

The global importance of reducing carbon emissions from port operations

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Introduction

Although producing far less emissions per tonne transported than aviation and road freight, the shipping industry still creates around a billion tonnes of carbon emissions per year, a similar output to that of Germany, and more than the UK.

With this in mind, a wide ranging Engineering and Physical Sciences Research Council and industry-funded project, entitled *Low Carbon Shipping – A Systems Approach*, is aiming to find ways of reducing the industry's carbon footprint.

Thanks to the increase in world trade, movement is set to increase and with it a rise in the industry's carbon emissions. In 2007, international shipping accounted for 870 million tonnes of carbon or 2.7% of global emissions, whereas international aviation accounted for 1.9% (IMO report, 2009). It is clear that measures need to be put into place to ensure that shipping pollution does not continue on an upward trajectory.

Ownership of the world's key ports is limited to a small number of companies and over 50% of global container throughput is controlled by around seven major companies. Therefore, port companies could act as effective and influential drivers of change in reducing greenhouse gas emissions in the industry's hugely complex supply chains.

The research

Our research concentrates on UK-centric freight flows, that is, freight that originates in, or is destined for, the UK. As a starting point, we have been mapping shipping activity within and around the UK (in its ports and trading routes) and endeavouring to calculate the share of emissions this shipping activity represents in the context of global international maritime emissions.

It is easy to ascertain the total volume of UK maritime freight at UK ports, and relate this to a global share, but it is more difficult to ascertain the UK's share of global maritime traffic (and carbon emissions). Moreover, this may not be particularly accurate as it doesn't take into consideration the different types of vessels involved and their associated carbon emissions. Our ongoing analysis of UK shipping activity, using various publicly available data, aims to address this issue.

The findings do reveal that carbon emissions from ports and port-related activity are small compared with emissions from ships and the haulage companies that serve ports. Our project looks at the interface between new ship technologies and the ports, maps out the environmental actions taking place in 72 UK port locations and compares them with initiatives

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at overseas ports in order to understand which are likely to be most appropriate for adoption in the UK.

According to the study's preliminary results, in 2008 the added emissions from five major UK ports groups represented only a small fraction of those generated by the ships calling at these same ports: 174,000 tonnes from ports operations and approximately 10 million tonnes from international shipping.

It is clear that given the right incentives and initiatives ports could have a major role bringing about major changes to reduce greenhouse gas emissions from shipping. Ports are already doing many things that are good, such as improving the energy efficiency of their handling operations and developing renewable energy sources, but there is scope to reduce carbon emissions in the maritime industry by between 25% and 75%, using a range of technical and operational measures.

Organising the tools

A number of tools exist to enable port operators to attempt to redress the balance and it is our role to assess the technologies to understand which will be most applicable to the UK ports system.

For example, one tool is that of Virtual Arrival, which aims to significantly reduce the amount of fuel consumption on a journey by making sure that the ship only arrives when the port is ready for it. By managing the arrivals through communication en route, ships are able to decrease their speed approaching port based on their date of arrival, planning for any known delays dockside. The positive effects of this are that waiting times are cut, health and safety issues around congestion in ports are addressed and, most importantly for our study, emissions are decreased.

In fact, trials undertaken by the Oil Companies International Marine Forum (OCIMF) and Intertanko have shown that it is possible to reduce a vessel's fuel consumption and consequent CO₂ emissions by up to 22%.

Slow steaming will assist shipping companies to save fuel, which in turn can lead to increased competitiveness in the market – BP, for example, is leading tests in this area.

Another possibility, already in operation in six European ports, is the use of 'green passports' that offer reduced port fees for vessels meeting specified environmental requirements for emissions of carbon dioxide and other pollutants – a specific example of ports enacting a major positive change for the environment.

The passport is given based on the ship's World Ports Climate Initiative's (WPCI) Environmental Ship Index (ESI) rating, which scores environmental performance on a scale from 1-100. Non-clean ships incur higher port charges; discounts are given for clean ships; and inspections may be made to certify qualifying ships.

Port authorities from Le Havre, Bremen, Hamburg, Antwerp, Rotterdam and Amsterdam launched the ESI in November 2010 and have reduced rates for vessels that score well on the scale. Implementation has been steady and although it has not yet been adopted globally, by producing a workable framework through the six initial ports it is hoped that other ports will follow suit over the next year. Given that major channel ports are already using or testing the scheme, issues regarding loss of competitive advantage for UK ports should be limited.

ABOUT THE AUTHORS



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Another way for ports to make an impact is to provide shore-side electricity for vessels while they are in port, where there appears to be considerable interest. A survey by WCPI of 53 ports worldwide indicated that 32% currently provide shore-side electricity and 85% are considering introducing or expanding shore-side power facilities in the next five to ten years.

This process, known as 'cold ironing', is far more energy efficient than generating power on board ships for heat, lighting and other operations. It is estimated that the greater efficiency and emissions abatement technologies of generation plants compared to onboard generators can reduce CO₂ emissions by more than 30%, and those of nitrogen oxides and particulates, by more than 95%, while eliminating noise pollution entirely (ENEL press release, 2010).

This technology has been adopted in ports across the globe from Gothenburg to Port of Los Angeles, Lübeck to Vancouver, with many other ports having projects in the pipeline – Venice and La Spezia recently announced plans to become 'green ports' with cold ironing as their main objective.

With a high proportion of Ro-Ro traffic to the UK, shore-side electricity seems to make more environmental sense. With longer times spent in port on some Ro-Ro routes, and many of these ports situated in urban areas, essentially plugging the ship into the mains is a far better prospect for local pollution levels. With a new surge toward renewable energy, the environmental benefits could be even greater. However, there is still a need for UK ports to assess the average berth times of vessels as on-shore power supplies are only effective for ships with long calls.

Carbon impact

It is difficult to calculate the carbon impact of supply chains in a globalised economy. Ports have long been ignored in this context so the study focuses on this area in detail. But where they work collectively, there is the capacity to not only reduce emissions from their own activities but also encourage shipping companies and other elements in the supply chain to do the same.

Initiatives such as the World Ports Climate Initiative have shown that ports can be very proactive in this area and there is a good track record of shipping companies working in partnership with the port operators to improve environmental standards, given the right incentives. However, for agreements to be effective, they would have to be adopted at a Europe-wide level.

The UK, such as any country should act carefully on taking unilateral decisions, since the ports' industry is a very competitive market. For example, an environmental levy through UK ports could divert the traffic to continental ports, increase feeder traffic from these ports to the UK and the final leg would be done by road. This scenario would be much worse in terms of carbon emissions. So, as always, there is a balance to be struck.

As work is ongoing it is not yet possible to make definitive conclusions from our analysis. Notwithstanding, from research to date, it is apparent that there is much interest in, and potential around, how ports can contribute to reducing the total shipping related envelope of CO₂ emissions.



Professor David Gibbs is professor of human geography at the University of Hull. Over his career, Professor Gibbs has been involved with a number of research projects addressing the key issue of sustainable development and its incorporation into local and regional policy.

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