

# Concrete is the Best Bet for Sustainable Development

*Concrete can help more than most to achieve real sustainable development. With over 100 million tonnes of concrete being used annually in the UK, the potential contribution of cement and concrete towards sustainable development is considerable reports Anna Scothern, Head of Concrete Performance at The Concrete Centre.*

Under the Kyoto Protocol, the UK is committed to reducing greenhouse gas emissions by 12.5 per cent (from 1990 to 2012). In addition to this the Government has set its own target of a 60 per cent reduction during the period 1990 to 2050. In order to achieve these reductions, Government has called on industry sectors to develop their own sustainable development strategies. The cement and concrete sector has risen to the challenge. The Concrete Centre and British Cement Association are facilitating a Sustainability Team

comprising of representatives from end user practices, manufacturing companies and trade associations to develop and implement a strategy where concrete can contribute positively towards sustainable development.

The cement and concrete sector has been addressing how sustainable thinking can be applied to its manufacturing processes and to concrete construction for some time. Progress has been made in using alternatives to fossil fuels for cement manufacture. For example, some 28

million used tyres are dumped in landfill every year. These provide an ideal cement kiln fuel, burning without fumes or flames. Other waste products that can be safely and environmentally recycled for fuel in cement fuels include sewage sludge, paper and plastics and even recycled solvents. Cement also uses waste by-products from other industries as part of its constituents. For many years waste ash from power stations, pulverised-fuel ash (pfa), has been used as a component of Portland pfa cement. By altering the chemical balance cement



*Crushed concrete and segregated steel is recycled for new steel reinforcement and concrete construction.*

kilns can also reuse their own main solid waste, cement kiln dust which was formerly land filled. As a result, in the UK over 100,000 tonnes less virgin material is quarried each year and some 120,000 tonnes of material is recycled instead of being sent to landfill.

Similarly, the by-product from blast furnaces is ground to produce a cement replacement called "ggbfs".

Furthermore, the gypsum that is a by-product of the de-sulphurisation processes installed at coal-fired power stations as part of the acid-rain reduction programme can be substituted for mined virgin gypsum used in cement making.

Concrete structures are durable with low maintenance requirements. But when a structure is at the end of its life concrete can be crushed and re-used as aggregate. The use of recycled and secondary aggregates for construction has increased by over 50 per cent from 1989 to 2002. Increasingly, buildings that are being demolished are crushed for re-use as aggregate. For some concrete buildings up to 95 per cent of the structure is recycled. This means less use of natural aggregate resources and reduced waste going to landfill.

The other main area where concrete contributes to sustainable development is by helping to reduce the energy used by buildings. Around 90 per cent of the total energy used in buildings is used for heating, cooling and lighting. Utilising the inherent thermal mass of concrete offers the opportunity to reduce the energy requirements of buildings.

The thermal mass of exposed concrete enables it to absorb, store and later radiate heat. In offices where heat is generated by people, computers, lighting and solar gain, the daytime temperatures can be reduced by as much as 5°C. Night time natural ventilation cools the concrete ready for the next day. The use of exposed

concrete and natural ventilation reduces the dependence on air conditioning and can reduce the level of CO<sub>2</sub> emissions by up to 50 per cent. Exposure of the concrete ceiling also means that suspended ceilings systems are not required. Plus concrete's inherent fire resistance means that, unlike other structural materials, it does not require additional expenditure on expensive protective coatings or preservatives.

The fact that materials used for cement and concrete are sourced within the UK provides further environmental credentials. Other construction products raw materials are often shipped in from abroad, as in the case of iron ore for structural steel manufacture. Iron ore is quarried from as far afield as Brazil and then shipped across to the UK. This raises significant questions about the environmental impact of such global

transportation. Concrete manufacture uses locally sourced raw material, provides local communities with employment and provides significant benefits to the UK.

The Concrete Centre is working with the British Cement Association, The Concrete Society, British Precast, Quarry Products Association and British Ready Mixed Concrete Association as well as major industry stakeholders to develop and implement medium-to-long-term strategies to increase and realise the sustainability potential of concrete. A programme of seminars will explain the role that concrete can play in creating a more sustainable built environment. In addition, further research is being carried out into the best environmental options for the recycling of waste and concrete aggregates and into the use of concrete for a sustainable built environment.



*Exposed concrete significantly increases a building's thermal efficiency.*

***The Concrete Centre is the new central market development organisation for the £5 billion UK concrete sector. The Centre works in the interests of all those involved in concrete design and construction. It focuses on design and construction methods, education and training, research, new product and process development and the performance of concrete in practice. It works closely with other well-established cement and concrete bodies in the UK.***

***For more information see: [www.concretecentre.com](http://www.concretecentre.com)***