Material change for a better environment

Practical solutions for sustainable construction

Setting a requirement for recycled content in building projects

Guidance for clients, design teams and contractors

WRAP works in partnership to encourage and enable businesses and consumers to be more efficient in their use of materials and recycle more things more often. This helps to minimise landfill, reduce carbon emissions and improve our environment.

In our work on construction procurement, we:

- provide **standards for good practice** in the efficient use of materials, including higher recycled content, waste reduction and recovery;
- help clients and contractors **introduce requirements** for good practice on their projects, through on-the-ground assistance and practical tools; and
- support sector leaders and exemplar organisations in **making commitments** to standards and targets.

Contents

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 four 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 information is supported by detailed guidance on setting and meeting requirements, including model wording for use at each stage of the procurement process. 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.

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 such guidance in February 2006.
- The Welsh Assembly Government has set the same standard 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 for recovery of demolition materials and 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 done likewise.
- Councils including Bristol, Greenwich, Islington, Lancashire, Leeds, Newcastle, Nottingham, Sandwell and Sheffield have set tender requirements in schools PFI, as have Leeds Metropolitan and Worcester Universities.
- Minimum standards have been adopted for regeneration by South West England and Yorkshire Forward Regional Development Agencies, Leeds Holbeck and Raploch Urban Regeneration Company.

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.

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.

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.

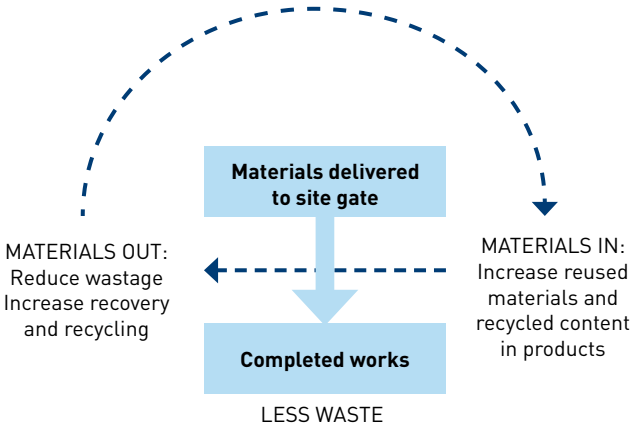
Applying good practice

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. Because 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, 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.

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. As an example:

'...at least 10% of the total value of materials used should derive from recycled and reused content in the products and materials selected. *In addition, show that the* ***most significant opportunities*** *to increase the value of materials derived from recycled and reused content have been* ***considered,*** *such as* ***the top ten Quick Wins or equivalent,*** *and implement good practice where* ***technically and commercially viable.'***

There is ample evidence to demonstrate that requiring a minimum of 10% recycled content by value for the project overall (i.e. not per product) is widely achievable.

Indeed, WRAP's case studies illustrate that most buildings exceed 10% even without explicitly trying to increase recycled content. 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.

While the 10% benchmark 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[1] [2], 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 10%.

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.

Making it simple

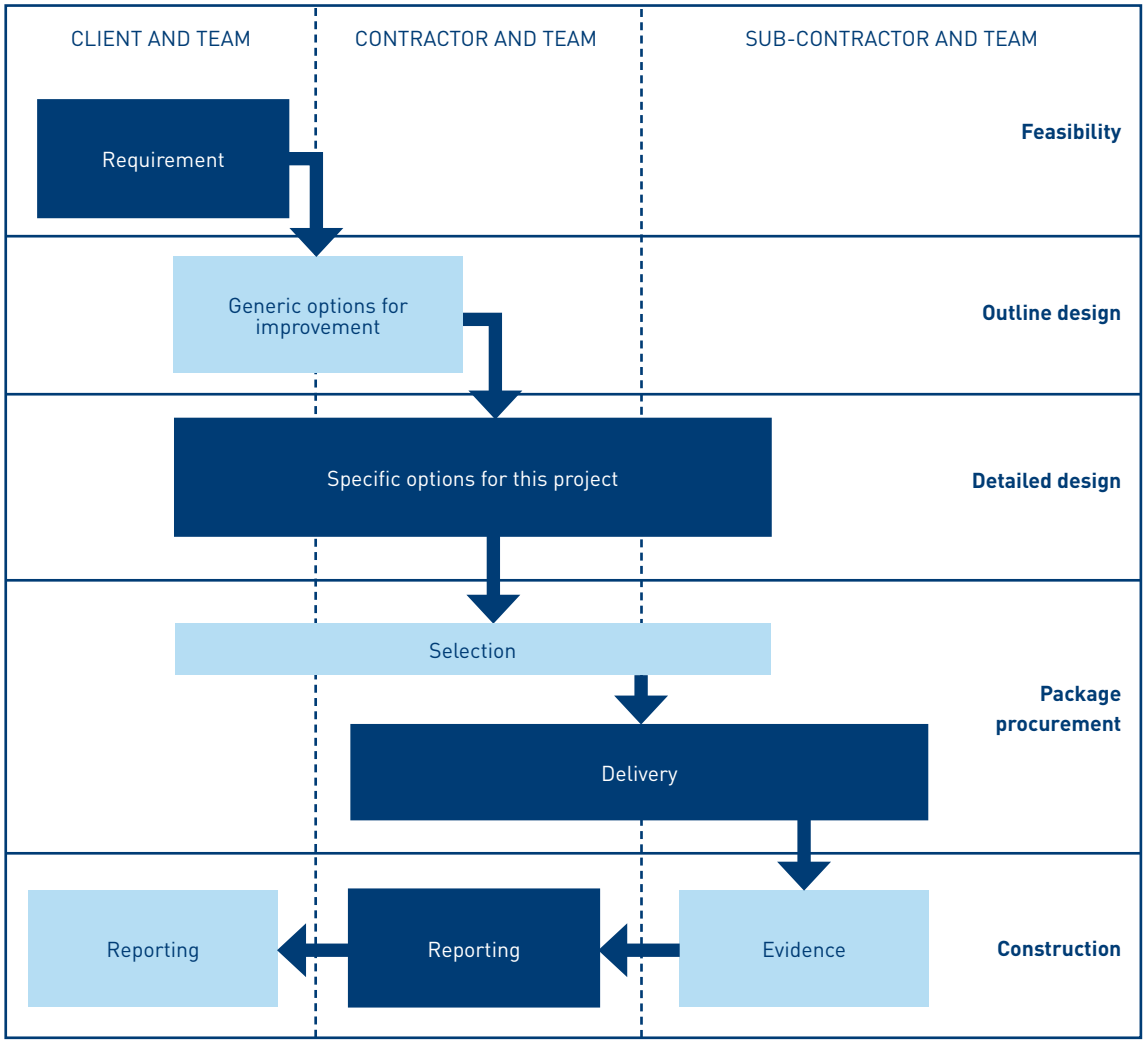
To help project teams to assess, increase and report on the recycled content of their projects, WRAP has developed an online Recycled Content Toolkit. This is a free resource available at www.wrap.org.uk/rctoolkit. The toolkit can be used on a range of project types to:

- 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 toolkit 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.

[1] *Refer to the Glossary regarding the use of the term Quick Wins in procurement documentation.*
[2] *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.*

The client requirement as a catalyst for improvement:



1 Why take action?

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 materials[3].

As a result, construction clients and developers are increasingly looking to set requirements for 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.

REQUIREMENTS FOR SITE WASTE MANAGEMENT PLAN

Reducing waste and landfill

Closing the loop on materials efficiency

REQUIREMENTS FOR REUSED AND RECYCLED CONTENT

Using recovered materials

[3] *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.*

1.1 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;
- **reducing materials costs** – reusing materials and products or the use of locally sourced construction and demolition waste is often cheaper than using virgin materials;
- **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;
- **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);
- **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.

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 1.1.

Table 1.1: 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%)

Public policy initiatives encouraging use of recycled materials

Greater resource efficiency is directly linked to two of the four priorities of the UK Framework for Sustainable Development 2005 (i.e. Sustainable Production and Consumption, and Natural Resource Protection and Environmental Enhancement). The Framework also sets out a goal for the UK to be recognised as amongst the leaders in sustainable procurement across EU Member States by 2009; this would include encouraging the procurement of products with low environmental impacts (e.g. those containing higher levels of recycled content).

While there is currently no regulatory compulsion to use recycled content in construction, the following initiatives provide a clear indication of the direction in which policy is moving.

Partnership for a better Scotland

Following a positive response to consultation, in 2006 the Scottish Executive (now the Scottish Government) asked all public bodies in Scotland to set a minimum requirement for recycled content in their tender specifications and contracts when procuring major construction projects, and to ask organisations which they are funding to follow the same targets. The minimum requirement for construction is defined as follows: at least 10% of the total value of materials used on a project should derive from recycled and reused content.

Building Regulations

In 2004, the Government's Sustainable Buildings Task Group recommended that 'Improving resource efficiency is one area which the Group considers that the Government should consult on in revising the Building Regulations. The Group recommends that the revised Building Regulations should specify a minimum percentage by value (at least 10%) of re-used/ reclaimed/recycled materials in building'. The Secure and Sustainable Buildings Act 2004 has already extended the scope of the Building Regulations to cover the use of recycled and re-used materials, and specifically includes a duty on the Secretary of State to report on the recycled content of buildings in England and Wales every two years.

Planning policy

In 2005, ODPM's Planning Policy Statement 1 said that development plan policies 'should seek the use of waste as a resource wherever possible'. Following this recommendation, a growing number of regional and local authorities are including a requirement for recycled content in their Regional Spatial Strategies, planning policies and Supplementary Planning Documents.

Economic instruments

The Landfill Tax escalator and the Aggregates Levy provide a financial incentive to use recovered materials and those with higher recycled content.

Public procurement

Use of recycled material is being required in an increasing number of public projects, including schools, hospitals, regeneration and waste infrastructure. This is supported by explicit references to the use of recycled materials in Government best practice guidance such as 'Achieving Excellence in Construction Procurement: Guide 11 on Sustainability' and targets set by the Central Procurement Directorate in Northern Ireland. Use of recycled content is listed as a key performance indicator in the procurement template for the Building Schools for the Future programme in England, and a similar benchmark has been adopted for prison construction in England and hospital construction in Wales. The latter will help towards the Welsh Assembly Government's target for 25% use of recycled and secondary aggregate (set in a Minerals Technical Advisory Note). PFI/PPP projects for schools, hospitals and offices in England, Scotland and Northern Ireland have all set tender requirements for recycled content.

In 2006, the Government's Sustainable Procurement Task Force identified construction as the top priority spending area for action. It stated that "the public sector should reduce the footprint of its procurement in three key environmental areas: carbon, water and waste, in areas of big spend as part of a move towards a carbon neutral, low water use, zero waste public sector."

In 2007, the National Audit Office stated that ....."Departments and agencies should implement to a greater extent the 'Quick Wins' and consider adopting other features of sustainable buildings which are cost neutral or have the potential to deliver cost savings in the short term. These might include:..... specifying that construction waste is recycled on-site, where possible, to reduce the cost of raw materials, and specifying that materials with recycled content should be used in construction; both measures assist in reducing the volume of waste sent to landfill."

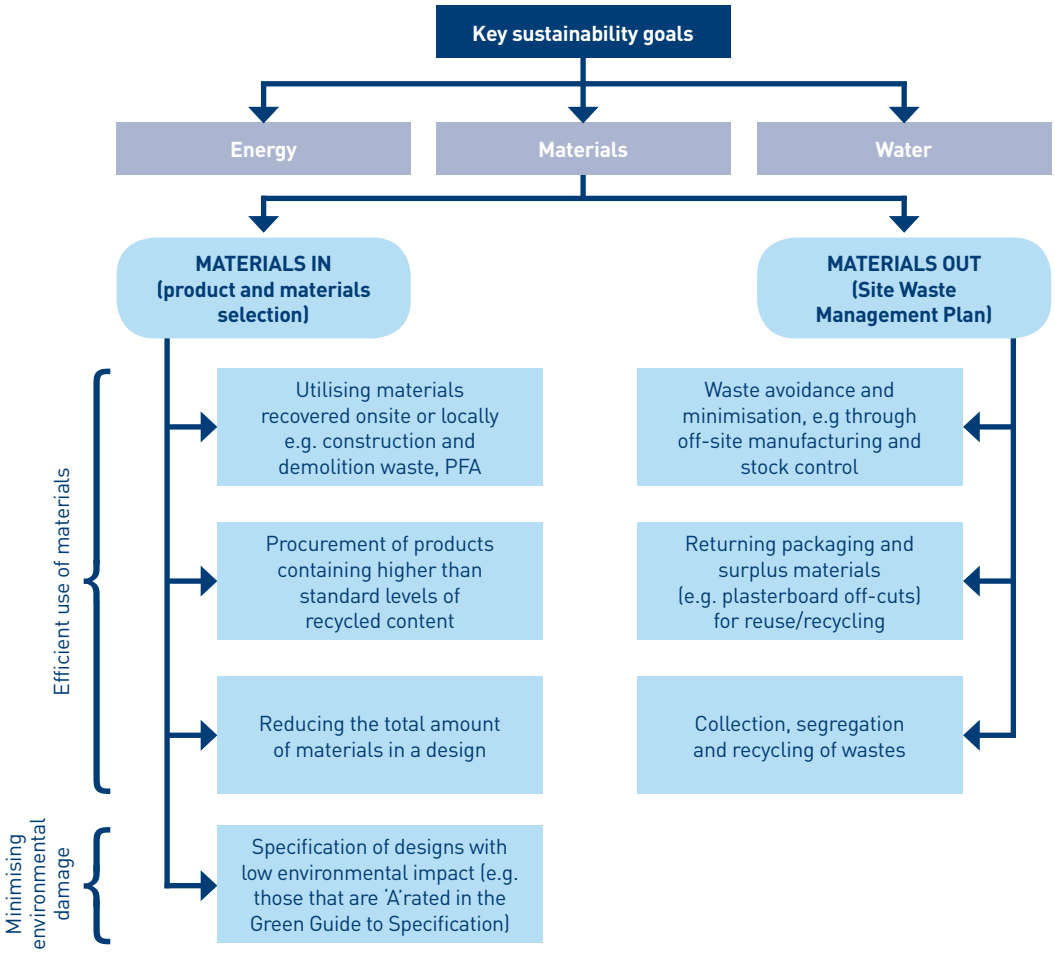
1.2 Contribution to sustainable construction

There are three key areas where the development and construction industry needs to increase its efficiency: energy, water and use of materials. Figure 1.1 highlights the various ways in which efficient use of materials directly contributes to greater sustainability in construction.

The Figure 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. Efficient use of materials:
   The second step is to consider the specific products used to meet the agreed design specifications. By using products that have above-average levels of recycled content, or by utilising locally available recovered materials, it is possible to conserve virgin materials, reduce minerals extraction and decrease landfill – while further reducing the environmental impacts of even 'A-rated' specifications by out-performing the industry average.

Figure 1.1: Materials selection and use is a key element of sustainable construction



Life-cycle assessment by BRE shows that, **on average, adopting higher recycled content reduces overall environmental impact** in each product category for which data are available. Across a range of case studies, adopting good practice also decreased overall carbon emissions associated with each project. In the case of aggregates (the most significant construction material in terms of tonnage), the average recycled aggregate was estimated to have a lower carbon impact than the equivalent primary aggregate, provided it is sourced on-site or at least 10km by road closer to the construction site than the primary aggregate.

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.

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.

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 m^2 and has 20% recycled content by mass, the recycled content by value of 10 m^2 would be:

£100 (per m^2) x 10 (m^2) x 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.

Table 1.2 below provides an example of how recycled content by value would be calculated for a whole building (units and prices are purely illustrative).

This method of project-level evaluation by value is already used in the USA and 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). As a result, estimation can readily be done by cost planners and quantity surveyors. WRAP's free-to-use web-based Recycled Content Toolkit (www.wrap.org.uk/rctoolkit) further minimises the effort.

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. This calculation is automated using the Toolkit.

Table 1.2: Examples 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.

2 Setting a requirement for recycled content

Setting a minimum standard for recycled content as a construction project outcome is a straightforward process[4]. 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.

2.1 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% recycled content by value as a minimum;
- 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.

On this basis, the following form of wording is recommended: a minimum outcome and a request for good practice. As an example:

Example requirement

'....at least 10% of the total value of materials used should derive from recycled and reused content in the products and materials selected. In addition, show that the most significant opportunities to increase the value of materials derived from recycled and reused content have been considered, such as the top ten Quick Wins or equivalent, and implement good practice where technically and commercially viable.'

While the 10% benchmark 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 10%.

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.

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.

[4] *In general, a reference to recycled content includes reused products and materials.*

2.2 Incorporating into project procurement

It is important that the requirement for recycled content is clearly communicated and is fully incorporated into project processes. To achieve this, information on what is required and the roles of different parties should be included in the appropriate documentation and processes. These would include:

- project information / briefing materials;
- pre-qualification questions;
- tender specification / design briefs;
- contract specification; and
- contract clauses.

The exact wording and processes will vary slightly depending on the procurement route being followed, reflecting the differing breakdown of project responsibilities for each option. Key aspects to remember, whatever the procurement route, are:

- The client should lead the process of setting requirements by defining policy and objectives and explaining why the issue is important.
- The selection (or pre-qualification) process for designers and contractors should include an assessment of appropriate knowledge and capability (or a willingness to learn).
- Terms of appointment should clearly identify roles and responsibilities:
  - Design teams should own responsibility for assessing the baseline performance of the project and identifying and evaluating the most significant potential opportunities to increase recycled content, such as the top 5–10 Quick Wins (for consideration by the contractor).
  - Contractors[5] should determine how the client's requirement will be met, in consultation with the design team, and can then focus their effort on implementing a selected set of product substitutions that will deliver the targeted outcome – such as some of the top 5–10 Quick Win options.
- Verification of compliance with the client's requirement should be straightforward and entail minimum effort – by focusing on evidence of the limited number of products with higher recycled content used by the contractor. Nonetheless, the process of verification should be enshrined in contractual arrangements.

Above all, one of the most important messages is to keep the process simple and flexible, and linked into existing procurement practice.

Appendix A provides a comprehensive set of exemplar wording that could be used in the above documents for common methods of procurement.

[5] *The contractor and sub-contractors are responsible for purchasing materials, and therefore are central to the decision on how the project can achieve higher levels of recycled content cost-effectively. For example, in the case of public procurement, the client always leaves the choice of brands to the contractor. The design team will advise which Quick Wins look suitable, and the contractor will select which Quick Wins they will purchase at what levels of recycled content to help meet the client's requirement for the project overall.*

2.3 Common concerns about requiring recycled content in construction

Most organisations considering setting a requirement for recycled content in construction ask five key questions[6]:

Q1: Will requiring higher recycled content cost more?

A: No, there need be no increase in material costs.

Q2: How much effort is required?

A: 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 Recycled Content Toolkit and focusing on the top 10 or so Quick Win opportunities. Using the toolkit, an experienced quantity surveyor can complete a baseline assessment of a large commercial building and identify Quick Win options in 1 to 2 hours.

Q3: Will products containing higher levels of recycled content deliver the required quality and performance?

A: Yes, products with higher recycled content will perform just as well as those with lower recycled content in most circumstances.

Q4: Will setting a modest requirement for recycled content impact adversely on other sustainability objectives?

A: No, good practice supports other sustainability objectives, although recycled content should only be one of the considerations influencing product selection.

Q5: Is a 10% minimum requirement realistic?

A: Yes, there is ample evidence that a 10% requirement is achievable for all types of construction project.

Further information is provided on each of these issues below.

[6] *Also see the Frequently Asked Questions in Section 7.*

2.3.1 Cost and effort

If correctly stated, a requirement for recycled content should result in no impact on overall 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, 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.

What information is available to help identify opportunities for improvement (Quick Wins)?

WRAP maintains a database of the recycled content of commonly used construction products. This contains data on the recycled content and other performance characteristics of many Quick Win options. The current version of the dataset can be searched on-line or downloaded at the WRAP website (www.wrap.org.uk/rcproducts). Other sources would include manufacturers and builders' merchants.

The Quick Wins specific to a particular project can be rapidly identified using WRAP's Recycled Content Toolkit. For many projects, the Quick Wins are a subset from the following list:

- **Bulk aggregates (sub-base, pipe bedding, fill, etc).**
- **Ready-mix concrete (foundations, floor slabs, etc).**
- **Asphalt.**
- **Drainage products/pipes.**
- **Pre-cast concrete products (paving, slabs).**
- **Concrete tiles and reconstituted slate tiles.**
- **Dense blocks.**
- **Lightweight blocks.**
- **Clay facing bricks.**
- **Plasterboard.**
- **Ceiling tiles.**
- **Chipboard and other wood-based boards.**
- **Insulation (floor, wall and roof).**
- **Floor coverings (carpet, underlay, etc).**

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 2.1 which summarises real product data for mainstream suppliers of building materials, obtained for school building work in the Bristol area at end-2004.

Table 2.1: 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 A – 0% recycled content (£550 per 1000)	Brand B – 25% recycled content (£550 per 1000)
Glass/ mineral wool insulation	Brand A – 10% recycled content (£3.50 per m^2)	Brand B – 80% recycled content (£3.00 per m^2)

Comprehensive information on the opportunities to use recycled and secondary aggregates is available from www.aggregain.org.uk.

WRAP also provides a guide to reclaimed building products.

2.3.2 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.

2.3.3 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 (2006), one materials 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. In fact, some specifications increase from 'B' to 'A' rating through product substitution[7].

2.3.4 Is a 10% requirement realistic?

Table 2.2 presents the findings of case studies undertaken for a broad range of building types, illustrating that most buildings[8] 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. House types include timber, masonry and steel-framed construction.

Table 2.2: Recycled content as a percentage of the total material cost for a selection of building types

Type of project	Range in whole building recycled content using standard practice products	Range in recycled content after applying cost-neutral good practice
Detached/terraced house	6–26%	16-31%
Commercial/retail property	11–32%	20-44%
School, hospital	13–20%	16-30%
Road reconstruction	8–16%	27–29%
Bridge construction	16-36%	25-49%

[7] *See BRE data in "Opportunities to use recycled materials in house-building: Reference Guide", published by WRAP.*
[8] *The variation in recycled content seen for each building type reflects the impact of different frame or cladding options.*

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 2.3 below.[9] 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.)

Table 2.3: 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[1] 8 unit timber frame, 1/2 storey terraced	6%	16%	33%
Milnbank HA[1] 48 unit timber frame, 2/3 storey semi-detached	12%	22%	29%
Glasgow HA[1] 700 unit roofing, over-cladding and repairs, medium/high rise	1%	21%	46%
E Thames HA[1] 200 unit high rise concrete frame	22%	31%	41%
Taylor Woodrow[2] detached house, brick and block	17%	30%	38%
Taylor Woodrow[2] terraced house, brick and block	16%	28%	44%
Taylor Woodrow[2] two-bedroom flat, brick and block	17%	30%	44%
Redrow Homes[3] light steel-framed double dwelling unit	20%	26%	30%
Peabody Trust[4] kitchen and bathroom refurbishment	12%	20%	-
Homes for Islington[4] kitchen and bathroom refurbishment	16%	31%	-
Glamorgan & Gwent HA[5] 50 independent living units in timber frame	13%	21%	-

Sources:

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

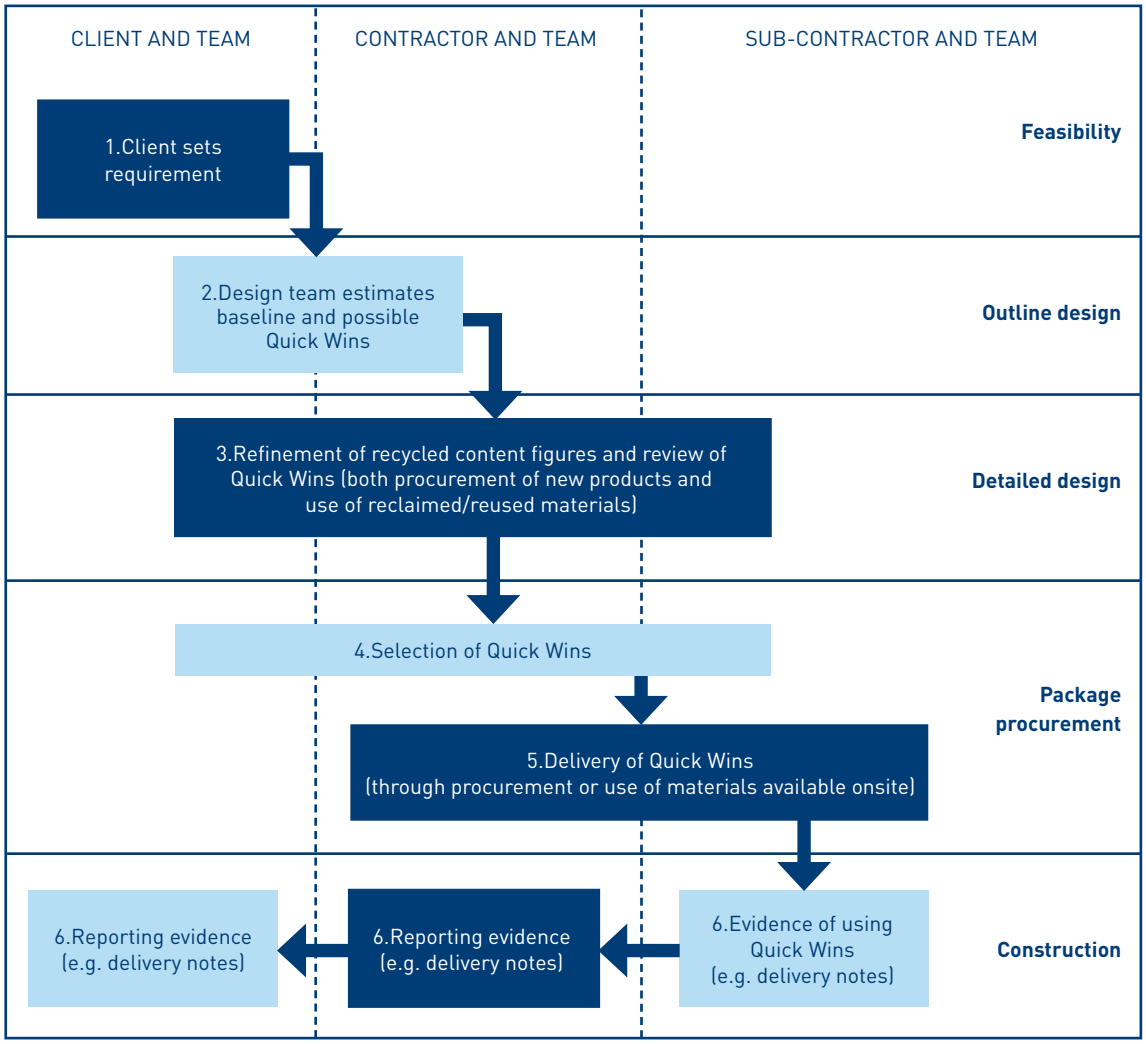
For more information, reports on these case studies can be downloaded from www.wrap.org.uk/construction/construction_procurement

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

3 Meeting a requirement for recycled content

Figure 3.1 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 3.1: Key steps in requiring and delivering buildings with higher levels of recycled content



Each of these steps is described below. (Information on Step 1 is included in the previous Section 2.)

3.1 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 web-based tool (freely available at www.wrap.org.uk/rctoolkit), 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).

It may also be useful to review WRAP's database of case study projects; these show the practical options to increase the recycled content of a wide range of different building types.

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.

3.2 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 toolkit 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.

3.3 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 they are unduly negative.

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.

3.4 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 of the supply chain, on both 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.

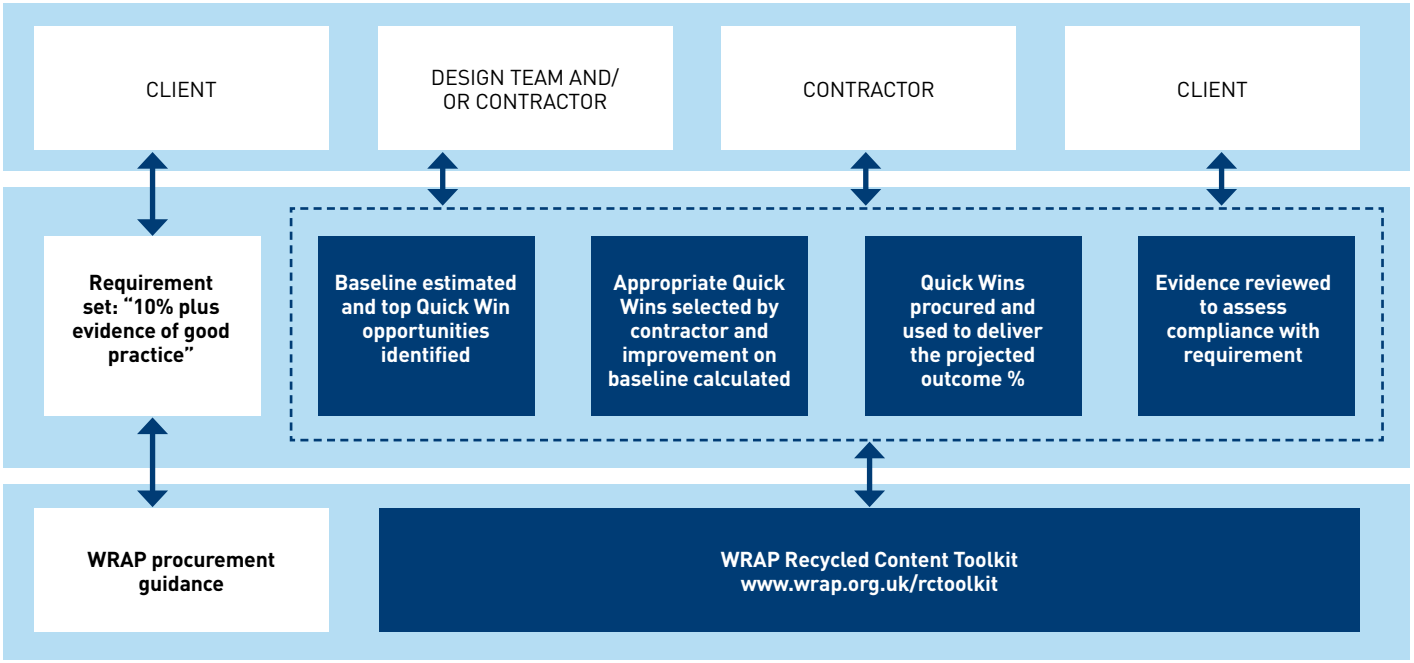
3.5 Demonstrating compliance

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. WRAP's Recycled Content Toolkit provides pre-formatted reports for this purpose.

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 the opportunity to check that the targeted level of recycled content had been delivered through Quick Win product substitutions, and to share lessons learned.

Figure 3.2: Illustration of assessment process



4 Roles and responsibilities

There is no necessarily correct way to divide responsibilities for setting and achieving a requirement for recycled content, and roles will vary slightly with the specific procurement process being followed. What is important is that each party's role is clearly defined and communicated. Nonetheless the following recommendations may be useful in determining which party is most suited to different activities:

- Terms of appointment of design team and contractors should clearly identify roles and responsibilities.
- The design team should have responsibility for developing the project baseline, and identifying and evaluating good practice / Quick Win opportunities[10].
- Contractors (and sub-contractors if appropriate) should be involved in the process of evaluating the feasibility of Quick Win opportunities, and will make the final purchasing decisions on products and materials. If possible, contractors should be consulted on methods of achieving increased levels of recycled content early in the project; particularly with respect to aspects that might impact buildability such as concrete mixes.

4.1 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 examples in Appendix A) 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.

[10] *The specific member of the team responsible for evaluating different options will vary with the materials in question. Discussion of concrete options would require the input of a structural engineer, finishing materials would need to be reviewed by the architect, while less visible and non structural items such as plasterboard or carpet underlay would be best evaluated by a cost consultant or purchaser.*

4.2 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.

4.3 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.

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.

4.4 Responsibilities under different forms of procurement

There are slight differences between the approaches to implementing requirements in different forms of procurement. However, these are either relatively superficial (such as differences in terminology) or simply reflect differences in the responsibilities of different parties in the process and the timing of key decisions (e.g. appointment of the contractor).

Model procurement wording

The following Sections summarise the application of the generic process to different forms of procurement; further information including exemplar wording to be used in project documentation is provided in Appendix A.

4.4.1 'Traditional' procurement

'Traditional' procurement involves a higher degree of client involvement than a design and build process and as a result the client has a greater responsibility for ensuring that different parties are working together to achieve the project requirement.

A client adopting a traditional procurement route generally has to develop a policy and define overall project outcomes (i.e. the design brief) before a contractor is appointed and possibly before the design team is on board. This means that it is important to check any early assumptions with the design and construction teams once they are appointed.

Key stages to introduce a requirement for recycled content are through:

- **Provision of a design brief –** which clearly identifies the requirement and importance of resource efficiency and the aim of using materials with higher levels of recycled content.
- **Selection of a design team –** with capacity to identify which Quick Win categories are likely to be suitable for the project. This can be tested through pre-qualification questions (PQQs) and other selection procedures.
- **Preparation of project documentation –** here the client's advisor produces a specification against which contractors can tender. This specification should set out the nature of, and reasons for, the requirement, together with the Quick Win options identified by the design team. The specification should not prescribe particular products, although a list of known examples can be provided. Tender documents should also specify how compliance with this requirement will be determined.
- **Selection of a contractor –** this could involve review of the contractors' proposals for delivering selected Quick Wins, including evaluation of the strength of any arguments put forward for not adopting certain options or for introducing new options. Appendix A provides exemplar wording to support each stage in this process.

4.4.2 Design and build

The contractor, under a full design and build arrangement, is expected to take responsibility for delivering all aspects of a project in response to the Employer's Requirements. Employer's Requirements normally use performance specifications to establish the brief with respect to construction and material standards. Thereafter the client usually has little further involvement in how these are achieved. This approach need not present any difficulty when specifying targets for recycled material content, provided that the performance requirements and method for achieving them are clearly described (e.g. as set out in this guidance and listed in Appendix A).

Design and build procurement is increasingly used as an alternative to traditional procurement, as it integrates the skills and expertise of designers, specifiers, contractors and sub-contractors at an early stage of the project lifecycle. Key documents used to achieve a recycled content requirement include an Expression of Interest document, to ensure that suitably qualified contractors bid for the work, the Tender Specification, which provides more detail on how the requirement might be achieved, and the Contract documents, which confirm the requirements of the client but do not restrict the consideration of alternative designs by the contractor.

4.4.3 Partnering / framework arrangements

Design and build contracts may be let through partnership arrangements, where a supply chain of committed organisations has already been established. If partnering agreements are already in place, the introduction of a recycled content requirement should be discussed and agreed with the partnership at the earliest opportunity. A commitment to meeting such requirements should be added to the partnership agreement and accepted by all parties. Following this point, the design and build process described above can be pursued. Exemplar wording for such an agreement is included in Appendix A.

4.4.4 PFI/PPP

It is important to remember that the inclusion of a requirement for recycled content is compliant with European legislation on public procurement (see Section 4.5).

The construction element of a PFI procurement process is similar to the design & build process used in the private sector (although payment mechanisms and approach to post-construction management will differ), while a PPP process has similarities with private sector partnering arrangements. The processes described above can therefore be applied although the names of the documentation used at each stage will vary slightly, e.g.

- the Project Brief becomes the Project Information Pack;
- the Pre-qualification process becomes the Pre-Invitation to Negotiate Process (Pre ITN or PITN);
- the Tender process becomes the Initiation to Negotiate (Full ITN or FITN); and
- the Employer's Requirements become the Output Specification.

In public procurement processes, it is beneficial to begin considering recycled content during the outline business case stage (as part of an overall sustainability strategy) and to demonstrate how recycled content was addressed in the public sector comparator, thereby demonstrating commitment and providing guidance on at least one suitable approach.

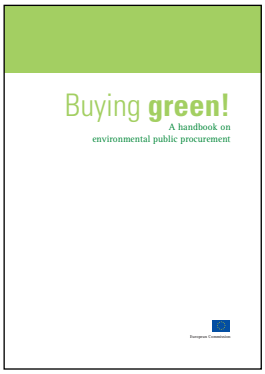
Specific guidance on setting a requirement for recycled content in PFI / PPP processes is provided in WRAP reports on schools and waste infrastructure PFI.

4.5 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.

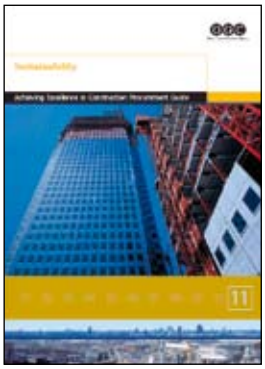
European Commission handbook on environmental public procurement (2004)

"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-Defra[11] 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.

[11] *OGC - Office of Government Commerce, Defra - Department for the Environment, Food and Rural Affairs.*

5 Reporting performance

Taking steps to increase the recycled content of new buildings 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. This section provides practical guidance on how information on recycled content could be included within a Corporate Responsibility report or the annual report from a public body, and provides examples of practical and robust performance indicators.

5.1 General information

Information on the recycled content of new buildings 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 Recycled Content Toolkit, etc.
3. Current performance and target for the future – detail of the target level of performance and how this will be achieved.

An example of the sort of text that might be suitable is shown below.

Increasing the recycled content of our buildings

Over the last year we have worked hard to understand the extent to which recycled materials are used within our projects and to find ways to increase the use of recycled material wherever possible. Including more recycled material within our projects helps address two important environmental objectives by reducing both the demand for raw materials and the amount of waste that is sent to landfill sites. Using recycled materials is particularly important for our industry because construction is one of the biggest users of materials in the economy, consuming approximately 400 million tonnes of materials each year. It also generates more than one-third of total UK waste materials.

We now require that a minimum of X% of the total material value of our projects is derived from recycled and reused content and that the largest opportunities to increase the use of recycled content in our projects are adopted wherever technically and commercially feasible. This requirement is assessed for all projects with a capital value above £X million.

5.2 Suitable performance indicators and targets

Measuring and reporting on the recycled content of construction projects is a relatively new aspect of sustainable construction. Therefore it is suggested that initially at least, the indicators used to report progress should be simple, beginning by reflecting the level of engagement in the process of measuring and managing recycled content rather than focusing too heavily on quantifying performance. Nonetheless it is important that the indicators are associated with SMART targets demonstrating a robust approach to improving performance over time.

Two performance indicators are proposed below for consideration. They cover engagement in, compliance with, and improvement over, the proposed requirement of a minimum of 10% of a project's material value being derived from a recycled source. Indicative targets are included for a conservative and gradual approach – some organisations will choose to seek faster introduction.

Indicator 1. Percentage of projects with capital spend ›£X million for which the recycled content has been measured (Target: 50% in year one, 75% in year two, 100% in year three)

Indicator 2. Increase in average percentage recycled content for all assessed projects above that which would have been achieved if only 'standard' practice products were used (Target: to increase average recycled content to 5% above standard practice performance within 3 years).

Some organisations have chosen to monitor performance against more challenging benchmarks, such as 20% minimum and 25% target level, typically where they know in advance the level of performance that can be expected from their specific types of construction.

Each of the above indicators could be reported through the application of WRAP's Recycled Content Toolkit (see Section 6). This software provides a consistent method for assessing the recycled content of a project using industry-standard benchmark data and calculations. The toolkit can be used by design teams (perhaps led by the project cost consultant) to:

- demonstrate that recycled content of the project has been robustly assessed; and
- show the level of improvement in recycled content in comparison to a 'standard' practice benchmark.

The toolkit enables this information to be aggregated for a whole development portfolio as well as measured for individual projects.

Use of the toolkit to report on these indicators would require its incorporation in project management processes (as shown in Section 3), with submission of completed reports from the toolkit to the client's Development Director or Environmental Manager.

6 Tools and support

WRAP have developed a series of technical reference and guidance documents together with software tools to help in the process of measuring and increasing recycled content in construction, available from www.wrap.org.uk/construction/construction_procurement. One key tool is described below.

6.1 Recycled Content Toolkit

WRAP's Recycled Content Toolkit is a free online resource (available at www.wrap.org.uk/rctoolkit) and can be used to:

- estimate the baseline performance of the project;
- identify the top 10 or more Quick Win opportunities;
- record how each Quick Win option is being addressed in the project (i.e. whether or not it is being pursued); and
- produce preformatted project-specific reports showing that a recycled content requirement is being achieved and by what method.

The toolkit includes modules for the following types of project:

- housing new build;
- other new build (including commercial, retail, schools, hospitals and blocks of flats);
- infrastructure; and
- refurbishment.

A further module estimates the useful materials that could be reused from demolition on site.

In addition, toolkit users can aggregate the results from individual projects into schemes (such as complete housing developments composed of multiple house types and roads), and can aggregate results from projects and schemes for corporate reporting (e.g. as part of an annual CSR report).

The toolkit would typically be used by a designer, quantity surveyor or cost planner working for the client or contractor (depending on the procurement process). Within perhaps an hour or two, it should be possible to enter the main project parameters, get a first estimate of recycled content for the project at standard and at good practice, and identify the top 5-15 potential Quick Wins that would contribute most to increasing the recycled content of the project in question. The toolkit has been designed to be intuitive and transparent (i.e. it is clear how the results are calculated) and incorporates extensive online help.

By selecting from the available Quick Win opportunities, it will be possible to immediately quantify the expected result for recycled content in the project. Evidence of this expected result (issued by the tool as a preformatted pdf report), combined with evidence that products containing the required levels of recycled content had been used during construction (e.g. product data sheet and delivery note), should be sufficient to verify compliance with a requirement.

Access to the toolkit is via a secure registration system. Once registered, a user is able to:

- generate their own project models (either from scratch, or using one of WRAP's library of 'case study projects' as templates) – users are also able to generate new projects from existing project information (either their own projects or those developed by others[12]);
- set a project-specific target;
- calculate the level of recycled content that would be achieved from the use of 'standard' practice products and the additional percentage of recycled content that could be achieved through the use of 'good' practice products;
- identify the top ten or more Quick Win items and run 'What if' analysis to determine the implications of selecting one or more Quick Wins;
- record the reasons why a Quick Win option has been selected or rejected for use on the project; and
- produce a series of pre-formatted reports that can be used to provide evidence of compliance.

[12] *Access to another user's buildings requires a building ID and password.*

The toolkit allows several different members of a project team to work on the same project analysis, while still keeping the information secure. This is achieved by having two categories of toolkit user:

- Main Users – i.e. the user that created the project file; and
- Guest Users – these are individuals that have been invited to work on the project by the main user. They are able to access the project (with either read-only or read/write permission) using a password.

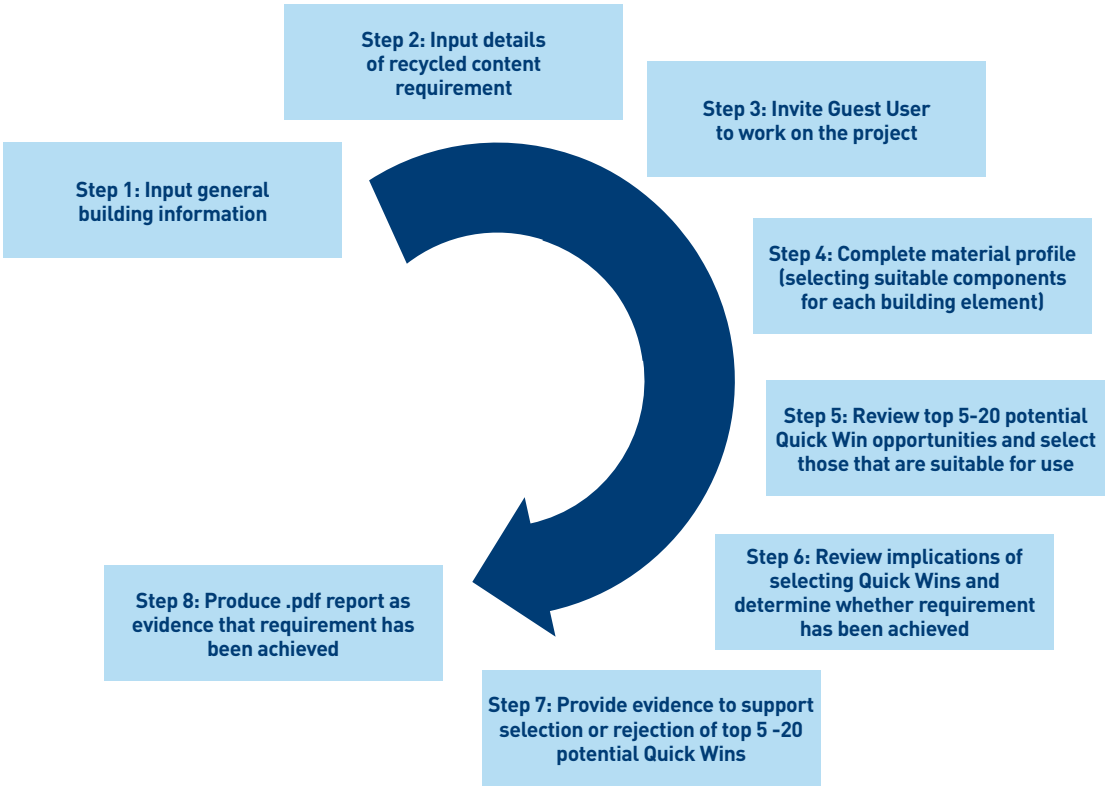
The main user can grant or retract Guest User privileges thereby maintaining the security of project information.

The different steps involved in using the toolkit to demonstrate that a recycled content requirement has been met are shown in Figure 6.1.

The toolkit allows the user to define and calculate additional Quick Win options with higher recycled content that have not been identified by the tool as being in its listing of the top 5-20 options.

Additional, more detailed information, on the use of the Recycled Content Toolkit is contained in the Toolkit User Guide (available on the toolkit website). This guide provides comprehensive information on each step in the assessment process and provides a clear description of all of the formulae and data around which the toolkit is based.

Figure 6.1: Steps in using WRAP's Recycled Content Toolkit



7 Frequently Asked Questions

7.1 General

7.1.1 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.

7.1.2 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.

7.1.3 If I am a supplier, will I be disadvantaged?

The aim of the toolkit 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.

7.2 Cost of meeting a requirement

7.2.1 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 template procurement clauses in Appendix A allow the designer or contractor to make the case for not adopting a suggested Quick Win where there is good evidence of a cost premium or other barrier.

The toolkit 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 toolkit to assess recycled content will depend on the complexity of the project in question and the user's familiarity with using the toolkit. With a reasonable amount of familiarity, it should be possible to set up a building model in the Recycled Content Toolkit within three hours for a complex project, and 1–2 hours for a simpler project. Once one building has been set up in the toolkit, this can be used as a template for other similar buildings, significantly reducing the effort involved.

7.3 Data quality

7.3.1 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. It is planned that the database will be updated annually.

7.3.2 How secure are my data?

The toolkit 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 building.

7.3.3 How may people will be able to access the data on my building?

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

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

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.

7.4 Toolkit

7.4.1 Does the toolkit tell me which products to use?

No, the toolkit 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).

7.4.2 How flexible is the toolkit for dealing with different types of project?

The toolkit is designed to be as flexible as possible and includes a number of basic building 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.

The toolkit contains a wide range of commonly used product types, and where the product is not pre-defined the user can insert the information.

7.4.3 How long will it take to complete the toolkit?

It should take no longer than two to three hours to complete the toolkit if you have following information available: specifications and bill of quantities / drawings / cost plan.

7.4.4 Whose role is it to complete the toolkit?

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

7.4.5 How can you be sure that the results generated by the toolkit are reliable?

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

7.5 Procurement of products with higher levels of recycled content

7.5.1 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.

7.5.2 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.

7.5.3 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.

7.6 Compatibility with other initiatives

7.6.1 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)[13]. BRE's own data compiled for WRAP demonstrate the major potential for switching to higher recycled content within 'A'-rated Green Guide specifications .

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 [14].

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 impact.

7.6.2 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.

7.7 Process of setting and meeting a requirement for recycled content

7.7.1 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 projects.

7.7.2 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.

7.7.3 Is the process influenced by different routes of procurement?

The process is the broadly the same whichever procurement route is followed, although the roles and responsibilities of certain parties may vary.

7.7.4 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.

7.7.5 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.

[13] *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.*

[14] *See "Opportunities to use recycled materials in house-building: Reference Guide" published by WRAP.*

Glossary

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' guide to the calculation and declaration of recycled content in construction products.

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 reused[15].

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 Guide.

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.

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.

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 project[16].

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

[16] *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)*

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.

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. Ideally, it should also demonstrate strong environmental credentials – or at least, not introduce significant environmental penalties relative to conventional alternatives[17].

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 Recycled Content toolkit. 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.

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.

[17] *WRAP publication 'Opportunities to use recycled materials in building – Reference Guide'*

Appendix A: Model clauses for procurement

This Appendix provides exemplar wording that can be used in generic corporate policy statements, project briefs and prequalification processes and subsequently in tender, appointment and contractual processes for 'traditional' and design and build procurement processes. Figure A.1 shows how this wording relates to different stages of a generic procurement process.

Figure A.1: Procurement steps at which model wording can be applied

PROJECT STAGE	AVAILABLE WORDING	
Pre-project	**Policy statements**	
Briefing/Pre-qualification	**Project briefs**	
	Design team pre-qualification	
	Contractor pre-qualification	
Design	Traditional procurement	Design and build
	Appointment of team	**Employer's requirements**
Pre-construction	**Tender specifications/briefs**	
	Contract clauses	
Partnering frameworks	**Framework agreement**	

Organisations wishing to set a minimum requirement for recycled content are encouraged to make use of this exemplar wording and insert as appropriate in their documentation and processes. There is significant overlap between the wording proposed for the different forms of procurement, and comprehensive information is provided for each process resulting in some unavoidable repetition of information.

Use of the model wording

Users are referred to the Disclaimer at the back of this guidance document. The model clauses are not intended to replace standard Terms and Conditions of Contract. They are intended for use as part of the client's specification of the works that define the required output and performance, alongside other clauses on sustainability such as minimum performance on energy and water efficiency. Any organisation or other person should take their own legal, financial and other relevant professional advice when considering the use of the model clauses in any procurement process.

The WRAP publication "Achieving good practice Waste Minimisation and Management" provides complementary advice and model wording on setting requirements for waste reduction and recovery, and is available at: www.wrap.org.uk/construction.

A1. Policy statement

Here is a sample of the kind of statement that can be used in environmental or procurement policies to signal intention and provide a mandate for action:

> As part of its commitment to sustainable construction, [Organisation name] aims to increase its efficiency in the use of material resources. One targeted outcome is to:
> - exceed a threshold proportion of re-used and recycled inputs in the products and materials used on construction projects. Therefore, in its procurement, [Organisation name] will set minimum requirements for re-used and recycled content as a percentage of the value of materials used on a project, and seek the adoption of cost-neutral improvements.

If there is also a project requirement for waste reduction and recovery, an additional outcome can be stated as follows:

> - reduce the quantity of waste arising and increase the recovery of materials for reuse and recycling on all construction projects. [Organisation name] will therefore set mandatory requirements for its projects to incorporate good practice waste minimisation techniques and to plan and implement good practice waste management and recovery, including forecasting and measurement of wastage.

A2. Project information / briefs

Where the client sets a high-level brief to the design team or contractor (in the case of design and build and PFI processes), the following wording can be included to define the overall objectives and requirements for environmental performance – thereby providing the mandate for appropriate technical solutions to be offered:

Under general design objectives, the following text is appropriate:

> In all of our development work, our aim is to minimise any adverse impacts that construction and subsequent operation have on the environment. We seek this through the design process, materials selection, construction techniques and operational methods. All organisations appointed to work on our behalf are required to work in accordance with these principles. Specific information on our environmental policy is set out in [Insert reference to the relevant document on this topic], to which all consultants and contractors appointed on our projects are expected to conform.

Alongside information on energy efficiency, water efficiency and other environmental performance criteria, the following text can be used to describe aims for materials resource efficiency:

> In respect of the efficient use of materials, our aim is to minimise the consumption of finite natural resources and to minimise the quantity of waste being sent to landfill sites. Therefore, as general design principles, we seek the following where commercially viable (in accordance with the waste hierarchy):
> - efficient design and stock control to minimise the use and waste of materials;
> - re-use and refurbishment of existing infrastructure;
> - use of reclaimed products and materials;
> - use of renewable materials from legal and sustainable sources (such as timber with appropriate certification);
> - waste minimisation on site;
> - recycling of construction, demolition and excavation waste; and
> - procurement of products and materials with good practice levels of recycled content (relative to other products meeting the same specification).
>
> These objectives should be pursued while avoiding adverse impact on cost, quality or other requirements in this brief, and minimising transport (especially road transport of heavy materials) where feasible.

We require specific outcomes on two aspects of materials resource efficiency – site waste management and the use of recycled content:

We require a Site Waste Management Plan (SWMP) to be developed from the pre-design stage to inform waste minimisation, and for the SWMP to be implemented in all construction site activities in line with good practice published by WRAP. The Plan is required to set targets for waste reduction and recovery based on an assessment of the likely composition and quantity of waste arisings and identification of the most significant cost-effective options for improvement (Quick Wins). This should be supplemented by information on how the targets will be achieved during construction activities and how the actual levels of waste reduction and recovery will be monitored for comparison with the targets set.

The use of construction products and materials with above-average recycled content can make a significant contribution to diversion from landfill and conservation of finite natural resources. To deliver measurable performance on this aspect of sustainable development, we seek to:

- Exceed a threshold outcome defined as follows: At least 10% (or other specified threshold) of the total value of materials used in the construction project must derive from recycled and re-used content in the products and materials selected (*see below).
- Identify and subsequently adopt for use, the most significant opportunities to increase the recycled and re-used content by value of the project, such as the top 10 Quick Wins or equivalent[18]. This will involve use of products with 'above-standard' recycled content (i.e. above the minimum commonly found in the market), unless it can be shown that it is not commercially or technically feasible to use products with this level of recycled content.
- Quantify the targeted improvement in the total recycled content above 'baseline practice' for the project.

The Quick Wins encountered on a specific project will vary but are likely to include some of the following types of product:

- bulk aggregates (sub-base, pipe bedding, fill, etc);
- ready-mix concrete (foundations, floor slabs, etc);
- asphalt;
- drainage products/pipes;
- pre-cast concrete products, including paving slabs and kerbs;
- concrete tiles and reconstituted slate tiles;
- dense blocks;
- lightweight blocks;
- clay facing bricks;
- plasterboard;
- ceiling tiles;
- chipboard and other wood-based boards;
- insulation (floor, wall and roof);
- floor coverings (carpet, underlay, safety flooring, etc);
- compost and soft surfacing; and
- furniture/kitchen units.

Tools and resources for evaluating recycled content and identifying Quick Wins with minimum effort are available from www.wrap.org.uk/construction

* The value of materials deriving from recycled content on a project may be calculated using the following summation across all the products and materials used: $\sum_A$ (quantity of product A) x (cost of product A) x (% recycled content by mass of product A)

Recycled content is the proportion, by mass, of recycled material in a product, excluding waste material (such as process scrap) reutilized within the same process that generated it. (See ISO14021 for a formal definition.) Where a product or material is reused (e.g. is removed and replaced or is moved to another location), then it is credited at 100% reused content by value. The cost of a product is the unit delivered price for the materials, excluding installation costs.

[18] *When applying a minimum 10% requirement, e.g. as requested by the Scottish Government, construction clients should preferably also request good practice in improving recycled content.*

A3. Pre-qualification

Assessment of capacity and competence to respond to a requirement for recycled content could be included in pre-qualification processes for all parties involved in delivering a project (e.g. designers, contractors, material suppliers and consultants). Generally speaking, information on ability to improve recycled content should be included alongside other information on environmental performance criteria for the project.

It is expected that pre-qualification processes will include a questionnaire (PQQ) and may be followed by an interview to explore issues in more depth. If the issue of recycled content is to be raised during a supplier interview, it is good practice to flag up its importance by including it within the PQQ, thereby providing an opportunity for suppliers to prepare a response.

Following are some examples of PQQs which might be suitable for different members of an organisation or project-specific supply chain. They are followed by guidance on how to interpret different responses and pursue the matter further at interview.

A3.1 Designers, contractors and consultants

> Prequalification question: 'Does your company have the ability to measure and improve the recycled content in construction projects (see www.wrap.org.uk/construction)?'

Relevant construction professionals include project managers, designers, quantity surveyors, planning supervisors & contractors. Whilst it is clearly of benefit for all these parties to have a good understanding of recycled content, it is of most importance if the designers (including Quantity Surveyors and Cost Planners) are able to identify project-specific opportunities for increasing recycled content using the most significant options (Quick Wins). Therefore, designers should be able to demonstrate an awareness and ideally working knowledge of existing information and methods, such as product data and WRAP toolkits.

Should a designer, contractor or consultant fail to respond appropriately to the question, it may be appropriate to refer that party to WRAP's resources, making it clear that ability to address this issue would be a necessary component of successfully meeting the contract requirements.

If a specific design team member / contractor has been identified to take overall responsibility for delivering a recycled content requirement, it is particularly important that this individual has a good grounding in the processes described in this guidance.

If an interview stage is included, questions could check the specific skills and knowledge levels required by each type of consultant. Whilst it is important that all consultants and contractors understand the issue of recycled content, specific skills are required by certain roles. For example, the designer should be able to develop a project baseline and identify Quick Wins using the toolkit, whereas the Project Manager must understand when each process should be used and how. Note that the pre-qualification stage focuses on a company's generic technical capability, and does not seek to assess how they would perform on the particular contract in question.

Identified below are some model questions to be included in the interview guidance:

1. What experience do you have in measuring and improving recycled content in construction and refurbishment projects?
2. What is your knowledge and experience of cost-neutral Quick Win categories for higher recycled content?

These questions encourage the respondent to expand upon and be specific about the skills and knowledge which they possess.

A3.2 Material suppliers

Ordinarily only those companies supplying types of product for which Quick Win opportunities are commonly encountered would need to be asked specifically about the recycled content of their products. Moreover, if the client for a construction project normally leaves materials procurement to the contractor and subcontractors, these questions will not be relevant for the client to ask.

> Prequalification question: 'Does your company measure and state the recycled content by mass of your products?'

The ability to measure is the first step in the process. If the supplier is unable to say yes to this question, it may encourage them to include this information routinely on their standard product data sheet.

If a specific product is sought from a supplier, it would be worth supplementing the above question with:

> What is the recycled content by mass of products X and Y (or products of type Z)?

The information on the actual level of recycled content in a product can then be compared with WRAP benchmarks for this component type to give an indication of how far 'good' practice for recycled content has been achieved. Refer to WRAP's product guide at www.wrap.org.uk/reproducts

It should be noted that the following product areas offer little opportunity for improving recycled content beyond industry norms:

Mechanical & electrical installation	The recycled content in mechanical and electrical installations is difficult to improve due to the high degree of manufacturer's design, which means that alternative systems do not compete on this parameter. Also, these systems often contain a high proportion of metals which have fixed levels of recycled content.
Metals	Metals already use a high proportion of recovered material due to the high cost of new material. The recycling industry is well established and it is therefore difficult to improve upon existing recycled content levels, which tend to be uniform across each metals sector.
Primary wood products	Primary wood products should be sourced from certified 'sustainable' forests but will not include recycled materials.

Additional questions which could be asked at interview stage are:

1. For product manufacturers – ' What are you doing to improve the recycled content of your products?'
2. For product suppliers / distributors – 'What are you doing to source materials with higher recycled content?'

A4. Tender specifications, contracts and appointments

The key requirement at this stage is to set out clearly what is expected of the supplier (e.g. designer or main contractor) and how they will demonstrate that they have fulfilled their role in meeting the requirement for recycled content.

A4.1 Traditional procurement

Under the traditional procurement process, the client is involved in separate tendering and appointment processes for the design team and for the contractor. As a result, there are two phases of appointment into which the requirement for recycled content should be incorporated – first the designer and then the contractor.

The following text assumes that the client requests good practice as well as the 10% minimum outcome.

A4.1.1 Appointment of designers

The design team has a key role in ensuring that good practice is adopted (if requested by the client). They are responsible for the following:

- identifying the baseline;
- identifying the possible Quick Wins, reviewing any additional Quick Win areas proposed by the contractor, discussing which options the contractor will adopt, and quantifying the projected outcome for the project; and
- including agreed areas where higher recycled content will be used in the project specification (e.g. identifying levels of recycled content that the contractor proposes to target as Quick Wins).

Following prequalification of suppliers, the following or similar wording may be incorporated in the designer's form of appointment:

With respect to the use of products and materials with recycled content in the projects for which they are appointed, and in pursuit of objectives defined in the Project Brief, the Designer shall take responsibility for:

- quantifying (at an early design stage) the overall level of recycled and re-used content by value in the project at baseline practice;
- identifying the most significant potential opportunities to increase the recycled content of the project, such as the top 10 Quick Wins or equivalent opportunities. (This assessment may be made using one of the WRAP calculator tools available from www.wrap.org.uk/construction.);
- agreeing with the Contractor which of the identified potential opportunities will be adopted and the level of recycled content to be achieved for these components (to be known as 'selected Quick Wins'). Where one or more of the top ten Quick Wins (or other identified opportunities) have not been adopted, justification of the commercial or technical reasons behind this decision should be provided;
- quantifying the projected outcome for overall project recycled content if products satisfying the selected Quick Wins are procured;
- ensuring that the Contractor is fully informed at tender/negotiation stage (or before) of the Client's requirements with respect to the use of the most significant commercially and technically feasible options for products with higher recycled content. As a minimum, the Designer shall provide the Contractor with:
- a brief description of the Client's policy context;
- the target outcome for the project and the requirement to adopt 'good' practice through Quick Win opportunities;
- a list of the most significant opportunities to increase recycled content and meet the client's requirement, such as the top ten Quick Wins or equivalent opportunities
- a statement outlining the Contractor's; responsibilities for (a) agreeing 'selected Quick Wins' with the Designer/Client, and (b) identifying, specifying or procuring, and providing evidence of the use of, the actual products and materials which will meet the target outcome and the associated specification for the 'selected Quick Wins'; and
- the agreed specification of the 'selected Quick Win' opportunities, including the assumptions upon which they are based.
- advising the Client throughout the design and construction process of the project on matters relating to recycled content, including the validation evidence available on request from the Contractor at project completion.

The above statements apply to framework and traditional contracts. Where full design & build (single point responsibility) procurement is used, the contractor should take on the designer's responsibilities and any negotiations regarding the agreement of

a target outcome above the 10% minimum should be carried out during the design stage and negotiated with the Employer's Agent on the client's behalf (see below). Similarly the Employer's Agent should be responsible for advising the client on the validation evidence at contract completion.

A4.1.2 Tender specifications / briefs

Here is some model wording that can be incorporated into the tender specification for the procurement of a construction project:

Under general design objectives and alongside other sustainability clauses, introduce the following wording:

As one of its objectives on sustainable development, [Organisation name] is seeking to maximise the cost-effective use of materials recovered from the waste stream – thereby diverting waste from landfill and reducing demand for finite natural resources.

To deliver measurable performance, we seek to exceed a threshold outcome defined as follows: At least 10% (or other specified threshold) of the total value of materials used in the construction project must be derived from recycled and re-used content in the products and materials selected (*see below).

We also seek to identify and implement the most effective cost-neutral opportunities (Quick Wins) to increase the value of materials deriving from recycled and re-used content, and quantify the improvement in the total recycled content above 'baseline practice' for the project.

*The value of materials deriving from recycled content on a project may be calculated using the following summation across all the products and materials used: $\sum_A$ (quantity of product A) x (cost of product A) x (% recycled content by mass of product A)

Recycled content is the proportion, by mass, of recycled material in a product, excluding waste material (such as process scrap) reutilized within the same process that generated it. (See ISO14021 for a formal definition.) Where a product or material is reused (e.g. is removed and replaced or is moved to another location), then it is credited at 100% reused content by value. The cost of a product is the unit delivered price for the materials, excluding installation costs.

In an appropriate place in the general part of the architectural or fabric specification, introduce the following wording:

Designs and specifications should consider the environmental impact of all elements of the design including choice of materials. One important contribution to sustainability goals is the efficient use of material resources, diverting waste from landfill. This can be achieved by using materials that have above-average recycled content, employing both off-the-shelf mainstream products such as certain brands of bricks, blocks, chipboard and plasterboard, and materials that have been recycled from site-won materials, such as crushed brick used for hardcore.

This project is required to achieve a minimum level of recycled content as a percentage of the total value of materials used on the project – this minimum level is 10% [or other specified threshold].

This project is also required to adopt the most significant cost-neutral opportunities to increase the value of materials deriving from recycled and re-used content, such as the top ten Quick Wins or equivalent opportunities. The list of components which could most significantly increase the recycled content of the project overall and their good practice levels of recycled content is included in this tender document. Implementation of these Quick Wins would achieve a target outcome of [X] % estimated by the design team.

Therefore the Contractor is required to include in their tender the details of how they will meet the minimum level of recycled content for the project, and which of the opportunities for higher recycled content (termed selected Quick Wins) they will implement, identifying the minimum level of recycled content to be achieved in each. Contractors may propose with justification any modifications to the requirements.

Upon completion of the project, the recommended method for demonstrating compliance is to provide evidence of the actual materials used and their levels of recycled content with respect to the list of selected Quick Win materials agreed with the Employer and incorporated in the Contract.

Where relevant, the Contractor should employ a systematic approach to good practice in the recycling and re-use of locally available construction, demolition and excavation waste materials (on-site and from nearby sites) – for example, applying the methodology outlined in the Demolition Protocol (published by ICE, London Remade and Envirocentre).

In an appropriate place, introduce the following text to explain what is required of the contractor during the tendering process:

In response to the List (included in these tender documents) of potential opportunities for increasing recycled and re- used content on this project (e.g. the top ten Quick Wins or equivalent options), the Contractor shall:

- Assess (with his suppliers and trade contractors where appropriate) whether products and materials containing levels of recycled content at least equal to those defined in the List can be obtained at competitive prices
- Supply information on the options identified in the List, detailing which the Contractor considers inappropriate or cannot be obtained at a reasonable price or do not meet the required performance criteria.
- Identify any other product areas offering higher recycled content that the contractor proposes to use as an alternative to those defined in the List, which can be obtained at a reasonable price, meet the required performance criteria and enable the works to meet the overall project requirement for recycled content.
- Be prepared to negotiate a final List of (cost neutral) Quick Win materials to be included in the Contract documents (if awarded) for implementation in the project.

A4.1.3 Contracts

With respect to the implementation of the 'selected Quick Win' material categories agreed with the contractor, the contract documentation may contain the following wording:

The Contract states a 'List of selected Quick Win materials' and specifies the minimum levels of recycled content to be achieved for these products. The Contractor is responsible for:

- Sourcing products and materials with levels of recycled content equivalent to or greater than those included in the List of selected Quick Win materials, selecting options which also meet all other relevant performance standards applying to this project – including where the Contractor has used materials which were not candidate Quick Wins identified by the design team in the tender specification
- Incorporating selected Quick Win materials in the works as described in the contract documents
- If requested, providing the Employer with evidence of the actual materials used that met or exceeded the requirements for the identified Quick Win materials.

Recycled content is the proportion, by mass, of recycled material in a product, excluding waste material (such as process scrap) reutilized within the same process that generated it. (See ISO14021 for a formal definition.)

A4.2 Design & build procurement

Design & build poses a different challenge to the improvement of recycled content as the client (Employer) is responsible for the project brief and contractor appointment, and it is the contractor that subsequently owns the process of specification writing.

The vehicle for setting minimum requirements is therefore the Employer's Requirements. The Employer's Requirements contain a set of performance criteria which the contractor must meet. The contractor is responsible for developing these criteria into a suitable design and then for constructing the building.

The following text assumes that the client requests good practice as well as the 10% minimum outcome.

Tender specifications / project briefs

The tender documentation may include the following wording within the Employer's Requirements:

[Organisation name] is committed to improving the environmental performance of their construction projects. Designs and specifications should consider the environmental impact of all elements of the design including choice of materials. One important contribution to sustainability goals is the efficient use of finite natural resources, diverting waste from landfill. This can be achieved by using materials that have above-average recycled content, employing both off-the-shelf mainstream products such as certain brands of bricks, blocks, chipboard and plasterboard, and materials that have been recycled on-site such as crushed brick used for hardcore.

Case study evidence shows that this may be achieved for no additional cost and without compromising the technical and aesthetic value of a project. The most significant opportunities to select materials which have a higher recycled content, comparable performance and availability and are cost-neutral are referred to as Quick Wins.

*The Contractor is required to ensure that, as a minimum outcome, at least 10% (or other specified threshold) of the total value of materials used in the construction project derives from recycled and re-used content in the products and materials selected (*see below).*

The Contractor must also demonstrate that the most significant cost-neutral opportunities to increase the value of materials deriving from recycled and re-used content (i.e. the relevant Quick Wins) have been identified and considered, that good practice has been implemented where technically and commercially viable, and that the targeted improvements made in the total recycled content above "baseline practice" for the project have been quantified. Tools and resources for evaluating recycled content and identifying Quick Wins with minimum effort are available from www.wrap.org.uk/construction/.

Clauses defining the minimum level of recycled content to be achieved on each of the selected Quick Wins should be inserted into the Contractor's specification.

Where the Contractor considers that the use of materials with higher recycled content for identified Quick Wins may be unachievable or that there is an additional cost in meeting this level, the Contractor must contact the Contract Administrator during the design development period with supporting information which states:

- *Identified Quick Wins (e.g. as indicated by the WRAP tools)*
- *The reasons for selecting not all of the identified Quick Wins or for pursuing levels of recycled content below "good practice" for the identified Quick Wins, identifying cost, programme and / or quality issues resulting in this decision*
- *Any alternative proposals for delivering higher recycled content.*

The Contractor must identify the minimum value for the recycled content in each of the selected Quick Wins. The Contractor must ensure that all corresponding materials achieve the required recycled content value, and retain evidence of their use through the collation of invoices and manufacturers' data. This information is to be made available to the Contract Administrator within five working days upon request.

At the end of the project, the Contractor must report to the Employer's Agent (or equivalent) the improvement made in the total recycled content above "baseline practice" for the project and the estimated outcome for total recycled content by value.

** The value of materials deriving from recycled content on a project may be calculated using the following summation across all the products and materials used: $\sum_A$ (quantity of product A) x (cost of product A) x (% recycled content by mass of product A)*

Recycled content is the proportion, by mass, of recycled material in a product, excluding waste material (such as process scrap) reutilized within the same process that generated it – see ISO14021 for a formal definition. Where a product or material is reused (e.g. is removed and replaced or is moved to another location), then it is credited at 100% reused content by value. The cost of a product is the unit delivered price for the materials, excluding installation costs.'

A5. Partnering frameworks

Under a partnering process, the basic wording described previously can be applied (for either a traditional or design & build process depending on the nature of the framework). However, under a partnering framework a further document, the partnering agreement, will be produced clearly setting out the high-level objectives and performance measures of the framework and defining the roles and responsibilities of the different partners. There should also be an expectation that the partners demonstrate continuous improvement in performance.

A typical partnering agreement will include information on the framework objectives, KPIs against which the team's performance can be monitored and roles and responsibilities. The following wording could be used as a basis (although on an actual project it is important that the detailed wording should be agreed by all partners):

Objectives

[Insert under an objective relating to sustainable construction]
Materials resource efficiency is an important element of sustainable construction, therefore the projects delivered under this agreement will seek to:

- *Ensure that a minimum of 10% of the total value of materials used on a project are derived from recycled and reused sources*
- *Increase the overall recycled and reused content of each project beyond that which would be achieved by standard practice products (as defined by benchmarks compiled by WRAP – Waste & Resources Action Programme) by adopting appropriate cost neutral Quick Win opportunities to increase recycled content and evaluating their impact*
- *Implement a Site Waste Management Plan in line with good practice published by WRAP. The Plan will evaluate what level of reuse and recycling is possible and set targets for waste reduction and materials diverted from landfill.*

Performance indicators

[Insert under the section on KPIs to measure continuous improvement]
Recycled content – increase in percentage recycled and reused content by value above that which would have been achieved if only 'standard' practice products (as defined by WRAP benchmarks) were used.

Roles and responsibilities

[Insert with respect to resource efficiency]
Under this agreement, the project architect/Quantity Surveyor/Cost Planner/ [as appropriate] shall complete an assessment of the recycled content of each project following the guidelines issued by WRAP. The partners will be responsible for evaluating the identified potential Quick Win opportunities to increase the recycled content of the project. The contractor and their subcontractors are responsible for selecting those that they believe to be appropriate for use on the project and procuring products with levels of recycled content at least equivalent to that agreed with the partners for each of the selected Quick Wins and for providing evidence of their use in construction.

Waste & Resources Action Programme

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