

Definitions and rationale

1. Unless otherwise stated, references to waste in this section are to construction, demolition and excavation (CD&E) waste. The sector is diverse and in some instances, the analysis is limited to waste from site construction or refurbishment, demolition or excavation.
2. The construction industry is a major source of waste in England, using the highest tonnage of solid material resources in any sector. The CD&E sector generates more waste in England than any other sector, and it is also the largest generator of hazardous waste.
3. The Government's Sustainable Development Strategy¹ recognised that the construction sector has a particularly strong influence on the sustainability of UK consumption, through use and management of resources. Reducing this resource use, and the associated reduction in waste arisings, will not only have direct environmental benefits (including carbon impacts) but also yield significant business efficiency gains in the form of cost savings.

Environmental benefits

4. Waste reduction and local re-use carry significant carbon benefits. For example, substitution of locally-sourced reclaimed materials for new in construction work can radically reduce the lifecycle environmental impact of that particular item, with use of reclaimed timber estimated as having a 79% lower impact compared to new.² The carbon benefit of recycling will depend on the relative fuel/energy demand for transport and processing of recycled versus virgin materials. For example, recycling of non-ferrous metals offers a large carbon benefit, due to the high embodied energy of these materials. By comparison, recovered soils and mineral materials (e.g. recycled aggregates) have a low embodied energy and high volume, and therefore should be used locally in order to retain a carbon benefit. Net carbon benefits are also likely to result from the recovery of higher value inert materials such as brick and concrete, and their use in higher value applications.
5. Therefore, recycling aggregates may have a net carbon benefit or detriment, in particular depending on transport distances. Carbon impact studies have differed in their conclusions and underlying assumptions.³ However, on a more holistic basis, taking account of additional environmental impacts such as minerals extraction, recycling of aggregates is generally beneficial.⁴

Resource efficiency benefits

6. Leading companies in the industry have already demonstrated that waste reduction and recycling deliver worthwhile financial savings. In addition, there are cost-neutral opportunities to close the loop and use higher recycled content and reclaimed products in projects.
7. For example, evidence suggests that contractors underestimate the value of materials in the skip. Amec have estimated the true cost of a skip to be 16 times the cost of skip hire, with the cost of materials put in the skip accounting for more than 80% of the total.⁵ Over-ordering contributes to this waste. Skanska Integrated Projects have been tracking waste for the past 3–4 years, increasing

¹ *Securing the Future*, UK Government Sustainable Development Strategy, 2005.

² Building Research Establishment (BRE) lifecycle analysis, cited in: *Reclaimed Building Materials in the Development of the Thames Gateway*, BioRegional Reclaimed, 2006.

³ For example, see *Environmental Benefits of Recycling: An international review of life cycle comparisons for key materials*, WRAP (2006) where recycling of aggregates instead of landfilling was estimated to save 1–10 kg of CO₂-equivalent per tonne of aggregate.

⁴ BRE Ecopoints analysis for WRAP. Also, WRAP is currently commissioning work to develop a Life Cycle Inventory and Assessment for aggregates produced from both primary and recycled resources.

recycling rates from 40% to over 80%. On a major hospitals project, their subcontractors assumed the wastage rate for drylining would be 10%, but Skanska found the figure to be 25% in practice (or one sheet of plasterboard wasted in every four). The cost of wasted material was five times the disposal cost.

8. Extensive case studies⁶ have shown that higher recycled content can be used in projects with no increase in cost of materials – and often with a cost saving where waste materials are reprocessed locally (e.g. for roads and other infrastructure). Moving to cost-neutral good practice can increase the mass of recovered material incorporated in a school or house tenfold.⁷ This includes the use of manufactured products with above-average recycled content, reclaimed materials and aggregates reprocessed on site or from nearby sites.

9. Wates Group has set itself a target of sending zero non-hazardous waste to landfill by 2010. This quickly led to meaningful reductions, most notably within the Interiors business which has found a way to reduce landfill by 70% within three months, at no extra cost.⁸

Objectives

10. In line with the waste hierarchy and the Government's objective to place more emphasis on reducing waste and using it as a resource, the Government's objectives in relation to construction waste are:

- to provide the drivers for the construction sector to improve its economic efficiency by **creating less waste** at every stage of the supply chain, from design to demolition;
- to get the sector to treat waste as a resource, **closing the loop** by re-using and recycling more and asking contractors for greater use of recovered material; and
- to **improve the economics** of the re-use and recycling sector by increasing sector demand and securing investment in the treatment of waste – this will benefit all waste streams, including construction.

Arisings, trends and projections

11. The construction sector uses over 400 million tonnes of solid materials each year, and is the biggest single user in the UK economy.

12. CD&E wastes account for the largest proportion of waste arisings in England (aggregate waste alone accounts for 33%),⁹ with around 60 million tonnes arising from construction-related quarrying.¹⁰ The sector also produces 32% of England's hazardous waste. By comparison, the sector accounts for 9–10% of GDP.

⁵ See http://www.ciria.org.uk/cwr/pdf/we_site_waste_man.pdf Also, Taylor Woodrow studies on live projects have shown average savings of 3% of build costs, or 20% of material on site, and these could be achieved without significant investment costs. Simons Construction estimates a saving of £28/tonne by segregating waste on site – rising to £57/tonne in the near future. From such data, BRE and AEA Technology calculate that the material wasted in building the 190,000 new homes in FY2004/05 had a value in the region of £1 billion. Current best practice could save over £200 million (around £1,000 per house).

⁶ See www.wrap.org.uk/construction and www.aggregain.org.uk for further information.

⁷ Case study analysis by Davis Langdon for WRAP, based on BRE data.

⁸ See *Target:Zero*, Wates Group, 2006.

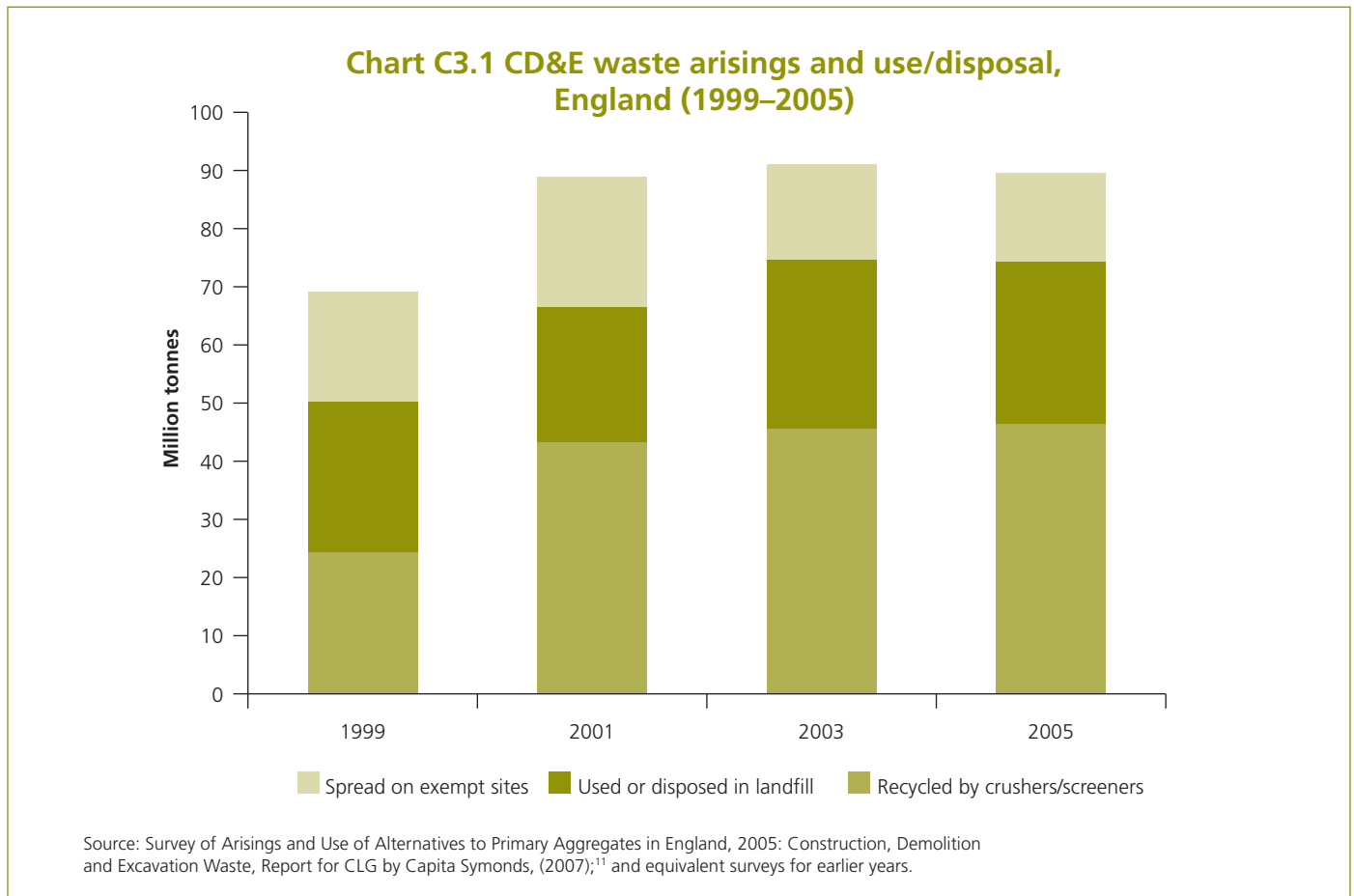
⁹ This figure does not include non-aggregate wastes from this sector – see paras 18 to 23 below.

¹⁰ Note that this latter figure also includes construction-related quarrying for uses such as road-building.

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Aggregate wastes

13. Chart C3.1 below shows CD&E waste arisings that are suitable for processing into aggregate and the use/disposal of this waste.



14. Between 2001 and 2005, inert construction waste (suitable for reprocessing into aggregate) is estimated to have remained stable at around 90 million tonnes.¹² Overall, the re-use and recycling (using crushers/screeners) of materials suitable for reprocessing into aggregates or recycled soil increased from 49% in 2001 to 52% in 2005. The amount of aggregate waste going to landfill has stayed stable in 2003 and 2005 at just over 30%. The non-recycled materials are largely used for beneficial purposes such as land restoration but an estimated 18 million tonnes goes to landfill for disposal.

15. Table C3.1 below shows more detail on the use and disposal of CD&E waste suitable for aggregate production in 2005.

¹¹ Figures are estimates (confidence level of estimates is 90%) and relate to CD&E waste arisings that are suitable for processing into aggregate. The Survey is available at: http://www.communities.gov.uk/pub/125/SurveyofArisingsandUseofAlternativestoPrimaryAggregatesinEngland2005Constructioe_id1508125.pdf

¹² Ibid.

Table C3.1: Summary of estimated CD&E aggregate waste tonnages (million tonnes) for England (2005)

Production of recycled aggregate	42
Production of recycled soil (excluding topsoil)	4
Unprocessed CD&E waste entering licensed landfill – for engineering use	4
Unprocessed CD&E waste entering licensed landfill – for capping use	5
Unprocessed CD&E waste entering licensed landfill – for waste disposal	18
Waste materials (mainly excavation waste) used on registered exempt sites	15
Total	90
Source: Survey of Arisings and Use of Alternatives to Primary Aggregates in England, 2005: Construction, Demolition and Excavation Waste. Report for CLG by Capita Symonds (2007).	

16. Around three-quarters of the tonnage of inert construction, demolition and excavation waste going to landfill (for disposal, capping or landfill engineering) is clean excavation waste.¹³ Excavation waste also dominates the materials spread on registered exempt sites.

17. Notwithstanding that non-recycled materials are largely used for beneficial purposes, cost modelling by the Waste and Resources Action Programme (WRAP) indicates there is still further scope for increased resource efficiency, with recycled and secondary materials being used to meet aggregate demand for a broader range of products, particularly higher value products such as sub-base.¹⁴

Non-aggregate waste

18. In terms of tonnages, non-aggregate wastes are a small proportion of CD&E waste. WRAP estimates that there are 15–20 million tonnes of non-inert and mixed CD&E waste, in addition to the aggregate waste described above. This would include site construction and refurbishment waste.

19. Data from the Building Research Establishment (BRE) SMARTStart system¹⁵ indicates that 58% of waste derived from all types of new build projects is non-aggregate waste by volume. This figure rises to 73% when civil engineering products are discounted. Defra is funding a BRE project aimed at understanding, measuring and predicting construction waste which will provide improved data on non-aggregate waste (see below on Improving Data and Measurement).

20. The rates of re-use and recycling of construction wastes appear to be substantially lower than for demolition wastes (10% or less for some materials).¹⁶ For example, insulation materials, plastics and board materials are predominantly sent to non-hazardous landfill.¹⁷ A consultation report by BRE and AEAT in 2006 considered existing data on waste generation and management for new-build housing, refurbishment and demolition (all sectors).

21. Waste also comes from refurbishment projects, many of which are small scale and have restricted space for segregation and reprocessing, as well as a high proportion of composite wastes with little or no reclamation value and limited recycling potential.¹⁸

¹³ Source – 2005 survey. See footnote 11 above.

¹⁴ *The Sustainable Use of Resources for the Production of Aggregates in England*, WRAP, 2006. See http://www.wrap.org.uk/downloads/WRAP_AGG0059_project_report_final_20.10.06.f13414b0.pdf for further information.

¹⁵ See www.smartwaste.co.uk for further information; the system is currently being used on over 300 projects.

¹⁶ BRE data used in the Green Guide to Specification – default disposal route figures by material. This data is being updated.

¹⁷ See also “Waste Management Quick Wins”, WRAP, 2007, based on case study data from Bovis Lend Lease and Taylor Woodrow.

¹⁸ *Developing a Strategic Approach to Construction Waste*, BRE/AEAT report for Defra, September 2006.

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22. Waste from material and product manufacture (apart from quarrying) is comparatively small – estimated at 2 million tonnes.¹⁹

Hazardous wastes

23. Construction and demolition waste (including asbestos) is the largest component of hazardous waste in England and Wales, constituting 32%, nearly 1.7 million tonnes.²⁰ Nearly all of this goes to landfill, but although arisings increased sharply in 2004 as developers sought to beat the co-disposal ban, the trend is downwards.²¹

24. Disposal of hazardous wastes presents a particular problem, with only a limited set of sites available. Although total capacity in England may be sufficient to meet demand, the majority of this capacity is located outside the regions where the majority of hazardous waste arises (London, South-East and East England). Substantial long-distance transport will therefore be required, increasing the costs of waste disposal and carbon impact.

25. Soil wastes arising from housing and other developments on brownfield land are likely to be contaminated to some extent. Landfill disposal of contaminated soils that are classed as hazardous waste is more expensive and involves longer journeys as a result of the reduction in the numbers of sites able to receive hazardous waste. However, overall these changes help to reduce the volume of wastes going to hazardous waste landfill and, importantly, are encouraging the use of more sustainable treatment technologies such as soil washing, thermal desorption and bioremediation, often onsite.

Plasterboard waste

26. Currently over one million tonnes of plasterboard waste from construction and demolition are sent to landfill each year. Only some 70,000 tonnes are recycled.²² Yet the volume of plasterboard waste is rising, as a result of projected increases in building works (notably housing) and changes in building methods – potentially doubling over the next 15 years.²³

27. In the UK, most gypsum and plasterboard waste is currently disposed to landfill. However, since July 2005, the Landfill Regulations require that gypsum and other high sulphate-bearing materials may only be disposed in landfill cells where no biodegradable waste is accepted. This is to avoid emissions of hydrogen sulphide.

28. There are currently few landfill sites with segregated cells in the UK designed specifically to accept high sulphate-bearing loads, and few alternative treatment options currently in place. See paragraph 60 below for a description of the voluntary agreement which has been developed.

Future trends in waste volumes

29. Future demolition and refurbishment rates will have a big impact on the amount of construction waste in England. It is possible that the quantity of demolition waste will grow sharply over the next 20 years due to increased replacement of buildings that cannot be upgraded cost-effectively to meet the energy efficiency standards needed to combat climate change. Demolition rates are around 20,000

¹⁹ *Construction Industry Mars Balance*, Smith, Kersey and Griffiths, Viridis Report VR4, 2002.

²⁰ See data on the Environment Agency website at <http://www.environment-agency.gov.uk/commondata/103196/1381147?referrer=/subjects/waste/1031954/315439/1434288/1378918/>

²¹ Environment Agency data for 2004.

²² Review of Plasterboard Material Flows and Barriers to Greater Use of Recycled Plasterboard, Waste & Resources Action Programme (2006).

²³ Policy Brief – Plasterboard, Defra's Market Transformation Programme (2006).

homes per year today. An increase in demolition rates will require an increase in reprocessing capacity and markets for recovered materials.²⁴

30. The reviews of Regional Spatial Strategies and the Government's response to the Barker Review are expected to lead to further growth in construction. It will be important to decouple this growth from materials consumption through increased resource efficiency. Other trends may also be significant, such as a growing market share for off-site fabrication.

Illegal waste activity

31. CD&E waste is a major component of fly-tipped waste. CD&E waste formed over 31% of fly-tipping incidents dealt with by the Environment Agency in 2005/06.²⁵ Nearly 60,000 incidents involving construction-related waste were reported to English local authorities, resulting in significant clean-up costs.

Management routes

32. Methods of **minimising waste** include:

- refurbishment instead of demolition and rebuild;
- off-site manufacture;
- design for minimum waste (e.g. matching wall sizes to plasterboard dimensions);
- design for reduced materials usage;
- design for deconstruction, reclaim and recycling;
- efficient delivery logistics and stock control to minimise over-ordering and site waste;
- good site practice to reduce spoilage and cut-offs;
- packaging design to reduce weight;
- switching to reusable packaging and bulk packaging to reduce waste left at the site;
- packaging design to reduce product spoilage; and
- setting tender requirements for take-back of packaging.

33. Options for **re-use of materials** include:

- use of reclaimed materials;
- use of reclaimed products such as windows and doors;
- on-site reprocessing of materials such as asphalt planings;
- use of higher recycled content in building products;²⁶ and
- re-use of packaging materials.

²⁴ *Developing a Strategic Approach to Construction Waste – Consultation Document*, BRE and AEA Technology (2006). The scenario implies that demolition waste should be one factor for consideration when the choice is made between refurbishment versus demolition and new build for the upgrading of the building stock.

²⁵ For further information see <http://www.defra.gov.uk/environment/localenv/flytipping/flycapture.htm>

²⁶ This can include the use of materials (such as waste glass) recovered from waste streams outside the construction sector (e.g. the use of glass in fibre insulation, bricks and concrete blocks). Increased demand for recovered materials in construction would thereby help to strengthen the overall market economics of recycling.

34. Good practice in **waste management and recycling** includes:

- segregation of waste materials onsite or offsite;
- efficient waste collection logistics, such as “milk-round” schemes and waste consolidation centres;
- local provision of reprocessing capacity;
- using technologies such as washing plant that can enhance the value and quality of the recycled product; and
- adoption of a site waste management plan (SWMP) (see below) to provide a framework both for monitoring Duty of Care and for measuring and improving rates of waste production and recycling.

35. Barriers to action to secure improved resource efficiency and waste management include:

- perception of increased cost;
- lack of awareness of potential business benefits and paucity of evidence;
- lack of knowledge of good practice, especially in smaller companies;
- need for financially attractive alternatives to landfill – including through increased market demand for recovered materials and increased reprocessing and recycling capacity;
- competing business pressures (e.g. the use of over-ordering to reduce the risk of expensive delays due to materials shortages);
- lack of measurement of the quantities and full costs of wastage; and
- the limited time and resources of smaller contractors to measure current performance and find out about good practice.

36. The re-use and recycling of inert demolition wastes is now well established, with recycling rates of 80% or more being achieved on some projects. Best practice from pre-demolition audits carried out by BRE indicates that recovery rates (recycling and reclamation) of 96% are feasible including a significant increase in reclamation to 28%.²⁷ Rates of landfilling for site construction and refurbishment waste still appear to be high and there is scope for improved performance (at least one major contractor has set itself a target of sending zero non-hazardous waste to landfill). Fly-tipping of these wastes is a significant concern.

Policies and targets

37. The UK construction sector is diverse and consists of many sub-sectors and different waste streams. Policies on resource efficiency act at various levels in the construction supply chain, from the client level down. The Government can most effectively influence the sector by applying leverage at the top of the chain, targeting the major players and large public sector projects using measures (such as procurement requirements and sector commitments) to elicit the desired behaviour change down the line from the main contractors to their supply chain members.

²⁷ *Developing a Strategic Approach to Construction Waste*, BRE/AEAT report for Defra, September 2006.

38. Key policies and targets already established and/or proposed/under development are set out below as a programme of strategic action to tackle construction waste.

Fiscal measures

39. The standard rate of Landfill Tax is currently £24 per tonne for non-hazardous (and non-inert) wastes for 2007/08. The Chancellor announced in the Budget 2007 that, from 1 April 2008 and until at least 2010–11, the standard rate of Landfill Tax will increase by £8 per tonne each year. A lower rate of £2 per tonne applies to inactive (or inert) wastes listed in the Landfill Tax (Qualifying Material) Order 1996. From 1 April 2008 this will increase to £2.50 per tonne.

40. The Aggregates Levy was introduced in 2002 to ensure that the environmental impact of extracting primary aggregate is more fully reflected in the price, thereby encouraging the use of recycled and secondary aggregates. It encourages economy in the use of construction aggregates and more recycling of construction and demolition waste in place of new quarrying. It is currently set at £1.60 per tonne of virgin aggregate. From 1 April 2008 this rate will increase to £1.95 per tonne.

41. The Government will keep the landfill tax escalator and other financial measures such as the Aggregates Levy under review.

Site waste management plans (SWMPs)

42. Effective site waste management is a key tool in improving resource efficiency and reducing waste.²⁸ In 2004, the DTI issued a voluntary code of practice on SWMPs,²⁹ intended for use by companies engaged in projects of £200,000 or more in value. Increasing take-up of this voluntary code,³⁰ and SWMPs in general, is helping to improve performance.

43. Government is currently consulting on regulations for SWMPs, which, subject to consultation, will make it mandatory for those responsible for projects above a certain threshold to prepare plans before work begins on site.³¹ Depending on the consultation outcome, regulations could come into force in April 2008.

44. SWMPs aim to reduce illegal waste activity, including fly-tipping. They will also encourage a reduction in the amount of waste produced and improve resource efficiency. SWMPs will help prevent fly-tipping as plans will record who takes waste away from a construction site, their waste carrier registration details and the final disposal or recovery site.³² The requirement that registered waste carriers and licensed disposal sites be used will improve compliance with Duty of Care. Less time will be needed for compliance visits as waste transfer and registration documentation will be easily accessible via a single document.

45. Pre-planning on-site waste management will help reduce costs as well as reduce waste and increasing re-use and recycling. SWMPs will require projects to forecast and record their waste arisings, re-use and recycling operations and will promote the opportunities of minimising waste at source, i.e. through resource-efficient design and construction methods. The regulations will also be accompanied by non-statutory guidance that will highlight key waste materials, such as wood, that are predominantly consigned to landfill and identify beneficial alternatives such as re-use, recycling or combustion. Again, all provisions are subject to consultation.

²⁸ Countryside Properties and Taylor Woodrow more than halved waste at the Greenwich Millennium Village from the 50m³/dwelling baseline by effective site waste management. See Envirowise publication GG493, *Saving Money and Raw Materials by Reducing Waste in Construction: Case Studies* (2005) for a range of examples.

²⁹ *Guidance for Construction Contractors and Clients*, available at <http://www.constructingexcellence.org.uk/resources/publications/view.jsp?id=2568>.

³⁰ A study commissioned by WRAP in 2005 found that 42% of top construction companies surveyed were either aware of the voluntary code or using their own SWMPs. Adoption of DTI SMWPs, Databuild Ltd, research completed 10 March 2006.

³¹ The consultation runs from April to July 2007. The consultation documents are available on <http://www.defra.gov.uk/corporate/consult/construction-sitewaste/index.htm>

³² Separately, Defra is undertaking a review of the existing regulatory framework (the duty of care and waste carrier registration regimes).

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46. The consultation seeks views on the appropriate threshold, such as by project value or building mass, above which the requirements of the regulations will apply. One option is that an SWMP will be required for any construction work valued at over £250,000, with a more detailed version applying to projects costing £500,000 or more.

Code for Sustainable Homes

47. The Code for Sustainable Homes – a new national standard for sustainable design and construction of new homes – was launched in December 2006,³² as part of a package of measures towards zero carbon development. The Technical Guide underpinning the Code was issued by the department of Communities and Local Government at the start of April 2007, and the Code went live on April 2007.³³

48. By assessing against the Code, developers will be able to obtain a 'star rating' for any new home which will demonstrate its environmental performance.³⁴ It will provide valuable information to home buyers, and offer developers a tool with which to differentiate themselves in sustainability terms.

49. The presence of an SWMP is a minimum standard under the Code, meaning that to achieve any Code level an SWMP must be in place. The Code awards additional points for having SWMPs in place that include procedures and commitments to minimise, sort, re-use and recycle site construction waste in accordance with WRAP/Envirowise guidance. Points are also awarded for best practice on construction site impacts, such as where 80% of site timber is reclaimed, re-used or sustainably sourced.

50. The Code is a voluntary standard for new homes in England only. As of April 2007, all new homes developed by English Partnerships or with direct funding from the Government's housing growth programmes are required to comply with level 3 of the Code³⁵. All new Government funding for homes built by registered social landlords and other developers (e.g. via the Housing Corporation) will now make it a condition that they comply with level 3 of the Code – in practice this will be implemented from the next National Affordable Housing Programme in 2008.

Sustainable procurement

51. The report of the Sustainable Procurement Task Force was published in June 2006. The Task Force identified construction as the top priority for action by public sector clients. Recommendations included setting minimum specification standards for sustainability.

52. The UK Government Sustainable Procurement Action Plan (published in March 2007), together with the HM Treasury report on Transforming Government Procurement, forms the Government response to the task force. It sets out a goal for a low carbon resource efficient public sector to be achieved through a range of actions, including Government departments meeting updated and extended mandatory standards across an increased range of products. As part of the ongoing process to review the level and range of standards every two years, the Government will consider the role that benchmarks could play in stimulating materials resource efficiency in key areas of public sector construction procurement.

³² See http://www.planningportal.gov.uk/uploads/code_for_sust_homes.pdf for further information.

³³ The Technical Guide is available on http://www.planningportal.gov.uk/upload/code_for_sustainable_homes_techguide.pdf

³⁴ The Code uses a sustainability rating system – indicated by 'stars', to communicate the overall sustainability performance of a home.

³⁵ See also the recent consultation on *Building a Greener Future – Towards Zero Carbon Development* at http://www.communities.gov.uk/pub/173/BuildingaGreenerFutureTowardsZeroCarbonDevelopment_id1505173.pdf

53. A range of organisations in both public and private sectors has already adopted a performance indicator or minimum procurement requirement for recycled content (typically 10% as a proportion of the total value of materials used on a project).³⁶ On any project, most of the improvement in recycled content can be achieved through 3–10 cost-neutral substitutions with alternative mainstream brands offering above-average recycled content, in product categories such as blocks and aggregates – and procurement, funding or planning requirements stimulate design teams and contractors to identify good practice. The evidence from these practical examples will be used to inform decisions on appropriate benchmarks for the Government.

54. The Office of Government Commerce (OGC) has established Common Minimum Standards for the Procurement of Built Environments in the Public Sector. Government Departments are required to conduct a BREEAM assessment, or equivalent, on all construction and major refurbishment projects, with a target of 'Excellent'. BREEAM operates on a points system and credits are awarded for the appropriate measurement and management of on-site waste and the use of re-used and recycled materials. The Common Minimum Standards also require all public sector clients to follow OGC's Achieving Excellence in Construction Procurement Guide 11 on Sustainability, which sets out a range of requirements for waste minimisation and management and resource efficiency. For example 'the (project) brief should include an outcome-based requirement for overall materials efficiency, such as a minimum requirement for recycled content in the project'.³⁷

55. The Government is putting forward for discussion a proposed target to achieve waste-neutral construction in its major construction projects by 2012 (see targets below in Boxes C3.2 to C3.4 for more information).

Sector commitments and policy road-maps for priority products and materials

56. Development of the evidence base on environmental impact is continuing by the Government and others. The Government will use this evidence to develop a greater focus on waste materials and products in the construction sector which have greatest environmental impact and where there are opportunities for improvement. Greenhouse gas impacts are particularly important. This is in line with the general approach set out in this strategy for all wastes and with the Government's prioritisation of products with the greatest environmental impact over their entire life cycle (see Chapter 4 of *WS2007* for further information).

57. Defra's Market Transformation Programme (MTP) is developing the evidence base for certain construction products, including roofing and flooring.³⁸ Defra is already developing ten product 'road-maps' for certain products which have been identified as having significant environmental impact. These include two construction products, using MTP's evidence. These are window systems, where the majority of materials (such as treated timber, PVC³⁹ and glass) currently go to landfill, and plasterboard (see paras 60 below for further information on action on plasterboard).

³⁶ For example, the Olympic Delivery Authority has adopted minimum standards for recovery of demolition materials and recycled content for London 2012. The Building Schools for the Future programme, Defra, Defence Estates and the National Offender Management Service have all adopted KPIs and benchmarks for recycled and re-used content. Visit www.wrap.org.uk/construction/construction_procurement/index.html for more information.

³⁷ *Common Minimum Standards for the Procurement of Built Environments in the Public Sector*, OGC, 2005, Part 6. Available on http://www.ogc.gov.uk/documents/Common_Minimum_Standards_PDF.pdf. See also *Achieving Excellence in Construction – Procurement Guide II – Sustainability*, OGC, at <http://www.ogc.gov.uk/documents/CP0062AEGuide2.pdf>

³⁸ See <http://www.mtprog.com/SelectProductStrategy.aspx?intSelection=5&intSector=16>.

³⁹ The Recovinyl scheme is promoting higher recovery rates for PVC.

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58. The construction products industry is actively engaged in quantifying the life cycle impact of different product types across the range of environmental issues, including as part of BRE's updating of its Green Guide to Specification. In addition, the 16 partners in the BE AWARE project (funded by the DTI Technology Programme) are seeking to reduce waste and resource use across the whole lifecycle of any given construction product, through waste exchange analysis, characterisation, testing and evaluation.⁴⁰

59. The Government (with its delivery bodies) intends to engage more fully with construction sub-sectors to establish voluntary waste prevention and recycling agreements. The Government wishes to build on some valuable projects currently underway within the sector.⁴¹

60. One recent example is the agreement by the major plasterboard manufacturers and their trade association. They have developed, with WRAP and MTP, a voluntary agreement to reduce plasterboard waste to landfill from manufacturing operations, increase the collection and recycling of plasterboard waste from new construction and engage with other stakeholders to reduce waste to landfill and increase recovery. WRAP and the Building Research Establishment are working with the remaining elements of the supply chain to agree a sector-level commitment.

61. WRAP has a programme in place⁴² to increase plasterboard recycling and to develop alternative markets for the waste materials. It is also assessing the environmental impacts of each stage in the product lifecycle of plasterboard, including waste and recycling, as part of its wider construction programme.

62. Packaging is another area where evidence suggests significant savings could be achieved.⁴³ Packaging may account for 10 – 20% or more of site waste by volume.⁴⁴ Typically less than half of such waste is recovered, although contractor experience demonstrates recovery rates of 90% or more at best practice⁴⁵. Envirowise and WRAP already offer advice and guidance in this area and are developing further guidance on practical proven examples and tips on how to minimise and avoid it. Subject to consultation, it is intended that SWMP non-statutory guidance will encourage tender specification to require take-back of packaging.

63. The Government will continue to make the case to major players within different segments of the construction sector – which might include, for example, property developers, retailers and local authorities – to commit to setting requirements for resource efficiency in their procurement of major projects (see proposed target 2 below in Box C3.3).

⁴⁰ Go to <http://www.beaware.org.uk> for further information.

⁴¹ See also below – Improving Data and Measurement – on the Be AWARE project which takes a product lifecycle approach to reduce waste and improve resource efficiency. It will examine around 40 products in detail.

⁴² See <http://www.wrap.org.uk/construction/plasterboard/about.html> for more information.

⁴³ For example, at the Chiswick Park office development in London, a waste audit identified recyclable or reusable packaging as the main cause of waste (43%). At a £58 million office/laboratory development at BP Sunbury, an estimated 40% of potential packaging waste was eliminated at no additional cost to the project through requirements placed on suppliers. See Envirowise publication GG493, *Saving Money and Raw Materials by Reducing Waste in Construction: Case Studies* (2005) for more information. BRE benchmark waste data for housing indicate 13% of the volume of waste on housing projects may be packaging waste.

⁴⁴ In *Current practices and future potential in Modern Methods of Construction*, WRAP, January 2007, AMA Research quantified packaging as contributing 25–35% (by weight) of the wastes from traditional new build. Values will vary significantly between different types of project.

⁴⁵ Research in progress for WRAP, based on data for 20 case studies including site data provided by Bovis Lend Lease and Taylor Woodrow. Contractors reported that typically only 10% of packaging waste is segregated for recovery, although their waste management contractors do recover some additional materials off site from mixed waste. A 20% cost saving is quoted where packaging waste is segregated. EnviroWise has commissioned the development of a packaging calculator tool to allow estimates of packaging waste arisings to be produced for different types and phases of construction projects.

DTI Review of Sustainable Construction 2006

64. The review, published in October 2006, provided an update on the initiatives which had been developed within the construction industry over the period since the publication of 'Building a Better Quality of Life – A strategy for more sustainable construction' in April 2000. Section 8 ('The future') also set out a vision for the industry in the future, including zero waste to landfill by 2020. The Government is currently considering a target for halving CD&E waste to landfill by 2012, which could be a step towards the vision for 2020 (see the section on Targets below).

Sustainable Construction Strategy

65. Improving resource efficiency, and therefore reducing costs of resources wasted, will be a theme of the Sustainable Construction Strategy which the Government intends to publish in 2007.⁴⁶

66. There will be a period of consultation with industry over the new draft strategy. Among the targets that the Government intends to put forward for consideration by industry stakeholders, will be an interim objective of zero net waste, at construction site level, by 2015, leading up to zero waste to landfill by 2020 (see below on Targets).

67. The DTI Technology Strategy Board has established a set of 'Innovation Platforms' to enable business and Government to work together to generate more innovative, UK-led solutions to major policy challenges. One of these platforms is a Sustainable Consumption and Production Platform on low impact buildings. The DTI has also set up a number of Knowledge Transfer Networks (KTNs) to bring together businesses, academics and innovators to develop solutions to many of the challenges facing the UK. In particular, the Resource Efficiency KTN, the waste and pollution KTN (IPM-net) and the Built Environment KTN have specific interests in the waste agenda.

Environment Agency sector plan

68. In discussion with the construction industry, the Environment Agency is developing a Construction Sector Plan. This Plan will establish milestones for construction businesses to achieve compliance with regulations as a minimum and increase good practice in waste reduction and recycling on site, as well as improving resource efficiency in construction projects.

Engaging SMEs

69. Smaller contractors and projects represent a major challenge when promoting the adoption of good practice. Envirowise provides extensive advice and tailored training to construction companies, many of which are SMEs. The Government is funding demonstration trials of construction waste recycling through WRAP, specifically targeted at SMEs.

70. The Environment Agency is also running a three-year awareness campaign "Sitewise II" to improve the environmental performance of the construction industry. This is part of the Agency's SME Strategy.

Market development and sector support

71. Through WRAP in particular, the Government will continue to help develop markets for recycled materials. WRAP's relevant construction activities include:⁴⁷

- aggregates – capital investment in reprocessing capacity, information to increase market awareness and acceptance of the economic and technical case for using recycled and secondary aggregates;

⁴⁶ In 2004, the Government's Sustainable Buildings Task Group noted making more efficient use of materials as one of the three key areas for action.

⁴⁷ See www.wrap.org.uk/construction/index.html for more information.

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- plasterboard – capital investment in collection and recycling schemes, and trials of the use of recovered gypsum;
- procurement – advocacy campaigns and exemplar projects to help public and private sector organisations introduce requirements for materials efficiency in their procurement of major construction projects; and
- waste minimisation and management – capital investment in reprocessing capacity and building the evidence base and tools for waste minimisation.⁴⁸

Box C3.1: WRAP construction targets

WRAP's construction sector targets for March 2008 are:

- 1.7 million tonnes of material diverted from landfill or avoided from being extracted from primary resources
- £10 billion value of construction projects where requirements are set for waste minimisation, recycling and recycled content
- £50 million saving to the construction sector from minimising site waste and recycling more waste.

Waste regulations

72. The Environment Agency and WRAP are jointly developing protocols for the recovery of materials for ten identified waste streams, a number of which relate to construction materials and products: flat glass, pulverised fuel ash (PFA), blast furnace slag, contaminated soils, tyre crumb and shred, non-packaging plastic and wood. Working with relevant industry bodies, the intention is to clarify the point of recovery of materials from waste and provide guidance on best practice for the processing and use of recycled products. This will help to provide greater clarity and certainty for industry and regulators alike.

Inert waste review

73. As stated in Chapter 3 of the strategy, Defra and the Environment Agency will put in hand a review of the regulation of inert waste covering a range of issues including the status of inert waste treatment residues from C&D waste recycling and reprocessing operations, as well as wider issues such as the appropriate use of inert waste exemptions, inconsistencies with the landfill tax regime and the quality of guidance in this area. Stakeholders will be formally consulted by the end of 2007 on options for reform.

Planning requirements

74. Planning Policy Statement 10 (PPS10),⁴⁹ which was introduced in 2005, states that proposed new development should be supported by SWMPs of the type encouraged by the current code of practice. These do not require formal approval by planning authorities, but are encouraged to identify the volume and type of material to be demolished and/or excavated, opportunities for the re-use and recovery of materials and to demonstrate how off-site disposal of waste will be minimised and managed.

⁴⁸ WRAP works in conjunction with Envirowise to promote good practice in site waste management.

⁴⁹ PPS10 sets out planning policies for waste management. See <http://www.communities.gov.uk/index.asp?id=1143834> for more information.

75. Minerals Policy Statement 1⁵⁰ aims to ensure, so far as practicable, the prudent, efficient and sustainable use of minerals and recycling of suitable materials, thereby minimising the requirement for new primary extraction. It is Government policy to encourage the greatest possible use of alternatives to primary aggregates and the National and Regional Guidelines for Aggregates Provision in England set a target that will be reviewed annually and revised when necessary.

Improving data and measurement

76. A lack of measurement of waste and recycling is apparent at the project level, especially on smaller projects. This incurs an opportunity cost through a failure to monitor and improve. Initiatives such as the BREW CoRE programme are promoting measurement tools – see further below.

77. There is a need for improved data on construction waste, in respect of arisings, composition and management route, both to inform the development of policy, and to motivate the take-up of good practice within the sector. This is particularly true for wastes which are unsuitable for processing into aggregate (such as wood, metals and plastics).

78. The Government is funding a number of projects aimed at addressing such data deficiencies⁵¹ including a BRE project aimed at understanding, measuring and predicting construction waste. This project had developed minimum reporting requirements for waste which will result in project – specific key performance indicators. Sites and companies will be able to use the resulting benchmarks to measure waste and set targets. This will assist the development of Site Waste Management Plans, which require measurement of site waste.

Targets

79. In order to stimulate action to improve resource efficiency, reduce waste and increase diversion from landfill (through more re-use, recycling and recovery) the targets set out below are proposed for further discussion with the construction industry.

⁵⁰ Minerals Policy Statement 1: Planning and Minerals, CLG, November 2006. Available at http://www.communities.gov.uk/pub/277/MineralsPolicyStatement1PlanningandMinerals_id1504277.pdf

⁵¹ Members of the Major Contractors Group have committed to measuring their performance on waste, to inform the future adoption of targets for improvement. See *Building magazine*, 13 October 2006.

Box C3.2: Proposed target 1

The construction industry to halve the amount of construction, demolition and excavation wastes going to landfill by 2012 as a result of waste reduction, re-use and recycling

- Responding to the Strategic Forum for Construction, the sector's Sustainability Forum – together with WRAP – has called for the construction industry to achieve the 50% cut in waste to landfill by 2012, and is working on an action plan to demonstrate how the target can best be achieved.⁵²
- Issues that would need to be agreed include the identification of an appropriate base date (2005 is a possibility) and the integration of this target with the potential objectives of zero net waste (at construction level) by 2015 and zero waste to landfill by 2020 – see above.
- This target refers to reduction in the amount of waste going to licensed landfill where landfill tax is paid. The target aims at waste reduction and not just recycling/diversion of waste.
- The target would not count diversion of waste from landfill to exempt sites, backfilling quarry voids, site restoration and landfill engineering.
- The reduction and recovery of construction and refurbishment wastes will be a key focus.⁵³

Box C3.3: Proposed target 2

For construction clients to include contractual requirements for measurement *and* improvement of materials resource efficiency in one-half of construction projects in England over £1 million in value by 2009

- Resource efficiency encompasses waste reduction, use of recovered materials in construction and recycling.
- The £1 million threshold would capture around 10% of projects by number, 60–70% by value.
- The construction target for materials resource efficiency will contribute to the Government's sustainable procurement policies.
- Client requirements will encourage contractors to perform beyond the minimum regulatory standard for proposed SWMPs, which will require measurement but not necessarily adoption of improved performance.

⁵² See press release issued on 22 November 2006 by the Strategic Forum for Construction and WRAP: "Construction Industry Urged to Halve Construction Waste by 2012" at <http://www.strategicforum.org.uk/PR-ForumandWRAPpledgeNov06.doc>

⁵³ Results from case studies confirm the opportunity to halve waste costeffectively – for example, see *Demonstrating Waste Minimisation Benefits in Construction*, CIRIA, 2001.

Box C3.4: Proposed target 3

Government to achieve waste-neutral construction in its major construction projects by 2012

- To meet this proposed benchmark, the value of re-used or recycled materials employed on a construction project will at least equal the value of materials delivered to site that are wasted,⁵⁴ while satisfying the criterion of no net adverse environmental impact from the adoption of good practice.
- It is proposed that value be credited for improvements in re-used and recycled content above standard practice and the value of materials reclaimed for use offsite. Value will be debited for materials delivered to site but not incorporated in the construction works (e.g. unused, offcut and damaged materials). The balance is termed “net waste”.
- A value element is proposed because (a) it will identify cost savings and motivate improvement in commercial organisations, (b) it can be calculated from existing data on waste quantities, and (c) it helps companies identify priorities, such as waste reduction and the use of recovered materials in higher-value applications. WRAP is working with major developers and contractors to develop and test this value-based method (and web-based tool) for assessing waste neutrality.
- Waste neutrality depends on reducing waste, segregating material for re-use and recycling, and using more recovered material – and procurement clauses would require action on all these aspects. Working towards ‘zero net waste’ should both reduce environmental impact and divert materials from landfill, as well as improving business performance.
- The 2012 target date chimes with the goal of waste neutrality for the London 2012 Olympic Games.⁵⁵
- The UK Government Sustainable Development Strategy 2005 aims for the UK to be recognised as among the leaders in sustainable procurement across EU Member States by 2009. This waste neutrality target will contribute to the Government’s sustainable procurement policies.
- The projects to which the proposed target would apply will need to be agreed. One option is for the target to apply to the Government Estate and major programmes such as Building Schools for the Future.

⁵⁴ The Sustainable Construction Strategy intends to consult on whether a waste-neutral concept defined by value is considered appropriate.

⁵⁵ In addition, the Thames Gateway Interim Plan sets out the ambition to explore making the Thames Gateway a zero construction waste zone. Government is currently considering whether the proposal is feasible and if so what policies and actions would be needed to put it into action.

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80. These proposed targets reflect the priority assigned to waste by the construction sector itself, where the Strategic Forum for Construction⁵⁶ and the Major Contractors Group are both working to set targets for waste reduction and diversion from landfill. The Strategic Forum's Sustainability Group is working with WRAP and others to draw up an action plan for the sector with measurable targets. WRAP will be discussing with the Forum how it can play its part in helping to deliver the proposed targets.

81. The Government's Sustainable Construction Strategy, due to be published later in 2007, will take account of stakeholder discussions on these targets and will present the Government's targets as agreed on a broad range of construction sustainability issues, including waste.

Implementation and timescales

82. Delivery partners funded through BREW will play a key role in implementation of CD&E waste policies and targets. In addition to the activities and timescales outlined above under 'Policies and targets', outlined below are a number of other strands of work relevant to delivery on CD&E waste objectives.

83. BRE, AEAT, the Government and others are now developing the industry-backed Construction Waste & Resources Roadmap due to be published shortly.⁵⁷ It will summarise existing evidence alongside new data collected on the reclamation industry, construction products used, waste prevention targets, SWMPs, and the role of whole life costing in evaluating the true cost of waste. It will propose coordinated actions to improve the use of resources in construction across the supply chain which will assist implementation of the objectives and targets set out here. The Roadmap will continue to evolve over 2007/08 through further evidence gathering to plug gaps in understanding and extensive dialogue with representatives of the construction sectors and other key stakeholders.

84. Other key delivery initiatives include:

- the **Environment Agency** runs training events for the construction industry on good site practice, in addition to its other construction work above;
- **Envirowise** offers free on-site FastTrack visits by experts to provide tailored advice to companies on waste minimisation (raw materials, packaging, time, etc.) as well as training events on site waste management, supported by guidance materials;
- **NISP** facilitates links between organisations to allow waste from one business to be used as a raw material by another – through events and visits;
- all nine **Regional Development Agencies** receive funding from BREW to coordinate resource efficiency and waste initiatives to meet the needs of local businesses, e.g. through networking opportunities, training and provision of information. A joint Construction Resource Efficiency Programme (CoRE), involving three RDAs, is delivering practical support for improved waste measurement and management on construction sites; and
- **WRAP** provides support and guidance through its construction programme to help the construction industry cut costs and increase efficiency through the better use of materials, from pre-design to demolition.

⁵⁶ The Strategic Forum for Construction includes the Construction Industry Council, the Construction Clients Group, the Construction Confederation, the Construction Products Association, the National Specialist Contractors Council and the Trades Union Congress.

⁵⁷ It will be published on the BRE website at www.bre.co.uk/wastestrategy

85. To increase resource efficiency in construction, it is essential to improve awareness among contractors and others of the true costs of waste disposal (usually under-estimated), including the value of the materials they are throwing away.⁵⁹ The Government will help behaviour changes through information and awareness raising.

Roles and responsibilities

86. A '**Construction Coherence Group**' with representation from key stakeholders has been set up to coordinate the BREW funded activity on construction. This BREW Construction Coherence Group will help ensure effective implementation of policy and minimise duplication of initiatives. The Group has representation from Defra, DTI, the Regional Development Agencies, Envirowise/AEAT, WRAP, NISP, BRE, the Market Transformation Programme and the Carbon Trust.

87. Table C3.2 below summarises roles and responsibilities for a number of key bodies involved in delivery of CD&E resource efficiency and waste objectives.

Table C3.2: Roles and responsibilities of selected key organisations and initiatives

Organisation/initiative	Roles and responsibilities
BRE	Advice, tools, codes and standards for the construction industry including all aspects of sustainability.
Constructing Excellence	Guidance, tools and advice including environmental key performance indicators.
CIRIA (Construction Industry Research and Information Association)	Research, publications, training and networks on sustainable construction.
Knowledge Transfer Network (Modern Built Environment)	Improve innovation and performance particularly within healthcare, infrastructure and offices
Knowledge Transfers Network (Resource Efficiency)	Provide businesses with support to reduce waste and increase profitability through improved resource efficiency.
National Platform for the Built Environment	Industry-led strategic, collaborative research including reduced resource consumption
Strategic Forum for Construction	Includes the Sustainability Task Group which disseminates information, works with and influences other bodies, events and publications
TRADA (Timber Research and Development Association)	Information and research on timber and wood products, including waste issues

⁵⁹ See, for example, CEED report (2005) funded by DTI Innovation programme which found that construction and demolition companies are largely unaware that effective waste management can deliver real cost savings – available at www.ukceed.org/downloads/files/9-PII04-27CExploitingtheValueofDemolitionandConstructionWaste_3vjs.pdf

Infrastructure and capacity needs

88. Four key areas for investment in infrastructure and capacity are:

- reprocessing capacity (e.g. for gypsum wastes);
- materials exchanges;
- sector skills (on procurement, design and site practice); and
- identification and demonstration of good practice.

Reprocessing and treatment capacity

89. Capital support can overcome the market failure of the perceived risk of investment in the emerging market of materials reprocessing, and helps to accelerate improvements in business resource efficiency. Capacity needs exist for on- and off-site treatment of contaminated soils. This can be in the form of treatment hubs, as exemplified by the CLUSTER project, or one-off provision, taking advantage of changes to the Mobile Plant Licensing regime. Treatments can include soil washing, thermal desorption and bioremediation. These needs relate to the other capacity needs for hazardous waste treatment and landfill explored in Annex C9 on hazardous waste.

Materials exchanges

90. Consolidation centres and smart logistics can improve the economics of both materials delivery to site and waste collection. Investment is needed in innovative systems, such as materials recovery facilities and exchanges for reclaimed products.⁶⁰

Skills and demonstration of good practice

91. In order to facilitate the introduction of procurement requirements, waste minimisation and good site practice,⁶¹ work is needed to define and communicate good practice.⁶² This will build on the existing work of WRAP and the BREW programme. There is a need for consistent and linked training packages, from on-site induction to various professions, and from school through to vocational and higher educational courses. This will build in particular on the work of CITB Construction Skills – which has developed a strategic plan for sustainability skills, the professional bodies (for architects, engineers etc), and the delivery activities of BREW partners such as Envirowise. As an example, site operatives will need the skills and training to implement SWMPs when these become a regulatory requirement next year, as planned.

⁶⁰ Large-scale reclamation yards for steel and timber have been proposed by stakeholders as a means of enabling reclaimed products to break into the mainstream supply chain – *Reclaimed Building Materials in Development of the Thames Gateway*, BioRegional Reclaimed, 2006.

⁶¹ Best practice from pre-demolition audits carried out by BRE indicates that reclamation rates for demolition waste could be increased from 13% to 28%.

⁶² See also the Review of Sustainable Construction, DTI, 2006.

Waste Strategy for England 2007