

Alternative Fuels

Cement kilns have traditionally been fired by coal but alternative fuels offer the joint benefits of improved environmental performance and lower production costs. Castle Cement has been an industry leader in introducing new fuels and is committed to their further development for the future at each of its three major works.

Energy accounts for around one-third of production costs in cement manufacture, so kiln fuels currently offer the greatest scope for cost-saving in the industry. Other costs, like electricity, remain beyond the control of manufacturers and the pattern of plant closures and rationalisation that has characterised the industry since the second world war has already reduced substantially the potential for further reductions in fixed costs.

A major benefit is the recovery of energy from materials that would otherwise be disposed of by landfill or incineration. The promotion of resources up the waste hierarchy in this manner is entirely in accordance with government and European Union policy. The new fuels also improve kiln stability, reduce emissions of 'acid rain' gases such as oxides of nitrogen and provide increased production of cement clinker of optimum quality.

The development of alternative fuels offers the cement industry an opportunity to make a significant contribution to the quest for a sustainable society while, at the same time, remaining competitive in a difficult European cement market.

In the last three decades, the industry has reduced by 40 per cent the amount of fuel required to produce a tonne of cement, principally by investment in more efficient, dry process kilns. However, Castle's consumption of coal is still around 400,000 tonnes a year. The company has therefore explored organic waste streams, together with residues from the solvent recycling industry, spent tyres, waste paper, packaging and plastics, as alternative sources of fuel.

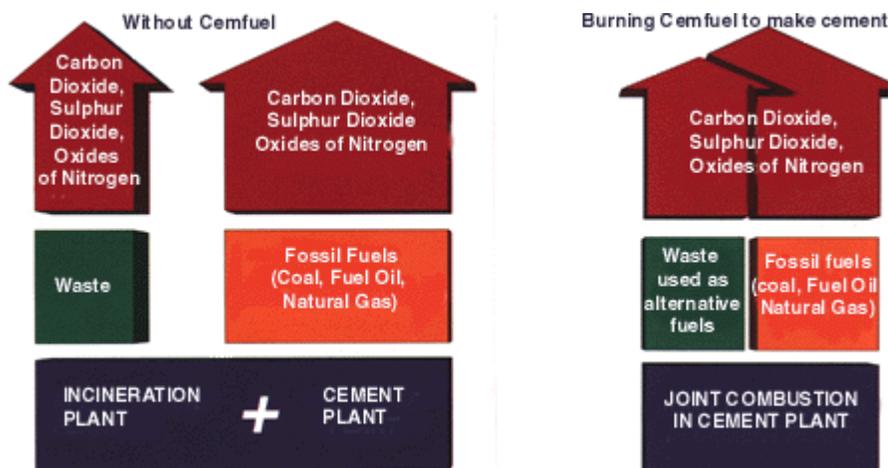
Castle began to consider the potential for liquid waste streams in 1990 and found that they could be a successful partial replacement for coal, with no harm to cement quality and no net adverse environmental impact. In 1992, the company introduced at its Ribblesdale works a new fuel, Cemfuel, which had been designed in consultation with Her Majesty's Inspectorate of Pollution (HMIP), the regulatory body now incorporated within the Environment Agency.

Cemfuel is of a high specification and closely regulated by the Environment Agency. Some of its major constituents are methanol, ethanol and acetone which are essential components of everyday products such as windscreen cleaners, antiseptics, paint thinners and cosmetics.

Cemfuel is injected directly into the kiln flame which burns at 2,000 degrees Celsius and, at these temperatures, is rapidly and completely consumed.

Regular monitoring of emissions demonstrates that burning Cemfuel as a partial replacement to coal significantly reduces emissions of oxides of nitrogen with no appreciable changes in other emissions, such as dust, metals, dioxins, furans and total organic carbon.

How energy recovery by Cemfuel reduces global emissions



Following the success of Cemfuel at Ribblesdale, Castle successfully applied to the Environment Agency for authorisation to introduce it at Ketton at levels of thermal replacement of up to 20 per cent. Trials showed that kiln operation was more stable when Cemfuel was burned.

The UK produces around 35 million spent tyres annually, causing a massive waste disposal problem for society as a whole. Many of these tyres are still disposed of by landfill but a proposed EU directive could bring this to an end by the year 2003. Burning spent tyres as kiln fuel offers environmental and cost benefits to cement manufacture. In 1996 at the Ketton plant, trials began to burn Cemfuel as a replacement for up to 30 per cent of coal on both kilns and tyres to replace a further 25 per cent of fuel in the preheater kiln.

These trials showed that burning tyres produced lower emissions of oxides of nitrogen and that using a fuel combination of 25 per cent tyres and 30 per cent Cemfuel yielded a 10 per cent increase in production of cement clinker of optimum quality. A more stable kiln performance led to lower releases to air. In July 1998 Ketton works received authorisation to burn spent tyres on a permanent basis.

In January 1998 the company applied to increase the use of Cemfuel to 40 per cent at Ketton and to conduct trials of a new processed fuel made from paper that cannot be recycled, industry packaging materials and low-chlorine plastics. Recycling of these materials is not viable but, as they have a high calorific value, energy recovery is possible and they are a particularly useful kiln fuel. Consequently, the fuel offers benefits for both the environment and the company.

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