



CITB-ConstructionSkills
Build to Last
Reviewing Sustainable Construction
An executive summary

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Index

1	EXECUTIVE SUMMARY	3
1.1	<i>Issues</i>	3
1.2	<i>Actions</i>	4
1.3	Definitions used in this report	5
1.4	Priorities for sustainable development	5
1.5	Industry's contribution to delivering sustainability	6
1.6	Moving the construction industry towards a more sustainable future	6
1.7	The change that is required of the industry	7
1.8	Adoption of relevant technologies, practices and business systems	7
1.9	Examples of good practice	8
1.10	The readiness of the industry for change	10
1.11	The barriers and blockages	11
1.12	The major players supporting this change	11
1.13	The views of those with influence in the sector	20
1.14	The contribution of higher education	25
1.15	A policy framework for CITB-ConstructionSkills.....	25
1.16	Translating the broad policy into specific actions	26
1.17	Taking the strategy to market.....	28

1 Executive summary

This review highlights where CITB-ConstructionSkills might effectively channel its efforts to help the construction industry make its full contribution to sustainable development (SD).

1.1 Issues

The key conclusions from the review are that:

- *SD will be driven by legislation, regulation and to a lesser extent shareholder pressure.*
- *Although client and consumer interest is growing, it is only a few niche markets where customers will add sustainability to their decision criteria and even then it will take second place to value, location and function.*
- *The industry's contribution to SD extends from what is built, to how it is built and lastly where it is built. To influence all of these aspects requires a co-ordinated contribution from all in the supply chain. Generally the client has most influence over what is built, the investor/developer over where it is built and the constructor over how it is built.*
- *The progress towards adopting sustainable development varies across the industry. Some large and usually public sector funded projects (for example the new Welsh Assembly Building) have sustainable development designed into the location, the construction method and the final building. Those involved in such projects (typically large companies and their supply chains) are exposed to, and capable of delivering the many aspects of the sustainable development agenda. In our review we found case studies of these high value highly sustainable projects. For projects that cost between £0.5m and £5m the degree of sustainable development is largely dictated by planning, building and environmental legislation which, on this size of project, is monitored by enforcement agencies. Legislation on sustainable development applies equally to the thousands of small construction projects however monitoring of this vast number of jobs is less easy and so compliance is largely at the "discretion" of the firm.*
- *Sustainable development is best positioned as part of a wider improvement agenda in the industry. Ensuring a business (or industry) can be sustained into the future, operates within the law and is responding to the demands of its clients is part of good management. This, rather than the moral argument, will engage the profit driven construction industry in sustainable development.*
- *The change required of the industry (and on which CITB-ConstructionSkills should focus) can be classified into four discrete areas;*
 - *Enable the industry to build legally*
 - *Enable the industry to build sustainably*
 - *Enable the industry to build sustainable buildings/roads/infrastructure*
 - *Enable the industry to build sustainable communities*
- *The main barriers to this change include:*
 - *The priority given to sustainable construction over that required to achieve more traditional corporate goals of return on investment, development time and cost.*

- *The current disjointed relationship between clients and contractors.*
- *The extended supply chain – SD requires the intervention of the whole supply chain.*
- *The focus on price based procurement and short term calculation of costs and benefits.*
- *The availability of more sustainable products and processes.*
- *Adequate/appropriate skills to support sustainable construction.*

1.2 Actions

*The immediate challenge, beyond meeting environmental legislation and building regulations, is **changing the way the industry builds rather than what it builds.***

In the short term we recommend that CITB-ConstructionSkills helps the industry to develop skills to cut waste (both labour and materials), to recycle and reuse materials and minimise damage to the environment whilst the building is taking place. These are immediate actions that improve the sector's contribution to SD and generally make good business sense.

Longer term CITB-ConstructionSkills should help the industry to respond to market demands for SD which will grow over time. There are a number of specific actions that we recommend that CITB-ConstructionSkills consider. They are:

- *In research*
 - *Researching and defining the implications for skills of current and emerging views of government and clients on sustainable development.*
 - *Researching and measuring the skills required for sustainable development and so quantify the nature of change required.*
 - *Interpreting what policy and legislation means for industry and identifying the skills to deal with that legislation.*
- *In setting standards*
 - *Ensuring that sustainable development skills are included in the national occupational standards and so become part of NVQs and SVQs*
 - *Working with the professional institutions to ensure they include relevant and realistic skills expectations in their requirements for membership.*
- *In stimulating the demand side (employers)*
 - *Providing briefings and short management courses on the subject of sustainable development.*
 - *Providing (or working with others to provide) information, advice and training on how to respond to increasing taxation, planning regulation and legislation in the area of sustainable development.*
 - *Stimulate employers to provide training for existing employees and, when recruiting, seek out employees with the skills in sustainable development.*
 - *Signposting the industry to sources of advice and training.*
- *In stimulating the supply side (training providers)*
 - *Influencing FE and HE colleges and private training companies to increase the coverage of sustainable development their courses.*
 - *Ensuring a link between the standards set by professional bodies and the provision of courses by trainers.*

Additionally, in its role as the Sector Skills Council, CITB-ConstructionSkills should work in partnership with others to influence policy development and implementation so that the various pressures on the industry for change are aligned to a single goal and

that the resulting change in construction methods and management can be effectively resourced.

Many of these actions require interactions with existing partners such as the professional institutions, industry organisations (such as Constructing Excellence) and organisations with specialist expertise on the subject.

1.3 Definitions used in this report

<p>Sustainability: an over-arching term used broadly as a ‘goal’ towards which we need to move over time - meeting human needs globally without overwhelming nature</p> <p>Sustainable development: the ‘actions required to achieve sustainability – ‘social progress which recognises the needs of everyone: effective protection of the environment; prudent use of natural resources; and maintenance of high and stable levels of economic growth and employment’. (UK Govt SD Strategy 1999)</p> <p>Sustainable construction: a subset of SD referring to the creation of buildings and infrastructure to shape communities in a way that sustains the environment, generates wealth over the long term and enhances the quality of life of people.</p>
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1.4 Priorities for sustainable development

The definitive and overarching targets are set by government and relate to the three strands of sustainable development. They are summarised below and covered in further detail in section **Error! Reference source not found.** of the Literature Review which details the full 150 headline indicators relating to them.

Economic	Environmental	Social
The economy must continue to grow	Improve air quality	Social inclusion
Industry must invest in modern methods and new technology	Improve the choice in transport	People should be equipped with skills to fulfil their potential
Employment must be high and stable so everyone can share in greater job opportunities	Improve river quality	Improve health of the population
	Reverse decline in populations of farm and woodland birds	Reduce the proportion of unfit housing stock
	Re-use previously developed land	Reduce crime and the fear of crime
	Minimise, reuse, recycle and recover waste.	

In our survey of relevant information, the government targets are the most comprehensive and overarching set and we recommend it is these that CITB-ConstructionSkills should adopt. We note that the Strategic Forum for Construction makes no reference to targets for sustainability on its website.

1.5 Industry's contribution to delivering sustainability

Achieving long term sustainability in the construction sector, requires changes to ***what is built, how it is built*** and ***where it is built***.

What is built is largely dictated by the client and designer although contractors have to be able to understand and deliver what is asked. The current “state of the art”, taken from the many case studies reviewed and summarised in the data source, is around reducing whole life costs and minimising the impact of the building on the environment.

How a building is built is largely dictated by the contractor and it is here that the traditional constituency of CITB-ConstructionSkills has greatest impact on sustainable development. The current focus, again derived from and documented in the larger literature review can be said to have approached the sustainability issue at three levels:

- **Complying with legislation** – ensuring that planning, building and environmental regulations are fully complied with.
- **Technology** – typically the adoption a single innovative technology such as contaminated soil remediation.
- **Process** – covering a new process or generalised approach in a specific project, for example re-processing of demolition waste for secondary aggregates.

Largely changes in “how a building is built” appear to draw upon good business sense of trading legally, reducing waste (of both materials and labour) , minimising environmental impact and increasing output per person.

Where it is built is largely dictated by the investor¹ and the planning authorities.

To move most rapidly to a sustainable future requires co-ordination of the efforts of all in the supply chain.

1.6 Moving the construction industry towards a more sustainable future

The construction industry (like most) will change when four pressures become greater than the desire to remain the same. These pressures are:

1. **A compulsion on the industry to comply.** Taxation, legislation, planning regulation and client demands will compel the industry to adopt more sustainable approaches.
2. **Business pressures on the industry for capital and skilled labour.** As investors and potential employees understand and begin the pursuit of sustainable development then capital and skilled employees will migrate towards companies that share their values.
3. **Increased understanding in the construction industry of the potential business benefit of sustainable development.** When the true cost of waste becomes apparent then the industry will act to reduce it. When the supply chain makes sustainable processes and products available and designers

¹ Investor is a general term used to include direct beneficiaries of the building. This could be government (eg an infrastructure project such as road or hospital) , a corporation (eg a shopping centre) or individual (a house).

become more aware of the design advantages then contractors will be able to more easily adopt sustainable alternatives.

4. **Consumer pressure.** As the elements of the green lobby increasingly become part of mainstream politics and gain greater acceptance amongst the general public then demands for construction companies to prove that they are operating sustainably will increase.

1.7 The change that is required of the industry

The change that is required can be classified into four discrete areas:

1. **Enable the industry to build legally** – the first dimension which is entirely in the control of the construction company is for it to adhere to current environmental law, planning guidelines and building regulations, to pay the necessary environmental based taxes and employ people within current employment legislation.
2. **Enable the industry to build sustainably** – the second dimension, again entirely within the control of the construction industry is to ensure that the process of building is done with minimum waste, creating minimum pollution, with least environmental damage, using sustainable resources and recycling and re-using materials.
3. **Enable the industry to build sustainable buildings/roads/infrastructure** – the third dimension is driven by the client, architect and designer and that is to build a structure that is itself sustainable.
4. **Enable the industry to build sustainable communities²** – the fourth dimension is when all aspects of a development are considered sustainable i.e. the structure is built with least environmental damage and the resulting structure operates with low or renewable energy, limits emissions, creates wealth for the community and is socially inclusive.

1.8 Adoption of relevant technologies, practices and business systems

From the large number of examples of sustainable technology, practices and business systems given in this report we highlight a selection and show in which segments of the construction market they are making most headway.

² In this context “communities” could refer to industrial, commercial or residential developments.

		Size of company			Client Served		Activity		
	Area of Agenda	Large	Medium	Small	Public Sector	Private Sector	Housing	Commercial	Civil
Technologies/Processes	Waste minimisation, segregation, re-use and recycling	Most	Many	Some	Most	Some	Some	Some	Most
	Reduction in use of energy on site	Many	Some	Few	Some	Some	Few	Few	Many
	Use of recycled materials	Many	Some	Some	Many	Some	Few	Some	Many
	Combined Heating and Power	Some	Some	Few	Some	Few	Some	Few	N/A
	Passive Heating and Cooling	Some	Few	Few	Some	Some	Few	Some	N/A
	Offsite fabrication	Some	Few	Few	Some	Few	Some	Many	Many
Approaches	Brownfield Development and refurbishment	Some	Some	Some	Some	Some	Some	Many	Some
	Local sourcing of components	Few	Few	Some	Some	Some	Some	Some	Some
	Build sustainable buildings	Some	Some	Some	Some	Few	Some	Few	Some
	Build <i>highly</i> sustainable buildings (eg Zero Emissions/Carbon Neutral)	Few	Few	Few	Few	Few	Few	Few	Few
Business systems	Environmental Auditing	Many	Some	Few	Many	Many	Many	Many	Many
	An Environmental Strategy	Many	Some	Few	Many	Some	Many	Many	Many

1.9 Examples of good practice

The following table is a summary of the exemplary performance in sustainable construction of a number of companies, at a number of levels. This is expanded upon in the section **Error! Reference source not found.** of the report and illustrates what is possible and indicates some of the actions industry is taking.

Scope	Description	Characteristics of success	Examples (See full report for details)
Technology case studies	Typically covers a single innovative technology such	The innovation must present a more sustainable	WRAP, with partners - ConGlassCrete - a high-value use for waste glass

	as contaminated soil remediation.	method of achieving an existing output, or must facilitate a more sustainable output.	<p>M4I - Green result on brown-field site</p> <p>M4I - Rethinking contamination</p> <p>M4I - Heathrow Constructed Wetlands</p> <p>EST - Community Energy Case Study: Aberdeen City Council</p>
Process case studies	Covers a new process or generalised approach in a specific project, for example waste-sorting.	The process must enable a more sustainable way of working or facilitate the production of a more sustainable end product.	<p>CBPP - 70% reduction in landfill, Mace for Wessex Water</p> <p>CBPP - How innovative management produces increased profitability</p> <p>LGTF - Integer brings sustainability to social housing</p> <p>CBPP - Promoting green travel</p> <p>CBPP - The Green Guide to Specification</p>
Sustainable buildings case studies	Focuses upon the sustainable output of a project, eg one with a low lifetime cost and environmental impact, like the BedZed Zero Emissions Development.	The case study must encompass a number of innovations brought together in a single project. The whole approach or key parts of it must be potentially re-applicable.	<p>BedZed – Beddington Zero-Energy Development</p> <p>CBPP - Creating a greener corporate identity (188)</p> <p>Hockerton Housing Project (HHP)</p> <p>SH - Swansea Foyer</p> <p>RIBA/ Chetwood Associates - Sainsburys Greenwich</p>

1.10 The readiness of the industry for change

To create change requires that the “market” is aware of the need for change, convinced that it is necessary and able to make the change.

In our work we found no detailed study of the industry’s readiness for change however we did find sufficient evidence to draw some informed estimates of where the influences over sustainable development act and where industry is.

The influences

To achieve sustainable development requires action by the whole supply chain as the table below shows.

	Influence/commitment of principle actors over factors				
Category	Investor	Client	Designer	Contractor	Supplier
Build legally	Low	Low	Medium	High	High
Build sustainably	Low	Medium	Medium	High	High
Build sustainable buildings	Medium	High	High	Medium	Low
Build sustainable communities	High	High	Medium	Low	Low

Market readiness

The market segments by size – generally small businesses and large businesses - and their position on the adoption curve – some businesses will lead whilst others lag. In the table below we outline the markets position on each of the four dimensions.

	Small Companies			Trailing Large Companies			Leading Large Companies		
	Aware	Convinced	Able	Aware	Convinced	Able	Aware	Convinced	Able
Build Legally	High	High	Med	High	High	High	High	High	High
Build Sustainably	Low	Low	Low	High	Low	Low	High	High	High
Build Sustainable Buildings	Low	Low	Low	Med	Low	Low	High	High	Med
Build Sustainable Communities	N/A	N/A	N/A	Med	N/A	N/A	Med	N/A	N/A

The position of many small companies as either working on domestic, small development or as subcontractor to larger ones limits their sphere of influence over whether a building or community is designed to be sustainable, hence their lower rating in the third and fourth dimensions.

1.11 The barriers and blockages

The literature survey, contact with industry players and the consultation workshop undertaken as part of this work reveals six major factors that unless fully addressed will slow the move to a more sustainable industry.

1. The priority given to sustainable construction over that required to achieve more traditional corporate goals. In some instances achieving sustainable construction may compromise company profit and project completion.
2. The disjointed relationship with clients. As already noted sustainable development requires concerted and collective action from clients and contractors. The nature of the contractual and working relationship between many clients and contractors is not one that engenders such collective action.
3. The extended supply chain. Many professionals and organisations are involved in construction projects and to make the process and result more sustainable requires them to take more of a team approach than they currently do.
4. The focus on price based procurement and short term costings rather than based on whole life costs and benefits. Sustainable approaches (both products and processes) are, therefore, seen in some cases as more expensive. Whilst the industry creates profit by buying the cheapest then sustainability is likely to be a secondary consideration to price.
5. The availability of more sustainable products and processes. Whilst our review of current literature revealed many examples of good practice the supply of sustainable materials and methods is still not as mature as traditional materials.
6. The skills to be sustainable. Confidential work with 300 managers of large construction companies revealed that only 18% recognised the environment as part of their responsibility and of that 18% only 47% claimed appropriate competence.

1.12 The major players supporting this change

The importance that government places on sustainable development has created significant interest and action amongst organisations supporting the construction industry. We have reviewed the activities of over fifty of the organisations with most relevance to the construction industry. These include national, devolved and regional government; non government organisations, construction industry groupings, professional bodies, and consultancies. We find that almost all are involved in setting and describing the agenda, many are disseminating good practice and a few are providing direct help for companies. Most of the activity is true to type i.e. government organisations are setting policy, industry groupings are translating this policy and illustrating it with case studies, the professional institutes are setting standards and consultancies are selling advice on both processes and people. The table which spans the next pages profiles the work done by these entities, and assigns them a rating according to their level of input; an orange box indicates a low to moderate input; a red box indicates a high input or a large degree of relevance.

Stakeholder Group	Stakeholder	Sustainable Development/Sustainable Construction Activities	Setting Sustainability Agenda	Setting Sustainable Construction Agenda	Supporting Sustainable Construction	Sustainable Construction Client	Best Practice Dissemination	Demonstration Projects	Benchmarking	Skills, Education and Training	Systems/Tools
Government Departments and Devolved Government	DEFRA	<ul style="list-style-type: none"> Main Steward of the UK Government's Sustainability Strategy Custodian of indicators and monitoring of the UK's progress in achieving sustainability targets Published a number of significant research and strategy documents on sustainability Hosts channels for consultation with industry and the public Has a co-ordinating role in the delivery of SD 									
	DTI	<ul style="list-style-type: none"> Significant commitment to the dissemination of high quality information and best practice guides to industry, with the emphasis on making the business case for embracing sustainability Publications include <i>Building a Better Quality of Life: A Strategy for More Sustainable Construction</i> Major stakeholder in the CBPP KPIs and the Constructing Excellence Process as a whole. 									
	DFES	<ul style="list-style-type: none"> Implementing the Sustainable Development Action Plan which is integrating sustainability into public education from primary level upwards, and committing educational establishments to sustainable procurement Driving the SD message to post-16 education through the SSDA/SSC networks and its Skills Strategy Encouraging the promulgation of SD through professional and learned bodies 									
	HM Treasury	<ul style="list-style-type: none"> Additional taxation applied to environmentally unsound practices, eg Aggregates tax, Landfill Tax, Carbon Tax Subsidies on sustainability-boosting measures such as regeneration and energy efficiency Proposed stamp duty exemptions and VAT relief on renovations of empty property. 									
	ODPM	<ul style="list-style-type: none"> Reviewing the building regulations, with a specific view to improved sustainability Custodian of the Sustainable Communities Urban and Rural Regeneration Project Sustainable Buildings Task Group 									

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	Scottish Parliament and Executive	<ul style="list-style-type: none"> • Largely reflects the British international commitments to sustainability. Much of its work in the environmental realm is the enacting of EU Directives. • SEPA Performs a similar function to the Environment Agency in England and Wales. Particular initiatives include guidance on Sustainable Urban Drainage Systems (SUDS), the Dumfries & Galloway Catchment Management Project, a Habitat Enhancement Initiative, National Waste Plan and a sophisticated Waste Minimisation project. • Sustainability is a cross-cutting issue in SP debates, and departments taken the message to heart in their plans and projects. 									
	Welsh Assembly	<ul style="list-style-type: none"> • Sustainable development is a defining theme of the Welsh Assembly and incorporated in its Bill of establishment. • The Department of the Environment, Planning and the Countryside publishes details of regulations and guidance on Biodiversity, Conservation Areas, Environmental liability, Planning and Rural Regenerations, and links to relevant Assembly Committees which consult on the topic. • A great deal of the Assembly's work in the theme seems to be the instituting of EU directives. • A particularly intensive area of activity is in rural development, where the focus is on working towards sustainable communities. Projects include LEADER+, an EU programme for RD; Rural Community Action, an government investment tied to local partnerships; and the Age Balanced Communities (ABC) study • The Environment Agency's remit extends into Wales. 									
	Northern Ireland Administration	<ul style="list-style-type: none"> • Devolved government to Northern Ireland is currently suspended. During devolution, the sustainability brief has been owned in the main by the Environmental and Heritage Service (EHS). • EHS has a monitoring, strategy and policy role. A key document is Promoting Sustainable Living A Discussion Paper on Proposals for a Sustainable Development Strategy for Northern Ireland. • Many of EHS' other publications are related to its regulatory brief, including learned reviews of data collection methods, concentrations of contaminants and targets for activities. 									
	Other Government Departments	<ul style="list-style-type: none"> • Expected to implement the government's policy on sustainability, both as clients and policy-formers 									
	Local Authorities	<ul style="list-style-type: none"> • Committed to LA21 Process and other government sustainability goals 									

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Government Agencies, including RDAs	Environment Agency	<ul style="list-style-type: none"> • Enforcer of Environmental Regulations in the UK • Publishes industry briefings and best-practice information on its Netregs website • Responsibilities in environmental protection, eg Conservation, Waste Management, Flood Management, Contaminated Land and Water Management and Resources. 	---	---	---	---	---	---	---	---	---
	One NorthEast	Building-In Sustainability - A guide produced by Sustainability NorthEast on how to embrace and capitalise on sustainability. Includes advice on sustainable construction relevant to the region based on the Building a Better Quality of Life report.	---	---	---	---	---	---	---	---	---
	Yorkshire Forward	An Environmental and Development Directorate - With policies on Sustainable Development, urban and rural 'renaissance' and property development. Specific joint ventures and targeted local investment.	---	---	---	---	---	---	---	---	---
	East Midlands Development Agency	A commitment to the Sustainable Communities initiative - with a number of documents available to review, including The Environmental Economy of the East Midlands Report 2002, an Economic Inclusion Development Plan, Planning Charter, and details of the RDA's social investment programmes. It has also trained at least a third of its staff on SD, who are responsible for allocating single pot grant to sub-strategic partnerships.	---	---	---	---	---	---	---	---	---
	SWERDA	<p>Environment South West - a joint initiative with the Environment Agency in the South West is a very detailed audit of the region's environmental status, including a notable strand on sustainable construction.</p> <p>Sustainability South West - is a RDA grouping committed to strategic planning and promotion of sustainable development in the region. A report specific to construction is published.</p>	---	---	---	---	---	---	---	---	---
	London Development Agency	Sustainable development in the capital - The RDA encompasses sustainable development as a central theme. It is engaged in the green economy, promoting sustainable business practices with other key stakeholders and is performing a Best Value review of sustainability.	---	---	---	---	---	---	---	---	---

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	North West Development Agency	Sustainable development a key strand of strategy - and a factor in the project and investment selection process. A particular commitment to urban and regional renewal in this region. Support for Sustainability Northwest initiative, encouraging sustainability in the region. Attractive and informative sustainability website. Engaged with the Centre for Construction Excellence (CCI), the Constructing Excellence centre in the region and involved in training and events.									
	Advantage West Midlands	Focus on regenerating communities - as part of the RDA's 'Four Pillar' approach to development. Sustainable development is not much of a subject area in its own right in this RDA, but a 'cross curricular' theme which crops up in just about all of its activities.									
	EEDA	Part of the programme - Sustainability features in the regional development strategy in the East of England. The region is working with Constructing Excellence on a Regional Centre of Excellence for Urban Renaissance.									
	SEEDA	Sustainable Business Awards - these acknowledge the efforts of companies in the region investing sustainably. The website also has a sustainability checklist for businesses, a report on the region's environmental industry, a report on the 'Building for Nature' Project, and advice to the planning professionals.									
	Regional Development Agencies	Forum for the Future	<ul style="list-style-type: none"> • Involvement in a huge range of initiatives, including The Natural Step (Environmental Consultancy), and numerous national and local projects • Major stakeholder in Project Sigma (qv) 								
	WWF	<ul style="list-style-type: none"> • Major and esteemed conservation organisation • Sustainable homes - project which intends to bring a million sustainable homes to the Thames Gateway area • The Carbon Disclosure Project - encourages major companies to be open about their carbon output • Climate Savers project attempts to encourage good environmental performance in major companies 									
	Friends of the Earth	<ul style="list-style-type: none"> • Supports community initiatives involving green building, living and working. • Highlights companies it perceives as failing to maintain a high standard of environmental and social responsibility 									

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	Greenpeace	<ul style="list-style-type: none"> • A campaign with UCATT to encourage the use of sustainable timber resources in UK construction. • The organisation is against the use of PVC and runs a PVC alternatives database. • Greenpeace is involved in opposing the construction, commissioning and development of facilities which it considers environmentally unsustainable, such as nuclear power stations, road development and waste incinerators. Various legal and PR methods are used to block affected projects. • It is a strong advocate of technologies of which it approves such as wind and wave power. 									
Construction Research Bodies	CITB Construction Skills	<ul style="list-style-type: none"> • A partner, although comparatively rarely a leader, in a great many sector and government sustainability initiatives. • A responsibility to embrace and extend the sustainable construction agenda comes as part of the SSC role. • Coverage of sustainability issues and technologies through CITB's skills foresight work 									
	nCRISP	<ul style="list-style-type: none"> • Learned research body, with an number of high quality publications, including some which highlight the disparity between SC aspirations and realities 									
	CIRIA	<ul style="list-style-type: none"> • Extensive research organisation with research, publication and networking components • Input to the environmental KPIs and env. Benchmarking in general • Custodian of Easy Access Environmental Management • Best practice research spans highly applied to blue-sky and strategy thinking 									
	Constructing Excellence	<ul style="list-style-type: none"> • SC a key theme of this enlarged and enhanced industry body. • Custodian of the industry KPIs • A huge database of best practice information, based on extensive demonstration projects • Significant regional representation and press coverage. 									
Professional Bodies and Federations.	AECB	An independent environmental building trade organisation, which encourages greater environmental awareness within its diverse membership, and the industry as a whole									

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	ICE	<ul style="list-style-type: none"> • A detailed sustainability charter , committing the Institution and its members to adopting and spreading best practice in sustainable construction • A commitment to a Sustainable Civil Engineering module in every certified undergraduate course • Living the sustainability values as an organisation and monitoring and improving its own performance. • Engaged in the Sustainable Construction In Practice (SCIP) programme with many other eminent stakeholders, delivering a UK-Wide best-practice roadshow. • ICE have issued new SD guidelines for their design and engineering degree courses leading to Chartered status. 									
	IStructE	<ul style="list-style-type: none"> • Operates a Panel on Sustainable Construction; “a forum for sharing information and experience, and to promote best practice” • Makes available a number of publications on its website related to Sustainable Construction of specific interest to Structural Engineers. • IStructE have issued new SD guidelines for their design and engineering degree courses leading to Chartered status. 									
	RIBA	<ul style="list-style-type: none"> • A solid commitment by the organisation to sustainability, promulgating best practice and influencing industry and education. <ul style="list-style-type: none"> o The proceedings and recordings of RIBA’s 2003 Sustainability Conference are still available on its website. • A dedicated sustainability website coming early this year. • Building Futures is a joint programme with CABE similar to industry Foresight processes. Particular emphasis is placed on sustainability issues. • Heavily involved in the production of CPD courses with HE institutions 									
	CIOB	<ul style="list-style-type: none"> • Committed to its Sustainable Building Policy • Involvement in the SD4BP programme delivering information on courses and training options in Sustainable Development to Building Professionals • Conferences, talks, and involvement in all-industry projects. 									
	CIBSE	<ul style="list-style-type: none"> • Established the Carbon Network as a forum for discussion/exchange of best practice • Publishes Building Energy Log Books • Partner in Climate Change and Internal Environment project led by ARUP 									
	IES	<ul style="list-style-type: none"> • Given the nature of the Institution, most of its actions are concerned with carrying forward the sustainability agenda. • Lead organisation in PP4SD • Involved in Sustainability Alliance and SocEnv, see below. 									

Stakeholder Group	Stakeholder	Sustainable Development/Sustainable Construction Activities	Setting Sustainability Agenda	Setting Sustainable Construction Agenda	Supporting Sustainable Construction	Sustainable Construction Client	Best Practice Dissemination	Demonstration Projects	Benchmarking	Skills, Education and Training	Systems/Tools
	RTPI	<ul style="list-style-type: none"> A developed sustainability policy, and a dedicated Sustainability Think Tank in place. Involved in government consultations and industry activities concerning sustainable development. 									
	RICS	<ul style="list-style-type: none"> Sustainability Task Group established to identify and disseminate best practice. A Global Manifesto and several policy documents on building balanced communities, integrating transport and development and coping with fast development. Existing brief to promote excellence in redevelopment environmental economics and other fields is central to fulfilling sustainability goals. Provides guidance on recycling construction waste 									
	IHT	<ul style="list-style-type: none"> Has produced keynote documents on the environmental management of highways (EMH), Cycle-Friendly Infrastructure, Providing for Journeys on Foot, Aggregate Recycling & Alternative Materials in Highway Construction and Road Transport, the Environment and Sustainable Development Stakeholder in the SCIP programme 									
	CPA	<ul style="list-style-type: none"> Involved in partnership in many industry initiatives Custodian of the Construction Products KPIs 									
	CIC	<ul style="list-style-type: none"> A wide range of publications and guides to sustainability and with environmental themes Sustainable Development Committee, reporting on waste, recycling, ground and transport issues Published "Constructing for Sustainability: a basic guide for clients and their professional advisors" in June 2003 jointly with CIEF. 									
	QPA	<ul style="list-style-type: none"> Environmental Awards Scheme for members Advocates uptake of ISO14001 amongst its members Partner in SCIP programme (see ICE, above) Active in Minerals & Nature Conservation Forum, which is promoting biodiversity at industrial and former-industrial sites. 									
Tools and Systems	Project Sigma	<p>"The project has produced a sophisticated package of guidelines for understanding and applying sustainability in a business context...</p> <p>The organisation makes a wide range of paper based guides and toolkits for implementing the programme available freely on its website (www.projectsigma.com). The scheme is intended to map well on to common business and environmental management systems already in operation"</p>									

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	PP4SD	PP4SD aims to promote the exchange of best-practice in sustainability, and the development of learning tools to support sustainable development, such as a foundation course, based on the concept of 'systems thinking', and tailored training for the financial and land-based sectors.									
	ISO	ISO Provides generic but customisable schemes for the structuring and assurance of environmental management systems through its ISO14000 series									
	EMAS	This is an EU supported EMS									
	BSI	BSI's national standard for environmental management systems is phased to encourage gradual uptake									
	CEEQUAL	CEEQUAL uses a credit-based assessment scheme delivered by a trained internal or consultant assessor and validated by an external verifier, and is intended to be applicable to any and all civil engineering projects. A spreadsheet is used to capture performance data on the use of water, energy and land as well as ecology, landscape, nuisance to neighbours, archaeology, waste minimisation and management, and community amenity.									
Private systems and tools providers	Arup Environmental	Custodian of SPeAR, an environmental indicator assessment based on a design tool to help companies evaluate, demonstrate and improve on the sustainability of their products, projects or the organisation's performance.									
	BRE	BREEAM - for assessing and improving the environmental performance of office, retail and industrial buildings, and Ecohomes for housing; Envest - for assessing environmental impacts of a building at early design stage and Environmental profiles - a universal method of measuring the sustainability of all construction products and materials. Of these BREEAM is a recurrent feature of many companies proven to be performing well in sustainability terms. BRE is also a notable industry consultant and has a notable body of research outputs									

1.13 The views of those with influence in the sector

We interviewed ten organisations who are working in the general area of sustainability, their views are given in detail in the report and summarised below.

Question	Summary Response
<p>What do you mean by sustainable construction?</p>	<p>Difficult to summarise, due to the diversity of responses. A majority of responses touch upon the three stands of environmental, economic and social sustainability as promulgated by government, but some focus mainly or wholly on the environmental aspect. Here the 'triple bottom line' – accounting for the environmental and social impacts of businesses as well as their economic impact – is a popular concept referred to or implied by a number of respondents.</p> <p>The level at which sustainable construction is considered by respondents is interesting. Some respondents instinctively define SC as a 'big idea' – in terms of policy handed down by government and industry worthies. Others instinctively define it in terms of nuts and bolts innovations, changes to working practices, and products which make the industry more efficient. The gap between the big idea and brass-tacks implementation is a recurrent one in the interviews.</p> <p>Furthermore some people couch their definitions of sustainable construction in terms of building in a sustainable fashion, others more broadly as building sustainable buildings. The literature review bears both of these viewpoints out. It seems likely that the decision-making power to influence these different aspects of sustainable construction often sits at different positions in the building supply chain (sustainable buildings closer to the client/designer end, building sustainably more towards the contractor end).</p> <p>The research here is unlikely to provide us with a single definition of sustainable construction, because no such definition exists, but identifying common factors amongst the many definitions will establish a consensus view.</p>

<p>What are the drivers of sustainable construction?</p>	<p>Respondents identified a wide range of driver factors, including:</p> <ul style="list-style-type: none"> • Increases in the importance of Corporate Responsibility to investors and companies themselves. Increasingly the perception and non-capital performance of companies is impacting their share price and ability to act. More broadly this driver might be described in terms of a desire to boost corporate and industry image. • The increased importance of whole life costing and similar methods which can establish a better business case for front-loading construction costs to save in the long term. This approach favours many green innovations. <ul style="list-style-type: none"> ○ An additional factor here is the increase in build/operate PFI/PPP projects which consortia have the lifetime responsibility for the maintenance of the project. • Creative and Socially Responsible Clients, particularly in the public sector, where government has stipulated a sustainability agenda, are demanding more sustainable buildings and construction methods. • Legislation is changing construction activities, through taxation/subsidy and regulation. • Political pressure from pressure groups, the public and government is influencing sector decisions. • Improved awareness of the potential of sustainable construction by clients, designers and contractors, and a growth in innovation by these stakeholders.
<p>What are the barriers to sustainable construction?</p>	<p>Respondents cited a number of impediments to sustainable construction, including:</p> <ul style="list-style-type: none"> • Client resistance – ironic since client push was cited as a driver. The root causes of client resistance were identified as the lack of a clear business case for private sector clients, and lack of awareness and confusion amongst public sector clients. • Poor fulfilment of sustainable solutions – sustainable solutions delivered by the construction sector rarely, it is alleged, achieve the benefits propounded at an acceptable cost. Projects which integrate Sustainability themes have been poorly thought out and overly complex. This has, it is suggested, left clients understandably wary of unproven SC methods and technologies. • There is perceived to be a weak business case for sustainable construction – although this is in part because uptake of SC is low and it is yet to enjoy scale economies.

	<ul style="list-style-type: none"> • Lack of clarity, understanding and knowledge by the various players. People are overwhelmed by the amount of conflicting information and don't know where to start, and are scared of the business risks. The difficulty of converting the comparatively clean, comprehensible 'big ideas' of SC to the fine detail of changes on the site recurred here as a theme. • The industry's culture is resistant to change – people are not used to behaving in a sustainable way, and some may even resist it because they believe it may be too much work or damage their bottom lines.
<p>Are skills needs an issue?</p>	<ul style="list-style-type: none"> • Responses here ranged from “no, not such a big issue” to “Yes, very much so”, but the majority of responses were in the affirmative. • The minority of respondents who downplayed the issue suggested that there is no shortage of best-practice information 'out there', and that any skills shortages there are, are not specific to SC, and are not for lack of inputs. • One respondent cited the disconnect between contractors and subcontractors as a place where the SC message gets lost and there are skills issues which dominate. • Another respondent echoed this by stating that upskilling needs to happen at all levels of the industry. • A communication barrier was mentioned by many respondents, and implicitly any initiative to address skills must overcome this barrier.
<p>What will be the greatest impacts of Sustainable Construction over the next three years?</p>	<ul style="list-style-type: none"> • Changes to waste management, with greater costs and complications for contractors. • Tightening of regulations. • Client attitudes to SC likely to improve as they 'get' sustainability, particularly in the public sector • Cultural shifts resulting in changes in the way the industry thinks and plans, to favour sustainable construction. • Sector investors will be looking for best returns and may act as a brake on ambitious changes. • Sustainable Communities as a concept gains more credence and integrates better with what is happening in cities and towns and on sites. • Construction professionals develop new ways of working together to deliver sustainable development. • A focus on local negative impacts of construction, such as noise and chemical pollution, and improved efforts to minimise and counteract them. • Developments in sustainable management

	<p>processes.</p> <ul style="list-style-type: none"> • Dominance of the best value approach. • An aspiration for CO2 reductions and a shift towards carbon neutrality in the sector. • More exemplary buildings which capture the imaginations of clients and contractors and trickle down innovations to more routine projects.
<p>What is being done to help respond to the changes?</p>	<ul style="list-style-type: none"> • Advice and guidance • Practical tools and systems • Best practice dissemination • Training and skills development • Engagement with regional groupings including RDAs and Local Authorities • Research and development, input to publications • Connecting with professionals, especially through their chartered bodies • Engaging with and contributing to Government processes in the area • Developing the business case for Sustainable Construction • Workshops and Discussion Forums • Networking and bringing together groups of interest
<p>What is being done to address the skills issues in the workforce?</p>	<ul style="list-style-type: none"> • Case Studies being drafted to be used as learning materials during professional training. • Training of designers and suppliers. More work needed to reach site employees. • Workshops and CPD events. • Expert consultancy input to companies.
<p>Is Sustainable Development/ Construction being taken seriously?</p>	<ul style="list-style-type: none"> • Several respondents noted that the business case for Sustainable Construction is not incontrovertible; so it is possible for companies to avoid or evade it, or sell it short. • There was no consensus about precisely where the impediments to its uptake are. For some, designers are the engine of change, and clients the constraint upon them, but for others change is led by public sector clients. • There is clearly a wealth of initiatives by the alphabet agencies associated with the sector, but are their efforts resulting in tangible change on site? • Some very creative and fruitful partnerships outlined in the detail of the response to this section.

<p>How effective has the work been to extend and implement Sustainable Construction?</p>	<ul style="list-style-type: none"> • Responses here varied from “largely ineffectual” through to “very effective”, via “there have been steps forward” and “It’s difficult to know”. • Regulatory changes are a major pressure to sharpen up, and where these exist they have changed behaviours. • Social Landlords are inclined to be more susceptible to the message and creative in delivering practical Sustainable Construction due to their social mission and capacity for long-termism. • The Private Sector has a more chequered performance. Some initiatives are great, but others are a futile exercise in box ticking undertaken for publicity purposes. • Awareness within the industry in general is still low, despite the body of work. Companies engaged and involved with policy leading bodies record a higher degree of recognition and understanding of the issues. • The spread of Sustainable Construction is an evolution, not a revolution a point which is perhaps lost on some of its most vehement advocates. • Sustained investment is needed by all stakeholders to push development forward. • There are a lot of things to unlearn – like the “this
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	is not in my job description” attitude.
<p>What can CITB-ConstructionSkills do?</p>	<ul style="list-style-type: none"> • At the trades end there are many technologies to which trades people have not been exposed. Identifying these technologies will help the trades to recommend, specify, install and maintain them. (eg condensing boilers) • Tie up with the research and best practice experts • Educate the client side and its advisors in the potential of Sustainable Construction³. • An integrated and co-ordinated long term strategy for Sustainable Construction skills development. • Make Sustainable construction understood and relevant at all levels of the industry. Make sure that everyone has a stake in the process, and that no single professional group or company type has the monopoly on making it happen. <ul style="list-style-type: none"> ○ SMEs are identified as being at risk of disenfranchisement here • Reach the people who <i>don't care about sustainability</i>. Existing initiatives have reached the converted very well.

1.14 The contribution of higher education

Our review of educational providers has found strong recognition of the importance of sustainable development, however, we have not been able to qualify its effectiveness.

At undergraduate level

Sustainable development is an established degree level course. 83 courses were listed for 2004 entry by UCAS, from a total of 36 institutions. Many of the courses focus on specific aspects of sustainable development such as rural development, third world development, product design or tourism; in these cases the core skills learnt may not be directly applicable to the construction sector. Some offer elements of design, focusing on CAD, management, sustainability and elements of engineering, typically structural or civil. In most cases it seems that these courses do not present a clear pathway to accreditation by a professional institution.

Our analysis of first degree courses found comparatively few construction courses with a strong sustainability element, and only slightly more have an 'environmental'

³ Responsibility for working with clients falls mainly with the Sector Skills Council activity of CITB-ConstructionSkills.

component.⁴ In order to obtain the list of five courses with variously relevant content here, syllabuses from fifteen or so institutions were reviewed, and no documented sustainability content found in two thirds. This may improve in time as pressure from the Professional Institutions to include sustainable development in accredited courses increases.

At post graduate level

The lack of a central store of information or analysis of the composition of postgraduate courses makes a comprehensive overview the work of a project in its own right. A qualitative analysis of the courses offered by Building, Built Environment, Construction and Civil Engineering departments finds Sustainable Construction much more in evidence as a distinct discipline than it is as an undergraduate course. Indeed, the area seems a most fertile area of both taught courses and research activities.

1.15 A policy framework for CITB-ConstructionSkills

The primary response of CITB-ConstructionSkills is to enable the construction industry to become more sustainable and to assess the sector's readiness to respond to change. Its also has a role to inform those setting the sustainable development (SD) agenda of the impact of their decision on skills. This translates into five policy aims.

1. Define, measure and monitor the impact of SD on the construction sector so that it can demonstrate the importance of change to the industry.
2. Stimulate the proper provision of appropriate training so that employers have access to the right development opportunities for their existing and new staff.
3. Stimulate the industry to increase the skills of the workforce so that employers can deal with the SD agenda.
4. Advise government and its agencies on the skills implications of additions to and changes in the SD agenda that are relevant to the construction industry.
5. Provide training and development opportunities that:
 - ▶ Enable the industry to understand and operate within relevant legislation.
 - ▶ Increase the efficiency and productivity with which companies execute the construction process and so reduce the required resources and negative impacts of that process.
 - ▶ Enable the industry to understand and apply the techniques and technology required to build sustainable buildings.
 - ▶ Prepare the industry for a future where the demands for sustainable development will be higher than they are today.

⁴ While many courses have units with 'environment' in their title, in most cases this pertains to either the built environment, or the immediate environment of the project, not environmental protection.

1.16 Translating the broad policy into specific actions

From the simple market assessment given earlier in this section it is clear that the most impact is to be had by:

1. Supporting all the industry to build within the legislation that is currently in place to improve sustainability.
2. Raising awareness and demonstrating the business case for sustainable construction amongst small and lagging large firms.
3. Addressing skills shortages in this area across the industry but particularly with the large leading companies who have the greatest understanding and so demand.

In the final table of this section (below) we outline potential roles for CITB-ConstructionSkills as both a Sector Skills Council and as Industry Training Board.

Pressure	Driver	Possible action	Fit with SSC Role	Fit with ITB/SSC Role
A compulsion to comply	Taxation	Lobbying government to change taxation policy to make sustainable options more affordable to the contractor than conventional.	Med	Low
		Lobbying government to provide tax breaks/funding for training in this area.	High	Low
		Providing ⁵ information, advice and training for companies on how to deal with increasing taxation	High	High
	Policy and Legislation	Being the voice of industry in government when it is setting policy on sustainable development.	High	Low
		Providing a channel for communicating employers' views on proposed policy developments to government	Medium	Low
		Interpreting what policy and legislation means for industry and developing the skills to deal with that legislation	High	High
		Advising government on the implications of their policy on the workforce in the construction industry.	High	Low
	Planning regulations	Providing a channel for employer input into bodies setting planning policy	Medium	Low
		Providing (or stimulating others) briefings and short training courses for employers on planning regulations	High	High
	Client demands	Researching the clients' current and future views on sustainable development.	Medium	Medium
		Defining the implications on skills of current and emerging client views on sustainable development	High	High
		Informing the clients of the potential the construction industry has to deliver	High	Med

⁵ By providing we include the stimulation of others to undertake this.

Pressure	Driver	Possible action	Fit with SSC Role	Fit with ITB/SSC Role
		sustainable development.		
	The availability of resources	Informing pools of potential new recruits of the industry's contribution to sustainable development.	High	Med
		Influencing FE and HE colleges to increase the coverage of sustainable development their courses.	High	High
		Stimulating the providers of short courses to increase their coverage of sustainable development	High	High
		Stimulating employers to train more in this subject	High	High
		Ensuring that sustainable development skills are included in the national occupational standards and so become part of NVQs and SVQs	High	High
		Ethical investment criteria	Informing contractors of the impact of ethical investment and their possible responses to it	Med
	Informing investors of how the construction industry is contributing to sustainable development in the UK		Low	Low
Secondary Drivers	The Green Lobby	Making the case that the construction industry is a responsible employer with a focus on sustainable development	Med	Low
	The availability of sustainable products	Providing briefings for designers and contractors on sustainable development processes and products	High	Low
	The awareness of the industry	Providing briefings and short management courses on the subject Signposting the industry to sources of advice and training	High	High
	The skills of the industry	Increasing the skills of the industry in this area through: <ol style="list-style-type: none"> 1. Defining the problem 2. Stimulating providers 3. Encouraging employers to train 	High	High
Tertiary Drivers	The attitude of consumers	Demonstrating that the construction industry is contributing to the sustainable development debate.	Low	Low
	The attitude of employees	Demonstrating the importance of all aspects of sustainable development through a range of communications media	Low	Med

1.17 Taking the strategy to market

Sustainable development is best positioned as part of a wider improvement agenda in the industry. Ensuring a business (or industry) can be sustained into the future, operates within the law and is responding to the demands of its clients is part of good

management. Many of the actions that lead to a sustainable future make immediate business sense for example:

- ▶ Waste minimisation, material re-use (particularly aggregates) and local sourcing of materials cuts costs.
- ▶ Energy saving and pollution control will cut costs on site.
- ▶ Labour reduction on site will increase profit and overcome the industry skills shortages.
- ▶ The ability to develop low cost brown field sites offers development profits and increases the size of the construction market.

In the longer term, the ability to construct off-site buildings that have less environmental impact and with features such as passive heating and cooling, combined heat and power and zero emissions will create rather than destroy markets for construction companies.

It is these messages rather than the moral argument that will win this profit and programme driven industry towards a more sustainable future.