



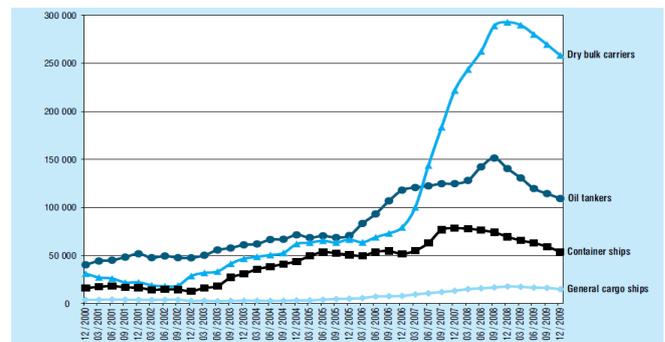
# Virtual Arrival as a Tool to Reduce Carbon Emissions from International Shipping

## Policy summary

International shipping of goods is an increasing source of carbon emissions, especially as production of goods for the developed nations is being off-shored to developing nations such as China. Some of these emissions are related to the problem of ships arriving at port before docking and unloading facilities are available, resulting in unnecessary costs, energy consumption and carbon emissions. This study demonstrates the potential of one technological solution—the Virtual Arrival system—to reduce this problem.

## Background

Carbon emissions from the international shipping of goods is increasing, and will become a significant fraction of the world's carbon footprint once energy sectors of the economy have become decarbonised. At present, many of these goods are sent by ship from exporting to importing nations. Virtual Arrival (VA) is an operational emissions management measure that seeks to reduce a vessel's speed to meet a revised arrival time when there is a known delay at the discharge port. The reduction in speed and the reduction in time spent waiting at a congested port reduces fuel consumption and generates financial savings for vessel operators and charterers, whilst also reducing greenhouse gas emissions.



Growth of world-wide shipping of materials and goods.

## The Study

The investigation was designed to address two problems:

- The uncertainty over whether VA can feasibly reduce fuel use and hence improve the environmental impact of the global shipping industry.
- If VA can feasibly reduce fuel use, why is it not being implemented into the industry?

In order to address these two separate problems, the investigation was composed of two sections.

- A feasibility study of the fuel and emissions reductions that VA can achieve, thereby assessing the role the scheme could play as part of a wider sustainability agenda in the shipping industry.
- An analysis of the potential reasons for the currently slow pace of implementation of VA followed by identification of methods to overcome these challenges.

The results of the study are used to prescribe a strategy for the implementation of VA on a global scale.

The Briefing Papers series by 4CMR provides policy makers, organisations, communities and citizens with advanced research on the roles of economic, energy and environmental strategies for reducing the risk of climate change.

The series is made possible through a generous award from the Three Guineas Trust supporting both the research described and public outreach and engagement.

## The Results

The study produced a number of conclusions that are applicable not just to the shipping industry, but to other industries and sustainability challenges. From the screening analysis VA was shown to be a feasible measure to form at least part of the shipping industry's response to its increasing fuel use and carbon emissions. Operational savings have the potential to achieve both fuel and emissions savings, and can therefore deliver financial and environmental benefits.

However, the analysis also showed that the pace of implementation of VA is slow due to the need to overcome established practices and a number of barriers. These barriers include uncertainty over the benefits that can be achieved, problems with the nature of shipping contracts and the need for regulation of Weather Analysis Service Providers (WASPs) that play a crucial role in determining the effect of weather on a ship's travel speed.

The study identified strategies for the implementation of VA based on a survey of industry attitudes.

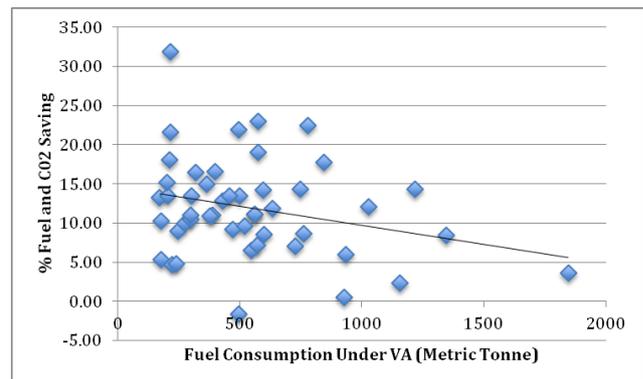
In the short-term, implementation should be prioritized where it will have most impact and be easiest to achieve. As a result of quantitative analysis carried out, longer journeys were identified as producing greater fuel and emissions savings, and hence the largest financial incentive. Therefore in the short-term, implementation of VA should be prioritised for longer journeys so as to build confidence that it returns significant cost savings.

In the longer-term implementing VA into the industry on a wider scale requires reducing uncertainty and changing the way shipping charters operate. The investigation found that introducing a standard for WASPs is viable to achieve and will reduce uncertainty and risk in the implementation and of Virtual Arrival.

In addition the development of a market-based measure for emissions from shipping (e.g. a global carbon tax) will increase the incentive for implementation of VA. While the shipping industry has shown a receptiveness to the introduction of a market-based measure, its development should be undertaken in a manner that balances the opportunities for emission abatement efficiency against the challenges faced by creating a market for a truly global industry.

## Conclusion

This study demonstrates the potential, and the means to achieve that potential, of operational and logistical changes that reduce inefficiencies in the shipping industry. Taking advantage of these opportunities, including introduction of VA, can achieve substantial improvements in the way the industry operates, and significant financial and emissions savings.



Estimates of the impact of VA on carbon emissions.

The Cambridge Centre for Climate Change Mitigation Research (4CMR) studies the inter-connected economic, energy and environmental policies at the heart of climate change policy.

This Briefing Paper was developed from research by Will Woods of the Sustainability and Global Decarbonisation Research Group of 4CMR.



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