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# Carbon leakage



By [Rob Goldsmith](#)

**Despite its good intentions, the next phase of EU emissions trading scheme (to be implemented in 2013) could end up doing more harm than good, both to the global environment and to European industries that must comply with the rules, says David Drake, a PhD candidate in Technology and Operations Management at INSEAD.**

Man-made carbon emissions have increased dramatically with the industrialisation of the world's economies. In 2004, approximately 49 billion tons of carbon dioxide-equivalent emissions were pumped into the air. The Kyoto Protocol, ratified by 187 countries, was set up to reduce the emission of greenhouse gases that contribute to global warming.

The mechanism it set up to do this is known as a 'cap-and-trade' policy tool, under which developed countries ratifying the Protocol accepted target reductions relative to their 1990 emission levels. The cap-and-trade system created a market whereby countries could buy and sell emission allowances, so that they could pay to exceed their cap, or profit from reductions beyond those that they agreed to.

To comply with the Kyoto targets, Europe set up the first and largest carbon cap-and-trade system in the world. Known as the European Union Emissions Trading Scheme (EU-ETS), it regulates ten of the EU's most energy-intensive

industries, which generate almost half of the continent's total carbon equivalent emissions.



Despite its good intentions, the next phase of EU-ETS (to be implemented beginning in 2013) could end up doing more harm than good, both to the

global environment and to European industries that must comply with the rules, according to **David Drake**, a PhD candidate in Technology and Operations Management at INSEAD.

“On the one hand, the EU-ETS incentivises industries to reduce their emissions but, on the other hand, it opens up issues that can be very difficult and costly for firms to manage,” Drake says. “Within some industries, such as cement, this could lead to carbon leakage.”

Carbon leakage happens when production moves from within a carbon-regulated region, such as Europe, to an unregulated region, such as North Africa or Asia. This could mean closed plants and lost jobs in the regulated region and an increase in emissions in the unregulated region. In Europe’s case, carbon leakage could occur because of the high costs of complying with EU-ETS.

In his dissertation research, Drake explores the impact of EU-ETS on firms’ supply chain decisions, paying particular attention to technology choice with respect to capacity investments.

## **Implications for the cement industry**

He focuses on the impact these rules might have on the cement industry in a case study motivating his dissertation called HeidelbergCement: Technology Choice under Carbon Regulation, which he wrote under the supervision of Paul Kleindorfer, the Paul Debrule Chaired Professor of Sustainable Development, and Luk Van Wassenhove, the Henry Ford Chaired Professor of Manufacturing and the Academic Director of the INSEAD Social Innovation Centre.

According to Drake, under the next phase of EU-ETS, the European cement industry could face compliance costs mounting to €4.8 billion annually by 2013. This would increase firms’ operating costs by more than 30 per cent.

Cement is not the most polluting industry in Europe. That distinction belongs to power generation, which accounts for about 70 per cent of the continent’s total EU-ETS regulated emissions. However, cement is a distant second with about nine per cent of the total.

A central issue for the cement industry is the technological problem of how to reduce emissions. Complying with the new phase of EU-ETS means the

industry must make significant changes to the core process of making cement, a process that, at its essence, has changed little since the time of the Roman Empire.

This process involves superheating limestone in immense kilns to transform it into a material called clinker, the main ingredient in cement. Conventionally, fossil fuels (e.g., coal, and oil) are burned to heat the kilns. Together, this limestone transformation, called calcination, and the fossil fuels, burned to enable it, account for about 90 per cent of the industry's CO2 emissions.

To reduce emissions, HeidelbergCement has started using alternative fuels to heat their kilns, such as waste from animal remains and sewage sludge. These alternative fuels are carbon neutral because the emissions released by their burning are offset by the emissions that would have been generated by their disposal. However, as these alternatives become more widely used as fuel substitutes, their limited supply has led to increasing prices.

So the industry is also looking at clinker substitutes, such as blast furnace slag and fly ash, to mix with clinker. This would reduce the production of clinker, which in turn reduces calcination and fossil fuel use. However, market absorption of these lower clinker cements can be slow.

Putting aside the technological issue, the cement industry could pass on the costs of compliance to their customers with little impact on demand -- if there were no competition from regions outside Europe that don't have to comply with EU-ETS. But that's not the case.

So far, the competitive threat posed by offshore production has been limited by the high cost of transporting a heavy material such as cement into the EU. But that could change once the costs of carbon compliance are factored in.

"When you have the EU region exposed to carbon costs, even modest carbon allowance prices could give offshore producers a cost advantage despite the transport fees and that would lead to carbon leakage," Drake says.

If this happens, cement production will move from within the regulated EU region to unregulated regions outside the EU, where producers can continue to use high carbon fuels in the core process. In addition, emissions would increase due to the fuel consumed in transporting the cement to Europe.

The EU Commission could implement a ‘border adjustment mechanism’, which would act as a tax on imports that would have faced regulation had they been produced in Europe. This measure would have to be approved unanimously by EU member states before it could be adopted, but some member states are adamantly opposed to any measure resembling a tariff.

So for cement manufacturers like HeidelbergCement and other European companies, the future is not clear.

“This uncertainty makes it hard for the cement industry to decide what investments to make to lower emissions,” Drake says. “Investments that would be profitable for them under one scenario would prove unprofitable for them under another.”

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