DTI 'Strategy for Sustainable Construction'- consultation events

MATERIALS

1 SUMMARY

Construction uses over 420million tonnes of materials per year, produces 92m tonnes of construction and demolition waste per year (around 50% of which is recycled).

The impacts of this activity arise in many ways from initial extraction of raw material, the processing and manufacture of material, assembly and transportation of products, characteristics of the product in use, longevity, maintenance requirements, disposal issues etc. In considering a vision, targets and mechanisms for construction materials within an overall construction sustainability strategy, the following general questions need to be addressed:

- What is the contribution of materials in improving sustainability of a building / infrastructure?
- What are the barriers and drivers to encouraging greater consideration of the role materials and products can play in improving the sustainability of a built asset?
- How can this be measured?
- What tools are available / being developed?
- Where is the 'knowledge-gap' – i.e. for manufacturers to move forward; for contractors to use it; and for clients to demand it?

To fully assess materials in a sustainability context requires consideration of a complex set of environmental, social and economic factors across a life-cycle perspective. There have been many advances in life cycle assessment of materials and products. However, there has also been developments in a number of specific policy areas such as the use of recycled materials or the use of renewables.

For the purposes of the workshop, the following target areas are therefore suggested for consideration

Target A: Specification of materials/products/units on the basis of their whole-life sustainability credentials

Target B: Specification of materials based on producer responsibility principles
Target C: Increasing use of secondary and recycled materials *
C1 Maximising use of materials recovered on-site or locally eg construction & demolition waste, PFA, and other locally available secondary aggregate **(Site focussed)**
C2 Procurement of products containing higher than standard levels of recycled content **(Manufacturing focussed)***

Target D: Use of renewable material

** Item c would also need to consider CO2 associated with the recycling process*

A. A key questions for the construction strategy, is whether it should express Target A as the primary (long-term) vision or focus on other targets which, arguably are more immediately attainable.

2 VISIONS AND METRICS

2.1 Industry vision

A number of provisional metrics are proposed in the DTI Review of Sustainable Construction (RSC)

Target A: Specification of materials/products/units on the basis of sustainability credentials

Industry visionaries anticipate a time when the sustainability performance of the materials used in a design can be assessed as simply as bills of quantities are presently generated. Until such time as tools are developed that will enable all design choices to be compared in sustainability terms from first principles, promotion of such an approach will invariably involve using an existing scheme or technique. For instance the new Code for Sustainable Homes will require the use of the A rated materials (See Appendix 2)

Target A therefore focusess on what can be done in terms of assessing materials across a numbed of sustainability criteria. Such selection should be done on the basis of the environmental performance of the building or structure as a whole.

However, the recent intensified focus on carbon suggests that this may be the first step. Should a target be established that focusses on carbon specifically?

Targets could therefore be expressed as follows:

Proposed target in RSC	Example of application	Associated metric
• 'A' rated materials used (e.g. from BRE green guide)		Ecopoints per m2 of building and A rated specification
• LCA declaration for products	Type III Environmental Products Declaration	% age of materials with Type III environmental declaration
Assessment of material choices in terms of carbon footprint./ overall energy performance	Whole-life carbon footprint	

Environmental Products Declaration
Type III EPDs have been developed to enable all producers to credibly communicate about their environmental performance of their products. The Scheme has been developed as part of the EU Integrated Products Policy

Target B – Greater use of product stewardship / producer responsibility principles

This target area is associated with the performance of the producer as opposed to the life-time performance of the product or material. The responsible sourcing of timber is one example of this. However, such targets can also relate to the overall sustainability performance of suppliers.

With regard to Product Supply Stewardship, the Code for Sustainable buildings is encouraging responsible sourcing through certification (where this exists) and EMSs, and there are also cases where manufacturers are taking control of the efficient use of their products during construction by taking back any waste created in its application. For this and for better management of resources on-site, closer working arrangements between suppliers and clients and designers is required..
Other initiatives involve the return of packaging, surplus materials (e.g. plasterboard) and even schemes where manufacturers a "Whole-life" approach to product supply e.g. carpets where products are supplied, maintained, removed when worn, remanufactured and replaced..

Proposed target	Associated metric
Percentage of building and construction schemes applying such principles	% schemes, by value

TARGET C1 Maximising use of materials recovered on-site or locally eg construction & demolition waste

A focus for industry for a number of years has been in the greater recovery of demolition arisings from site clearance and encouragement of the use of secondary materials available locally e.g. waste exchanges, PFA etc. There has been progress in the development of specifications, for example, for aggregates and WRAP's Quality Protocol for aggregates and the AggRegain tool, together with the Demolition Protocol provide guidance and confidence on such practices. The targets suggested, therefore are:

Proposed vision in RSC	Associated target
• Increased use of recycled secondary materials derived locally	Measured as increased % age of recycled materials used in construction by mass or by value. *Note 1*
• Increased use of demolition waste on-site	No proposed metric given in RSC

Note – original DTI review targets expressed as Reduced primary material consumption

WRAP are leading in this area. They provide guidance on minimising waste arising through demolition works and increasing recovery and recycling of materials both for re-use on site (predominantly aggregates) and for use in other applications off-site. They are doing more direct liaison to support individual company target setting for recovery of materials in demolition and regeneration projects. This work links directly into Target C2 below

TARGET C2 Procurement of products containing higher than standard levels of recycled content

Proposed vision in RSC	Associated metric
No proposed vision in RSC	No proposed target given in RSC

WRAP is also leading the way in this area, providing guidance on setting requirements for recycled content in projects and support for achieving such requirements in the form of Quick Win guides, recycled content toolkits, and recycled product listings. These are promoting the setting of easily achievable targets of 10-15% recycled content with improvement to good practice levels above this.

This area would focus on greater use of recycled and secondary materials as a feedstock to manufactured or processed products used in construction Materials suppliers and manufacturers would therefore be key in delivering this..

Specification of products with high recycled content might, in some instances, be at odds with producing the best overall environmental option. However, preliminary work in progress by BRE shows that higher recycled content generally correlates with lower overall environmental impact across various product categories.

TARGET D. Use of renewable material

Proposed vision in RSC	Associated metric	Present performance
No proposed vision in RSC	No proposed target given in RSC	

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"Renewables" cover a range of materials, including hemp and lime blocks, sheeps wool insulation, natural fibre insulation and panelling, geotextiles and, of course, timber.

The sustainability benefits of renewable materials should therefore be evident from product declarations (see A above) etc. No specific target has been put forward in this area.

2.2 Metrics

The following table (to be discussed at workshops) provides an assessment of the ease with which such a vision could be implemented based on current practice and metrics. The contrast between the ease with which materials can be recycled in relation to the performance of an LCA can be seen.

Table 2 – Assessment of current awareness and attainment (for testing)

Rating 0 – 5 (see Appendix 1 for guidance)	A. LCA / Sustainability performance	B Producer responsibility Product stewardship	C1. on-site recovery	C2. High-recycled content products	D. Renewable materials
1 Established principles / sound science	2	2	4	2	4
2 Widely understood across industry	2	2	4	2	4
3 (Technically) attainable with no risk/ skills shortage	2	4	4	3	4
4 Cost-effective	2	3	4	4	4
5 Compelling business case	1	2	4	2	3
6 Strong Market pull	1	2	3	2	3
7 Established metrics and performance data	2	1	3	2	3
8 Degree of regulation (policy driver)	3	1	3	1	3

3 MECHANISMS

3.1 Current initiatives and targets

Life-cycle assessment approach

OGC guidance doc 11 – Sustainability already states government construction procurement should use BREEAM, CEEQUAL or equivalent. For both, this would include some consideration of materials. Government Commitment to apply BREEAM to all new public sector buildings.

- European Platform for Life Cycle Assessment This is likely to have a bearing on life cycle assessments by introducing a standard method.
- The programme of work within CEN/TC 350 will provide with a standardised voluntary approach for the delivery of environmental information on construction products, and to assess the environmental performance of buildings, and more generally the integrated performance of buildings in a framework document. The objective is to cover all kinds of building products and all kinds of buildings, new and existing buildings, and possibly other construction works, if appropriate. Work planned to be completed by 2008-9

Producer responsibility / product stewardship

CSR and management systems e.g. ISO14001, and formal supply-chain systems etc.

On-site recovery and use of local recycled materials

- WRAP programme – including Quality protocol
- WRAP quick wins
- Site Waste Management Plans
- The forthcoming “Clean Neighbourhoods” legislation, will require site waste management plans to become statutory (for sites above a certain threshold) However, the primary driver here is fly-tipping. waste reduction and re-use of waste arisings.

Use of recycled contents in manufactured materials / products

There is a comprehensive programme of activities within WRAP promoting the setting of minimum requirements for recycled content by value in projects.

Use of renewables

DEFRA's organic farming and non-crops programmes have included work relating to the use of non-food crops in construction.

3.2 Industry and market drivers / principal sectors

Although in terms of mass, aggregates dominate, there is a wide range of suppliers and stakeholders. Specific targets can favour particular sectors and care needs to be taken in driving targets towards favouring materials on specific criteria.

- Aggregates (primarily WRAP - also QPA, British Aggregates Assoc, Aggregate Industries)
- Cement (BCA)
- Timber (TRADA, FSC, Greenpeace, Friends of the Earth)
- Metals (SCI)
- Finishings, coatings and adhesives
- Plastic
- Cables
- Glass
- Ceramics
- Renewables

Construction Products Association announced in November 06 of a Low and Zero Carbon Buildings Technology Group to encourage the development of new technologies in a quest to deliver more sustainable construction (low and zero carbon buildings)

3.3. Targets, incentives, barriers and actions

The workshop will consider selected targets in terms of how the industry can respond, incentives and barriers and how Government can help to accelerate progress.

TARGET Note target may have more than one outcome	Which industry sector or client body would need to drive / own this	What can the industry do voluntarily without intervention / support from Government	What is incentive to the sector or what barriers exist at present	**MECHANISMS How can Government facilitate this change or remove the barrier.**
A Specification of materials/products/units on the basis of their whole-life sustainability credentials	Clients Designers Manufacturers			
B Greater use of product stewardship principles.	Manufacturers Specifiers			
C1 Increased use of secondary materials / demolition waste on site	Construction procurers			
C2 Procurement of products containing higher than standard levels of recycled content **(Manufacturing focussed)***	Manufacturers Construction procurers			
D Use of renewable materials	Manufacturers Construction procurers			

APPENDIX 1

Guidelines for scoring Table 1

1	2	3	4	5	6	7	8
Principles established and practice within reach of most companies	Widespread **understanding** of principles across most parts of the industry	Technically attainable with little or no **risk**	**Cost effective** to implement within present fiscal / regulatory regime	Compelling and well promoted **business case**	Strong **market pull** from both public sector and private sector	Published **metrics** on current performance / benchmarking	Highly regulated, clear signals of future policy / regs
SCORE 5 SCORE 0	5 0}						
Gaps in scientific / social / economic principles	Knowledge and understanding across most parts of the industry non-existent	Technical risks / serious skills shortages	Not presently cost effective in competitive market or using conventional business case justification	Little in the form of case studies and evidence of **business case**	Little market pull beyond regulatory minima	Little in the form of any current openly available data	Largely unregulated and reliant on voluntary action

APPENDIX 2

Performance rating systems

BREEAM (particularly EcoHomes) and the forthcoming CSH reflect what is achievable today in terms of design decisions relating to materials . Ecohomes focusses on three materials-related issues. These include :

- Encouraging use of materials that have less impact on the environment, taking into account of the full life cycle.
- Responsible sourcing of materials: basic building elements and finishing elements – which relates to certification schemes (e.g. timber) or EMS schemes covering the extraction/production process.

These tools are focussed on buildings. They include schemes for new build, building operation and design. BRE have developed a range of techniques and tools which perform such functions e.g. Ecoprofiles and ENVEST2, the "Green Guides to Specification and the Environmental Profiles Certification Scheme.
Boundaries are critical in LCAs and different results are obtained depending on where the boundaries lie e.g. "factory gate", "construction site", "design life", "eventual demolition" etc. LCAs will consider a range of categories e.g. energy use v air emissions during production and can also help in aggregating impacts eg. BRE Ecopoints.
In making such assessments, until such time as tools are developed that will enable all design choices to be compared in sustainability terms, promotion of such an approach will invariably involve using an existing scheme or technique.