

Annex 3 – Construction Resources and Waste support

This annex provides more detail on tools, training, guidance and other support available to the construction sector. The organisations responsible for providing this support have been split into BREW delivery partners (i.e. these activities funded principally by BREW, via landfill tax, or Defra); and those who are not BREW delivery partners

- A3.1 BREW delivery partners
- A3.2 Other organisations

The information presented in this Annex is based on research completed before August 2007. Some of this information may, therefore, have been superseded.

For definitions of terms and abbreviations used in this Annex, please see the main CRW roadmap document.

A3.1. BREW delivery partners

Carbon Trust

The Carbon Trust (CT) provides a range of services aimed at improving energy efficiency, reducing carbon emissions and increasing the use of low carbon technologies. The majority of activities undertaken by CT do not fall specifically within the realm of waste management within the construction sector, but do have wider sustainability concerns.

The **Low Carbon Building Accelerator** demonstrates expertise in the energy-efficient refurbishment of non-residential buildings. The scheme works with refurbishment projects to help them design, develop and manage low carbon technologies/approaches, and aims to demonstrate cost-effectiveness and replicability of the technologies. The findings of these projects will be used to inform landlords, developers and managing agents in order to increase market demand for low carbon refurbished buildings.

In addition to the assistance offered on energy efficiency, CT offers **Building Design Advice** services, available free or on a subsidised basis, to anyone involved in a significant non-domestic renovation or new build. The service will help companies make the most of low carbon technologies, ensure effective energy controls are in place, make sure the building is economically responsible and uses recycled, or sustainable materials where appropriate.

The services include:

- A detailed printed guide (**Building Design Advice Guide**) which contains a detailed overview of what a company needs to know about procuring good, energy efficient buildings.
- Three different levels of face-to-face **consultancy** are available, depending on the size of the construction project. There are no set rules though companies can generally expect to receive one day's consultancy per 1,000 ft² of the project's total area. Consultancy advice is either free or subsidised.

A number of products are available from CT to help reduce energy waste and manage buildings after construction. Further information can be found on the Carbon Trust's website: www.carbontrust.co.uk.

Department of Trade and Industry (DTI)/Department for Business, Enterprise & Regulatory Reform (BERR)

DTI Technology Programme

Defra, through BREW, are providing £50 million into the Technology Programme. Their funding is supporting research to help businesses reduce waste and increase resource efficiency leading to bottom line benefits. Here, the Technology Programme focusses on technologies that can deliver sustainable solutions and minimise waste – particularly to deliver a programme of competitions to support technologies (product and process) that move UK business up the waste hierarchy and to address sustainability issues at the 'needs conceptualisation' stage.

The Technology Programme is now managed by the Technology Strategy Board, which in turn reports to the new Department for Innovation, Universities and Skills (DIUS).

Activity to date

The Technology Programme currently funds two Knowledge Transfer Networks (KTNs) in this area: the Resource Efficiency and Waste Minimisation KTN (formerly Mini-Waste Faraday) focused on minimisation and recycling of industrial waste and the Integrated Pollution Management KTN (formerly FIRST Faraday) focused on contaminated land and groundwater remediation.

<p>November 2004, includes:</p> <ol style="list-style-type: none"> 1. Using wastes from the paper recycling process to make composite construction materials: Salvtech Ltd 2. Reducing Waste Through Integrated Product Design and Manufacture (now called Be Aware): Building Research Establishment Ltd (BRE) 3. Zero Waste Advanced Service Trench Excavation and Reinstatement (ZEROWASTER) Yorkshire Water Services Ltd 	<ul style="list-style-type: none"> • ‘Succeeding through innovation: waste management and bioremediation’ (http://reporting.dti.gov.uk) (£10 million): technologies and processes to eliminate, reduce, re-use, recycle or treat waste products
<p>April 2005, Includes: Towards Zero Emission Refurbishment Options (TZERO): BRE</p>	<ul style="list-style-type: none"> • Meeting the challenge of the Zero Emission Enterprise (ZEE 1) (http://reporting.dti.gov.uk) (£20 million): innovative ways to eliminate industrial and commercial waste and create more resource-efficient processes
<p>Autumn 2005 There are around 5 construction related projects due to start</p>	<ul style="list-style-type: none"> • Succeeding through innovation: design and manufacture of sustainable products: collaborative research and development (http://reporting.dti.gov.uk) (£5 million): reducing waste and environmental impact across a product’s life-cycle
<p>Spring 2006</p>	<ul style="list-style-type: none"> • Sustainable Production and Consumption: Energy Efficiency Technologies (www.technologyprogramme.org.uk) (£12 million) (includes building design and controls, and manufacturing processes)
<p>Autumn 2006</p>	<ul style="list-style-type: none"> • ZEE 2 (£10 million)

Table 1 Collaborative R&D funded by BREW through the Technology Programme

Environment Agency

The EA website www.environment-agency.gov.uk provides a large amount of information to the construction industry, including information for developers, and construction guidelines. A number of additional initiatives are aimed directly at the construction industry:

Environment Agency sector plan

The Environment Agency is developing a Construction Sector Plan in discussion with the construction industry. The purpose of this partnership plan is to support and drive improved environmental outcomes of the main impacts of the sector over the next decade. It will identify milestones for construction businesses to achieve compliance with regulations as a minimum and then increase adoption of good practice, best practice uptake, and moves to excellence in environmentally sustainable practices. This will cover waste reduction and recycling on site, as well as improving resource efficiency in construction projects, risk management systems, and moves towards sustainable construction.

The Sector Plan is being developed for formal consultation during 2007 with adoption proposed for the start of 2008.

Environment Agency Awareness Campaign

The Environment Agency is also running a three-year awareness campaign “Sitewise II” to improve the environmental performance of the smaller businesses in the construction industry. This is part of the Agency’s SME Strategy and is being piloted in the Anglian region. Targeted initiatives to combat Flytipping are also underway in several areas of the country.

Sustainable Design and Construction

In 2004 the Sustainable Buildings Task Group (co-chaired by the Environment Agency and English Partnerships) reported in Better Buildings – Better Lives that the way we use natural resources for building and the level of pollutants emitted both in the process and in occupation is unsustainable. It suggests that the construction industry should adopt more sustainable forms of building and recommended the adoption of a Code for Sustainable Buildings.

The EA is also involved in a three-year project to assist SMEs to reduce hazardous waste, **HAZRED**. The ‘general construction/building’ sector is one of six priority sectors which can obtain assistance in the form of:

- on-site guidance from a specialist adviser on how you can better manage your hazardous waste to prevent and reduce the amount you produce
- the latest information and advice on hazardous waste management
- report and action plan for measures you could put in place that will save you money
- access to the hazardous waste best practice catalogue detailing innovative and cost saving techniques
- links to partners’ services and support
- participation in a European Life funded environmental project
- network with other similar businesses.

NetRegs is a unique web-based resource designed to help small and medium-sized businesses (SMEs) understand their environmental responsibilities. It was developed by the Environment Agency in partnership with the main UK regulators, working closely with the Small Business Service. The construction sector guidelines pages of Net Regs are among the most-visited information pages of the site. From 2007 users will be able to personalise their favourite pages.

Envirowise

The Envirowise programme offers UK construction companies free, independent, confidential advice and support on practical ways to increase profits by minimising waste and reduce environmental impact. Envirowise offers its services to many different sectors including construction and manufacturing.

Envirowise started focusing on the construction sector during 2004/05. Financial year 2005–06 saw activity in the construction sector, such as the supply chain partnership project, site waste management plans, waste minimisation tools and a small builder campaign. The business plan being delivered for 2006–07 includes the following activities:

- **Trade Suppliers** – A pilot study with building suppliers aimed at enhancing resource efficiency through the supply chain.
- **Packaging Guide** – A project to develop further guidance to reduce and deal with packaging waste on construction sites

- **Design for Resource Efficiency** – Projects to develop guidance for architects and surveyors, to produce case on modern methods of construction (MMC) and to provide guidance on reducing plasterboard waste
- **Site Waste Management Plans** – Envirowise recently completed a series of successful events in conjunction with WRAP on SWMPs.
- **Small Builder On-site Training** – Envirowise has been sponsoring the Café Van project, which provides waste management training on site for small builders. Feedback suggests there is enormous scope for this to continue. A further three regional projects developing the Café Van approach are being set up to test the feasibility of a regional roll. A set of ‘trade sheets’ on four skills – decorating, carpentry, bricklaying and labouring – will add to site training material.
- **Supply Chain Partnerships** – Such partnerships involve sharing experiences and ideas through meetings, site visits, workshops, collaborative and in-house projects, discussions and networking. Three SCPs are being set up to further develop the SCP model and demonstrate its benefits.
- **Specialist Contractors** – A study of environmental management systems (EMS) as a driver for change for specialist contractors at fit-out stage leading to guidance in the form of a publication and workshops.
- **Case Studies** – Further short profiles and fully researched case studies are being developed for the construction sector.
- **Advisor Support and Site Visits** – Envirowise has been offering Fastrack and DesignTrack services to provide tailored guidance and help companies save money through waste minimisation and resource efficiency. This support is being developed and tailored for the construction sector.

Additional services:

- **Resource Efficiency Clubs** – The RECs programme aims to help companies reduce costs through minimising waste and energy consumption. Envirowise actively promotes RECs among the Constructing Excellence Clubs, through workshops focussing on waste minimisation and supply chain waste minimisation.
- **BrickSandMortar** – Envirowise produces a construction industry e-Bulletin providing up-to-date information on Envirowise activities in the construction sector (free subscription).
- **Website** – The Envirowise [website](#) has a construction sector-specific area where free access to all construction-related information can be obtained.

Market Transformation Programme (MTP)

The Market Transformation Programme has been set up on behalf of Defra to support government policy on sustainable products. The aim of the MTP is to reduce the environmental impact throughout the life cycle of products.

The information and standards are based on evidence, including models on how products will evolve in the market place and their future environmental impacts. The work is undertaken in partnership with policy makers, industry and other experts. The aim is to reduce environmental impact by using less energy, water, material and ultimately producing less waste.

‘Construction products’ is one of the high-priority product areas covered within the current programme. This product area is being managed by BRE on behalf of MTP

MTP is undertaking work on a number of key construction products, as listed below, with the initial aim of developing draft policy briefs and briefing notes, followed by industry adoption of policy.

- **Off site fabricated housing (OSF)/modern methods of construction (MMC)** – These products are becoming more dominant due to DCLG/DTI policy and skills shortages. The strategy is to move market towards systems and products that have lower environmental impacts.

- **Floor coverings, such as carpets, laminate flooring, vinyl** – The strategy is to quantify measures for impact reduction and evaluate opportunities to reduce flooring waste to landfill through potential improvements in resource efficiency.
- **Roofing products such as tiles, flat roofs** – Earlier work by BRE has shown that most roofing waste goes to landfill, but there are real opportunities to recycle elements of the waste stream. The strategy is to quantify measures for impact reduction and evaluate opportunities to reduce roofing waste to landfill.
- **Insulation products** – Little is known about the waste impacts now and into the future or possible actions that would promote resource efficiency. The MTP strategy is to evaluate opportunities to reduce insulation waste to landfill and is currently scoping future waste impact.
- **Window systems and plasterboard** – Some high-impact actions to reduce waste to landfill have been identified in both these products areas. The strategy is to take forward specific actions in both products with the industry stakeholders, to reduce waste through design and manufacture. Activities include:
 - Plasterboard – with WRAP, MTP has developed with the major plasterboard manufacturers and their trade association a voluntary agreement to reduce plasterboard waste to landfill and increase collection and recycling. WRAP and BRE are working with the remaining elements of the supply chain to agree a sector-level commitment.
 - Defra will complement existing work on plasterboard and window systems through its product and service roadmaps. The roadmaps, which will be developed collaboratively with a broad range of stakeholders, will chart the sustainability impacts and propose a range of interventions to improve environmental performance across the life cycles of ten priority products, including window systems and plasterboard.
 - Window systems – Stakeholder working group; quantify measures for impact reduction; innovation road map.

In addition to the specific product areas, MTP is continuing work to strengthen links with key stakeholders and policy makers.

National Industrial Symbiosis Programme (NISP)

NISP roots are in the emerging field of industrial ecology, an approach linked to the sustainable consumption and production agenda that considers the flow of materials in regional and national economics. It is about bringing traditionally separate industries and organisations together to see whether there is competitive advantage in physically exchanging by-products, such as energy, water and materials, along with logistics, expertise and assets. Such synergies are driven by collaboration, proximity and economic viability. The NISP programme is business-led, free of charge and nation-wide, though delivered regionally. NISP acts as an independent coordinator and facilitator, linking companies from different sectors to explore new business opportunities.

The programme started two-and-a-half years ago as a regional initiative in the West Midlands and rapidly expanded to cover Scotland and then Yorkshire and Humberside. Eight more regional networks covering the rest of England and Wales were given the go-ahead two years ago with funding from the government's Business Resource Efficiency and Waste (BREW) programme. Environmental consultancies WSP Environmental and Scott Wilson are contracted to deliver the regional programme.

NISP members are encouraged to attend workshops to network with other companies. These could generate numerous and potential synergies in the scope of a few hours. These workshops are facilitated by helping companies to release creativity. The ideas are then followed up and help is provided to unblock any problems or barriers. Alongside workshop 'quick wins', regional programmes are shaped by legislation, availability of new technologies and local business issues.

The NISP [website](#) provides a large amount of information to the industry and local authorities including information on case studies. A number of additional initiatives are currently aimed directly at the construction and water sectors.

Regional Development Agencies

Regional Development Agencies (RDAs) were set up by government to promote sustainable economic development in England. They are business led. Their main tasks are to help the English regions improve their relative economic performance and reduce social and economic disparities within and between regions. All nine RDAs are funded by central government with their sponsoring department being the Department of Trade and Industry.

All nine Regional Development Agencies, spearheaded by EEDA, which leads for the RDAs on sustainability issues, receive funding from BREW to coordinate resource efficiency and waste initiatives to meet the needs of business. BREW will return landfill tax to businesses in the form of coordinated programmes that provide access to a wide range of support on resource efficiency and waste issues.

The BREW initiative encompasses all nine RDAs and each has its own local programmes in place to assist businesses increase resource efficiency, some of which are identified below.

Advantage West Midlands

Developing a world class construction industry in the West Midlands is a key role of the [Advantage West Midlands](#) which has established a Buildings Technologies Cluster of companies concentrated in the region, with core strengths in building materials, design and manufacturing. The vision for this cluster is for the region to be an international leader in sustainable building materials, sustainable building products and design-led, manufactured building solutions.

The key themes of the cluster are:

- Implementing continuous improvement in the industry through Constructing Excellence – focussed programmes that aim to deliver radical improvements to innovation, best practice knowledge, productivity and industry engagement.
- Stimulating off-site manufactured building solutions.
- Using the region's strengths in materials and product development to position the West Midlands as an international leader in sustainable buildings.

East England Development Agency (EEDA)

EEDA and the East of England Regional Assembly commissioned the UK Centre for Economic and Environmental Development (UK CEED) to develop a Sustainable Development Toolkit. The broad aim of the toolkit is to highlight the economic, environmental and social impacts of policies, development proposals and other new initiatives within the region and provide information which can help to inform them. Other regions are also developing their own region-specific versions of the toolkit. EEDA has also been in discussions with BRE and World Wildlife Fund (WWF) over inclusion of their checklist for Sustainable Construction to be integrated into the regional toolkits.

The toolkit can be accessed at www.toolkit-east.org.uk.

EEDA is also involved with CoRE (see end of RDA section).

East Midlands Development Agency

The East Midlands Development Agency established a strategy for the environment which aims to generate more energy from renewable sources, create less waste to landfill and encourage businesses to be more energy efficient. To enable them to achieve this, the following initiatives were commenced:

- **Cutting Out Waste in Construction** – A number of commercial sectors have been identified to be targeted by regional and national stakeholders and construction is one of the most important.
- **Innovative Waste Solutions: Feasibility Studies** – A feasibility study to assess the effectiveness of implementing a voluntary sector led construction waste recycling service in Nottingham.
- **Sustainable Property Development** – To address the impact of energy ratings on the commercial property sector at a more regional level. The focus of this work will be on existing property as opposed to new developments.
- **Energy Efficiency Training and Awareness** – To raise awareness of energy efficiency technologies and the potential impact their implementation could have on the build and running costs of the completed building, as well as its environmental performance.
- **The East Midlands Business Resource Efficiency Network** – Promotes a series of environmental business events, including construction sector-specific seminars. (See www.embren.net.)
- **EMPIRE: East Midlands Performance Improvement in Resource Efficiency** – (EMCBE, Loughborough University, BRE, University of Northampton):
 - Awareness raising and benchmarks
 - Additional fast track visits
 - Follow up visit – University of Northampton
 - Pre-demolition audits (x5).

London Development Agency

The London Development Agency has a construction web portal. This initiative promotes opportunities in employment, training, workforce development and business development in the construction industry for people in North London.

The Report Green Alchemy Turning Green to Gold: Creating Resource from London's Waste was commissioned by the Mayor of London to look at what policies could be put in place to achieve a range of objectives, one of these being environmental improvements through improved resource efficiency and higher recycling.

The LDA is also involved with CoRE (see end of RDA section).

North West Development Agency

The North West Development Agency commissioned the Centre for Construction Innovation (CCI) to deliver a training package on 'Rethinking Construction and Better Public Buildings'. The project, 'Constructing Excellence', derives from the NWDA's intention to lead in the region in improving the quality and efficiency of the construction industry. The training programme was delivered to give a better understanding of the principles outlined in the government report 'Rethinking Construction' and included seminars on lean construction and sustainability and the environment.

One North East

One North East is taking the lead in the development of resource efficiency business support services in the region, playing two key roles: coordination of BREW partners' activities; and the development of additional programmes to complement BREW initiatives. A regional BREW network has been set up, to create a common understanding of each other's programmes to explore ways of joint working and to respond to the needs of the business community represented on the network

These additional programmes include:

- Resource efficiency business support service – a brokerage service to enable access to the most appropriate form of assistance. This will have very close links with Envirowise and Business Link
- NISP-NE – provision of financial support
- Recyclate market development in the region
- Environmental technologies – a programme will be developed to increase the technology transfer for new product development and adoption of sustainable technologies.

One North East has developed a Sustainable Development Guidance Manual. The manual provides useful information and guidance on how to increase resource efficiency through reducing the amount of waste produced, reusing and recycling waste, using recovered or recycled materials and ensuring the safe disposal of materials that cannot be reused or recycled.

South East England Development Agency (SEEDA)

SEEDA is the lead RDA for construction and has a programme of activities aimed at improving communication and collaboration between RDAs and government departments with interests in the construction sector. Work undertaken has included gathering best practice examples, improving communication and liaising with government departments, working with CITB ConstructionSkills on training issues.

SEEDA, in conjunction with BRE, developed the Sustainability Checklists for Developments to allow construction projects to contribute to sustainable development. The checklist is aimed specifically at developers, architects, planners and housing associations. It aims to ensure that new developments throughout the South East incorporate as many facets of sustainability as possible.

SEEDA is also involved with CoRE (see end of RDA section).

South West of England Regional Development Agency

The SWRDA promotes sustainable construction through its Future Foundations: a Sustainable Construction Charter, developed by Sustainability Southwest in 2001. SWRDA was one of the first organisations to sign up to the principles of the Charter for its own construction. Future Foundations provides information, advice and examples of good practice and encourages organisations to consider the principles of sustainable construction – such as efficient waste management, energy efficiency and local sourcing of materials. Future Foundations is funded by the SWRDA, Government Office for the South West, the Environment Agency and Wessex Water.

Yorkshire Forward

Yorkshire Forward is committed to establishing the Region at the leading edge of sustainable development practice. The Sustainable Development Team provides internal and external advice and technical expert help to assist businesses to make positive use of Yorkshire and Humber's environment for long-term business success, with particular interests in transport, land use, planning, nature conservation, waste, resource efficiency and energy issues.

In 1999 Yorkshire Forward established the Community Construction Training Company Ltd (CCTC). The training is aimed at providing opportunities for multi-disadvantaged people/communities to access construction skills through work-based learning experience. The training programme employs sustainable construction techniques which is hoped will lead to increase resource efficiency in the industry.

Joint RDA work: CoRE – Construction Resource Efficiency Programme

CoRE is a regionally based pilot to draw together the work relating to construction resource efficiency. This is taking place in the regions of East of England (Eastern CoRE), London (London CoRE), and South East of England (South East CoRE), due to the high levels of construction underway already, and planned for the future, in these regions.

Working with BRE, each region has a champion to drive forward the delivery of CoRE, which will add value to projects relating to construction resource efficiency in those regions.

Tasks include: pre-demolition audits; sites registered to SMARTStart, BREMAP, Envirowise Fast Track visits and follow up; exemplar projects.

Waste and Resources Action Programme (WRAP)

WRAP (the Waste & Resources Action Programme) is a major government funded UK programme established to promote resource efficiency. Its particular focus is on creating stable and efficient markets for recycled materials and products, and removing the barriers to waste minimisation, re-use and recycling. WRAP is working across the whole of the material supply chain and seeks to make an impact on consumers, businesses and local authorities through seven key programmes: Construction, Manufacturing, Retail, Organics, Business Growth, Behavioural Change and Local Authority Support.

WRAP's construction programme aims to drive an increase in the efficient use of materials across the entire construction process, by minimising waste generated on site, improving the economics of recycling and boosting the demand for recycled materials. WRAP adopts a two-pronged approach to assisting the construction industry improve its materials resource efficiency – making the business case to clients, their advisers and contractors, and providing practical tools and support to help people minimise waste, recycle more and achieve higher recycled content in their projects.

Key work areas and outputs

Waste minimisation and management

- Site waste management – on-site planning and segregation and working closely with Envirowise to deliver guidance on SWMPs
- Support for C&D waste infrastructure
- Potential for off-site manufacturing, modern methods of construction and efficient logistics to minimise waste
- Waste minimisation through closed-loop recycling.

Materials recycling

- Support for investment in reprocessing facilities for materials, including aggregates, plasterboard and tyres
- Development of construction products and applications using recycled materials
- Development of quality standards for recycled materials.

Procuring recycled content

- Support to policy-makers, planners and development agencies in setting practical requirements
- Delivery of the business case for taking action to clients and contractors
- Development of benchmarks, good practice exemplars, guidance and tools, and delivery of tailored on-the-ground support (workshops and seminars).

WRAP has developed an extensive range of resources, including:

- Quick Wins and procurement guidance for recycled content
- Construction products with recycled content

- Case studies in procurement and use of recycled products and materials
- **RCtoolkit** – web-based evaluation tool for recycled content
- Practical 'how to' guides for site waste management
- Guidance on resource efficiency in demolition
- **Aggregain** – the complete online guide to sustainable aggregates.

All WRAP's resources are available free of charge through the Construction Portal www.wrap.org.uk/construction.

Other organisations

Building Research Establishment

BRE is the UK's leading centre of expertise for construction, the built environment, sustainability, energy, fire and many associated issues.

BRE's Centre for Resource Efficiency provides expertise on aggregates, waste auditing, waste minimisation and waste management in the construction, demolition, refurbishment, manufacturing and related industries. The Centre provides a one-stop-shop of integrated solutions to the whole supply chain on all aspects of material waste including research, consultancy, testing, re-engineering and specifying. The Centre has pioneered best practice in construction resource efficiency with a range of different projects, services, techniques and software tools available to the industry; examples of which are given below.

National Construction Waste Benchmarking Programme

This Defra-funded project will measure construction waste in a consistent and systematic way from a range of construction, refurbishment and demolition projects across the UK so that national benchmarks and standards can be formulated. The data collected will enable the industry to understand the causes of waste and to predict waste arising from new build, demolition and refurbishment sectors. Knowing the typical composition and quantity of waste being generated across these sectors will be a powerful tool for setting targets for reduction and planning for reprocessing/recovery facilities. The project will work with companies using minimum reporting requirements to generate data and then use this to provide reliable and accurate key performance indicators and benchmarks.

Towards Zero Emission Refurbishment

Refurbishment of buildings has massive potential to reduce energy, water and materials consumption, CO₂ emissions and provide markets for reclaimed and recycled materials. This project will gather together the existing evidence relating to reduced emission refurbishment and build on it through extensive stakeholder dialogue and seminars and likely trends in the construction/refurbishment marketplace. An integrated R&D approach to reduced emission refurbishment will be developed. Building on the work relating to reduced carbon refurbishment, this will include reducing life cycle impacts and resource use, from the production and supply of products/materials, occupation, and the end-of-life/closing the loop phase. It will primarily address housing as an immediate and high-priority policy area, where millions of properties are guaranteed to be refurbished or demolished over the next 10 years.

BE AWARE – Built Environment Action on Waste Awareness and Resource Efficiency

BRE is leading this DTI-funded project which has an industrial consortium of 16 project partners driving the project. The project aims to reduce waste and resource use across the whole life cycle of any given construction product. The objectives include researching the viability of modifying product design, manufacture, packaging/distribution, application, maintenance and end of life management to maximise resource efficiency. This integrated approach to

considering the whole life cycle of construction products will be enhanced by conducting pan-industrial waste exchange analysis, characterisation, testing and evaluation providing opportunities for knowledge transfer. The project will model scenarios for improving resource use throughout the whole life cycle by re-engineering processes.

CoRE – Construction Resource Efficiency Programme

CoRE is a regionally based pilot to draw together the work relating to construction resource efficiency in the regions of East of England, London, and South East of England due to the high levels of construction underway and planned into the future in these regions. Each region has a champion to drive forward the delivery of CoRE which will add value to projects relating to construction resource efficiency those regions. BRE will provide a centralised support to CoRE, principally through providing a means of benchmarking (SMARTStart), identifying best practicable environmental option (BREMAPP), and training of the regional champions/associated delivery bodies.

Recycled Building Products Network

Recycled Building Products are construction products that include recycled or secondary material in the manufacturing feedstock.

The Recycled Building Product Network has been set up to encourage greater use of recycled material in construction product manufacture and stimulate demand for recycled building products.

Membership is currently free. Register at www.recycledbuildingproducts.co.uk.

SMARTWaste

The SMARTWaste System (www.smartwaste.co.uk) provided by BRE comprises four tools that provide an integrated and practical approach to more efficient material resource use for the construction sector:

- **SMARTStart** – a quick and easy to use waste auditing tool providing a simple overview of waste generation.
- **SMARTStart+** – incorporates the measurement tool SMARTStart and provides local governments and companies with the opportunity to measure performance of the contractor using targets.
- **SMARTAudit** – a more detailed waste auditing tool which provides a robust and accurate mechanism by which wastes arising can be benchmarked and categorised by source, type, amount, cause and cost
- **BREMAPP** – a geographical information system (GIS) that enables firms to locate the nearest most suitable waste management sites (free to use).
- **Best Practice guides for reducing waste** freely downloadable

BREEAM

BREEAM assesses the performance of buildings in the following areas:

- **management** – overall management policy, commissioning site management and procedural issues
- **energy use** – operational energy and carbon dioxide (CO₂) issues
- **health and well-being** – indoor and external issues affecting health and well-being
- **pollution** – air and water pollution issues
- **transport** – transport-related CO₂ and location-related factors
- **land use** – greenfield and brownfield sites
- **ecology** – ecological value conservation and enhancement of the site
- **materials** – environmental implication of building materials, including life-cycle impacts
- **water** – consumption and water efficiency.

Credits are awarded in each area according to performance. A set of environmental weightings then enables the credits to be added together to produce a single overall score. The building is then rated on a scale of PASS, GOOD, VERY GOOD or EXCELLENT, and a certificate awarded that can be used for promotional purposes.

BRE has recently produced a guide for incorporating sustainability into new developments. It is known as the Sustainability Checklist for Developments and is designed to enable developers, planners and their advisors to assess the sustainability of their developments. It provides a simple method that can be followed to ensure that sustainability is included in developments.

The original version, developed in the South East of England, was highly successful. BRE is now working on a programme to produce similar versions for other English regions. A tailored version is currently being produced for use in the North West.

The checklist uses existing systems and standards to define performance, such as BREEAM. It is designed to help developers assess the sustainability implications of a development under eight subject areas:

- climate change – adaptation, mitigation and energy
- community
- place making
- transport
- ecology
- resources
- business and economy
- buildings.

Construction Lean Improvement Programme (CLIP)

The Construction Lean Improvement Programme (CLIP) was created in 2003 to support the UK construction industry in its drive, inspired by the Egan report Rethinking Construction, to improve its financial performance, provide a better product and service to its customers, and cope with a skills shortage. CLIP operates across the whole construction supply chain, from raw materials processors to clients. It provides the knowledge and practical skills needed to make change happen and to bring about real business benefit. The main focus is process improvement. There is no specific focus on waste minimisation and recycling.

More information can be found on the CLIP's [website](#).

CIRIA (Construction Industry Research & Information Association)

CIRIA is a not-for-profit company owned by a variety of organisations representing all parts of the supply chains of the modern built environment, covering building and civil engineering as well as transport and utilities infrastructure. CIRIA presents a way by which the many different stakeholders in the modern built environment can work together to identify, codify, publish and promote the emerging best practice in the industry.

- **Publications** – Pragmatic guidance documents, based on CIRIA's research projects, and produced in a consistent format and to a uniformly high quality. Extensive catalogue of publications, available at discounted cost for members. Also retail other publishers' books relevant to construction industry, available at discount to members. www.ciriabooks.com.
- **Training** – Short courses to aid industry implementation of selected CIRIA guidance documents.
- **Events diary** – Available at: www.ciria.org.uk/events.htm.

- **Networks** – A series of learning networks to spread awareness and encourage the sharing and adoption of new ideas, techniques and processes. Membership fees apply to some (see below). www.ciria.org.uk/networks.htm. Networks of relevance to resource efficiency in the construction sector include:
 - **Construction Productivity Network (CPN)** – Mission is to deliver leading-edge thinking and improvement opportunities to the construction industry www.ciria.org/cpn_intro.htm.
 - **Construction Industry Environmental Forum (CIEF)** – Mission is to improve the sustainability and environmental performance of construction, by providing a cross-sector and independent forum for the exchange of new ideas and demonstration of best practice www.ciria.org/cief.
 - **Buildoffsite** – An industry-wide campaigning organisation that promotes greater uptake of offsite techniques by UK construction www.buildoffsite.org.

National Platform for the Built Environment (formerly nCRISP) (New Construction Research & Innovation Strategy Panel)

The **National Platform (NP)** has evolved from CRISP and nCRISP and will build upon the principles and work of these groups. It is an industry-led initiative that aims to engage a wider group of key stakeholders including academia and the research community at large. The focus of its activities is on strategic, collaborative research.

Since its launch, the NP has established two groups of influential industry individuals to steer its activities. Following extensive industry consultation, it is preparing a Strategic Research Agenda (SRA) for the UK, based around three research priorities including:

- reduced resource consumption
- a client-driven, knowledge-based construction sector
- ICT and automation.

In support of the first of these priorities, the NP is supporting the Construction Resources and Waste Platform.

BSRIA

BSRIA is a consultancy, test and research organisation construction and building services companies and their clients.

Its publications cover building services relating to wastes but there appears to be little or no BSRIA-published information on resource efficiency in the manufacture of building services. It offers publications and consultancy in relation to building services and issues such as air-tightness.

More information can be found on BSRIA's website: www.bsria.co.uk/about.

TRADA

The Timber Research and Development Association (TRADA) is an internationally recognised centre of excellence on the specification and use of timber and wood products. TRADA can help businesses in the following areas:

- identifying areas for waste minimisation
- identifying appropriate techniques and technologies for waste minimisation
- identifying and advising on potential recycling and/or recovery options
- providing contacts for alternative disposal routes and/or technologies
- providing technical and research support to get ideas off the drawing board and into reality.

TRADA runs programmes of information and research. Information is provided through its website, an extensive collection of printed materials and training courses.

More information can be found on TRADA's website: www.trada.co.uk.

Other research organisations

The following organisations are undertaking some research in construction resource efficiency:

- Transport Research Laboratory (TRL)
- Viridis
- The Steel Institute
- The Biocomposites Centre.

Mass Balance

The mass balance concept is based on the fundamental physical principle that matter can neither be created nor destroyed (see www.massbalance.org). Therefore, the mass of inputs to a process, industry or region balances the mass of outputs as products, emissions and wastes, plus any change in stocks. Hence the term 'mass balance' is used to describe this type of analysis.

When applied in a systematic manner this simple and straightforward concept of balancing resource use with outputs can provide a robust methodology for analysing resource flows.

Resource flow analysis aims to quantify the flow of resources in terms of mass within a defined geographical area or industry sector over a set period of time. Data generated from a resource flow analysis allows the identification of the inefficient use of resources, and therefore allows more focussed management of resources and the development of policies to maximise resource efficiency (see www.bestfootforward.com/resflow.html).

Biffaward has funded a series of research projects examining resource flows in the UK using the mass balance principles. This has resulted in around 60 studies. These projects are quantifying the movement of resources for the production of specific materials or through specific economic sectors or geographical areas as these resources are extracted/imported, manufactured into products, used and disposed of or recycled. The wastes generated at each stage of this sequence are also quantified and in this way the entire material flow is captured.

Resource Efficiency Knowledge Transfer Network

The Resource Efficiency Knowledge Transfer Networks is a DTI-funded service for businesses, enabling exchange of information relating to resource efficiency, with the aim of reducing waste and increasing profitability within the UK. The network incorporates the former MiniWaste Faraday Partnership and NISP (National Industry Symbiosis Programme) and provides science and innovation support to its sister organisation, NISP.

Registration online is free. For members, the Network provides:

- access to other members, via discussion forums and so on
- access to support services – Knowledge Transfer Managers available for advice, downloadable documents and so on
- news and reference information on jobs, funding, partnering opportunities
- online conferencing facilities for registered members.

More information is available on the Resource Efficiency Knowledge Transfer Network's website www.resource-efficiency.org.

Constructing Excellence

Constructing Excellence aims to deliver improved industry performance resulting in a demonstrably better built environment.

Constructing Excellence funded a project aimed at extend the scope of the existing Construction Products Association Key Performance Indicators (CPKPIs) to include a wider range of indicators, mainly covering more sophisticated issues of sustainability and health and safety issues.

The aims of the project were to:

- develop and promote CPKPIs to the whole construction industry
- use the CPKPIs for data collection, analysis and benchmarking within the supply sector.

More information is available from the Constructing Excellence website: www.constructingexcellence.org.uk.

Remades (REcyclable MArket DEVELOPMENT)

The ReMaDe Network was created in 2000 to ensure that an integrated approach to recyclables market development was achieved across the country. The aim of the group is to coordinate recyclables market development activities, promote network members and their activities, exchange best practice, disseminate the results of research and development projects and promote an integrated and coordinated approach by regional programmes and WRAP.

The network represents a group of regional programmes that share the common aim of developing markets for recyclable materials. Alongside six of the UK's ReMaDe initiatives, other organisations actively involved in developing markets for recyclables are members of the network, including the Clean Merseyside Centre, Urban Mines and WRAP. The list of these organisations and their website links are given below:

- Clean Merseyside Centre, Merseyside & NW (www.clean-merseyside.com)
- Enviro UK (www.enviros.com)
- Hampshire County Council, Hampshire & South East (www.integra.org.uk)
- London Remade, London & Thames Gateway (www.londonremade.com)
- MaReN Northamptonshire & East Midlands (www.northamptonshirewastenetwork.org/remade)
- ReMaDe Essex & East of England (www.remadeessex.org.uk)
- ReMaDe Kent and Medway, Kent and Medway, Thames Gateway & SE England (www.remade-kentmedway.co.uk/remade)
- ReMaDe Kernow ,Cornwall (liaises with SW) (www.remadekernow.co.uk)
- ReMaDe Scotland, Scotland (www.remade.org.uk)
- ReMaDe South West Ltd, South West (minus Cornwall but liaises with ReMaDe Kernow) (www.remadesw.co.uk)
- Urban Mines, Yorkshire & West Midlands (www.urbanmines.org.uk)
- Wales Environment Trust CWMRE, Wales (www.walesenvtrust.org.uk)
- WRAP, UK (www.wrap.org.uk).

The ReMaDes aim to drive material resource efficiency by increasing demand for recycled materials and developing collection, reprocessing, remanufacture and procurement practices and facilities.

The focus is on diverting materials away from landfill into end products by:

- providing business support to organisations collecting, reprocessing and remanufacturing reusable and recycled materials
- encouraging more manufacturers to use recycled materials in their processes
- develop regional markets for recycled content and refurbished products
- build strong regional recycling supply chains through networking and knowledge exchange mechanisms.

English Partnerships – Design for Manufacture

The Design for Manufacture Competition was launched in April 2005 by Deputy Prime Minister John Prescott. It was a challenge to the housebuilding industry to create a sustainable, well-designed, good quality home for a construction cost of £60,000 and aimed to address the increases in housing construction costs in recent years. Measurement and reduction of waste is a key part of this. (See www.designformanufacture.info.)

SmartLIFE

The SmartLIFE (www.smartlife-project.net/smartlife/home.asp) commercial team has been working with the key stakeholders: Warden Housing (a division of Homegroup), English Partnerships, Fenland District Council and the Building Research Establishment to facilitate the delivery of approximately 100 three- and four-bedroomed affordable homes which will be constructed in the Fenland District, Cambridgeshire.

Approximately a quarter of the homes will be constructed using conventional brick-and-block methods, and three-quarters of the homes will be constructed using a minimum of three different modern methods of construction (MMC) from the steel, timber and concrete material groups.

The houses will be built on three sites in Chatteris and March in Cambridgeshire. Architects from Avebury Architects, Churchill-Hui and Proctor and Matthews are working on the designs. The architects have developed standard house designs to be suitable for all kinds of construction from conventional to volumetric.

In April 2007, the Building Research Establishment issued the SmartLIFE Measuring Process Report which defines the measurement tools that will be used monitor the construction process, and post occupancy. These tools include various Constructing Excellence KPIs and the BRE measuring tools CalIBRE and SMARTWaste.

Vinyl2010

[Vinyl 2010](#) is the European PVC industry's voluntary commitment to sustainability, and it is subscribed to by 23,000 companies. It involves a 10-year plan to enhance the industry's sustainability profile by improving production processes and products, investing in technology, minimising emissions and waste and boosting collection and recycling. Commitments of this group include:

- The recycling in 2010 of 200,000 tonnes of post-consumer PVC waste. This is in addition to 1999 post-consumer recycling volumes and that required by EU Directives on packaging waste, end-of-life vehicles and waste electronic and electrical equipment
- The recycling of 50% of the collectable available PVC waste for windows profiles, pipes, fittings and roofing membranes in 2005, and flooring in 2008
- A research and development programme on new recycling and recovery technologies, including feedstock recycling and solvent-based technology
- A partnership with local authorities within the Association of Communes and Regions for Recycling (ACRR) for the promotion of best-practices and pilot recycling schemes at local level.

Recovynl is the UK-wide implementation strategy for Vinyl 2010 and is led by Axion Recycling and the British Plastics Federation. They expect to collect 20,000 tonnes of PVC waste per year by 2009.

MINRES

MINRES is a Defra-funded project, led by the Mineral Industries Research Organisation (MIRO) in partnership with BRE, the University of Leeds and industry partners. The objective of this three year project is to develop a conceptual model, decision tools and a GIS-based approach to facilitate the use and uptake of mineral wastes in construction products. The project will identify and gather key information that is required by potential waste users (producers of bricks, concrete, tiles, pipes, architectural products and insulation), mineral waste producers and policy makers. The principal focus is on bulk manufactured products.

Strategic Supply Chain Group

The SSCG is a network of leading companies, public agencies and professional institutions who promote sustainable procurement as a strategic business issue at board level. The group is managed by the Sustainable Supply Chain Forum (SSCF), which is based at the Institute of Innovation Research, University of Manchester.

A number of initiatives have been developed by the SSCG and SSCF, aimed at improving knowledge in the areas of environmental and sustainable procurement.

Two main outputs from SSCG to date are:

- a Business Case for Sustainable Supply Chain Management – aimed at Chief Executives
- a risk management tool for sustainable supply chain management – developed by SSCG members and launched in July 2004.

The Forum organises **training events** for companies on environmental and sustainable procurement, which have included events specific to the construction sector:

- Sustainable Supply Chain Forum and CITB ConstructionSkills
- Involving your suppliers in environmental improvement – the construction industry
- Sustainable procurement in the construction sector
- Enhancing Business Competitiveness in Construction.

Resource Recovery Forum

The Resource Recovery Forum was established in 1997 to research and promote the effective recovery of natural resources from waste, with due weight given to environmental, social and economic considerations. The Resource Recovery Forum is an international non-profit network of around 320 organisations from industry, government, academia, voluntary sector, waste management businesses and consultants.

Green Guide to Composites

This guide has been created to enable the composites sector to understand the environmental and social impacts associated with composite production, and assist with the decisions made about material and process choice. The materials and processes modelled are rated from A (good) through to E (poor). Twelve different environmental impacts are individually scored and totalled to give an overall environmental impact summary rating. Two social impact ratings are also given. (See www.netcomposites.com/composites-green-guide.asp.)

Ecoconstruction website

The Ecoconstruction website (www.ecoconstruction.org), developed by Faber Maunsell, contains guidance on issues ranging from planning, choosing and specifying materials, to case studies of recycled and reclaimed material use. The site also contains a searchable database of available products with details of manufacturing processes of products, their composition, and suppliers.

The Centre for Economic and Environmental Development (UK CEED)

A charity aimed at supporting environmental enterprise. The centre undertakes research, develops policy, implements technology demonstration projects and carries out a wide range of engagement and education activities.

UK CEED has a major programme of work in the areas of waste reduction and recycling, with a focus on practical demonstration projects and policy development activities. Projects focus on major waste streams in the region, and are likely to include construction and demolition, agricultural and electrical wastes. UK CEED's recent activities include the Ecotrade Centre, which is a project aimed at establishing a pilot construction and demolition waste recycling facility and exploit the value of construction waste.

National Green Specification

National Green Specification (GreenSpec: www.greenspec.co.uk) is an independent organisation working to produce an internet-based resource for all building designers, constructors and manufacturers involved with sustainable construction. This website aims to improve the understanding of what good practice is and provide the audience with the resources to achieve it through sustainable construction. Sustainable construction incorporates a number of factors that include designing for minimum waste, lean construction (minimise waste) and minimise energy in construction and use.

Local government initiatives and programmes

A review was undertaken to find any construction-related resource efficiency activities within local authorities. The following were identified:

Durham County Council, in partnership with Sustainability North East, has developed a portal to Building-In Sustainability, a guide to sustainable construction and development. The guide looks at: how to use materials that have low energy intensity and minimise environmental damage in their extraction' production, construction, occupation and dismantling of the building; and producing high-quality designs that are capable of long life and have minimal impact on the environment. Building-In Sustainability has a discussion forum where views, advice and suggestions can be discussed.

Nottingham City Council has designed a Building Control Guidance Note looking at floor joists for domestic floor loadings. By resourcing material to the specifications listed less waste will be generated.

Macclesfield Borough Council (MBC), Groundwork Macclesfield, and Vale Royal (NHS Trust), are working in partnership to improve the Borough's communities. This partnership secured funding to allow a number of activities to be carried out successfully. Funding was obtained from MBC, the Trust's own money and from the Office of the Deputy Prime Minister.

In 2005 a new service was launched called the ENWORKS - Resource Efficiency Programme. This service is open to all companies across the North West of England aiming to reduce their waste, energy, water and raw material cost by £10 million.

MBC have recently produced its Sustainability Appraisal for 2006. The purpose of the Sustainability Appraisal is to ensure that the principles of sustainable development are fully integrated into the emerging policies and proposals. Sustainability Appraisals are a statutory requirement of the Local Development Framework. Part of the plans of the Sustainable Appraisal is The Johannesburg Declaration of Sustainable Development 2002. This initiative is a 10-year programme aiming to reverse the trend in loss of natural resources by increasing the shift towards sustainable consumption and production. Actions to implement the programme include greater resource efficiency, supporting businesses to use best practice, waste reduction and producer responsibility.

Brent Council Environmental Services developed a Sustainable Design, Construction & Pollution Control document as supplementary design and planning guidance. The purpose of this guidance is to: advise developers on ways of meeting policies aimed at securing more sustainable development; encourage developers and building professionals to consider sustainability from the early stages of the design process; and to go beyond minimum standards. It also raises awareness among local residents, businesses and other Council units through highlighting the expectations and features of current best practice in sustainable design, construction and pollution control. The guide highlights the advantages of how developing and implementing an environmental management system can be a way of increasing resource efficiency.

East Sussex County Council Waste Development Framework and the **Brighton & Hove City Council** Local Development Framework have combined to produce a supplementary Planning Document on construction and demolition (C&D) waste. This Supplementary Planning Document was produced to offer guidance for developers to reduce, reuse and recycle construction and demolition waste, reduce the quantities of construction and demolition waste being sent to landfill through recycling and waste minimisation, encourage the use of construction and demolition waste as a resource, and to improve the awareness of sustainable construction techniques.

The document also highlights how resource efficiency helps to minimise the environmental impacts of construction by generating a lesser amount of waste, maximising the opportunities for reuse and recycling, and reducing the demand for virgin materials.

East Sussex Council has developed a programme, **Business Excellency Through Resource Efficiency** (betre), to assist companies to improve resource efficiency. Betre is a two-year programme funded by Viridor Credits and Onyx Environmental Trust, all East Sussex Local Authorities, South East Economic Development Agency and the Environment Agency. The purpose of the programme is to provide free support and advice to small and medium sized businesses to reduce costs through waste minimisation, recycling and energy and water efficiency. The programme is designed mainly for the farming, hospitality and construction industries.

To assist the construction industry in being more resource efficient East Sussex Council has produced the Construction & Demolition Waste Advice Note. The guidance document has been produced to provide information to the construction industry on methods of best practice to reduce waste. Through the document, the Council conceived the idea of establishing a Waste Exchange Scheme in partnership with the Environment Agency. The purpose of a waste exchange scheme is to create a match between suppliers and end users of waste products through contractors and developers exchanging information on waste resources. As a result the East Sussex Exchange was established, funded by the INTERREG IIIa Sustainable Eco-Enterprise Programme, a European fund. The exchange is an ideal tool for advertising businesses excess resources or resource requirements.