



# A review of sustainable procurement initiatives

C4S at TRL Ltd and Halcrow

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# A REVIEW OF SUSTAINABLE PROCUREMENT INITIATIVES

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by TRL Limited and Halcrow

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(Matthew Winter)

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## Executive summary

This is a summary document of a full report on ‘Review of Procurement Practices in the UK, EU and Overseas’ with respect to introducing requirements for sustainability into highway construction and maintenance for the Highways Agency (HA). The purpose of these reports is to identify sustainability policy and legislation drivers as well as identify and learn from best practice on sustainable procurement from organisations internationally, in Europe and in the UK, and to identify how best practice could be implemented to meet HA’s current and potentially future sustainability vision and objectives.

There is a great deal of high level policy documents that exist on sustainable procurement in the UK, EU and overseas. In UK, the Environment Agency has implemented sustainability in its procurement processes to a very high degree, including setting specific targets for materials such as recycled aggregates and producing specific contract clauses to require contractors and designers to produce sustainable solutions. WRAP has also developed contract clauses that can be included in a range of contract-related documents to increase material resource efficiency. They have particular experience with local authority highway maintenance works, and there is experience of these by a number of local authorities in England.

A review of current sustainable procurement practices in Highway Agency was conducted and it was observed, that procurement staff require further support to understand sustainability and how to include it in contracts. The Sustainable Development Action Plan has helped, but more guidance is needed. Further, any sustainable solutions must be cost-neutral or offer an economic benefit. There may also be conflict with other drivers, such as Journey Time Reliability, which limit the time contractors have access to the network and hence the scope for sustainable options. Procurement staff expressed a preference for requirements on sustainability to be included in standards and specifications – the MCHW and DMRB. Although there are numerous sustainable options available in both sets of documents, introduced over recent years, they are permissive rather than mandatory. It would appear that the best place to include specific requirements for sustainability is in the Works Information of the relevant MCD. Procedures such as Value Engineering and Value Management can also be used to improve the sustainability of schemes, but clearer guidance is needed on how the sustainability of a proposed scheme should be evaluated.

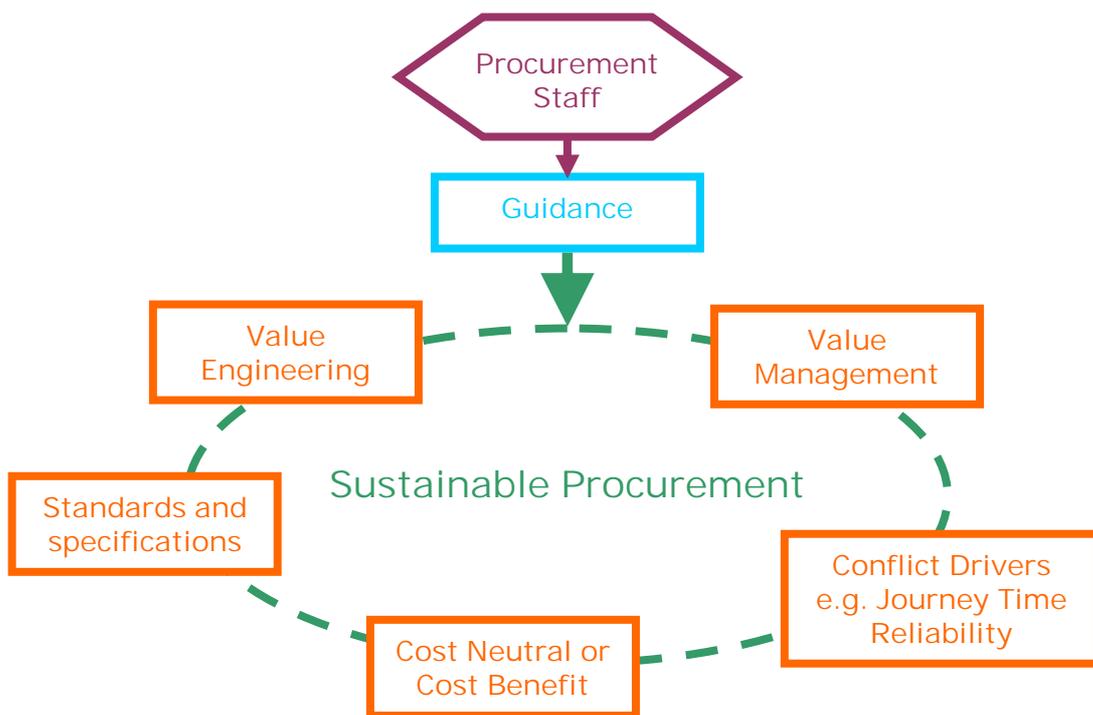


Figure 1: How sustainability guidance could utilise the current procurement tools

In terms of targets, a large number are potentially available as developed by organisations such as WRAP. These can include targets such as minimum recycled content or diversion of waste from landfill to newer concepts such as net waste and carbon footprints. These may be required in order to demonstrate that government targets for sustainable construction have been met. Other parameters such as CEEQUAL or BREEAM ratings may be appropriate in some situations.

Targets for individual contracts can still be set in terms of recycled content and diversion of waste from landfill, which are relatively easy to monitor. The Site Waste Management Plan (SWMP) Regulations 2008 provide a useful driver in this regard. As the amount of recycled content that is possible on any individual scheme can vary widely depending on the site specific circumstances, we recommend requiring contractors and designers to participate in a process of maximising reuse and recycling of materials and minimising waste, energy and transport distances rather than setting arbitrary targets for recycled content. This allows the optimum sustainable solution for each scheme to be developed. Site Waste Management Plans and HA Environmental Information System (EnvIS) provide useful ways in which this can be monitored; the lack of adequate monitoring of what was built was highlighted as a problem by HA procurement staff.

The large amount of information has been reported in full report which should be reviewed and used to assess the best way forward for developing contract clauses and other mechanisms to implement sustainability into HA operations via procurement.

The following recommendations have been made in this summary report.

- A tender assessment framework needs to be developed to assess the potential sustainability of tenders.
- Examples of relevant contract clauses should be developed for the different HA project types to enable the HA to be able to require the contractor or contract consortia to meet relevant sustainability targets.
- The HA should encourage the development of relevant product and material assessment schemes which encourage the use of resource efficiency.
- Identify cost neutral solutions that will help HA to achieve its sustainability objectives.
- HA should consider the development of additional relevant targets/Key Performance Indicators.
- Introducing updates to the value management process to assess the value of schemes presented

## Abbreviations

AMF	Asset Management Framework
BMW	Biodegradable Municipal Waste
BREEAM	Building Research Establishment Environmental Assessment Method
CEEQUAL	Civil Engineering Environmental Quality Assessment & Award
C&D	Construction & Demolition
D&B	Design and Build
DBFO	Design Build Finance Operation
DMRB	Design Manual for Roads & Bridges
ECI	Early Contractor Involvement
EnvIS	Environmental Information System
ETS	Emissions Trading Scheme
HA	Highways Agency
KPI	Key Performance Indicator
LCA	Life Cycle Analysis
MAC	Managing Agent Contractor
MCHW	Manual of Contract Documents for Highway Works
NIA	Northern Ireland Authority
PESTLE	Political, Economic, Socio-Cultural, Technological, Legal and Environmental
PQQ	Pre-Qualification Questionnaire
RC	Recycled Content
SPTF	Sustainable Procurement Task Force
SRN	Strategic Road Network
SWMP	Site Waste Management Plan
VWP	Value Wales Procurement
WRAP	Waste & Resources Action Programme

# 1 Introduction

In the 1980s, increasing concern about the effects of economic development on health, natural resources and the environment led the United Nations to publish the Brundtland Report, *Our Common Future* (1987). This defined Sustainable Development as “*development which meets the needs of the present without compromising the ability of future generations to meet their own needs*”.

Sustainable Development encourages the conservation and preservation of natural resources and of the environment, and the management of energy, waste and transportation. It is development based on patterns of production and consumption that can be pursued into the future without degrading the human or natural environment; one of the main initiatives to achieve this is through sustainable procurement which is the application of sustainable development considerations to spending and investment decisions.

This report is a detailed report aimed at aiding procurement staff, environmental policy makers and Agency management to make decisions which will complement the Highways Agency's Sustainable Development Action Plan<sup>1</sup>. This report was compiled by carrying out a review of published literature, interviews with Highways Agency (HA) procurement staff, TRL and Halcrow experts and consultations with procurement professionals in overseas countries and the devolved administrations in the UK.

Experiences from within the UK, EU and internationally were examined for examples of best practice within the procurement process, which will benefit the Highways Agency both as a Government agency as well as a private organisation.

## 1.1 What are the aims and objectives of this report

The overall aim of this report is to identify and promote best practice in the field of sustainable procurement which can be incorporated in to the Highways Agency's procurement practices. The aim of the report is to review drivers that currently exist in the HA, how the HA are currently responding to these drivers, where the gaps are and the recommendations.

## 1.2 Scope of the report

This report is a scoping report on procuring in a sustainable manner. The report includes:

- A review of what has been done to implement sustainability by setting targets through procurement practices in the UK and internationally;
- A review of good practice;
- Identification of practices that offer promise and areas that should be investigated in greater detail; and
- Recommendations for policy, procedure, new guidance, training and awareness raising, and amendments to Highways Agency documents to implement sustainability in operations.

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<sup>1</sup> [www.highways.gov.uk/aboutus/documents/SDAP\\_Jun\\_07.pdf](http://www.highways.gov.uk/aboutus/documents/SDAP_Jun_07.pdf)

## 2 A review of sustainable procurement

### 2.1 What is sustainability?

Before procurement can be used to implement sustainability, there needs to be a clear vision of what sustainability means and how it applies to the HA. The concept of sustainability has achieved wide currency in the last twenty years, since the famous definition in the Bruntland Report.

The concept has been taken up very widely across the developed world, partly as a result of the two 'Earth Summits' in Rio de Janeiro (1992) and Johannesburg (2002), and partly because it is a concept that can be intuitively understood and has wide resonance with the public. Sustainable development has been part of UK government policy since the late 1990s and was reaffirmed in the 2005 document "Securing the future" (Defra, 2005a). This UK policy has been taken up by the devolved administrations, and the HA has produced its own Sustainable Development Action Plan (SDAP) (Highways Agency, 2007), based on the five principles and four priority areas set out in "Securing the future". The relation between the priority areas and HA activities is shown very well in Figure 1 of the SDAP, reproduced below as Figure 2.

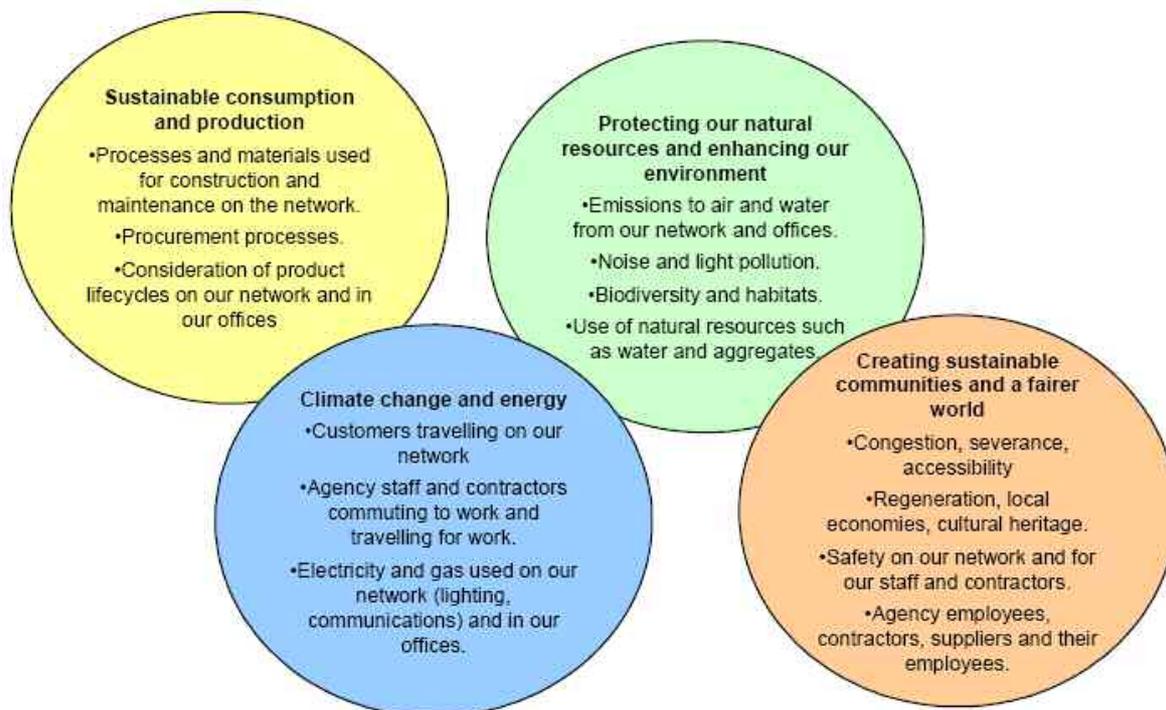


Figure 2 Highways Agency main sustainability impacts against UK priorities

While sustainability may be easy to grasp as a concept, translating it into a consistent set of actions that can be implemented and monitored is more difficult, partly because the scope of the subject is so wide, as Figure 1 indicates. Within the HA, the focus since the mid 1990s has been mainly on materials and processes, specifically the use of recycled and secondary aggregates and recycling techniques for road pavements. The Specification for Highway Works (Manual Contract for Highway Works. MCHW1) and the Design Manual for Roads and Bridges (DMRB), particularly Volume 7 Pavement Design and Maintenance, have been updated to permit the use of these materials and processes, subject to safeguards on quality control so that performance is not affected. As a result there has been a considerable uptake of these materials and processes, particularly by the major contractors, and a number of projects have shown major sustainability

benefits. However, this has not been universal and is ultimately down to the contractor's preference and the economics of each contract. The MCHW and DMRB are essentially permissive; they present a range of options and say, "if you use this option, this is how you must do it." In their present form, they do not require the contractor to use sustainable options, or even to determine what the most sustainable options are for a given contract. Such requirements could be included elsewhere in the DMRB, possibly in Volume 10, Environmental Design.

Besides the use of materials and processes, other sustainability issues such as climate change and biodiversity impact on a number of other areas of the HA's activities, affecting the construction, maintenance and operation of the network. These may be addressed in a range of ways, as set out in the SDAP. However, procurement is clearly set in the area of "Sustainable consumption and production" (Figure 1), along with "processes and materials used for construction and maintenance on the network" and "consideration of product lifecycle on our network and in our offices". This seems appropriate, as the way in which the construction and maintenance of the network is procured can affect the other two items in this area, whereas many of the topics in the other areas are not so directly open to influence by procurement processes.

## 2.2 Sustainable procurement

Sustainable procurement is the application of sustainable development principles to procurement and is a key activity in helping to ensure that the world remains habitable and that people have a decent quality of life.

The principle that procurement processes can be used to achieve sustainable methods of construction and maintenance has been established by the Office of Government Commerce in Achieving Excellence in Procurement Note 11: Sustainability (Office of Government Commerce, 2007). There are numerous examples from the UK, devolved administrations, Europe and other developed countries, and these are discussed in the following sections. The examples include national governments and highway authorities, other government agencies, local authorities and private companies such as utilities. The methods used range from legislation through a statement of principles to detailed processes with targets for particular activities. The methods used by different organisations and their application to Highways Agency procurement are discussed briefly below.

### 2.2.1 Legislation

Legislation is used as a direct tool to enforce sustainability only in a few countries; most notably Japan where the Construction Materials Recycling Law of 2002 requires contractors to ensure the maximum material possible is selectively dismantled and recycled at construction works above a specified size. This policy includes numerical targets including the recycling rate of specified construction materials (such as concrete, asphalt and timber) in 2010 be 95% and the final disposal amount of specified construction material wastes generated in works ordered by the Government be zero in 2005. This approach is determined partly by the acute shortage of landfill in Japan and partly by Japanese cultural traditions.

This direct approach is unlikely to be adopted in the UK, which has traditionally avoided such prescriptive methods of changing behaviour and has to work within the wider Environmental legislative framework of the European Union. The European Union has a significant set of Environmental and social legislative frameworks on issues such as waste, water, climate change and resource use and the UK is required to transpose European regulation into UK law.

The public sector in Wales has a duty under Section 121 of the Government of Wales Act 1998 to promote sustainable development into the exercise of its functions. This duty is unique in the UK. This has yet to work down into specific sustainable procurement requirements for Transport

Wales, the nearest equivalent to the Highways Agency. However, the Welsh Assembly Government insisted on a recent resurfacing contract for the M4 that a high recycled content be used, resulting in an innovative use of 25% reclaimed asphalt in the new surface course.

The introduction of the Site Waste Management Plans Regulations 2008 and environmental taxes such as the landfill tax and aggregates levy, both of which are set to rise sharply in April 2008, indicate that the UK government is prepared to use legislation to at least indirectly influence behaviour by influencing the economics of waste disposal and recycling. This trend is likely to continue, and should result in greater willingness for contractors to choose recycled materials and processes that avoid sending waste to landfill.

### 2.2.2 Green procurement: Europe

The green procurement approach considers other factors than the lowest price when awarding tenders and allows sustainability to be one of the other criteria to be scored in tender assessment. In the EU there has been some concern that European sustainable procurement policies are in conflict with its policies on free trade. Consequently the European Commission has modified European procurement directives to take into account the desire of many Member States to use procurement as a method of increasing sustainability. EU Directives 17&18 (2004) allow for specification of environmental criteria in calls for tender/product specification/contract performance clauses (within the broader guidelines). However, environmental clauses and specifications in contracts and calls for tenders need to be carefully worded to ensure they are not seen to prevent free trade.

The EU has initiated a number of projects and guidance documents on sustainable procurement. These include the EU Buying Green Handbook (Commission for the European Communities, 2004) which gives the following recommendations:

- Use a life cycle approach;
- Clear and precise;
- Use performance-based or functional specifications to encourage innovative green offers;
- Set criteria (if cost insert minimum acceptable environmental standard);
- Set priorities;
- Transportation of material and tools to the site (e.g. provide a bonus for every 'green' vehicles used);
- Require EMS and training of staff.

So far, it appears that these initiatives have largely been applied to buildings rather than infrastructure, but the principles would apply equally to highway construction and maintenance.

A number of countries, including Switzerland, The Netherlands, Denmark and Sweden, have used a combination of approaches to achieve high levels of use of recycled materials in roads. The measures include:

- Procurement policies;
- Updated national Specifications that cover the use of recycled materials;
- Involvement of national Environmental Agencies to assess potential harm from use of recycled materials;
- Taxes on disposal to landfill and use of natural aggregates.

This approach is similar to that of the UK in several respects, and suggests that use of sustainability criteria in highway procurement in the UK could achieve similar results.

### 2.2.3 Green procurement: other OECD countries

The literature review looked at practice in the USA, Japan, Canada, Australia and New Zealand (as discussed in the Full Report on Procurement). In Canada, Australia and New Zealand, the national highway authorities have started to introduce clauses relating to sustainability into their contracts for highway construction and maintenance. For example, the New Zealand Government defines sustainable procurement policy as extending the concept of best value for money to include the costs involved in resource use (i.e. whole life costs) and other non-monetary aspects. It states for the Government this should include national targets and policies. The following model clauses for contracts are listed:

- “[Agency] is committed to purchasing sustainable products works and services wherever possible.
- [Agency] will give appropriate weighting to sustainable products works and services in the purchasing process.
- [Agency] has determined that the following sustainability considerations will be weighted when purchasing (list materials or services to be purchased). The supplier will:
  - Perform the services in a manner which gives appropriate regard for the protection of the natural environment
  - Comply with all environmentally related legislation and codes of practices relating to the products and services being offered
  - Ensure any opportunities for improvement in [agency’s] environmental performance identified by the Supplier’s employees or sub-contractors are reported to the relevant [agency] key contact.”

New Zealand’s state highway agency, Transit lists using resources effectively as one of its environmental policies. Historically, the majority of Transit’s business was awarded on the basis of a ‘lowest-cost price’ tender model, with no weighting attributed to environmental performance beyond compliance with designation and resource consent conditions. However, recently Transit has introduced a Long Term Procurement Plan increasing the focus on quality as part of the selection process.

In 2003 Transit put in place a Waste and Energy Management Policy (WEMP) stating Transit’s commitment to sustainable road construction, management and administration. It emphasises the need to recycle and reuse materials when constructing highways. The WEMP aims to ensure Transit meets its responsibilities under central government strategies to reduce waste and achieve energy and resource efficiency. Transit is in the process of preparing templates and guidelines for resource efficiency plans and compiling case studies of good resource management. These may offer a suitable model for use by the Highways Agency and should be investigated further. There appears to be little noticeable difference at individual contract level as yet, but this is likely to take place over the next few years.

### 2.2.4 UK: local authorities

Some UK local authorities have made considerable strides towards introducing sustainability into their operations. This can be done through the planning system, with developers being required

to include consideration of waste and recycled materials in their proposals. An example is Bristol City Council's Supplementary Planning Document Number 5, Sustainable Building Design and Construction (Bristol City Council, 2006). In theory, local authorities could use the planning system to require Highways Agency to include sustainability requirements in contracts. Certainly, pressure from local agents can influence the Agency; in a similar development to the M4 resurfacing described in the full report, the local agent insisted on a high recycled content for the resurfacing of the M25 near Reigate, and this was approved by Highways Agency.

Local authorities are responsible for the maintenance of about 98% of the road network in England and Wales. This includes a very wide range of roads, from heavily trafficked principal roads to very lightly trafficked rural lanes and suburban estate roads. Many local authorities have responded to government policy on sustainable construction by adapting their procurement methods to include requirements for contractors to use recycled materials and recycling processes. A number of examples of how this can be achieved are presented in the WRAP document "Recycled roads: a step-by-step guide to local authority procurement" (WRAP, 2005). These focus on term maintenance contracts for highway works and cover a range of contract types, with example clauses, KPIs, targets and case studies. Among the key points that are stressed are:

- Set top-down objectives for higher recycled content, based on your authority's core objectives for sustainability and waste management;
- Make choices within your form of contract to provide a positive context for introducing higher recycled content – particularly by developing partnering arrangements;
- When inviting tenders, specify objectives and quantitative requirements for recycled content;
- When evaluating tenders, give credit for those that offer higher recycled content and associated benefits;
- Set performance indicators and targets for improvement, and allocate risks and rewards accordingly;
- During contract extension, introduce requirements and indicators that create incentives to use recycled content.

Experience from a number of local authorities was that, through partnership working, significant increases in recycled content and reduction in waste to landfill could be achieved. This approach may be relevant for MAC/AMF contracts, although the nature and scale of the works and the contractual setups are different. The approach focuses on relatively easily measured parameters such as recycled content of various road construction materials and waste to landfill and often incorporates year-by-year increases in targets.

Guidance on use of sustainable materials and processes in local authority highway maintenance has been drafted by TRL for DfT; this includes a comprehensive guidance document (Reid *et al.*, 2007a) and a short guide, including milestones and KPIs for sustainability (Reid *et al.*, 2007b). When published, these documents will provide useful guidance to local authorities on incorporating sustainability into highway maintenance.

### 2.2.5 UK Environment Agency

The body that has taken sustainable procurement most seriously in the UK appears to be the Environment Agency (See Section 5.3 in Full Report). The Environment Agency strongly believes that procurement has a key role to play in achieving their overall vision and mission. They have set up a sustainable procurement strategy model and guide. The guide emphasises the importance of adopting a Life Cycle Assessment (LCA) approach as best practice in terms of environmental and social risk assessment. The application of LCAs along with Life Cycle Impact Mapping is given as best practice for buyers in terms of identifying the overall environmental

impacts of a product or service being purchased. The Environment Agency has conducted internal research in terms of the application of these approaches to day to day procurement with great success especially in relation to identifying, assessing and managing risk.

All Environment Agency contracts contain the following main contract condition which looks to address elements of sustainability in relation to goods or service provided:

"The Contractor shall in all his operations, including purchase of materials goods and services, adopt a sound proactive environmental approach, designed to minimise harm to the environment and be able to provide proof of so doing to the Contract Supervisor on demand."

The Environment Agency uses a series of risk assessments at the procurement stage, which is based on the size and scope of the project. The risk assessments inform the high level approach at the design phase. The Agency uses a template for construction projects and commodity guidance that provides information on the risk of using different commodities, i.e. aggregates, sand or energy.

The sustainability agenda translates to the construction contractor through the Environment supplier performance measure. A process is then in place to review the environmental performance on a quarterly basis with the contractor. The Environment Agency has recently produced a number of new guidance documents that could be reviewed in further study.

The National Capital Programme Management Service (NCPMS) is a separate distinct group within the Environment Agency which aims to provide Regions, Areas and other National Services/centres with an effective project and programme management service. NCPMS through partnership working with its service providers has several environmental targets in relation to aggregate use, timber sourcing, and waste to landfill. NCPMS intend to lead from the front and by example in adopting such environmental targets therefore championing more sustainable construction practices. These targets are set annually and it is the intention that improvements shall be seen on an annual basis. Only by working in partnership with its service providers can the Environment Agency achieve these targets.

As part of the procurement process, all construction contractors working for the Environment Agency have a role to play in leading by example and demonstrating what sustainable construction means in practice. The Environment Agency considers that this should include improving resource efficiency and reducing carbon emissions on all construction projects. Calculating carbon will help the Environment Agency assess and compare sustainability of different designs (in CO<sub>2</sub> terms) and therefore to influence options at the appraisal stage. It will also help highlight where 'big wins' carbon savings can be made. The use of the Carbon Calculator is detailed in the Environment Agency Operational Instruction 'Use of the carbon calculator on Environment Agency construction projects'.

Clearly, the Environment Agency is highly advanced in its consideration of sustainability and how it can be implemented through the procurement process. It is notable that the Environment Agency not only has specific environmental targets for aggregates, but also that they consider the social as well as the environmental and economic aspects of sustainability. It therefore presents a model that the Highways Agency may wish to investigate with a view to implementing in its own procurement processes.

### 2.3 Targets

A key factor running through all the examples given above is the setting of appropriate Key Performance Indicators and targets for sustainability. The more advanced the system is with respect to sustainable procurement, the more detailed and specific the KPIs and targets are.

Clear and precise targets are preferable to general statements, but need to be carefully crafted with respect to the local conditions to avoid being either not stretching enough or being unachievable; worse still, carelessly drafted targets may in some cases be counterproductive, leading to emphasis on use in low value applications and effectively preventing use in higher value applications. Proposed KPIs and milestones for local authority highway maintenance are suggested by Reid *et al* (2007b). The milestones and KPIs in this study are broken down into four levels; zero, one, two and three. Milestone Zero is explained as the use of standard techniques for highway maintenance that are safe and fit for purpose but do not include any use of recycled or secondary materials. Milestone one to three are cumulative to eventually include cutting edge techniques for sustainable construction. The milestones are then broken down to provide a detailed description of the materials and methods used at each level of the highway construction.

The KPIs were developed on a similar basis and are outlined in Table 1.

## Key Performance Indicators

### *Description of works:*

- KPIs and targets for sustainability in highway maintenance and new construction works

Milestone	KPI	Possible Target
ZERO	<ul style="list-style-type: none"> <li>• No recycling carried out, or recycling not recorded</li> </ul>	<ul style="list-style-type: none"> <li>• No formal system for recording amount of recycling or diversion of waste from landfill</li> </ul>
ONE	<ul style="list-style-type: none"> <li>• Percentage of waste sent for recycling</li> <li>• Percentage of waste sent to landfill</li> <li>• Percentage of recycled materials used (by volume or value), overall or in specific applications</li> <li>• Cost savings due to recycling</li> </ul>	<ul style="list-style-type: none"> <li>• e.g. up to 100% of all bituminous bound arisings</li> <li>• In line with overall targets for the Local Authority</li> <li>• Baseline values or minimum/low risk accepted within standard specifications</li> <li>• Positive (i.e. cost savings rather than losses)</li> </ul>
TWO	<ul style="list-style-type: none"> <li>• Percentage of waste recycled on site</li> <li>• Percentage of imported recycled materials (by volume or value)</li> <li>• Percentage of work for which recycling is specified (i.e. required, not optional)</li> <li>• Percentage of recycled materials used (by volume or value), overall or in specific applications</li> </ul>	<ul style="list-style-type: none"> <li>• Project specific, taking into account industry good practice</li> <li>• Relate to available material on site</li> <li>• The Office of Government Commerce advises setting 10% (by value) as a minimum but work undertaken by WRAP has demonstrated that higher values can be achieved</li> <li>• Incrementally increased from baseline and/or industry good practice</li> </ul>
THREE	<ul style="list-style-type: none"> <li>• Reduction in construction waste</li> <li>• Percentage of recycled materials used (by volume or value), overall or in specific applications</li> <li>• Percentage of all aggregates sourced within a specified miles/km radius</li> <li>• Savings in emissions of CO<sub>2</sub></li> </ul>	<ul style="list-style-type: none"> <li>• Project specific, taking into account industry best practice</li> <li>• Incrementally increased from Level 2 and/or industry best practice</li> <li>• The maximum considering technical requirements (e.g. high PSV aggregates might need to be imported)</li> <li>• Positive, i.e. savings with respect to existing practices</li> </ul>

Table 1 Key Performance Indicators (Reid et al, 2007b)

At present, Highways Agency do not set any targets for sustainability. If it is decided to set such targets, they would need to be set using the procurement process, probably in the Works Information of Model Contract Documents (see 2.6 of Full Report). Targets that have been used are generally for recycled content or diversion of waste from landfill, but need not be limited to these areas. A selection of these targets is shown in Table 2 and 3.

Client Organisation	Target	Comments
Environment Agency	At least 70% of aggregates used in capital works by weight are from secondary/recycled sources	Principally flood defence works
Central Procurement Directorate, Northern Ireland Government	Minimum recycled content of 10% by value in all major public procurement works	Also being considered by Scottish Government
Welsh Assembly Government	At least 25% of Wales aggregate supply should be from secondary sources	Already achieved; no specific targets for roads in Wales
City of Edinburgh Council	Greater than 20% by mass of aggregates to be recycled content	Caltongate Masterplan; includes other KPIs such as reuse 40% of demolition arisings
Thames Water Engineering	Minimum 30% by mass recycled content in backfill for utility excavations	Applies within M25 only; target is 15% outside M25
National Grid	Zero use of virgin aggregate where recycled materials are available for backfill and sub-base	UK wide: backfill for gas mains renewals, to be achieved by 2010
Essex County Council term highway maintenance contract	5% of all materials used in service delivery to be from recycled sources in 2000/01, rising to 50% in 2006/07	Over 95% of material extracted from highways is now reused or recycled
London Borough of Merton	Minimum percentages for recycled aggregates specified for different applications, ranging from 5% for surface course to 80% for sub-base	Contractor expected to exceed the minimum requirements
Construction Material Recycling Law, Japan	Recycling rate of 95% for concrete and asphalt by 2010	Recycling rates up to 98% achieved

Table 2 Examples of targets for recycled content

Client Organisation	Target	Comments
EU Targets for reduction in Biodegradable Municipal Waste to landfill	75% of 1995 level by 2009/10 50% of 1995 level by 2012/13 35% of 1995 level by 2019/20	Not strictly relevant to waste from highway works.
UK Government Draft Strategy for Sustainable Construction	By 2012 a 50% reduction of construction, demolition and excavation waste to landfill compared to 2005.  By 2015, zero net waste, at construction site level.  By 2020, zero waste to landfill	To be finalised in 2008.
Environment Agency	To ensure that less than 25% of construction waste produced from capital works are sent for disposal to landfill.	Mainly flood defence works
City of Edinburgh Council	Divert 80% or more of waste away from ultimate disposal at landfill by means of promoting source reduction, re-use and recycling of waste	Caltongate Masterplan: includes other waste and recycled content KPIs
Thames Water Engineering	Not more than 20% of excavated material to be sent to landfill	Applies to renewals and new works, not to tunnels
National Grid	Less than 10% of arisings to landfill by 2009/10	UK wide; excavations for gas mains renewal works

Table 3 Examples of targets for diversion of waste from landfill

The research team were not able to assess the cost implications of each target due to time constraints and resources available.

The targets vary from high level targets with wide application, such as the EU targets for diversion of Biodegradable Municipal Waste (BMW) from landfill and the draft UK targets on waste for the sustainable construction strategy, to very specific targets for specific areas or developments, such as the Edinburgh Caltongate waste and materials targets and the recycled content targets for Essex County Council and London Borough of Merton highway maintenance. Targets for specific contracts, such as DBFO or Major Project schemes, or for highway maintenance over a large area such as a MAC or AMF, require a good knowledge of available materials and processes. In the case of long term maintenance contracts they should also allow for future developments that enable the use of new materials or processes, and should not restrict the contractor's ability to choose the most appropriate materials and methods for the project.

In terms of strategic targets, the ones in the UK strategy for sustainable construction would be the most appropriate for Highways Agency to adopt. These are long term targets that will have a significant influence on the construction industry in the UK, and could potentially become legal requirements at some future stage. As a government agency, it would be appropriate for Highways Agency to support these targets.

Because of the difficulties of setting appropriate targets for individual projects and asset management frameworks at the start of the project cycle, it may be more appropriate to require the contractor (and designer) to engage with Highways Agency in a process to determine the most sustainable options for a particular scheme during the design stage and then confirm that these had been implemented during the construction stage; in other words, a process rather than a preset target that may turn out not to be appropriate. WRAP has developed a number of contract clauses of this sort for implementing good practice in Site Waste Management Plans and Waste Minimisation and Management in construction (WRAP, 2007). These cover a variety of contract types, including traditional, design and build and partnering frameworks. Clauses are also given for appointment of designers, project information/briefs (akin to the Works Information in Highways Agency contracts) and pre-qualification questionnaires. These contract clauses could provide a model for use in Highways Agency contracts, with appropriate modifications. An extract from the suggested text to include in the Employer's Requirements for a design and build project is given below:

"[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 meeting good practice levels of waste minimisation and management throughout the project in accordance with WRAP guidelines and by adopting the most significant cost-neutral opportunities to increase waste recovery.

The Contractor is required to implement where possible cost-effective methods of waste minimisation during the design of the project and thereafter during construction. As a minimum the contractor should:"

There follows a long list of items to be considered, agreed with the Employer's Agent, implemented on site and recorded in the Site Waste Management Plan for the project.

The WRAP guidance is aimed principally at building contracts rather than infrastructure, and is full of references to WRAP guidance, tools and procedures that would not be appropriate in Highways Agency contracts, but the basic approach could be adopted.

A very important aspect of the process approach is that Highways Agency would need to be involved throughout the design and construction stages to approve the contractor's proposals and ensure that they are implemented on site. Site Waste Management Plans (see below) provide a mechanism by which this can be achieved, and the information can also be recorded in Environmental Information System (EnvIS) – a system developed by the HA to record environmental information. SWMP only deals with waste not directly with material efficiency. For MAC/Asset Management Framework contracts, the Value Management process provides a mechanism for this at the design stage. The existing procedures do not cater for sustainability other than for noise and a brief section on recycled content, so additional guidance on assessing the sustainability of proposals will need to be developed. For DBFO, EC1 and TPI projects, the value engineering process could be used to maximise the sustainability of proposals. Again, it will be necessary to provide guidance for this.

As mentioned earlier, targets for recycled content and diversion of waste from landfill are relatively easy to measure. However, they may not be the best measure of the sustainability of a

proposal, as they do not take account of other factors such as energy use, transport distances and emissions. Using recycled aggregates in a rural location when sources of rock or gravel are available locally, for example, is not sustainable. Other tools, such as using the WRAP or Environment Agency CO<sub>2</sub> calculators can be used to determine the most sustainable option for a particular location and type of work, and targets for recycled content and waste diversion can be set on the basis of this information rather than on national targets that may not be appropriate.

A further refinement on this process is LCA; this is a technique for assessing the environmental aspects associated with a product over its life cycle (often referred to as 'cradle to grave'), which is important to understand during the procurement process. A LCA can assist decision-makers in selecting the product or process that result in the least impact to the environment. This information can be used with other factors, such as cost and performance data to select a product or process. At present sufficiently reliable tools for LCA are not available to employ this technique for setting targets. However, it is likely that over the medium to long term targets based on CO<sub>2</sub> emissions or LCA will become more common in construction.

A further option would be to require CEEQUAL ratings of excellent for individual projects. This is required in HA's sustainable development action plan (SDAP). This would allow the contractor scope to develop the best way of achieving the target, and would give a broader coverage of sustainability issues than recycled content and waste. However, the scheme might not be appropriate for all schemes, particularly small maintenance projects.

## 2.4 Site Waste Management Plans

The government is introducing the Site Waste Management Plans Regulations 2008 under Section 54 of the Clean Neighbourhoods and Environment Act 2005. A Site Waste Management Plan (SWMP) is a plan that records the types and quantities of waste that are produced on a construction site and how they are reused, recycled or otherwise disposed of. It should be updated regularly during the course of the project. A transitional period will apply so that works planned before 6 April 2008 but where construction work begins before 1 July 2008 will be exempt from the Regulations. A scoping study carried out in March 2007 found that most of the Highways Agency's contractors were aware of the impending legislation.

Under the Regulations, the Agency will have responsibilities as a client to:

- see that a SWMP is prepared before work begins on site;
- appoint a principal contractor;
- give reasonable directions to any contractor to enable the principal contractor to comply with the Regulations;
- review, revise and refine the plan as necessary and ensure that any changes in roles and responsibilities are communicated to those affected; and
- take reasonable steps to ensure that sufficient site security measures are in place to prevent the illegal disposal of waste.

As part of the SWMP, the client and the principal contractor must also sign a declaration before work commences that all waste from the site will be dealt with in accordance with the waste duty of care and that materials will be handled efficiently and waste managed appropriately.

The Regulations will apply to all new construction and structural maintenance projects (pavements, bridges, drainage, earthworks, etc) and to ground investigations above the threshold value but do not apply to routine maintenance operations (grass cutting, gully cleaning, litter removal, etc).

The SWMP Regulations 2008 and associated non-statutory guidance are quite clear that both the client and the principal contractor are equally responsible: the client is responsible for setting up the SWMP before work begins on site and coordinating the designer, principal contractor and

subcontractors so that they are aware of it and able to implement it; and the principal contractor is responsible for implementing it on site and completing the project declarations.

Overall responsibility for seeing that the SWMP is developed and implemented therefore remains with the Highways Agency, and needs to be incorporated in the overall contract for the MAC/AMF and the contracts for individual schemes. The definitions of 'client' and 'principal contractor' in the SWMP Regulations are the same as in the CDM Regulations 2007, so if the Agency is the client for CDM they will also be the client for SWMP.

An Interim Advice Note covering the Agency's requirements for SWMPs is being prepared and will be available in draft form by the end of March 2008. This will cover general requirements for how SWMPs should be prepared and implemented for Highways Agency contracts. Specific requirements can be given in the Works Information in the Model Contract Documents for individual schemes. In general, it is likely that specific requirements would be set for implementation of particular sustainability measures, such as maximising the use of recycled materials, and that the SWMP would be used to record this at the design stage and to demonstrate that it had been implemented during the construction works. More general requirements for sustainability and the use of SWMPs to demonstrate this should be incorporated in the Works Information for the MAC/AMF as a whole, so that the contractor knows what will be expected. An option is suggested below:

"The successful contractor will be required to develop and implement a Site Waste Management Plan in accordance with the Site Waste Management Plan Regulations (Statutory Instruments 2008 No. 314) for all schemes above the threshold value of £300,000 excluding VAT. The Plan must be drawn up at the scheme development stage and will be agreed with the Agency during Value Management. The contractor must ensure that the Plan is updated during the construction works and completed in accordance with the Regulations. At agreed milestones, the contractor shall provide the Agency with a copy of the actual and estimated quantities of each waste type and an explanation for any difference."

"The contractor will be expected to maximise the sustainability of all works under the contract in accordance with the Highways Agency's Sustainable Development Action Plan and policy on Waste and Materials (if available) and to use the Site Waste Management Plan to demonstrate how waste has been minimised and reuse and recycling maximised. The contractor will work with the Agency to meet government targets on waste for the construction industry set out in the Draft Strategy for Sustainable Construction (BERR, 2007) and will use Site Waste Management Plans to document how this is being addressed."

Because SWMPs are a regulatory requirement, Highways Agency will have to incorporate them into new and existing contracts. This gives the opportunity to use them to drive sustainable construction in construction and maintenance operations. However, this may involve requiring the contractor to provide information on the final quantities of each waste type, which is not required under the Regulations. There may be some cost associated with this, but it would be a powerful tool to achieve the Agency's aims as set out in the SDAP.

## 2.5 HA Standards and Specifications

The technical requirements for construction and maintenance work on the HA network are contained in the Manual of Contract Documents for Highway Works (MCHW) and the Design Manual for Roads and Bridges (DMRB). Routine maintenance is dealt with in accordance with the Network Management Manual and Routine and Winter Service Code (NMM/RWSC). These are large and complex documents that deal with a wide variety of situations and are updated on a regular basis. References to British and European Standards are incorporated as necessary.

In the last ten years a number of changes have been made to the MCHW and DMRB to allow greater use of recycled and secondary aggregates, subject to appropriate quality control measures, and to permit the use of more sustainable techniques such as cold recycling of

asphalt and concrete pavements. However, the Specification for Highway Works (MCHW1) is permissive rather than mandatory; it permits the use of recycled materials and recycling techniques, but does not require them to be used. Consequently, contractors can opt to use less sustainable materials and techniques if they believe these will be cheaper or more appropriate. If HA wish to impose requirements for contractors to use sustainable materials or techniques, this will have to be stated in the Works Information for the contract, or further requirements will have to be included in the DMRB, possibly in Volume 10, Environmental Design. This aspect is being considered elsewhere in the BRO3 project, and is not dealt with further in this report.

## 2.6 Options for HA to implement sustainability by procurement methods

All contracts between the HA and contracting parties are based on a series of model contracts, based on the ICE NEC (New Engineering Contract) suite of contracts. These are rarely deviated from. However, it is not common practice to ensure that the contract is completed to the specification outlined, as contractors are allowed to do what is best once on site. In the case of DBFO contracts, the HA does not dictate full requirements to the contractor as this may lead to compensation events in the future.

Requirements on sustainability for individual contracts should be included in the Works Information of the Model Contract Document. Currently no requirements or targets are set for sustainability, so work will be required to develop appropriate wording for the different contracts. Some revisions will be required in any case to allow for the introduction of SWMPs. This should be supported by the inclusion of requirements on sustainability in the DMRB, probably in Volume 10, so that there is a clear link between policy and the contractual requirements. However, in order to drive the process it will be necessary to include specific requirements for sustainability in the contract documents.

The Works Information of the Model Contract Document should as a minimum contain reference to "Securing the future", the "Strategy for sustainable construction" and the Highways Agency's "Sustainable Development Action Plan" and a requirement for the contractor to work towards achieving these aims in his proposals. Rather than setting specific targets for recycled content or diversion of waste from landfill, it would be more effective to require the contractor to engage in a process where sustainability is considered from the initial stages of the design; measures are agreed with Highways Agency and then implemented on site with proof required. This will allow the contractor maximum freedom to consider how to achieve the most sustainable solution available at no extra cost rather than restricting them to targets for specific materials and methods that may not be the most appropriate for the particular project. This approach can be adopted both for asset management frameworks and individual new construction schemes.

If this approach is adopted, procedures will have to be developed to enable the Agency to assess contractors' proposals in terms of sustainability. Site Waste Management Plans present one way in which the process can be recorded; EnvIS can be used as a tool to collect data and report against targets. The value management and value engineering processes can also be used to assess contractors' proposals in terms of sustainability. Guidance will have to be developed to enable Agency staff to do this in a consistent manner. This will be appropriate for ECI and other schemes where the contractor is involved at an early stage. However, there may be difficulties in schemes which have very short timescales, such as Design and Build schemes where the contractor may not be engaged until a very late stage. In such cases, good practice from other schemes should be used as guidance.

In the longer term requirements for other targets may be set in terms of CO<sub>2</sub> emissions, results of Life Cycle Assessment or to directly match the targets in the draft strategy for sustainable construction. In the short term, however, it is suggested that targets are set mainly in terms of recycled content (by mass, not value) and diversion of waste from landfill. Once experience has been gained with these targets it will be possible to move on to more complex ones.

It is recommended that these proposals be discussed with relevant parties in Highways Agency, including both the technical staff who might set targets and the procurement staff who would apply them in contracts. Once an approach has been agreed, the relevant contract clauses can be drafted for the various types of contract.

There may be conflict between sustainability objectives and those for other factors, such as cost and journey time reliability. It is taken as read by all parties that sustainable options will only be pursued if they are cost neutral or offer cost savings. The requirement to minimise the time that roads are unavailable to traffic for repairs can prevent sustainable maintenance techniques being undertaken; with access restricted to night working, the range of techniques available to the contractor is limited and results in a series of temporary patches that have to be repaired until the whole road requires complete reconstruction. This is detrimental to the ride quality and much more expensive in the long term. Whole life costing or LCA would indicate the most cost-effective and sustainable solutions. These conflicting priorities will need to be addressed by the Agency.

### 3 Conclusion

A review of sustainable procurement policies and practices with particular reference to highway construction and maintenance has been carried out, covering UK government, devolved administrations, government agencies, local authorities and private companies in the UK, and national government and highway authorities in Europe, North America, Japan, Australia and New Zealand. The current practices of Highways Agency with regard to sustainability in procurement have also been reviewed through interviews with key technical and procurement personnel, with a view to identifying how to take sustainability forward by means of procurement processes within the Agency. The Agency's Sustainable Development Action Plan identifies procurement processes as one of the main areas where Highways Agency activities interact with UK government policy on sustainability, specifically in the priority area of sustainable consumption and production and related to processes and materials used for construction and maintenance of the network. Several of the 39 actions in the plan involve procurement. Figure 3 shows the process of the study and recommendations as to how best practice and guidance is translated into action.

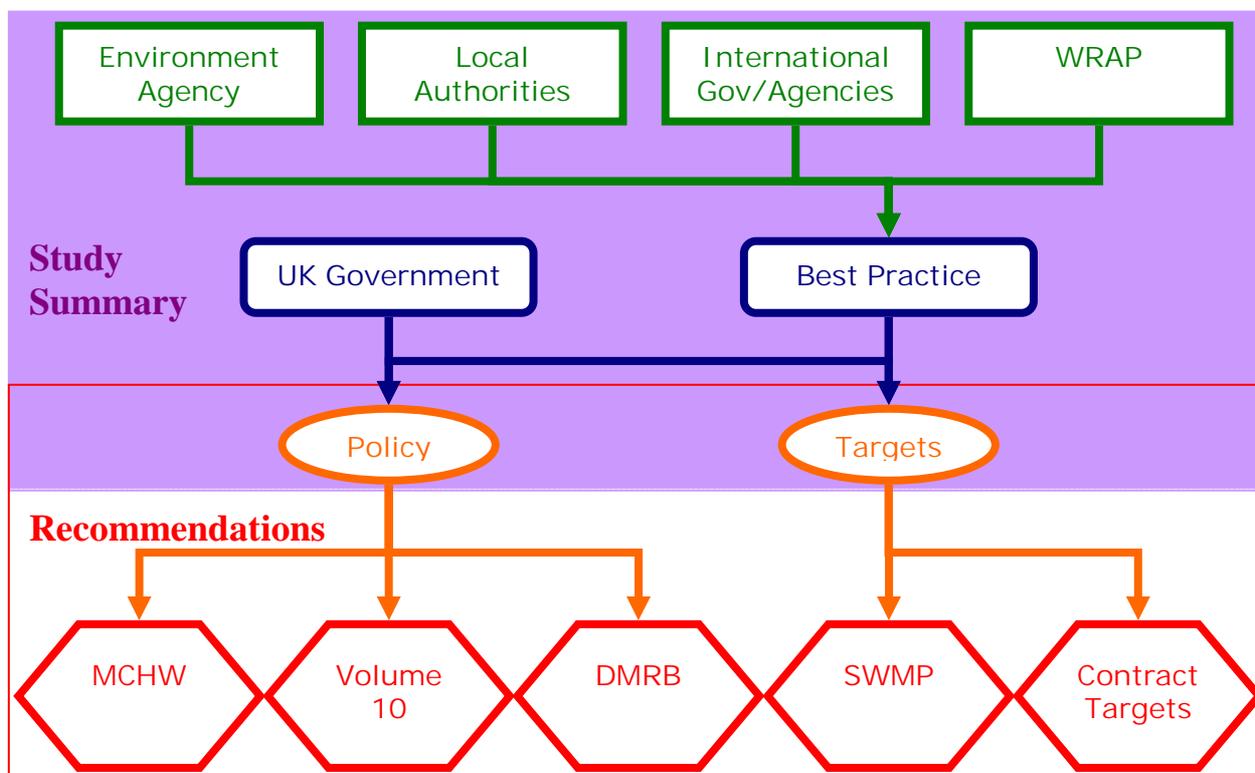


Figure 3 Study Chart

The literature review found that, while there was widespread acceptance of the principle of using procurement to drive sustainability by authorities, there were relatively few examples of its application to infrastructure projects such as highway construction and maintenance. Guidance on sustainable procurement is available in the UK from the Office of Government Commerce in Achieving Excellence Note 11. There is a lot of guidance in Europe relating to sustainable procurement, including using it as a factor in tender assessment, with guidance on the need to avoid restrictive trading. Examples of contract clauses that could be used to incorporate high-level sustainability objectives in highway works were also found in Canada, Australia and New Zealand.

For highway works, the main areas where sustainability can readily be increased are in the use of materials and energy. This can be measured through recycled content, diversion of waste from landfill and the CO<sub>2</sub> emissions of different options for construction and maintenance works. Sustainability also includes economic and social elements. The economic element is dealt with by

default in that no proposals that increase sustainability will be acted on if they are more expensive than conventional construction. There appears to be little clarity in how to assess the social aspects as yet, so the review has concentrated on the environmental aspects, and specifically those involving materials, waste and energy.

The countries that achieved the highest rates of use of recycled materials appeared to achieve this through a combination of developing national technical specifications, developing environmental guidance on how the recycled materials could be used, applying financial pressure through taxes on landfill and primary aggregates and using procurement to push for higher levels of recycling. Most of these factors are present in the UK: the MCHW and DMRB have been updated to enable the use of recycled materials and processes; the landfill tax and aggregates levy are already significant and are set to rise sharply in April 2008; guidance on environmental aspects is gradually becoming clearer through the development of waste protocols and the quality protocol for recycled aggregates. What is needed is to apply pressure to increase sustainability through procurement. A number of local authorities have been doing this by setting targets for recycled content in their term contracts for highway maintenance, with generally successful results. Where these procurement pressures are not applied, recycling rates lag behind. The procurement methods used by these local authorities should be investigated for their applicability to Highways Agency works.

The Environment Agency has developed sustainable procurement to a much greater degree than any other organisation in the UK, and many of their procedures could be adapted for use by Highways Agency. Because they are so far ahead of Highways Agency in this respect, it would not be advisable to try to directly adopt their procedures, but they can point the way for future developments that Highways Agency might want to adopt.

Targets that have been set for sustainability in highway works to date mainly relate to the recycled content, usually by mass or the diversion of waste from landfill. These are relatively easy to measure, though there may be a cost implication in requiring contractors to do so, and it is recommended that targets for Highways Agency works are initially set in these terms. At present, Highways Agency does not include any requirements or targets for sustainability in their model contract documents. In the longer term, targets set on the basis of CO<sub>2</sub> emissions or LCA may be required. It is recommended that rather than setting targets in advance, which may be easy to achieve or too onerous, the contractor should be required to engage in a process to determine the cost-neutral solution that offers the most sustainability benefits for a particular scheme, agree these with Highways Agency and set targets for the scheme on that basis. The actual performance should be recorded and evidence submitted to the Agency that the promised sustainability benefits had been achieved. There is an issue that at present the Agency are not always able to confirm whether a contractor has delivered the scheme in the way that was promised.

One way in which decisions and targets on sustainable consumption and production aspect of sustainability can be recorded and monitored is through Site Waste Management Plans (SWMPs), which will become compulsory from April 2008. Wording is suggested for contract clauses to incorporate SWMPs into new Asset Management Framework (AMF) contracts. This will require the contractor to provide information on the final quantities of waste, which is not required under the Regulations. There will be costs associated with this, and also with requiring existing MACs to provide SWMPs for projects from April 2008. SWMPs will also be required for any major projects currently in preparation.

This review has aimed to cover as many ways of incorporating sustainability into procurement for highway works as possible, and to identify those that show most promise for use in Highways Agency model contract documents. Inevitably, the coverage has been broad rather than deep, aimed mainly at identifying areas for more detailed investigation in the future. It has also been difficult to find much independent feedback on the success or otherwise of many of the initiatives. With these caveats, the process has still given a broad view of the options that may

be available to Highways Agency on sustainable procurement and enabled an assessment to be made of the best way forward. The following specific recommendation has been proposed:

- All HA model contract documents should introduce clauses confirming Highways Agency's commitment to UK policies on sustainability and in particular to the proposed targets in the draft strategy for sustainable construction. The appropriate place for these clauses is the Works Information.
- The contractor should be required to work towards these targets and also to undertake the process described above to determine the most sustainable solution for the proposed scheme. The wording for such clauses may be adapted from examples suggested by WRAP (2007) for waste minimisation and management in construction and from other sources, such as local authority conditions of contract for highway maintenance and overseas examples.
- There should also be a link to Highways Agency policies, such as the Sustainable Development Action Plan and to specific guidance on how to incorporate sustainability into highway works. This will require additional guidance in the DMRB, probably in Volume 10.
- Existing information elsewhere in the MCHW and DMRB allows the use of sustainable options for construction and maintenance but does not require them, hence the need for guidance on this topic.

Consultation on these proposals should be held with technical and procurement personnel in Highways Agency to agree the approach and to resolve any conflicts, for instance with journey time reliability. The appropriate wording will then be developed. Guidance will also need to be developed on how to assess the sustainability proposals made by contractors. For MAC/AMF projects, the value management process provides a mechanism for this, but does not at present contain enough guidance on sustainability. The value engineering process could be used in a similar way for major projects. SWMPs could be used to record the decisions on materials and methodology, the estimated quantities and the final quantities on project completion. All this information is required to be collected in the SWMP under the SWMP Regulations 2008. EnvIS can also be used to collect the relevant information on waste and materials.

## 4 Recommendations

- A tender assessment framework should be developed to assess the potential sustainable performance of a bid so that this aspect can be considered as part of the overall quality/economic assessment of the proposal. Relevant bid guidance should also be developed so that contractors can understand the need of the HA to meet its sustainability requirements and how the tenderers response to meeting this need will be assessed by the HA as part of the Tender Review process. This may require additional guidance in relevant volumes of the Specification for Highways Works (SHW) i.e. Volume 10.
- Examples of relevant contract clauses should be developed for the different HA project types to enable the HA to be able to require the contractor or contract consortia to meet relevant sustainability targets (Key Performance Indicators) and supply relevant data to enable the HA to meet the requirements of current and future HA Sustainable Development Action Plans. A review of the new procurement documents produced by the EA would further inform this process.
- The HA should encourage the development of relevant product and material assessment schemes to identify the sustainability of the significant materials and products used by the HA. At present the sustainability of many materials and products is not known or is difficult to verify between the claims of different manufacturers.
- Begin to develop for the longer term a comprehensive road network Life Cycle Analysis tool factoring in sustainability elements such as product assessment, material waste management, transport, traffic delay required for installation etc. This would enable the HA and its contractors to be able to assess the overall sustainability impact of a scheme in terms of its construction and maintenance.
- Identify cost neutral solutions that will help HA achieve its sustainability objectives; this will provide confidence to HA staff and the HA supply chain that improved sustainability can be achieved by improved planning, processes and information rather than much greater expense.
- HA should consider the development of additional relevant targets/Key Performance Indicators to support the wider objectives of the HA Sustainable Development Action Plans. Specific examples could include draft sustainable construction strategy targets for zero net waste from individual sites by 2015 and zero waste to landfill by 2020.

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## 6 References

1. APEC (1999). APEC Government Procurement Experts Group Non-Binding Principles on Government Procurement. Retrieved from [http://www.apec.org/content/apec/apec\\_groups/committees/committee\\_on\\_trade/government\\_procurement.downloadlinks.0001.LinkURL.Download.ver5.1.9](http://www.apec.org/content/apec/apec_groups/committees/committee_on_trade/government_procurement.downloadlinks.0001.LinkURL.Download.ver5.1.9)
2. Australian Government (2005). Commonwealth Procurement Guidelines. Retrieved from [http://www.finance.gov.au/procurement/procurement\\_guidelines.html](http://www.finance.gov.au/procurement/procurement_guidelines.html)
3. Australian Government (2006). Greening Government Policy. Retrieved from <http://www.environment.gov.au/settlements/government/purchasing/policy.html>
4. Australian Government (1992). National Strategy for Ecological sustainable development, Ecologically Sustainable Development Steering Committee, Department of Environment, Water, Heritage and the Arts. Retrieved from <http://www.environment.gov.au/esd/national/nsesd/strategy/index.html>
5. Australian Procurement and Construction Council. (2006). Australian and New Zealand Government Framework for Sustainable Procurement. Retrieved from <http://www.med.govt.nz/upload/50471/anz-framework.pdf>
6. BERR (2006). Draft Strategy for Sustainable Construction. Retrieved from <http://www.berr.gov.uk/files/file21326.pdf>
7. Bouwer M, de Jong K, Jonk M, Berman T, Bersani R, Lusser H, Nissinen A, Parikka K and Szuppinger P (2005). Green Public Procurement in Europe 2005 - Status overview. Virage Milieu & Management bv, Korte Spaarne 31, 2011 AJ Haarlem, the Netherlands. Retrieved from [http://ec.europa.eu/environment/gpp/pdf/Stateofplaysurvey2005\\_en.pdf](http://ec.europa.eu/environment/gpp/pdf/Stateofplaysurvey2005_en.pdf)
8. Bristol City Council (2006). Bristol Local Development Framework. Supplementary Planning Document Number 5, Sustainable Building Design and Construction. Bristol City Council.
9. BRE (2007). BREEAM fact sheet. Retrieved from [http://www.breeam.org/filelibrary/breeam\\_Fact\\_File\\_V5\\_-\\_Oct\\_2007.pdf](http://www.breeam.org/filelibrary/breeam_Fact_File_V5_-_Oct_2007.pdf)
10. Business in the Community (2007). European Benchmark on Sustainable Procurement. Retrieved from [http://www.bitc.org.uk/take\\_action/in\\_the\\_marketplace/relationship\\_with\\_suppliers/benchmark\\_sourcing.html](http://www.bitc.org.uk/take_action/in_the_marketplace/relationship_with_suppliers/benchmark_sourcing.html)
11. CARPE Project (2005). Website of the CARPE Project, Eurocities and the European Commission, DG Employment & Social Affairs. Retrieved from [http://www.eurocities.org/carpe-net/site/rubrique.php?id\\_rubrique=6](http://www.eurocities.org/carpe-net/site/rubrique.php?id_rubrique=6)
12. Craigavon Borough Council (1999). Green Procurement Policy. Retrieved from [http://www.procuraplus.org/fileadmin/template/projects/procuraplus/files/tenders/Craigavon\\_Green\\_Procurement\\_Policy\\_2007.pdf](http://www.procuraplus.org/fileadmin/template/projects/procuraplus/files/tenders/Craigavon_Green_Procurement_Policy_2007.pdf)
13. Choki S (2005). Life Cycle Assessment of Road Maintenance Works in Sweden, Centre for Environmental Strategies Research. Retrieved from [http://www.infra.kth.se/fms/utbildning/lca/project%20reports/Group%208%20-%20Road\\_maintainance.pdf](http://www.infra.kth.se/fms/utbildning/lca/project%20reports/Group%208%20-%20Road_maintainance.pdf)
14. CIRIA (2008) Benefits of CEEQUAL. Retrieved from [www.ceequal.com](http://www.ceequal.com)
15. City of Edinburgh (2006). Caltongate Masterplan, Sustainability Statement, Appendix A. Retrieved from [http://www.edinburgh.gov.uk/internet/Attachments/Internet/Environment/Planning\\_and](http://www.edinburgh.gov.uk/internet/Attachments/Internet/Environment/Planning_and)

[\\_buildings/Planning/Development\\_frameworks/Caltongate%20Masterplan/Sustainability\\_Statement\\_Appendix\\_A.pdf](#)

16. Commission for the European Communities (2004). The EU Buying Green Handbook. Retrieved from [http://ec.europa.eu/environment/gpp/handbook\\_en.htm](http://ec.europa.eu/environment/gpp/handbook_en.htm)
17. Commission for Environmental Cooperation (1999). Supporting Green Markets Environmental Labelling, Certification and Procurement Schemes in Canada, Mexico and the United States. Retrieved from [http://www.cec.org/files/PDF/ECONOMY/labels-e\\_EN.pdf](http://www.cec.org/files/PDF/ECONOMY/labels-e_EN.pdf)
18. Communities and Local Government (2006). Government sets vision for carbon neutral development. Retrieved from <http://www.communities.gov.uk/news/corporate/governmentsetsvision>
19. Constructing Excellence. (2006). Using Performance Incentives. Retrieved from <http://www.constructingexcellence.org.uk/tools/hfpartneringtoolkit/partnering/incentives.jsp>
20. Defra. (2005a). Securing the Future. Retrieved from <http://www.sustainable-development.gov.uk/publications/uk-strategy/index.htm>
21. Defra (2005b). One future, different paths: The UK's shared framework for sustainable development. Retrieved from <http://www.sustainable-development.gov.uk/publications/pdf/SD%20Framework.pdf>
22. Defra (2006). Procuring the Future, Sustainable Procurement National Action Plan.
23. Defra (2006). Survey of procurement professionals Final results, February 2006, Sustainable Procurement Task Force, Forum for the Future. Retrieved from [http://randd.defra.gov.uk/Document.aspx?Document=SD12015\\_6830\\_FRP.pdf](http://randd.defra.gov.uk/Document.aspx?Document=SD12015_6830_FRP.pdf)
24. Defra. (2007). National Waste Strategy. Retrieved from <http://www.defra.gov.uk/environment/waste/strategy/strategy07/index.htm>
25. DETR (2001). Local Authority Procurement. Retrieved from <http://bipsolutions.com/briefings/briefings2001/LAP.pdf>
26. Environment Canada. (2004). The Life Cycle Concept. Retrieved from <http://www.ec.gc.ca/ecocycle/issue1/en/p8.cfm>
27. European International Contractors (2004). EIC Blue Book on Sustainable Procurement, European International Contractors, Germany.
28. Faith-Ell C (2005). The Application Of Environmental Requirements In Procurement Of Road Maintenance In Sweden, TRITA-LWR PhD Thesis 1016, [www.diva-portal.org/diva/getDocument?urn\\_nbn\\_se\\_kth\\_diva-133-3\\_fulltext.pdf](http://www.diva-portal.org/diva/getDocument?urn_nbn_se_kth_diva-133-3_fulltext.pdf)
29. Federal Highway Administration (1999). Chapter 2 of Construction Management Practices In Canada and Europe by the International Scanning Study Team. Retrieved from [http://international.fhwa.dot.gov/construction\\_mgmt/chapter\\_two\\_d.htm](http://international.fhwa.dot.gov/construction_mgmt/chapter_two_d.htm)
30. Finland Committee on Sustainable Production and Consumption (2005). Getting more for less. Retrieved from <http://www.ymparisto.fi/download.asp?contentid=40611&lan=en>
31. Finland Prime Minister's office (2006). Towards sustainable choices: A nationally and globally sustainable Finland. Retrieved from <http://www.ymparisto.fi/download.asp?contentid=57597&lan=en>

32. Finland's environmental administration (2005). New tools to promote eco-efficiency in construction. Retrieved from <http://www.ymparisto.fi/download.asp?contentid=33441&lan=en>
33. Global Footprint Network. (2007). Scottish Government Adopts the Ecological Footprint as Performance Measure. Retrieved from [http://www.footprintnetwork.org/index.php/blog/af/scottish\\_government\\_adopts\\_the\\_ecological\\_footprint\\_as\\_a\\_performance\\_measur](http://www.footprintnetwork.org/index.php/blog/af/scottish_government_adopts_the_ecological_footprint_as_a_performance_measur)
34. Government Construction Client Group (1999). Improving the Government Construction Client; The Achieving Excellence Initiative for Northern Ireland. Retrieved from [http://www.cpdni.gov.uk/achieving\\_excellence.pdf](http://www.cpdni.gov.uk/achieving_excellence.pdf)
35. Government Construction Clients Group (2002a). Achieving sustainability in construction procurement.
36. Government Construction Clients Group (2002b). Achieving Sustainability in Construction Procurement: Sustainability Action Plan
37. GRIP (1996). GRIP Purchasing, GRIP Centre- Norwegian centre for sustainable production and consumption. Retrieved from [http://www.grip.no/innkjop/Nedlastningsdokumenter/GRIP\\_Purchasing.pdf](http://www.grip.no/innkjop/Nedlastningsdokumenter/GRIP_Purchasing.pdf)
38. GRIP (2006). Norwegian National Programme on Green Public Procurement. Retrieved from [http://www.grip.no/Felles/Vedlikehold/English/GRIP\\_procurement.pdf](http://www.grip.no/Felles/Vedlikehold/English/GRIP_procurement.pdf)
39. Highways Agency (2001). Procurement Strategy. Retrieved from <http://www.highways.gov.uk/business/706.aspx>
40. Highways Agency (2003a). Building Better Roads: Towards Sustainable Construction. Retrieved from <http://www.highways.gov.uk/aboutus/726.aspx>
41. Highways Agency (2003b). Vision 2030: Final Report. Retrieved from [www.highways.gov.uk](http://www.highways.gov.uk)
42. Highways Agency (2007). Helping you with your journey: The HA business plan 2007/08. Retrieved from <http://www.highways.gov.uk/aboutus/14772.aspx>
43. Highways Agency (2007). Sustainable Development Action Plan 2007/08. Retrieved from <http://www.highways.gov.uk/aboutus/15577.aspx>
44. Holtz K and Taylor Eighmy T (2000). Scanning European Advances in the Use of Recycled Materials in Highway Construction, Public Roads, July/August 2000, Vol. 64, No. 1, United States Department of Transportation - Federal Highway Administration.
45. ICLEI (2000). Green Purchasing Good Practice Guide, How local authorities spend their budgets responsibly, The International Council for Local Environmental Initiatives, European Eco-Procurement Programme and Eco-Efficient Economy. Retrieved from [http://www.iclei-europe.org/fileadmin/user\\_upload/Procurement/PICOLight/Publications/Good\\_Practice\\_Guide/GPG\\_fullversion.pdf](http://www.iclei-europe.org/fileadmin/user_upload/Procurement/PICOLight/Publications/Good_Practice_Guide/GPG_fullversion.pdf)
46. ICLEI (2003). Study contract to survey the state of play of green public procurement in the European Union. Retrieved from [http://www.iclei-europe.org/fileadmin/user\\_upload/Procurement/EPP\\_Survey/Final.PDF](http://www.iclei-europe.org/fileadmin/user_upload/Procurement/EPP_Survey/Final.PDF)
47. ICLEI (2007). The Procura+ Manual, A Guide to Cost-Effective Sustainable Public Procurement, 2nd Edition, ICLEI – Local Governments for Sustainability, European Secretariat Gino Van Begin (responsible). Retrieved from <http://www.iclei->

- [europe.org/fileadmin/template/projects/procuraplus/New\\_website/Printed\\_Manual/Procura\\_Manual\\_complete.pdf](http://europe.org/fileadmin/template/projects/procuraplus/New_website/Printed_Manual/Procura_Manual_complete.pdf)
48. Japanese Government (2000). Construction Material Recycling Law. Ministry of the Environment Government of Japan
  49. Marrakech Task Force (2006). Marrakech Task Force on Sustainable Public Procurement. Retrieved from [http://www.uneptie.org/pc/sustain/resources/MTF/Fact\\_sheet\\_MTF\\_procurement.pdf](http://www.uneptie.org/pc/sustain/resources/MTF/Fact_sheet_MTF_procurement.pdf)
  50. Moschitz S (2005). CARPE Guide to responsible procurement, EURO CITIES Secretariat, Brussels, 2005. 2nd edition. Retrieved from [http://www.eurocities.org/carpe-net/site/IMG/pdf/CARPE\\_guide\\_to\\_responsible\\_procurement\\_secondedition.pdf](http://www.eurocities.org/carpe-net/site/IMG/pdf/CARPE_guide_to_responsible_procurement_secondedition.pdf)
  51. National Assembly (2001). Better Value Wales: The Review of Procurement in the Public Sector.
  52. Northern Ireland Assembly (2006). First steps towards sustainability: A Sustainability Strategy for Northern Ireland. Retrieved from <http://www.ofmdfmi.gov.uk/sustain-develop.pdf>
  53. Northern Ireland Audit Office (2005). Modernising Construction in Northern Ireland, Report by the Comptroller and Auditor General, NIA 161/03. Retrieved from <http://www.niauditoffice.gov.uk/pubs/reports/2005/ModernisingConstruction/FullReport.pdf>
  54. Northern Ireland Central Procurement Directorate (2007). Construction Procurement Guide, Department of Finance and Personnel. Retrieved from [http://www.cpdni.gov.uk/construction\\_procurement\\_guide\\_master.pdf](http://www.cpdni.gov.uk/construction_procurement_guide_master.pdf)
  55. Northern Ireland Road Service (2007). Achieving Excellence in Construction
  56. OECD (1999). Trade Issues In the Greening of Public Purchasing. Retrieved from <http://www.oecd.org/dataoecd/17/7/39919037.pdf>
  57. Office of Government Commerce (2007): Achieving Excellence in Procurement Guide 11: Sustainability. Office of Government Commerce, London. Available at <http://www.ogc.gov.uk/documents/CP0016AEGuide11.pdf>
  58. Office of Government Commerce and Defra (2003). Joint Note on Environmental Issues in Purchasing. Retrieved from <http://www.scotland.gov.uk/Resource/Doc/1265/0009333.pdf>
  59. Pakkala P, Martin de Jong W, Äijö J (2007). International Overview of Innovative Contracting Practices for Roads, Finnish Road Administration.
  60. Practices for Roads, Finnish Road Administration. Retrieved from <http://alk.tiehallinto.fi/julkaisut/pdf/internoverview.pdf>
  61. Procura+ (2007). Manual: A guide to Cost Effective Sustainable Public Procurement. Retrieved from [http://www.iclei-europe.org/fileadmin/user\\_upload/Procurement/DEEP/Project\\_Results/Procura\\_Manual\\_complete.pdf](http://www.iclei-europe.org/fileadmin/user_upload/Procurement/DEEP/Project_Results/Procura_Manual_complete.pdf)
  62. Public Works and Government Service Canada (2008). Guideline for Integration of Environmental Performance Considerations in Federal Government Procurement. Appendix 2- Examples of Environmental Factors and Evaluation Indicators.
  63. Reid J M, Hewitt A, Chandler J W E, Schiavi I, Bendall E and Griffiths R (2007a). Sustainable choice of materials for highway works: a guide for local authority highway engineers. TRL Unpublished Project Report UPR/IE/157/06. TRL Limited, Crowthorne.

64. Reid J M, Chandler J W E, Schiavi I and Hewitt A (2007b). Sustainable highways; a short guide. Unpublished Project Report UPR/IE/216/06. TRL Limited, Crowthorne.
65. Road Service's Delivery Strategy Retrieved from [http://www.roadsni.gov.uk/rs\\_achieving\\_excellence.pdf](http://www.roadsni.gov.uk/rs_achieving_excellence.pdf)
66. Scottish Executive (2005). Construction Works Procurement Guidance. Retrieved from <http://www.scotland.gov.uk/Resource/Doc/76169/0019812.pdf>
67. Scottish Executive (2006). Sustainable Development: A Review of International Literature, Scottish Executive Social Research. The Centre for Sustainable Development, University of Westminster and the Law School, University of Strathclyde. Retrieved from <http://www.scotland.gov.uk/Resource/Doc/123822/0029776.pdf>
68. State of Wisconsin (1989). 1989 Wisconsin Act 335. Retrieved from <http://vendornet.state.wi.us/vendornet/recycle/bullet12.asp>
69. Sustainable Regions (2004). Starting to construct differently; A review of consultations and a plan for action towards a sustainable knowledge based construction industry in Wales, Vol 2. Issue 5, March 2004. Retrieved from [http://www.sustainableregions.net/uploads/documentbank/137\\_document.pdf](http://www.sustainableregions.net/uploads/documentbank/137_document.pdf)
70. Swedish Environment Management Council (2007). The Swedish National Action plan for Green Public Procurement 2007-2010. Retrieved from [http://www.msr.se/Documents/rapporter/handlingsplanen\\_eng.pdf](http://www.msr.se/Documents/rapporter/handlingsplanen_eng.pdf)
71. Swedish Ministry of the Environment, (2007). Implementation of the EU Sustainable Development Strategy- Sweden's report to the European Commission, June 2007. Retrieved from <http://www.sweden.gov.se/content/1/c6/08/53/60/d96ec014.pdf>
72. Swiss Federal Government (2002). Sustainable Development Strategy 2002. Retrieved from <http://www.bafu.admin.ch/produkte/02076/index.html?lang=en&download=NHZLpZig7t,lnp6l0NTU042l2Z6ln1ad1lZn4Z2qZpnO2YUq2Z6gpJCDeoN7fmym162dpYbUzd,Gpd6emK2Oz9aGodetmqaN19XI2ldvoaCVZ,s-.pdf&.pdf>
73. Swiss National Road Association (2001). National Environmental Programme 2002-2005, Publ nr 2001:57. Retrieved from [http://www.vv.se/filer/publikationer/Miljoprogram\\_english\\_KO.pdf](http://www.vv.se/filer/publikationer/Miljoprogram_english_KO.pdf)
74. TieHallinto. (2006). Finnra's Procurement 2010. Retrieved from Finnra Board on 21 August 2006 <http://www.tiehallinto.fi/pls/wwwedit/docs/13728.PDF>
75. Transit (2006). Green Procurement and Good Environmental outcomes- A Practical Example, Jonnette Adams. Retrieved from [http://www.transit.govt.nz/content\\_files/news/ConferencePaper37\\_PDFFile.pdf](http://www.transit.govt.nz/content_files/news/ConferencePaper37_PDFFile.pdf)
76. Transport Canada (2006). Sustainable Development Strategy 2007-2009. Retrieved from [http://www.tc.gc.ca/programs/environment/sd/sds0709/docs/SDS2006\\_2009ENPDF.pdf](http://www.tc.gc.ca/programs/environment/sd/sds0709/docs/SDS2006_2009ENPDF.pdf)
77. Transportation Research Board (2006). Best-Value Procurement Methods for Highway Construction Projects, National Cooperative Highway Research Program, Report 561. Retrieved from [http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp\\_rpt\\_561.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_561.pdf)
78. United Nations (1987). Report of the World Commission on Environment and Development: Our Common Future. Retrieved from <http://www.un-documents.net/wced-ocf.htm>
79. United Nations (1992). Rio Declaration on Environment and Development. Retrieved from <http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm>

80. UN (2002). Plan of Implementation of the World Summit on Sustainable Development, Johannesburg, 26 Aug-4 Sep. 2002.
81. World Trade Organisation (1996). The plurilateral Agreement on Government Procurement. Retrieved from [http://www.wto.org/english/docs\\_e/legal\\_e/gpr-94\\_e.pdf](http://www.wto.org/english/docs_e/legal_e/gpr-94_e.pdf)
82. Waste & Resources Action Programme (2005). Recycled roads: a step-by-step guide to local authority procurement. WRAP, Banbury. Available at <http://www.wrap.org.uk/applications/publications/index.rm?criteria=recycled+roads&id=698&programme=wrap&x=33&y=9>
83. Waste & Resources Action Programme (2005). Procurement and the efficient use of material resources. Retrieved from <http://www.wrap.org.uk/downloads/Procurementgoodpractice.13ba53fa.pdf>
84. Waste & Resources Action Programme (2006a). News Article, WRAP Publishes Step-by-Step Guide to Road Recycling, 10/03/2006. Retrieved from [http://www.aggregain.org.uk/news/wrap\\_publishes.html](http://www.aggregain.org.uk/news/wrap_publishes.html)
85. Waste & Resources Action Programme (2006b). Office of Water Services Consultation on "Contributing To Sustainable Development": 2006 Consultation Response from WRAP. Retrieved from [http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/AttachmentsByTitle/sd\\_consres\\_011106\\_wrap.doc/\\$FILE/sd\\_consres\\_011106\\_wrap.doc](http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/AttachmentsByTitle/sd_consres_011106_wrap.doc/$FILE/sd_consres_011106_wrap.doc)
86. Waste & Resources Action Programme (2007). Achieving Good Practice Waste Minimisation and Management. Retrieved from [http://www.wrap.org.uk/downloads/Mid-level\\_WMM\\_guide\\_lo-res\\_for\\_web.78314581.pdf](http://www.wrap.org.uk/downloads/Mid-level_WMM_guide_lo-res_for_web.78314581.pdf)
87. Waste & Resources Action Programme (2007). The net waste method: testing a new standard for measuring waste neutrality. Retrieved from [http://www.wrap.org.uk/downloads/Net\\_Waste\\_Brochure.df42f30d.pdf](http://www.wrap.org.uk/downloads/Net_Waste_Brochure.df42f30d.pdf)
88. Waste & Resources Action Programme (2008). *Construction Procurement*. Retrieved from [http://www.wrap.org.uk/construction/construction\\_procurement/tools\\_publications/index.html](http://www.wrap.org.uk/construction/construction_procurement/tools_publications/index.html)
89. Waste & Resources Action Programme (No date). Sustainable procurement: making it happen. Retrieved from <http://www.idea.gov.uk/idk/aio/69979>