CARES Sustainable Reinforcing Steel Scheme

1.0 Introduction

Governments around the world are increasingly focussed on sustainable development and in the UK the Government has made clear its commitment to require the construction industry to improve standards and performance in the built environment [1].
As a result, those involved in designing, supplying and building these greener structures are having to prove that their buildings are constructed with sustainability in mind.
This Guide describes how the CARES approved reinforcing steel supply chain is meeting that demand.

CARES has developed a sustainable reinforcing steel scheme that quantifies the environmental impact of the reinforcing steel supply chain. One such quantitative measure is the carbon footprint. In the absence of a national or international Standard, CARES has developed a methodology that will enable firms in the reinforcing steel supply chain to establish their carbon footprint data in a consistent, transparent and comparable way.

Procuring reinforcing steel via the CARES approved supply chain provides a holistic approach to managing a product from the point at which a material is sourced in its raw state through manufacture and processing, use, recovery and recycling.

All reinforcing steels produced by CARES approved firms are uniquely identified via a system controlled by CARES. When steel arrives on-site, no further testing is required, so avoiding unnecessary and costly delays.

2.0 Drivers of sustainability

Drivers for sustainability vary from one part of the world to the next. In the UK the key drivers of sustainability are UK and EU legislation. In particular the UK Climate Change Act 2008 and the UK Sustainable Construction Strategy. There are two key aims underpinning the UK's Climate Change Act 2008;

- to improve carbon management by helping the transition towards a low carbon economy in the UK.
- to demonstrate strong UK leadership internationally.

The key provisions of the Act are legally binding targets, a carbon budgeting system and company level reporting of greenhouse gas emissions;

- Legally binding targets for reducing greenhouse gas emissions through action in the UK and abroad of at least 80% by 2050, and reductions in carbon dioxide emissions of at least 26% by 2020 [against a 1990 baseline].
- A carbon budgeting system which caps emissions over five year periods, with three budgets set at a time. The first three carbon budgets will run from 2008-12 [3,018 MtCO2e], 2013-17 [2,782 MtCO2e] and 2018-22 [2,544 MtCO2e].

An example of a carbon budgeting system is that being used by the UK Highways Agency (HA), which is a UK leader in the construction sector.

Masdar City

Figure 1 Courtesy of Masdar City

The HA has provided its supply chain with the tools necessary to measure greenhouse gas emissions and provide the incentives to actively manage and reduce these wherever possible. The HA first established and quantified its current greenhouse gas emission levels by gathering data from across the HA and the supply chain to populate the HA Carbon Calculation Framework. The HA has reported its carbon footprint from six areas of business for the last two years[2]. It has improved the data collection process itself, and in the completeness, robustness and quality of the data sets being returned from its supply chain.

3.0 CARES sustainable reinforcing steel scheme

3.1 Objectives;

a) to provide a means by which construction clients can be assured that approved firms have produced and processed the product in line with the sustainability principles.

b) to provide a means by which approved firms in the reinforcing steel supply chain are able to declare product and organisational level sustainability performance.

c) to undertake a review, at least biennially, to ensure continuous improvement of the reinforcing steel supply chain against the relevant issues and continuous improvement against the sustainability principles.

d) to undertake regular and relevant public reporting in order to encourage continuous improvement of the reinforcing steel supply chain against the relevant issues and sustainability principles.

3.2 Sustainability principles;

a) Ensuring that approved firms operate to the highest quality and environmental standards necessary to satisfy end users by attaining and maintaining quality and environmental management systems to ISO 9001 and 14001 respectively.

Building the superstructure

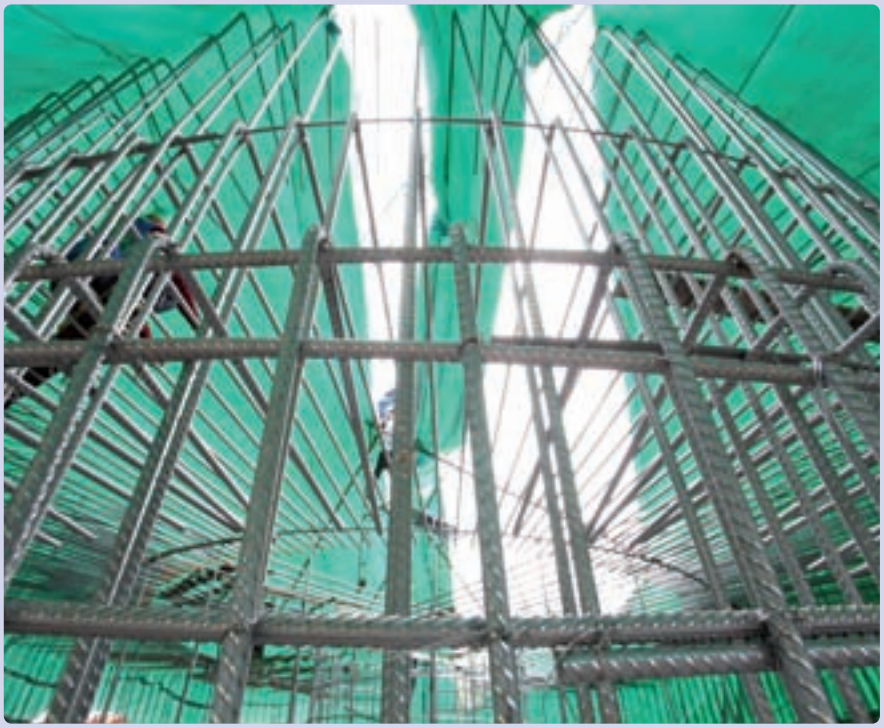

Figure 2 Courtesy of Outokumpu

"CARES has a proven track record of assuring the quality of the product delivered via the CARES approved reinforcing steel supply chain and Masdar City contractors have used reinforcing steel from CARES approved sources. We are now working to further develop the CARES sustainable reinforcing steel scheme which includes determining the carbon footprint."

Richard Reynolds, Manager – Supply Chain Consultancy, Masdar City

b) The responsibility for compliance with legal requirements and standards rests absolutely with the firm.

c) The means of ensuring consistent compliance with the policies are the formal management systems which the firm must operate and implement to the satisfaction of the Authority and which is subject to assessment by the Authority at periodic intervals.

d) Development of products that improve the quality and sustainability of the built environment.

e) Management of all waste streams effectively and minimisation of waste disposed to landfill.

f) Measurement, reporting and improvement of performance on sustainability issues.

g) Minimisation of pollution and emissions associated with production and transportation.

h) Protection and enhancement of the natural environment adjacent to or affected by reinforcing steel production.

i) More efficient use of energy and reduction in 'carbon footprint'.

j) More efficient use of primary materials and promotion of the recyclability of reinforcing steel products.

k) More efficient water use and minimisation of demand on mains water supplies.

At least once per year the approved firm shall assess its level of performance against the sustainability principles using a maturity matrix.

4.0 Compliance with BS 8902

The CARES sustainable reinforcing steel scheme has been established to comply with BS 8902[3], which provides a framework for the management, development, content and operation of sector certification schemes for responsible sourcing and supply of construction products. It will enable the industry to demonstrate the responsible sourcing of construction products and its commitment to sustainable development.

5.0 Compliance with environmental assessment methods of buildings

A number of Environmental assessment methods of buildings are used throughout the world, of which the following are a selection of the most widely used in the UK and Middle East:

- **BREEAM** (originating in the UK).
- **LEED** (originating in the USA).
- **ESTIDAMA** (originating in Abu Dhabi).
- **Greenstar** (originating in Australia).

These methods may be adopted for use in the areas in which they originated or may be used elsewhere, as the construction client requires.

Product traceability to production source and manufacturing process

The supply chain for reinforcing steel, which involves its production, distribution, processing and delivery to a construction site, is complex. It is important to recognise that steel used in construction projects in the UK and internationally may come from manufacturers based all over the world. It is vitally important that the suppliers of these steels are independently verified as being proficient and trustworthy, so that the use of material of dubious or unknown origin and hence unknown properties and performance is avoided.

Caster torches

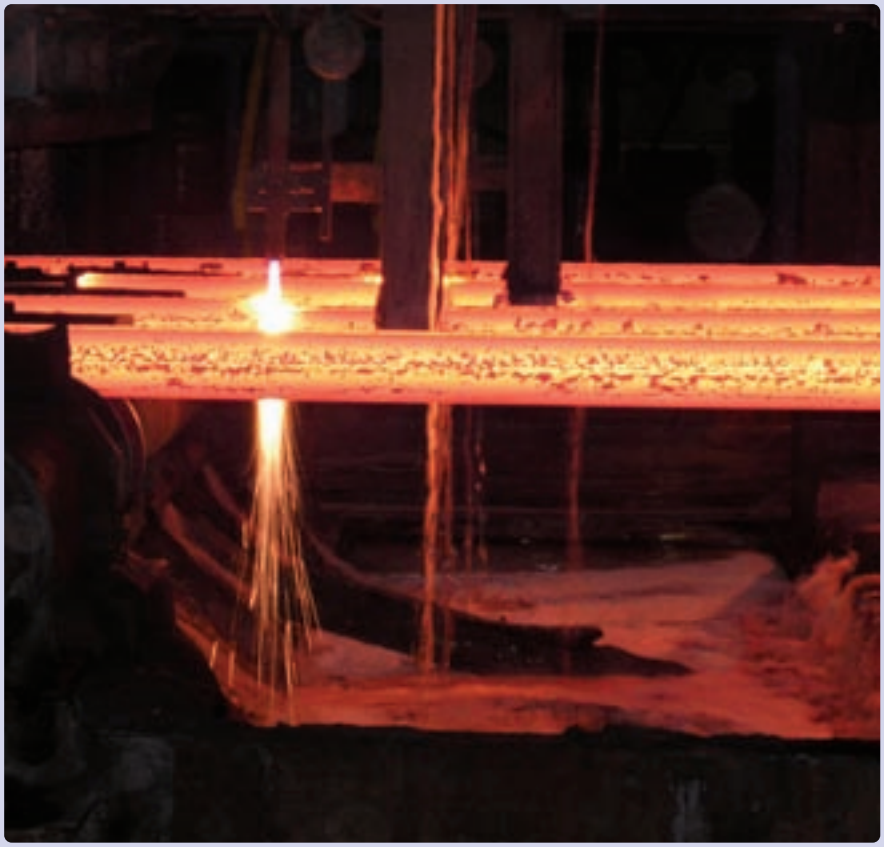

Figure 3 Courtesy of Thamesteel

Reinforcement made by CARES approved companies is fully traceable throughout the whole supply chain, from the molten steel to the finished structure. It flows within an unbroken chain between the manufacturer and the local end-user thus enabling the end user to know the production source and the manufacturing processes used. All reinforcing steels manufactured by CARES approved firms are uniquely identified. When steel arrives on-site no further testing is required, thereby avoiding undue and costly delays at the construction site.

Carbon footprint tool for reinforcing steel

Life-cycle thinking considers the environmental impacts at all stages of a product's life. The environment is not concerned with one single issue. Life-cycle analysis provides transparent, quantitative and verifiable data and should be critically reviewed in accordance with ISO Standards.

It should then be possible to make functionally equivalent comparisons. This results in something more than just a declaration of 'environmental friendliness'. Life-cycle thinking also provides an opportunity to identify improvement areas or 'hot spots' in the supply chain.

The life-cycle assessment (LCA) of a product can vary significantly depending who prepares the data, what assumptions have been made, which method of calculation was used and where organisational boundaries are drawn. Voluntary disclosures of companies may tend to err on the side of self-interest, and critical examination and adjustment is required before the data can be used corresponding to how most information provided by a company should be treated. With this in mind, CARES has worked with a global company in the provision of LCA consulting services and environmental reporting tools to develop a tool to assess the carbon footprint of reinforcing steel products.

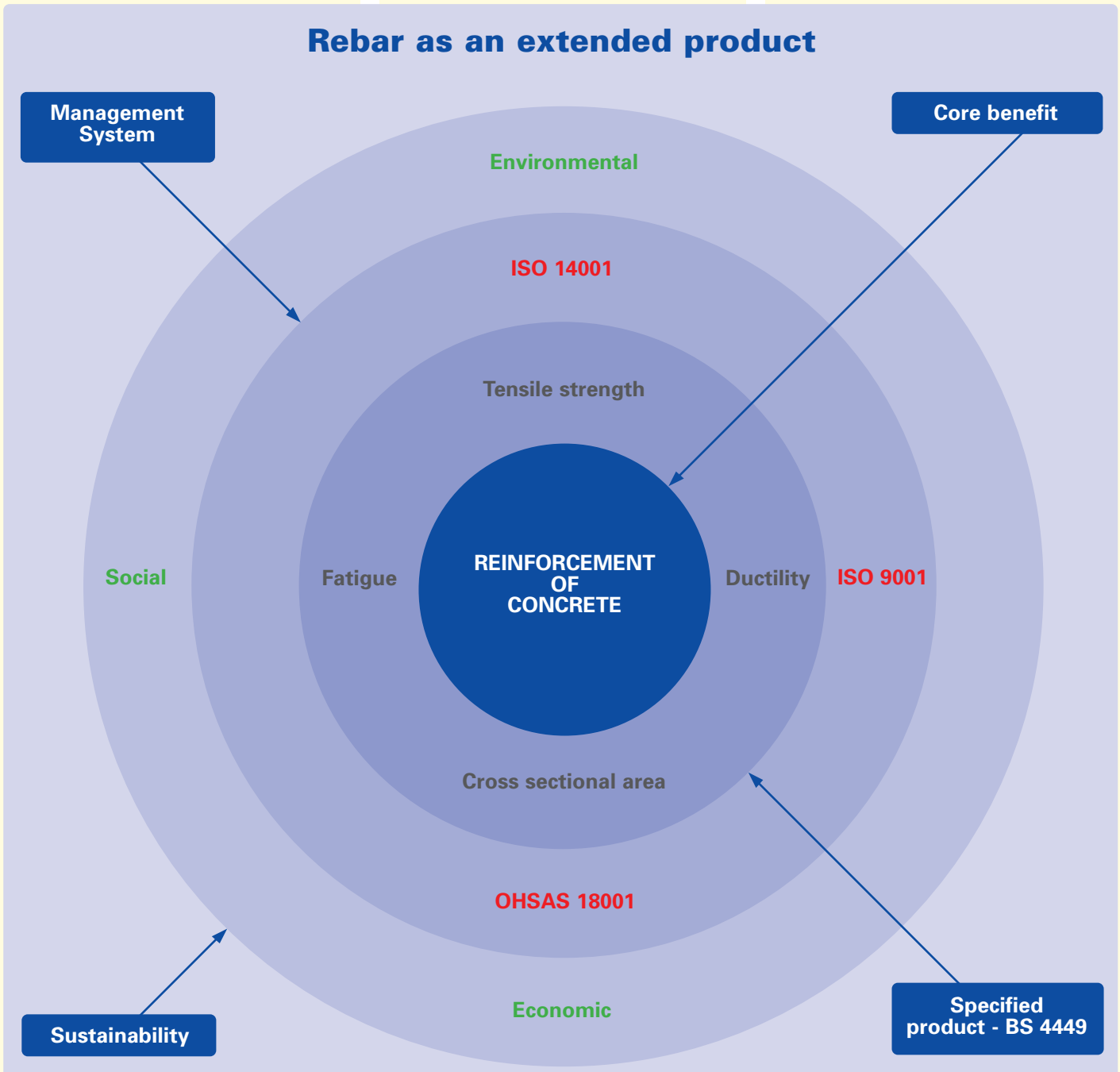

Figure 4

This will be a mandatory aspect of the CARES sustainability certification scheme. The CARES carbon footprint tool describes the structure of the carbon footprint model, and the data sources and methodologies used in its development. Emissions calculations by CARES approved firms will be underpinned by a system of agreed calculation methodologies and independent verification.

Management Systems to ISO 9001 and 14001

The CARES Sustainable Reinforcing Steel scheme requires compliance with the core product conformity scheme which uses ISO 9001 as a cornerstone, plus compliance with the environmental management systems standard ISO 14001.

A suitably documented management system enables an organisation to have robust data collection and reporting systems that are independently audited. It ensures the firm has:

- identified the applicable legal requirements and understood how they apply
- a quality management system that complies with the requirements of ISO 9001

- an environmental management system that complies with the requirements of ISO 14001
- a management system for the purchasing process and approval of suppliers
- effective product traceability systems so that they can trace the mill that produced the steel and the specific batch reference (cast number) throughout the whole supply chain
- cut/bent steel delivered to site is traceable to production source and manufacturing process with the necessary supporting documents
- recorded and verified performance data for, inter alia, greenhouse gas emissions and energy usage, transport impacts, environmental management performance, water usage, waste management and recyclability and recycled content

Reporting of performance

Performance indicators against the sustainable reinforcing steel criteria have been developed for internal management use and external communication to CARES. Procedures and systems are in place to provide an audit trail and allow data collected to be verified.

Performance against the sustainable reinforcing steel criteria are submitted to CARES once per year in the prescribed format, Annex 1 - Sustainable reinforcing steel workbook. These will be analysed at CARES and will form part of subsequent surveillance audits and an industry sector report. Where a carbon footprint value is reported the basis of the calculation shall be reported.

Declarations and product labelling

Declarations of product conformity with the Scheme, including product labelling, shall be made only for products which fully conform and which have been handled in compliance with the requirements of the Scheme.

Statements of conformity to the Scheme shall be made and shall take the following form: "This reinforcing steel has been produced in accordance with the CARES Sustainable Reinforcing Steel Scheme that conforms to BS 8902:2009".

6.0 Reinforcing bar – Functional and environmental performance

The concept of the extended product based on selected attributes can be applied to reinforcing steel, **Figure 4**. At the centre of the diagram is the rebar's core benefit and core attribute: reinforcement of concrete.
Around the core benefit is a ring of attributes which include the product's characteristics, such as strength and ductility, which are stated in a product standard, BS 4449, and hence constitute the 'specified product'.

The next ring shows the associated management system standards that provide the means for ensuring consistent compliance with the product standard through a structured and systematic approach to the control of business and manufacturing processes.

Finally there is a circle of sustainability attributes based on environmental, social and economic issues. These have not normally been thought of as being product attributes but as buyers move their purchases to suppliers of products that are socially, environmentally and economically acceptable they will become significant factors in purchasing decisions.

Fixing on-site

Figure 5 Courtesy of Outokumpu

Comparison of sustainability issue identification

HM Government Strategy for sustainable construction - June 2008	CARES Appendix 1 - Production of carbon steel bars for the reinforcement of concrete June 2010	BS 8902 2009 Table 1 Relevant sustainability issue identification and reporting
Climate change and energy	Greenhouse gas emissions and energy usage	Greenhouse gas emissions
		Energy usage
	Transport impacts	Transport impacts
Sustainable consumption and production	Environmental management	
	Waste management	Waste management
	ISO 14001	
	Local Community and stakeholder engagement	
	Recyclability and recycled content	Recyclability and recycled content
	Quality and performance	
Natural resource protection and enhancing the environment	Materials efficiency	
	Water usage	Water usage
	Biodiversity and eco toxicity	Biodiversity and eco toxicity
	Incidents, complaints and prosecutions	Complaints and prosecutions
Creating sustainable communities	Safe and healthy working conditions and OHSAS 18001	Safe and healthy working conditions
	Skills and training	Skills and training
	Local Community and stakeholder engagement	Community relations
	Fundamental rights at work including: Workers' conditions, Slave labour, Child labour, Fair wages, Working hours and holidays, Freedom to join trade unions (freedom of association), Equality in respect of gender, ethnicity, religion, political persuasion	Workers' conditions, Slave labour, Child labour, Fair wages, Working hours and holidays, Freedom to join trade unions (freedom of association), Equality in respect of gender, ethnicity, religion, political persuasion
	Long-term financial viability	Long-term financial viability
	Contribution to diversity and stability of the local economy	Contribution to diversity and stability of the local economy
	Ethical business practice	Ethical business practice
	Carbon footprint lifecycle assessment tool	

Table 1

CARES Appendix 1
Sustainable reinforcing steel production, selected key performance indicators

Selected sustainable reinforcing steel key performance indicators	
Environmental	Greenhouse gas emissions and energy usage
	Transport impacts
	Environmental management
	Water usage
	Waste management
	Recyclability and recycled content
Social	People - including fundamental rights at work
Economic	Long-term financial viability

Table 2

Certificate of Approval

Figure 6

Sustainability criteria

Table 1 shows how both BS 8902 and the CARES sustainable reinforcing steel scheme satisfy the requirements of the Government's strategy for sustainable construction.

In consultation with industry stakeholders CARES has selected headline indicators that will meet the needs of as many of the public and private sector initiatives as possible. For example, a selection of the sustainable reinforcing steel indicators for steel production are shown in **Table 2**.

7.0 CARES list of approved manufacturers

The outcome of a satisfactory assessment by CARES assessors is the issuance of a CARES Certificate of Approval with a closely defined scope of approval. A typical certificate of approval, as shown in **Figure 6**, states the name of the firm, the factory to which the successful assessment applies and a description of the products covered.

The details of all approved firms are published on the CARES website: www.ukcares.com.

Occasionally suppliers have falsely claimed to hold CARES approval because they only use steel from CARES approved sources, and/or have an approval for cutting and bending to BS 8666 / BS 4466. In these cases the other products supplied by these firms are not covered by the CARES sustainable steel scheme approval.

If there are any doubts concerning the scope of approval of a firm then the CARES List of Approved Firms should be consulted, www.ukcares.com, or alternatively the CARES office can be contacted for verification, contact details are given overleaf.

8.0 Conclusion

CARES and reinforcing steel industry stakeholders have developed an objective and workable approach to the identification, collection, auditing and reporting of sustainability data which readily supplements that data related to compliance with product certification requirements including the product standard. The Scheme will use industry best practice and International Standards throughout the whole supply chain.

Products made by approved companies are fully traceable throughout the whole supply chain, from the molten steel to the finished structure. It is an unbroken chain between the global producer and the local end-user, which enables the user to know the material properties, environmental credentials, production source and manufacturing processes used.

It is apparent that the clear definition of boundaries and methodologies are crucially important. It is also important to be aware of mis-information from individual Companies and to seek an authoritative source for the collection and dissemination of the data.

The CARES scheme takes into account specific environmental, economic and social impacts and provides recognition for reinforcing steel producers and processors embracing genuine sustainability. CARES adapted its traditional product certification model to address the sustainability agenda and meet the designer's need for robust, reliable and trusted sources of environmental performance data to facilitate comparability between different materials and then between different suppliers.

Finally, before using an ecolabel to inform a purchasing decision, it is important that purchasers check that they know what criteria the ecolabel requires and who awarded the ecolabel to that product, to check that it is truly impartial. Purchasers also ought to check that the product meets their other sustainability requirements.

References

1) **Strategy for sustainable construction**
HM Government, Department for Business, Enterprise & Regulatory Reform, Construction Sector Unit, June 2008.

2) **Highways Agency Annual Report 2009-10.**

3) **BRITISH STANDARDS INSTITUTION, BS 8902**
Responsible sourcing sector certification schemes for construction products Specification. BSI, London, 2009.

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