



RESOURCE EFFICIENCY FACTSHEET

Construction Sector



The construction sector

There were approximately 137,000 people engaged in the construction sector in 2016¹. This is much reduced from the peak at 273,000 people in 2007 but the sector is again in a growth phase in terms of employee numbers and output. 2016 construction output of c.€14.5 billion (a 15% increase on 2015) is largely attributed to a boom in commercial construction while residential construction output has increased at a slower rate and is currently not meeting demand, giving rise to a housing crisis and increasing house prices and rents.

In Europe the construction sector generates almost 10% of GDP and provides 20 million jobs, mainly in micro and small enterprises. Construction is also a major consumer of raw materials, products and related services.

Resource efficiency considerations can be incorporated all along the construction chain from procurement of materials and products, to design, logistics, construction, use and deconstruction.

Policy

At the European level, the EU has policies, strategies and initiatives in place to try to improve resource efficiency in construction. An EU Communication² on the Sustainable Competitiveness of the Construction Sector and its Enterprises (2012) outlines ways the performance of the value chain can be improved and how Europe can move towards a low-carbon economy with the construction of low energy buildings.

The EU Directive on Energy Performance of Buildings states that by 2020 the renovation and construction of buildings and infrastructure will be made to high resource efficiency levels. The Life-Cycle approach will be widely applied; all new buildings will be nearly zero-energy³ and highly materially efficient, and policies for renovating the existing building stock will be in place⁴ so that it is cost-efficiently refurbished at a rate of 2% per year. 70% of non-hazardous construction and demolition waste will be recycled⁵.

The EU Communication⁶ on Resource Efficiency Opportunities in the Building Sector (2014) focuses on resource efficiency through the use of relevant indicators in the building life-cycle and developing a better functioning market for recycled construction materials.

The Circular Economy Strategy includes proposed actions to minimise C&D waste and to better manage its recovery. Tools available to achieve these objectives include:

- the assessment framework for the environmental performance of buildings;
- the construction and demolition waste management protocol;
- and Green Public Procurement criteria for construction projects.

Potential resource efficiency initiatives in the sector

Relevant Indicators

The Building Energy Rating (BER) certificate is an indicator of the energy performance of a building, and is based on the EU Energy Performance of Buildings Directive (EPBD). BER is the calculated energy use for space and hot water heating, ventilation and lighting based on standard occupancy.

The "Reference Document on Best Environmental Management Practice in the Building & Construction Centre"⁷ is a best practice document developed for the European Commission. The document takes a life cycle approach, with a chapter on each element of the construction of a building from land planning through to building end-of-life. Each section begins with an analysis of the elements of each stage in the construction process and then develops a number of best practices that will result in good environmental performance. The document takes a life-cycle approach which is very relevant to resource efficiency, and also has a specific section for selection of construction products. It also includes a table of environmental indicators (e.g. specific energy consumption kWh/m²/year benchmarks). Three indicators relate to material usage: use of eco-labelled materials according to type I ecolabel (ISO 14024); that hazardous products are avoided; and percentage of wood data with certificates of chain of custody.

BREEAM is an international sustainability assessment method for master planning projects, infrastructure and buildings. It addresses a number of life-cycle stages including as New Construction⁸, Refurbishment and In-Use. BREEAM sets the following New Construction Key Performance Indicators based on the amount of waste generated per 100m² (gross internal floor area):

One credit $\leq 13.3\text{m}^3$ or ≤ 11.1 tonnes

Two credits $\leq 7.5\text{m}^3$ or ≤ 6.5 tonnes

Three credits $\leq 3.4\text{m}^3$ or ≤ 3.2 tonnes

Exemplary level $\leq 1.6\text{m}^3$ or ≤ 1.9 tonnes



Materials

The sector is a significant consumer of materials. The construction materials of significance include: stone, sand, gravel, ready mixed mortar and concrete, blocks and bricks, structural steel, timber, bituminous macadam and asphalt, electrical fittings and cement. The use of insulating materials in floors, walls and ceilings is critical to the energy efficiency of buildings. Conservation of fuel and energy in buildings is covered by Part L of the Building Regulations (2011)⁹. There are separate guidance and different criteria for dwellings and non-dwellings in terms of building operational performance. Operational criteria refers to primary energy consumption and CO₂ emissions. The guidance also covers building fabric insulation, air tightness, boiler efficiency, building service controls, insulation of pipes, ducts and vessels, and mechanical ventilation. For specific renewable technologies (solar thermal systems, wood pellet stoves, wood pellet/chip boilers and heat pumps), the SEAI maintains databases of these products together with information on relevant performance characteristics.

The requirements of the materials used in construction, are addressed in Part D of the Building Regulations (Materials and Workmanship). The only environmental consideration specified is that the materials used in building work should, as far as is practicable, be free of chlorofluorocarbons (CFCs). There is currently no mention of waste prevention or reduction in the Building Regulations nor on the use of materials with recycled content.

CASE STUDY: ECOCEL

Ecocel is an eco-friendly building insulation product made from recycled newspapers, in Cork. The product is the only cellulose insulation made in Ireland and the UK and compares favourably with all imported alternatives. The material is treated with inorganic salts that act as a biocide and fire retardant. Dust is removed from the product during production.

Ecocel is also reusable beyond the lifespan of a building, and has a naturally low carbon footprint, acting as a carbon sink. It has a thermal conductivity of 0.038 W/mK. The insulation has NSAI Agrément Certification for both horizontal (attic) and vertical (walls) installations.

Ecocel insulation is pumped into spaces by trained professional installers, creating an airtight seal. The product is suitable for the insulation of timber framed homes, as well as attics and roofs in domestic and commercial properties.

Waste

According to the Department of Housing, Planning and Local Government "the EU Commission estimates that Construction and Demolition (C&D) waste accounts for approximately 25 to 30% of all waste generated each year in the EU¹⁰". While Ireland is on track to meet its recovery targets for C&D waste (over 98% is recovered¹¹); preventing the generation of large quantities of C&D waste remains elusive.



The EPA National Waste Report 2012¹² indicates that collected Construction and Demolition (C&D) wastes in Ireland have decreased by 83% from a peak of 17.8Mt in 2007 to just over 3Mt in 2011. The bulk of the tonnage collected in 2011 was made up of soil and stones (1,975,844t), with the remaining 1,027,847t consisting of other C&D waste materials such as rubble, metals, timber, plastic, glass, wood and mixed C&D waste.

The Markets Development Programme for Waste Resources (2007-11¹³) identified potential uses in construction for several waste material streams (Fig 2).

The Market Development Group noted that in Northern Ireland there is a voluntary initiative whereby local authorities are encouraged to specify that at least 10% by value of recycled construction materials is included in all local authority construction jobs. Such an initiative could be replicated in green public procurement in Ireland. The Construction Industry Research and Information Association (CIRIA) in the UK, has developed a number of real life examples of economic benefits of using recycled materials in construction.

Article 28 of the EC (Waste Directive) Regulations, SI No. 126 of 2011, details how specified waste ceases to be waste when it has undergone recovery, including recycling, and meets with certain listed conditions. Article 31 of the same Regulation specifies that by 2020, the preparing for re-use, recycling and other material recovery, including backfilling operations using waste to substitute other materials, of non-hazardous construction and demolition waste excluding naturally occurring material defined in category 17 05 04 in the list of waste shall be increased to a minimum of 70% by weight.

The EPA study¹⁴ "Design Out Waste" provides guidance for design teams to reduce waste in construction and demolition projects. Much of the guidance is based on a review of waste management practices during the design and construction phases on two Irish case studies, the Human Biology Building (NUIG) and the Mater Adult Hospital (Dublin) and also references WRAP (UK) guidance on designing out waste.



New system ready for transport post factory assembly

CASE STUDY: SCHIEDEL CHIMNEY

Schiedel manufactures chimney systems for the construction industry. The company redesigned the chimney system to produce a factory assembled 'Storey High' product rather than supplying the chimney system in component kit form. The new system eliminates packaging since it is transported to site in re-useable metal cradles, replacing the pallets and plastic wrapping of the old system.

The new system is also assembled in the Schiedel factory rather than on the building site. This increases the quality and accuracy of construction and reduces the amount of materials needed per unit. The new system also results in a reduction in chimney installation times for builders.

The new system eliminates packaging since it is transported to site in re-useable metal cradles, whereas the existing system uses two pallets with heavy duty shrink wrapped hoods and insulation and sealant supplied separately.

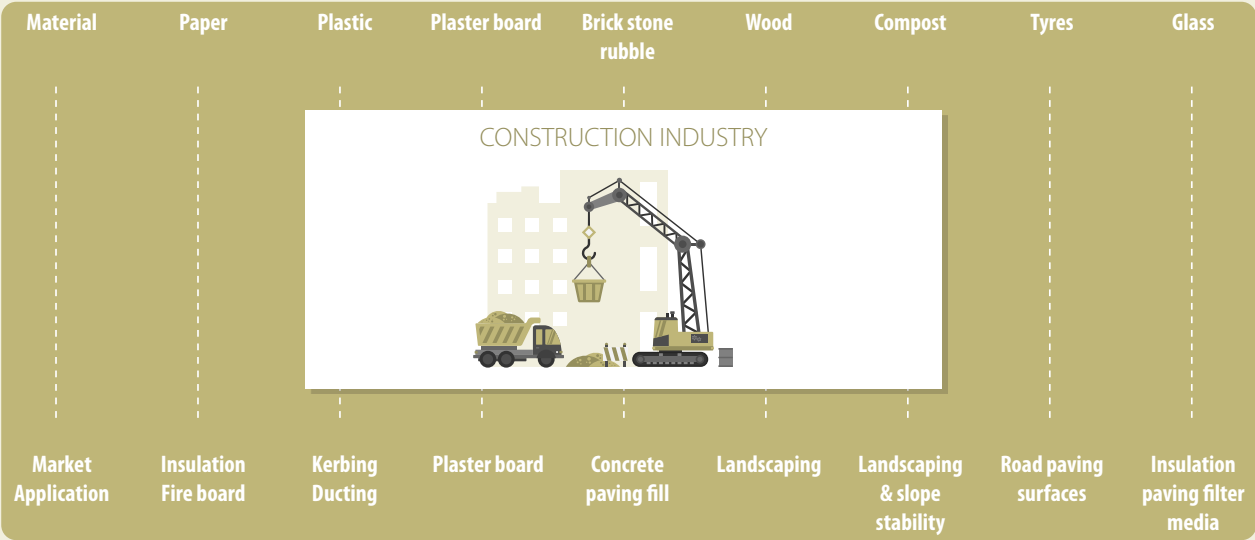


Fig.2 Opportunities for Use of Recycled Materials in Construction¹⁶



Further Information

EPA Strive project “Design Out Waste” provides guidance for design teams to reduce waste in construction and demolition projects.

<http://www.epa.ie/pubs/reports/research/waste/research146designoutwastefactsheets.html>

Department of Housing, Planning, and Local Government webpage on Construction & Demolition Waste

<http://www.housing.gov.ie/environment/waste/construction-and-demolition-waste/construction-and-demolition-waste>

“TM56 Resource Efficiency of Building Services” is a technical document developed by CIBSE aiming to provide guidance on principles and tools relating to resource efficiency and set out opportunities to improve the resource efficiency of building services. The document lists resource efficiency drivers & assessment tools as well as potential opportunities in a number of key areas. There is more of a focus on the operational life of a building than the initial construction: there are chapters on resource efficiency regarding heating, cooling, lighting, lifts & escalators. However, there is a chapter on key materials in the construction sector & their environmental aspects. Section 8.4 of the document suggest embodied energy/carbon as an indicator of environmental performance for building services. <http://www.cibse.org/knowledge/cibse-tm/tm56-resource-efficiency-of-building-services-new>

Resource Efficiency in Priority Irish Business Sectors

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This factsheet is one of seven that accompanies the main report of the EPA research project: Efficiency in Priority Irish Business Sectors (2014-RE-DS-1). Other factsheets are available on the following sectors: Food and Beverage, Pharmaceutical and Chemical, Retail, Manufacture of Non-Metallic Mineral Products, Accommodation and Food Service. There is also an overall factsheet. The main report is available at www.epa.ie.

¹ https://aecomtl.azurewebsites.net/annualreview/AECOM_Review_2017.pdf

² <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52012DC0433>

³ European Commission Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings 2010, Brussels.

⁴ In line with Art. 9 of Directive 2010/31/EU of 19 May 2010.

⁵ In line with Art 11 of Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives

⁶ <http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1411482206636&uri=CELEX:52014DC0445>

⁷ susproc.jrc.ec.europa.eu/activities/emas/.../ConstructionSector.pdf

⁸ BREEAM UK 2014 Non-Domestic New Construction Technical Manual http://www.breeam.com/filelibrary/BREEAM%20UK%20NC%202014%20Resources/SD5076_DRAFT_BREEAM_UK_New_Construction_2014_Technical_Manual_ISSUE_0.1.pdf

⁹ <http://www.housing.gov.ie/sites/default/files/migrated-files/en/Publications/DevelopmentandHousing/BuildingStandards/FileDownload%2C27316%2Cen.pdf>

¹⁰ <http://www.housing.gov.ie/environment/waste/construction-and-demolition-waste/construction-and-demolition-waste>

¹¹ http://www.epa.ie/pubs/reports/waste/stats/epa_infographic_waste_v2_web_Q42013.pdf

¹² http://www.epa.ie/pubs/reports/waste/stats/EPA_NWR12_Complete_to_web_5Aug14.pdf

¹³ <http://www.ncdwc.ie/html/documents/MarketDevelopmentProgrammeforWasteResources2007-2011.pdf>

¹⁴ <http://www.epa.ie/pubs/reports/research/waste/research146designoutwastefactsheets.html>

¹⁵ <http://www.modular.org/marketing/documents/DesigningoutWaste.pdf>

¹⁶ <http://www.ncdwc.ie/html/documents/MarketDevelopmentProgrammeforWasteResources2007-2011.pdf>

