15% could be considered a modest requirement, its aim is to instil the process of measuring and considering recycled content within the project. When coupled with a requirement to achieve 'good practice', e.g. following identification of the top 5–10 Quick Wins, this instruction has the effect of necessitating action by the project team even if the baseline level of recycled content for the selected design is shown to be greater than the specified minimum requirement.

In this way, improved performance can be achieved whilst retaining flexibility for the design team and contractor to take account of the economic, technical and environmental circumstances of the specific project.

¹⁰ In general, a reference to recycled content includes reused products and materials.

¹¹ The most suitable minimum requirement for a specific project can be estimated using the benchmark figures presented in Table 4.

¹² The full set of guidance is available at www.wrap.org.uk/procurement_requirements.

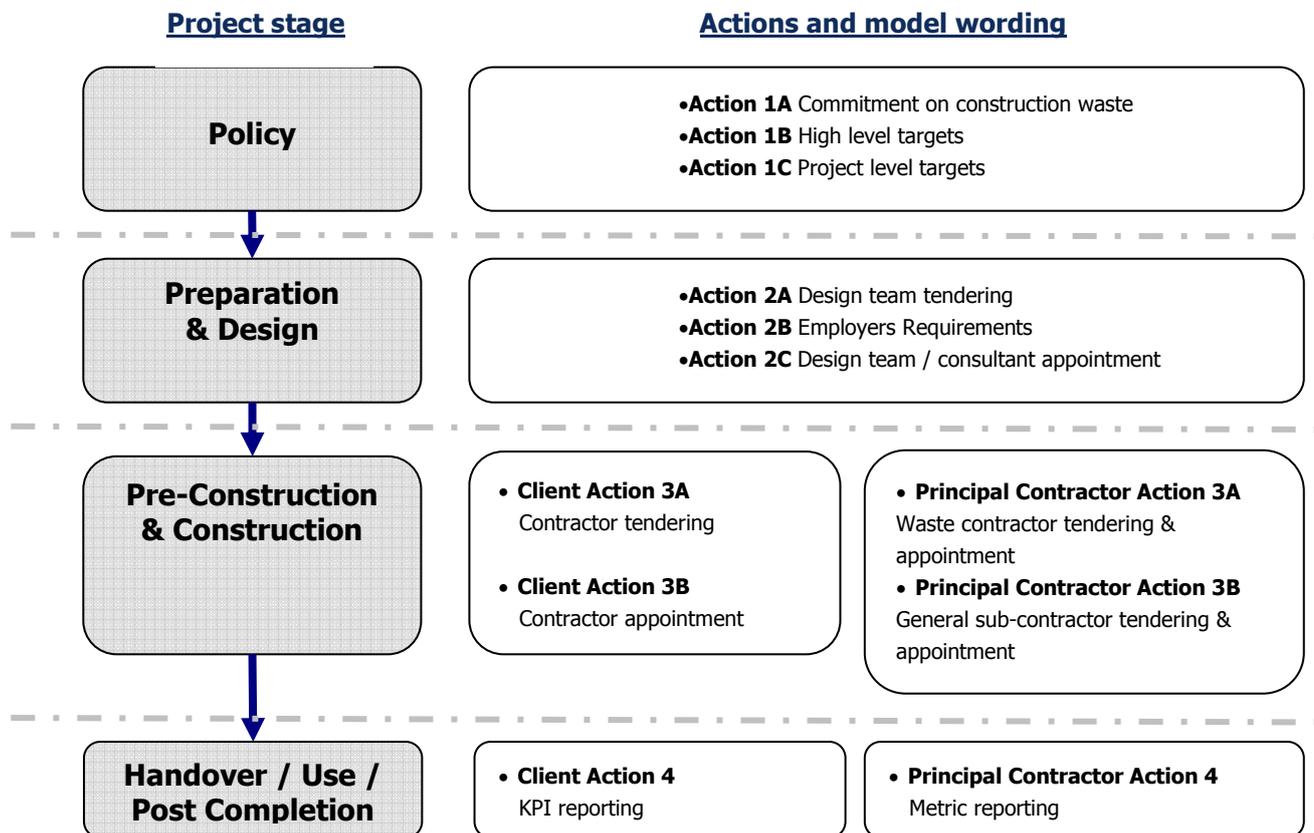
Careful consideration should be given before adopting a higher baseline requirement (e.g. to achieve a minimum threshold of say 30% recycled content) because, if strictly enforced, this could have the impact of influencing key design decisions (such as choice of framing solution or cladding material) on the basis of the inherent recycled content of different options. It is definitely not intended that setting a requirement for recycled content should dictate the choice of design specifications used on a project. Using alternative specifications rather than higher recycled content products within an existing specification would not provide the same stimulus to the markets for recycled materials. This is because it would not stimulate demand for products with higher levels of recycled content than their peers.

Whilst the above requirement is generally appropriate, it is worth checking the requirements of other stakeholders (e.g. the land owner or planning authorities) to ensure that this suggested form of requirement will meet their needs.

3.2 Core procurement wording

Model wording for setting the recycled content requirement can be found in the WRAP publication “Procurement requirements for reducing waste to landfill¹³”. For ease of use, the recycled content actions, as with the W2L reduction actions, are set by project stage rather than procurement route. This means that irrespective of procurement route adopted for a project (e.g. Traditional, Design & Build, PFI etc.), the actions and model wording are ordered according to project stage.

Figure 4: Summary of project stages and associated model wording



¹³ The full set of guidance is available at www.wrap.org.uk/procurement_requirements/. WRAP have also included guidance on the model procurement requirements in an interactive format on the WRAP website where clients and contractors can select their actions at the various project stages.

3.3 Public procurement

In recent years, the scope to set environmental requirements within public procurement has been clarified, both by the European Commission and by the Government. The following excerpts from European and national public procurement guidance show that requiring recycled content on public projects is not only possible but is actively encouraged.

European Commission handbook on environmental public procurement (2004)

"As a contracting authority, you have the right to insist that the product you are purchasing be made from a specified material, provided they respect the Treaty principles of non-discrimination, and the free movement of goods and services. You can also indicate the range of materials you would prefer, or alternatively specify that none of the materials or chemical substances should be detrimental to the environment. The right to specify materials or the contents of a product also includes the right to demand a minimum percentage of recycled or reused content where possible." (Section 3.4.1)



Achieving Excellence in Construction Procurement Guide 11 on Sustainability (2007)

"The (project) brief should include an outcome-based requirement for overall materials efficiency, such as a minimum requirement for recycled content in the project".

OGC-Defra¹⁴ Joint Note on Environmental Issues in Purchasing (2003), also included in Scottish Procurement Directorate guidance on the same topic (2004)

"This is a key stage at which to consider environmental issues.....Contracting authorities are free to specify in terms of performance or functional requirements, which can include environmental aspects. By focussing on the outcome or functionality desired you can give suppliers the opportunity to be innovative, to suggest more environmentally preferable solutions, and to find the most cost-effective ways of meeting environmental objectives."

Northern Ireland Central Procurement Directorate, Sustainable Construction Group, Guidance Note on Targets for Recycling (2006)

"The aim of this note is to focus on one of the most important primary targets for sustainable construction..... When setting the target, the Centre of Procurement Expertise/ Contracting Authority should consider the scope and nature of their work to set challenging but achievable targets. It is expected that each Centre of Procurement Expertise/ Contracting Authority will achieve a minimum of 10% in material value of recycled or re-used content on average across all projects. It is recognised that this is an aggregated target and that, for an individual project, a target of 10% may be too high or too low depending upon the nature of the work".

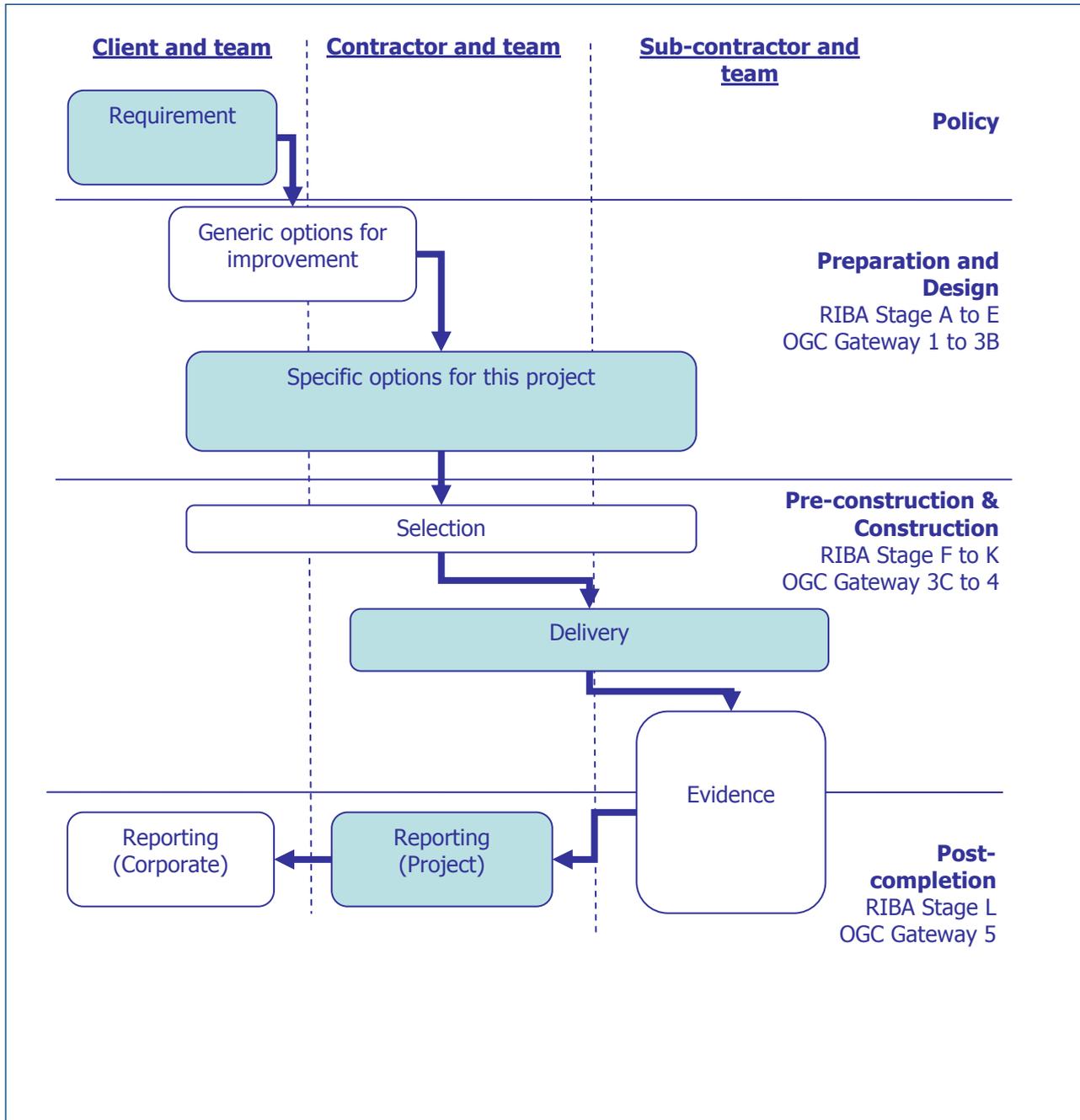
The above examples illustrate that a public client can specify an overall level of recycled content for the project, and a designer can identify minimum levels of recycled content in types of product that help to meet their client's objective – but individual brands should not be specified, and the requirement should not be set so high as to restrict the choice to a single brand. In this respect – as demonstrated by case study evidence – the 10% benchmark is modest and encourages selection from a range of options.

¹⁴ OGC – Office of Government Commerce, Defra – Department for the Environment, Food and Rural Affairs

4.0 Meeting a requirement for recycled content

Figure 5 summarises the key steps involved in setting and delivering a requirement for recycled content. There will be some slight differences in responsibilities and timing when using different procurement routes, but the core steps should be the same for most projects. In terms of demonstrating good practice, the following guidance encourages design teams and contractors to identify *the most significant opportunities* to increase recycled content on their project, termed Quick Wins.

Figure 5: Key steps in requiring and delivering buildings with higher levels of recycled content



Each of these steps is described below. (Information on Step 1, setting a requirement, is included in the previous Sections 1.3 and 3.1.)

4.1 Estimating the recycled content baseline and identifying Quick Wins

It is possible to begin estimating the likely level of recycled content that will be achieved by a project at a very early stage in design development. For example, once the basic dimensions of a building are known together with key design considerations (e.g. whether it will have a concrete or a steel frame), an initial figure for recycled content can be estimated and possible improvements (Quick Wins) identified. Using WRAP's Outline Designing out Waste Tools¹⁵ it is possible to rapidly assess the likely baseline recycled content level of a project and to identify opportunities by which this can be increased. As more design detail becomes available it may be appropriate to use the Net Waste Tool (see below) to determine a more detailed estimate of the recycled content in a project and the impact of making specific product substitutions.

4.1.1 Net Waste Tool

The Net Waste Tool replaced the Recycled Content Toolkit in April 2008. The tool has been designed as a series of simple web pages that enable the user to enter information on their project and the materials they are intending to use and then to carry out analysis on both waste management and recycled content. The tool uses a dataset containing both recycled content data and waste data. Therefore, it is only necessary to enter project information once to conduct both analyses.

Using the Net Waste Tool, calculating the recycled content baseline is a simple process and requires little time or effort. Analysing high level information on the outline design and specification of a project, and using reference data on material prices and levels of recycled content, the tool initially calculates the likely recycled content by value of a project and highlights the top 5–20 Quick Win opportunities to improve on that figure. Where information on elements of the specification are not currently known, generic information (e.g. a generic roof drainage system or a generic carpet option) can be used, and refined once a detailed specification option is agreed.

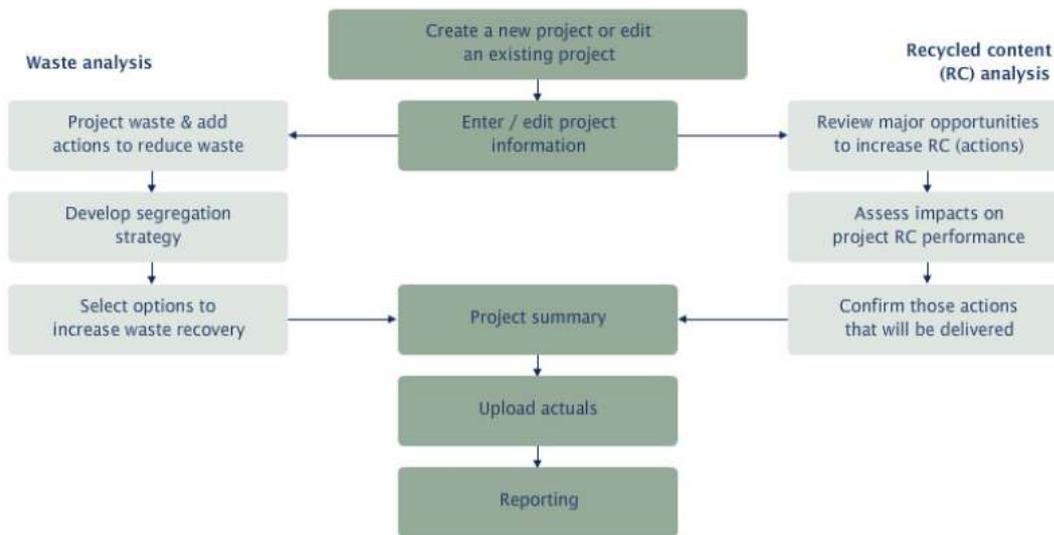
Even at this stage in the project (typically Outline Design), it would be worth beginning to investigate the feasibility of moving to 'good' practice for the identified Quick Win categories. Information sources include:

- builders' merchants;
- key suppliers;
- WRAP's reference guide to the recycled content of commonly used construction products (www.wrap.org.uk/rcproducts);
- WRAP's web site on recycled aggregates (www.aggregain.org.uk);
- National Green Specification (www.greenspec.co.uk);
- Ecoconstruction (www.ecoconstruction.org); and
- for reclaimed products, WRAP's Reclaimed Building Products Guide, Bioregional Reclaimed (www.bioregional-reclaimed.com), the Materials Information Exchange (www.salvomie.co.uk) and the Waste Exchange (www.waste-exchange.org).

The tool has separate assessment modules for new build projects (including housing, retail, office, education, healthcare and bespoke projects), refurbishments and infrastructure projects. The tool's database of components is tailored to the sorts of specifications typically seen in these projects.

¹⁵ Separate tools are available for civil engineering and buildings projects. Tools are freely accessible at www.wrap.org.uk/nwtool.

Figure 6: The Net Waste Tool process – waste and recycled content



An experienced project team will be able to base its analysis on existing buildings where recycled content has previously been assessed, and use its accumulated knowledge of product options – thereby minimising effort.

4.2 Refining the estimate of recycled content

As the detail of the building is resolved, information on the level of recycled content should be periodically updated to reflect the emerging design and specification. The frequency with which the recycled content of the building needs to be reviewed will depend on the scale of any design changes that occur. In any event, using WRAP's Net Waste Tool it is possible to rapidly update a building's specification and retain a record of the nature and reason for the amendments made.

Once a reasonable level of design detail is available (perhaps at Stage D of a traditional procurement process), then it is likely that there will be little further change in the list of top 10 or so Quick Win categories and it is worth beginning to consider in more detail whether and how these might be incorporated within the project. Information on products that contain higher levels of recycled content can then be used to identify a set of product options for each of the Quick Win items.

At this stage, it is also useful to start to identify which of the project's work packages will include the potential Quick Wins, so that only these packages are considered further. This step is especially useful for projects procured using a Construction Management process (where initial packages are procured and delivered before the detailed design of other packages is complete).

When considering the use of recycled content during design activities, it is important to remember that the aim is always to procure the agreed design using higher recycled content products, not to influence the design process to use specifications with inherently higher levels of recycled content.

4.3 Selecting Quick Wins

Each organisation will have its own processes for evaluating the suitability of specific products for use on their projects. Important considerations might include:

- capital cost;
- durability;
- quality / aesthetics;
- availability; and
- buildability.

The competitiveness of higher recycled content products in terms of cost and performance is described in Section 2.

At this point it makes sense for the design team to consult with contractors / sub-contractors to get their views on the practical implications of particular Quick Wins – since the contractors and sub-contractors will normally be responsible for procuring the individual products. This consultation will be easier if a preferred contractor has been involved throughout the design development process. Issues such as the local availability of materials or planning constraints could affect the final selection of Quick Wins and it may be necessary to make some adjustments to the recommended approach once a contractor has been appointed. While most contractors will provide valuable insight into project-specific opportunities and constraints, it is important to challenge their comments if necessary and promote an open-minded approach to using products containing higher levels of recycled content.

While it may seem easiest for a design team to simply state the products that they wish to see used in a project, this approach is not always the most commercially efficient – and generally it is not permitted in public procurement. It is often better to simply agree with the contractor a minimum level of recycled content as part of the list of performance requirements for the Quick Win product categories – or state a minimum level of recycled content for the project overall, together with a list of the Quick Wins that would contribute the most. This approach provides flexibility to contractors or sub-contractors, enabling them to use those products that are most economical (e.g. ones for which they already have a preferred supplier arrangement) provided they have sufficient recycled content.

It is often the case that the most significant Quick Win components are 'commodity items' where most designers would not name a product in their specifications. For example, it is common practice for components such as concrete blocks or plasterboard to be specified only by their performance characteristics rather than including brand and product names. In these instances, including a specific performance criterion for recycled content in the specification for that component could be a good approach to delivering a Quick Win.

Other Quick Wins commonly include recycled aggregates sourced on site or from nearby demolition. WRAP guidance on Site Waste Management Plans and the ICE Demolition Protocol provide a framework for assessing the potential to recover such materials.

4.4 Delivering required levels of recycled content

Once the Quick Wins that are suitable for a project have been agreed and reflected in the technical specifications for appropriate components, these higher recycled content products must be delivered through the supply chain.

As with other aspects of procurement, providing clear and useful information at each stage to the supply chain, both on expectations and on potential solutions, can help smooth the process and lower the chance of supply chain members adding a premium to their estimates because of 'unknown' factors.

An example of this might be providing a list of known examples of products and brands which are able to meet all technical requirements, including recycled content. Similarly, meeting to discuss options for complying with recycled content targets, perhaps as part of a broader meeting on sustainable construction issues (e.g. BREEAM, Code for Sustainable Homes, energy performance, etc) can help to allay fears that a recycled content requirement would impose an unnecessary restriction on product choice.

4.5 Roles and responsibilities

4.5.1 Client's role – setting the overall requirement

It is best if the client leads the process of setting a requirement, ideally by reference to a clearly-defined policy statement (see Sections 1.3 and 3.1 for model wording), and through references in the project brief. It is important that this indicates the priority the client attaches to specific actions, such as a measurable improvement in the efficient use of material resources – rather than just stating general aspirations on sustainability.

Clients should be wary of setting overly challenging targets. They should instead focus on ensuring that their supply chain achieves all the sensible cost-neutral good practice options within the boundaries of the opportunities presented by the proposed design. The client may even wish to point out that improvements in one area should not be at the expense of other sustainability targets and should not distort design decisions or normal construction good practice.

The client's role is to provide leadership and a mandate for change. Whether or not the client becomes directly involved in technical issues is a matter of choice, but what is important is that the client is seen by the rest of the design and construction team to be committed and sufficiently knowledgeable to be decisive and set clear requirements.

It is recommended that the client delegates the responsibility for assessing recycled content and identifying opportunities to increase recycled content (i.e. Quick Wins) to the project design team, whether or not they are directly employed or are a part of a design & build contractor's team.

4.5.2 Designer's role – identifying the potential improvement

The designer is usually involved in a project from initial brief through to completion. It is therefore recommended that the designer takes ownership of core tasks including:

- estimating the potential baseline and good practice levels of recycled content for the project as a whole at key stages in the project;
- identifying the top ten Quick Wins (or equivalent Quick Win areas offering higher recycled content) and determining how the project can meet the client's requirement;
- negotiating and agreeing how the contractor will meet a client request for good practice (e.g. by agreeing the actual Quick Wins or levels of higher recycled content to be used), through discussions with contractors and project cost consultants;
- preparing specifications to meet the requirement – to be met by the contractor and their supply chain in the case of traditional procurement, and by subcontractors in the case of design and build; and
- advising the client, if required, on the process for checking compliance with the requirement based on the identified Quick Wins.

Where design & build (single point responsibility) arrangements are adopted, the contractor's designer would be required to undertake the tasks outlined above. In these circumstances, the 'negotiation' process on the Quick Wins would take place with the Employer's Agent.

4.5.3 Contractor's role – delivering the Quick Wins

A contractor sources materials and manages the construction process. This involves both direct material purchase and indirect purchasing through trade contractors. Therefore, the contractor is the party responsible for agreeing with the design team how they will meet the client's requirement for recycled content, selecting the actual Quick Wins to be implemented (from those suggested by the design team or identifying alternatives), delivering these Quick Wins, and gathering evidence of compliance from their supply chain. Where a Management Contractor is employed on a project, this organisation will have the role of ensuring that their chosen Quick Win items are incorporated in the specifications for those sub-contractors responsible for relevant work packages.

The contractor would be expected to test availability and cost neutrality of the candidate Quick Wins proposed in the specification. This would take place during the tender process (traditional and framework procurement) and early design stages (design & build procurement) and involve checking with both material suppliers and trade contractors. Where, for good reason, one or more of the candidate Quick Wins cannot be achieved, the contractor would be expected to advise the client/designer and identify which of the remaining list of (e.g. top 10) Quick Wins could be implemented – or what alternative product areas the recycled content might come from.

A final list of areas where higher recycled content will be used (i.e. the Quick Wins selected for implementation) should be negotiated and agreed to be included in the contract and SWMP.

The contractor's task is then to source and incorporate specific products that satisfy or exceed the client's requirement into the works as specified. This can be achieved with minimum effort by focusing on the limited set of Quick Wins selected by the contractor. On completion, the contractor should be able to provide the client with documentary evidence that products with the sufficient level of recycled content were used for each of the areas where higher recycled content was targeted – as a means of demonstrating that the overall target level of recycled content for the project had been achieved.

4.6 Online guide to recycled content in construction products

The online guide to recycled content in construction products created by WRAP provides details of a range of products and materials commonly used in new build and refurbishment for housing, commercial and public sector projects. Its purpose is to help designers and contractors to identify how to increase recycled content through product substitution (e.g. using concrete blocks with 50% instead of 0% recycled content). The guidance is intended to be an indicative sample of products across the range, and not a definitive list of all products that contain some recycled content. It should provide a starting point for discussion and provoke a dialogue between the client, architect, manufacturers, suppliers, etc. This dialogue may well provide opportunities for the discovery of other alternative products.

This online guidance and associated publication “Choosing construction products” are aimed at construction professionals including:

- clients and developers;
- architects and designers;
- main and specialist contractors; and
- staff responsible for specification and procurement.

The online Recycled Content in Construction Products guidance and “Choosing construction products” publication can be found at www.wrap.org.uk/rcproducts.

4.7 Common concerns about requiring recycled content in construction

4.7.1 Cost and effort

If correctly stated, a requirement for recycled content should result in no overall impact on material costs and entail minimal effort on the part of project teams. This is because:

- A prerequisite for selecting products containing higher levels of recycled content is that they should cost no more than alternatives with less. The recommended procurement wording allows designers and contractors to justify why potential Quick Wins or other product substitutions are not economic in their location and situation.
- Higher recycled content products are mostly ‘mainstream’ construction products. These are by their nature cost competitive (otherwise they would not be widely used) and are readily available throughout the UK.
- On any project, most of the opportunity to increase recycled content typically lies in the top 5 to 15 options (e.g. blockwork, concrete, tiles, etc) for that project. As a result, it is not necessary to try to review large numbers of product options to make a major difference to the overall recycled content of a project.
- Where it is possible to reuse site-won or locally sourced demolition wastes as bulk aggregate, this will contribute towards a recycled content requirement while also reducing cost (i.e. costs of buying and transporting primary aggregates and / or the costs of disposing of site waste).

In-depth case studies have all demonstrated that the major gains on a project can come from as few as five or six building products. These are commonly referred to as ‘Quick Wins’. While Quick Wins are not the same for all projects and will vary according to construction methods and building configuration, there will always be a relatively small set of materials that offer the majority of gains.

For many projects, the Quick Wins focus on the materials identified from the list in Table 2.

Table 2: Product types commonly offering higher levels of recycled content

<ul style="list-style-type: none"> ■ bulk aggregates (sub-base, pipe bedding, fill, etc) ■ asphalt ■ pre-cast concrete products (paving, slabs) ■ dense blocks ■ clay facing bricks ■ ceiling tiles ■ insulation (floor, wall and roof) 	<ul style="list-style-type: none"> ■ ready-mix concrete (foundations, floor slabs, etc) ■ drainage products/pipes ■ concrete tiles and reconstituted slate tiles ■ lightweight blocks ■ plasterboard ■ chipboard and other wood-based boards ■ floor coverings (carpet, underlay, etc)
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Some materials, such as metals, have consistent levels of recycled content across all competing products, while for others, such as dense concrete blocks, the levels vary significantly between suppliers providing substantial scope for improvement. This point is illustrated in Table 3 which summarises real product data for mainstream suppliers of building materials, obtained for school building work in the Bristol area at end-2004.

Table 3: Examples of higher recycled content products available at no extra cost

Component	Typical products	Products with higher recycled content
Dense blocks	Brand A – 0% recycled content (£5.50 per m ²)	Brand B – 50-80% recycled content (£5.50 per m ²)
Concrete roof tiles	Brand C – 0% recycled content (£550 per 1000)	Brand D – 25% recycled content (£550 per 1000)
Glass/ mineral wool insulation	Brand E – 10% recycled content (£3.50 per m ²)	Brand F – 80% recycled content (£3.00 per m ²)

Effort will depend on the size and complexity of the project. Nonetheless it should be possible to measure, increase and report on the recycled content of a project quickly and easily using WRAP's Net Waste Tool and focusing on the top 10 or so Quick Win opportunities. Using the tool, an experienced quantity surveyor can complete a baseline assessment of a large commercial building and identify Quick Win options in 1 to 3 hours.

4.7.2 Quality and performance

It is a natural concern that the use of 'waste' or 'recovered' materials as a manufacturing input could result in an inferior product. However, many common products from mainstream manufacturers contain a proportion of recycled content, and those brands with higher content still have to meet the same technical standards and testing regimes. In fact, most construction projects will be using a number of higher recycled content products without knowing it.

Therefore, although care needs to be exercised in specifying alternative products, there is ample evidence to show that brands containing higher levels of recycled content perform equally well compared to others in the market and that they meet the appropriate standards and durability. In fact, in some cases, the higher recycled content option may actually be the market-leading brand for that type of product.

The decision to specify materials with higher levels of recycled content also needs to take account of aesthetic qualities, buildability issues, handling requirements and appropriateness for a particular assembly. While some substitutions are straightforward – one concrete block may have identical functional characteristics to another, except that it contains more recycled aggregate – others may require greater care in their selection to ensure that there are no additional costs

or unforeseen difficulties. However, it is fair to say that the majority of recommended substitutions have little or no impact on functionality.

4.7.3 Implications for other project goals and sustainability objectives

There is no reason why requiring higher levels of recycled content in a building should influence the achievement of other project considerations. It is important to remember that the aim is to procure products with higher recycled content in comparison to available alternatives of the same specification, i.e. achieving higher recycled content should not influence the design and specification process at all.

It is possible to increase the overall recycled content of a building significantly whatever its specification. Therefore, there is no need for concern that setting a requirement for recycled content will have any impact on the way a building looks, feels, costs or performs.

Under the current version of BREEAM (2008), one Waste credit is available for making use of on-site or locally sourced (within 30 km) recycled aggregate for at least 25% of the total high grade aggregate uses (e.g. in floor slabs, road surfaces or gravel landscaping) on a project. Importantly, using construction products with higher levels of recycled content will not prejudice the environmental ratings of designs in the Green Guide to Specification and will invariably result in improved environmental performance.

4.7.4 Is a 10% requirement realistic?

Table 4 presents the findings of case studies undertaken for a broad range of building types, illustrating that most buildings¹⁶ have greater than 10% recycled content by value even without explicitly trying to increase recycled content. However, by adopting the available opportunities to increase recycled content through the use of cost competitive, readily available products (i.e. good practice products), levels of over 15% recycled content by value are common.

Table 4: Recycled content as a percentage of the total material cost for a selection of building types

Type of project	Using standard practice products	Using cost-neutral good practice
Commercial retail	11–32%	21–44%
Commercial offices	10–22%	12–30%
Education, healthcare	12–20%	15–30%
Residential	6–26%	16–31%
Infrastructure	8–36%	25–49%

Case studies of housing projects show that even two developments using the same construction type (such as timber frame) may yield distinctly different results in terms of baseline outcome – see some examples in Table 5 below¹⁷. Nevertheless, they also confirm that there is always considerable opportunity to improve performance above the baseline at no extra cost, and that the 10% threshold was always exceeded at cost-neutral good practice. (Note: The 'best practice' level may incur a price premium and/or additional effort in product sourcing, and designers and contractors would not be expected to achieve this level).

¹⁶ The variation in recycled content seen for each building type reflects the impact of different frame or cladding options.

¹⁷ Note that project results will also vary depending on the extent of external works included in the analysis.

Table 5: Percentage of recycled content as a proportion of the total material cost in a range of housing case studies

Project	Base	Good	Best
Hillcrest HA^a 8 unit timber frame, 1/2 storey terraced	6%	16%	33%
Milnbank HA^a 48 unit timber frame, 2/3 storey semi-detached	12%	22%	29%
Glasgow HA^a 700 unit roofing, over-cladding and repairs, medium/high rise	1%	21%	46%
E Thames HA^a 200 unit high rise concrete frame	22%	31%	41%
Taylor Woodrow^b detached house, brick and block	17%	30%	38%
Taylor Woodrow^b terraced house, brick and block	16%	28%	44%
Taylor Woodrow^b two-bedroom flat, brick and block	17%	30%	44%
Redrow Homes^c light steel-framed double dwelling unit	20%	26%	30%
Peabody Trust^d kitchen and bathroom refurbishment	12%	20%	-
Homes for Islington^d kitchen and bathroom refurbishment	16%	31%	-
Glamorgan & Gwent HA^e 50 independent living units in timber frame	13%	21%	-

Sources:

- ^a Analysis by Davis Langdon in work to inform Communities Scotland
- ^b Analysis by Taylor Woodrow of its own housing projects and supply chain options
- ^c Analysis by Cyril Sweett of the design of Redrow's Debut range of affordable housing
- ^d Analysis by Faber Maunsell of typical Decent Homes refurbishment projects
- ^e Analysis by Faithful+Gould of the 3 storey extra-care facility with 1 and 2 bed units

For more information, reports on these case studies can be downloaded from http://www.wrap.org.uk/construction/case_studies/index.html.

5.0 Reporting performance

5.1 Demonstrating compliance

Complying with a requirement for recycled content should only require evidence that higher recycled content products have been used for a relatively few Quick Win categories (usually no more than 5-10). By providing evidence of the recycled content of these products and assuming a 'standard' level of performance for all other components (unless the specific performance of other products used on the project is also known), demonstrating that a requirement has been met is relatively straightforward.

Clear arrangements have to be agreed before the contractor is appointed about what evidence will be provided to show that the client's recycled content requirement has been met. This includes the situation where the contractor has proposed to include options with higher recycled content from product areas not mentioned in a list of candidate Quick Wins provided by the design team.

The exact nature of the evidence required to demonstrate that selected higher recycled content products have been used will depend on the general project monitoring processes being applied. However, they could include invoices or delivery notes to confirm the specific products that were delivered to site, together with manufacturers' or suppliers' product datasheets to demonstrate that these products have the required levels of recycled content.

Demonstrating compliance with a recycled content requirement will be significantly easier if the process is closely integrated into other project (e.g. cost and progress) monitoring activities and the responsibilities of different parties are clearly set out in appointment contacts. A **post-construction review** would provide an opportunity to check that the targeted level of recycled content had been delivered through Quick Win product substitutions, and to share lessons learned.

5.2 Reporting

Taking steps to increase the recycled content of new buildings and infrastructure is a quantifiable means of demonstrating a commitment to responsible and sustainable business practice. As such, it is an ideal issue for inclusion within Corporate Responsibility reports.

Information on the recycled content of new buildings and infrastructure is best located in the 'resource efficiency' section of a corporate responsibility / sustainability report, i.e. adjacent to information on waste and material management initiatives such as recycling, waste minimisation or use of sustainably certified timber, etc. If a report doesn't have a specific section on resource efficiency, it would be appropriate to include the information under a broader 'Environment' heading (assuming that the report will include sections on employee, community and environmental issues).

Although the issue of procuring products containing recycled materials is relatively well known for some product types (e.g. paper), it is still an emerging issue in relation to construction projects. As a result it is suggested that some introductory information is included within the report in addition to one or more performance indicators. The nature of the information provided will clearly vary from organisation to organisation, however the following structure should be generally applicable.

1. Introduction to the issue – an overview of the reasons why the issue is important in the context of sustainable construction
2. Steps being taken to increase the recycled content of construction projects – information on the processes being applied, such as the inclusion of requirements within project briefing documents and the use of WRAP's Net Waste Tool, etc.
3. Current performance and target for the future – detail of the target level of performance and how this will be achieved.

Common metrics and Key Performance Indicators (KPIs) should be used to enable benchmarking of performance. It is suggested that the indicators used to report progress on the recycled content of construction projects should be simple. Nonetheless it is important that indicators demonstrate a robust approach to improving performance over time.

The difference between a recycled content metric and a recycled content KPI is that a metric is a measurement which is undertaken on a project by project basis, whereas a KPI is at a more strategic measuring level such as across a portfolio of projects.

Example metrics and KPIs for recycled content can be seen below in Table 7.

Table 7: Recycled content metrics and KPIs

Reused and recycled content metrics:	Reused and recycled content KPIs
<ul style="list-style-type: none"> ■ % RC by value (reported per project); ■ amount of recovered material used (t), if known; and ■ construction value (£). 	<ul style="list-style-type: none"> ■ RC % KPI: % RC by value (averaged across all construction output) during the last year, compared to performance in a baseline year. ■ Reused material KPI: t/£100k reused during the last year, compared to performance in a baseline year.

5.3 Waste to Landfill Reporting Portal

The Waste to Landfill Reporting Portal is a free resource which could also be used to help in recording and benchmarking the recycled content of the project as part of the wider reporting on corporate progress in reducing waste and waste to landfill from construction.

The W2L Reporting Portal¹⁸ has been designed to:

- record the client's commitment to reduce construction waste being sent to landfill;
- specify targets for improving the construction resource efficiency by:
 - reducing overall waste arisings
 - reusing materials onsite
 - recovering and recycling more waste materials
 - using more products containing high levels of recycled content;
- record data on waste arisings and the amount going to landfill;
- benchmark the performance (anonymously) against others that have submitted data;
- track progress towards targets; and
- enable waste information and data entry to be shared between nominated individuals.

¹⁸ Available at www.wrap.org.uk/construction/tools_and_guidance/reporting_portal.html

6.0 Frequently Asked Questions

6.1 General

6.1.1 *Why is recycled content calculated by value and not mass?*

There are three reasons why recycled content is calculated by value:

- It is the most practical indicator, making best use of the data on material quantities and costs commonly available to the designers, specifiers, cost planners and contractors who have to meet a client requirement for recycled content. Calculation by mass would require these people to access data not normally included in their designs, cost plans and Bills of Quantities.
- A 'by value' assessment is more likely to increase the markets for the recoverable materials that the UK is seeking to divert from landfill. It provides the incentive to move recovered materials up the value chain, and gives greater credit for the use of reclaimed construction products.
- A 'by value' assessment focuses more attention on the wider range of opportunities where recovered materials can be used in construction products, beyond aggregates and low-value fills.

6.1.2 *I already recycle materials so why do I need to use materials containing recycled content?*

Recycling materials onsite is an excellent contribution to resource efficiency. Procuring materials with higher recycled content further supports this objective. By helping to increase the market demand for recovered materials, including those you are generating on site, you are ultimately reducing the cost of removing these materials.

6.1.3 *If I am a supplier, will I be disadvantaged?*

The aim of the Net Waste Tool is to encourage the use of products with higher recycled content. However, this is only one factor that will influence the selection of a product – quality of service, availability, cost, conformance with technical standards, technical performance etc are all significant. A modest requirement for recycled content will not drive product choices to the detriment of other factors.

Where your product is comparable in terms of cost, quality and other considerations with a product that has a higher level of recycled content, you may find some purchasers would prefer to use the product with the higher recycled content.

6.2 Cost of meeting a requirement

6.2.1 *What are the material costs or costs relating to employing consultants to carry out the assessment?*

There should be no additional materials costs associated with meeting a recycled content requirement. This is because, where a higher recycled content product is significantly more expensive than alternatives, there should be no requirement to use the higher recycled content product.

The Net Waste Tool has been developed to be used by project professionals i.e. project manager, QS, architect or consultant and it is not expected that external expertise will be needed. The amount of time required to use the tool to assess recycled content will depend on the complexity of the project in question and the user's familiarity with using the tool. With a reasonable amount of familiarity, it should be possible to set up a building model in the tool within three hours for a complex project, and 1–2 hours for a simpler project. Once one building has been set up in the tool, this can be used as a template for other similar buildings, significantly reducing the effort involved.

6.3 Data quality

6.3.1 What is the source of WRAP data i.e. its quality and how often are these data updated?

The data are based on detailed analysis of construction products available in the UK market, and have been provided to WRAP by (among others) BRE, the Construction Products Association, Cyril Sweett, Davis Langdon, Faithful & Gould, Arup, Faber Maunsell, EC Harris, WSP, C4S, AMA Research, Costain and Taylor Woodrow. WRAP has a rolling programme of database review and updating.

6.3.2 How secure are my data?

The Net Waste Tool runs on a secure server. Data are backed up and securely stored on a regular basis. Unless you are the registered project owner or have been given Guest User privileges, you will not be able to access the data on a project.

6.3.3 How may people will be able to access the data on my project?

Only the registered project owner and guest users can access data on your project. WRAP has no access to project-level data, and will only review statistical data averaged across all users, such as tool usage.

6.3.4 How do you get new materials recognised in the tool i.e. products not included in the tool?

Each user can add new components to their own data base. On completing the assessment, all new materials will be listed in the standard reports for possible verification.

6.4 Net Waste Tool

6.4.1 Does the tool tell me which products to use?

No, the tool does not specify particular products or brands; however all data are based on analysis of products available in the UK market.

Information on the recycled content of specific products is available from WRAP (see www.wrap.org.uk/rcproducts).

6.4.2 How flexible is the tool for dealing with different types of project?

The toolkit is designed to be as flexible as possible and includes a number of basic project types such as schools, houses, offices etc. However, if your building is not standard (e.g. those with varying roof heights), you may need to calculate specific areas of certain building elements, e.g. the area of internal partitioning.

6.4.3 How long will it take to complete the tool?

It should take no longer than two to three hours to complete the tool if you have following information available:

- specifications;
- bill of quantities;
- drawings; and/or
- cost plan.

6.4.4 Whose role is it to complete the tool?

The tool has been developed to be used by project professionals i.e. project manager, QS, architect or consultant and it is not expected that external expertise will be needed.

6.4.5 How can you be sure that the results generated by the tool are reliable?

It is possible to download all information on your project that is in the tool to verify the data and calculations applied (in spreadsheet format).

6.5 Procurement of products with higher levels of recycled content

6.5.1 *How does this initiative fit within European Public Procurement rules?*

Provided a modest recycled content requirement is set at an overall project level and the contractor has flexibility on how to meet the requirement, there is no conflict with European Procurement legislation or with the Construction Products Directive. Both European and UK good practice guides to procurement explicitly identify recycled content as a valid requirement to include in procurement processes. The contractor should not be confined to a list of Quick Wins identified in the design brief – if the contractor is able to meet the client's requirement (such as a minimum 10% recycled content for the project overall) in a measurable way by including product areas and options which are not on the Quick Wins list, then this should be permitted.

6.5.2 *How do I identify products with high recycled content?*

WRAP publishes a guide listing the recycled content and other information on a wide range of construction products. Increasingly product manufacturers are volunteering information on the recycled content of their products e.g. through product data sheets.

6.5.3 *How do I prove my product choice has the claimed level of recycled content?*

Where possible, use a standard product data sheet that provides information on recycled content. In some cases, a third party such as BBA may have confirmed the product data. If a data sheet is not routinely available from your normal supplier, then a letter of product declaration or a technical datasheet may be sought direct from the manufacturer. Where a manufacturer has confirmed to WRAP that their measurement of recycled content complies with international standards, it will be listed in WRAP's product guidance.

6.6 Compatibility with other initiatives

6.6.1 *How does recycled content link to the Green Guide to Specification?*

The Green Guide to Specification provides information on the environmental performance of different elemental specifications based on average industry performance for the materials within the specification. Thus it does not discriminate between a wall constructed from bricks and blocks with no recycled content, and a wall made from bricks with up to 20-30% recycled content and blocks with up to 93% recycled content (using alternative mainstream brands)¹⁹.

Put simply, Green Guide ratings tell a designer which building design specifications are environmentally preferable, but do not help the specifier or procurer to identify the potential for product substitution with higher recycled content within these environmentally preferable specifications.

In general, selection of particular construction products is a process that occurs after the design specifications have been determined. Therefore, recycled content can be used – separately and subsequently to the use of the Green Guide – as a criterion influencing product selection to meet the predetermined specification.

On average, products with higher recycled content reduce overall environmental impact²⁰.

6.6.2 *If I already have BREEAM do I need to do this as well?*

Yes, BREEAM does not incentivise using higher overall recycled content in a project (although BREEAM does award credits for use of recycled aggregates) and therefore the recycled content requirement further increases the resource efficiency of a building even if it has a high BREEAM rating.

¹⁹ Market research for WRAP shows that across a range of common product types, there is a range of values of recycled content in alternative cost-competitive mainstream brands.

²⁰ Information on the relative environmental impact of using recycled content in construction is available at www.wrap.org.uk/document.rm?id=4497

6.7 Process of setting and meeting a requirement for recycled content

6.7.1 How will this impact on my design, and will it limit my design?

It is not intended that achieving the recycled content requirement should have any impact on designs; rather it is intended to impact the procurement of specific products.

6.7.2 What is the process and does it change depending on when the assessment is carried out?

This guide sets out a process which is applicable from early feasibility stages through to project completion.

6.7.3 Is the process influenced by different routes of procurement?

The process is broadly the same whichever procurement route is followed, although the roles and responsibilities of certain parties may vary. See the Procurement Guide produced by WRAP for details of how the different procurement routes influence the process (available at www.wrap.org.uk/procurement_requirements).

6.7.4 Who will audit my submission?

Verification that the requirement has been met will be determined by the client or other stakeholder responsible for setting the requirement.

6.7.5 Who is responsible for the results?

A number of different organisations will be responsible for different areas of the analysis, e.g. designers would be responsible for completing the baseline analysis and identifying Quick Win opportunities, while contractors would be responsible for selecting and implementing the feasible product substitutions.

7.0 Glossary

7.1 Recycled content

Recycled content, as defined by ISO 14021, is the proportion, by mass, of recycled material in a product or packaging. Only pre-consumer and post-consumer materials shall be considered as recycled content, consistent with the following usage of the terms:

- **Pre-consumer material:** Material diverted from the waste stream during a manufacturing process. Excluded is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it.
- **Post-consumer material:** Material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose. This includes returns of material from the distribution chain.

WRAP has published a 'Rules of Thumb' guide²¹ to the calculation and declaration of recycled content in construction products.

7.2 Reused content

A reused product or material is one which is:

- supplied from another location (either within the same organisation or from a third party); or
- reconditioned or relocated (e.g. for demolition waste) within the same location; and in addition
- for new buildings, any foundations or other infrastructure that is retained can be considered as being reused²².

The value of reused materials is taken to be the purchase price of the material (if bought) or the cost of equivalent materials, if in-situ materials are reused. WRAP has published a Reclaimed Building Products Guide²³.

7.3 Material value

The value of a material (i.e. material value) is the cost of a product to the purchaser at the point of purchase from a producer or supplier. Value added that occurs prior to sale of the product is considered as part of the material value of the product. However, value added that occurs after purchase (i.e. during construction) is excluded. Transport costs to the site gate are counted within the purchase price.

7.4 Classifications for levels of recycled content

To assist project teams in identifying the areas where there is greatest potential to increase the recycled content of a building, WRAP have gathered reference data on the levels of recycled content that are contained within a wide range of construction materials. Information is held on three levels of recycled content as shown below, reflecting the availability of products containing different proportions of recycled content:

- **Standard practice** – the likely level of recycled content in a given specification if no request is made for recycled content.
- **Good practice** – a higher level of recycled content which is better than that for standard products but is still readily available in the marketplace at no additional cost. The recycled content of these products may not necessarily be as high as current technology or market conditions allow.
- **Best practice** – is defined as the highest recycled content currently available in products on the UK market.

²¹ WRAP guidance on calculating and declaring recycled content in construction products is available at www.wrap.org.uk/document.rm?id=4939.

²² For refurbishment projects, the building frame and other fixed components which are reused in-situ are excluded from the assessment.

²³ The guidance is available at www.wrap.org.uk/document.rm?id=5259.

Thus for any given building specification, it is possible to determine the recycled content by value achieved through the use of standard, good or best practice products. Those components that are used in large quantities and have the greatest difference between standard and good levels of recycled content by value are likely to be those where there is greatest opportunity to increase the overall recycled content of the project²⁴.

7.5 Product

It is important to define what is meant by a construction product in this context because the results calculated could vary considerably if different interpretations are used.

The proposed definition is:

"A construction product is a material or combination of mutually dependant materials that is delivered to site as an individual construction product".

For example:

- In reinforced concrete, the concrete and rebar are treated as separate products, because these materials are typically delivered separately to site (and appear separately on a cost plan). The recycled content by value is calculated for each product.
- The concrete itself is treated as a single product, combining its constituent parts (cement, sand, aggregate etc.). The recycled content by value is calculated as the mean recycled content by mass across all constituents, multiplied by the delivered cost of the concrete.
- A pre-cast product containing reinforcement would be treated as a single product.
- A pre-fabricated component such as a bathroom pod would be assessed in the same way as if the component products had been assembled on site, i.e. excluding the labour cost of off-site manufacture built into the delivered price of the pod.

7.6 Quick Wins

A Quick Win is a construction specification, product category or type of material that offers the opportunity to increase recycled content beyond current average practice and is cost-competitive to procure and install within a construction scheme. In addition, it satisfies the conditions of being technically acceptable, meeting the required level of performance, and having reliable supply and availability.

Box 7: Use of the term "Quick Wins" in procurement documentation

Typically the top 5-10 Quick Wins on a project (i.e. the most significant contributors in raising the total recycled content of the project) deliver most of the potential for cost-neutral good practice. Therefore, in traditional procurement, the client's design team may suggest a list of candidate Quick Wins, and these may be the top 10 Quick Wins identified by WRAP's Net Waste Tool. Nevertheless, there may be occasions where the contractor identifies materials which can contribute to exceeding the 10% (or other) minimum requirement but which are not included in the Quick Wins list. The Quick Wins list is intended to be a guide for the project, and is not intended to inhibit the contractor's flexibility to decide what materials he will use. Where the contractor decides to use materials which are not included in the list of Quick Wins, he will still have to produce the same level and type of information required of materials which are included in the Quick Wins list. For this reason, the term "Quick Wins" includes all items identified by the contractor as contributing to the client's requirement, whether or not they appear on the Quick Wins list provided as part of the design brief.

7.7 Standard baseline performance

The standard baseline performance of a building is considered to be the level of recycled content by value that would be achieved for the proposed specification when only standard practice products are employed.

²⁴ Calculated as follows: (quantity of component A) x (cost of component A) x (% recycled content by mass of component A at good practice minus % recycled content by mass of component A at standard practice)

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