

Speed Limits for Ships

At the first meeting of the ECCP ship working group attendees were asked to provide ideas for a possible EU measure to tackle GHG emissions from ships in the event that the global IMO process addressing this issue did not reach agreement by the end of 2011. The idea of speed limits for ships is something that Seas At Risk has been interested in for some time and we offered this idea to the meeting as one possibility. This paper is an elaboration of that idea and meant as a stimulus to further discussion on the issue. The contents are based on the preliminary findings of a study commissioned jointly by Seas At Risk and T&E and undertaken by CE Delft. The report of the study will be published later in the year.

Context

If we are to stand a good chance of keeping global warming below dangerous levels then GHG emissions have to peak in the next few years and decline dramatically between now and 2050. It is a very demanding schedule that calls for all sectors to exploit every possibility to make deep cuts fast. Progress in putting in place the measures that will deliver these cuts has been slow in all areas, but none slower than in shipping where at present there are no legally binding measures and nothing on the negotiating table that will deliver the necessary reductions in emissions. Talks have either focussed on market-based measures, which will likely only deliver reductions outside the sector, or efficiency standards (EEDI) for new ships which will have only a modest effect in the longer term.

Why speed limits for ships

If shipping is to play its full part in tackling climate change then it needs to make deep cuts fast and arguably regulated slow steaming is the only way this can be achieved. The IMO GHG Study (2009) indicates that cuts of 25-75% per ship are possible with currently available technologies, but concludes that the top end of this range is only possible by reducing speed. Other studies show the potential of slow steaming. Corbett *et al* (2009) found that emissions reductions across a range of container ships could be up to 70% if ship speed was halved, and a recent study for Seas At Risk (CE Delft, 2009) concluded that if tankers, bulkers and container ships slowed down just to the extent necessary to bring surplus capacity back into the fleet emissions could be cut by c. 30%.

Speed limits exist for all sorts of land transport and have resulted in substantial reductions in fuel consumption and emissions. Mandatory speed limiters on European trucks resulted in an immediate 3-11% reduction in emissions per annum. In the US the 55 mph vehicle speed limit is estimated to save 175,000-275,000 barrels of oil per day. And the approximate cubic relationship between speed and ship power (and thus fuel consumption) means that speed reductions in shipping would have a far greater proportional effect on emissions than with vehicles on land.

Slower ship speeds in proximity to land would also have significant environmental and human health benefits as NO_x, SO_x, PM, PAH and black carbon emissions are also reduced. Slower ships are also likely to be less prone to collision with each other and with marine mammals, and when collisions do occur they are likely to be less serious.

High fuel prices and a global recession has led a few shipping firms, including Maersk and NYK, to run their ships at reduced speed. While this has helpfully illustrated the feasibility of even super-slow steaming (Maersk reduced the speed of some of its container fleet to 12 knots from a design speed of 25 knots) and reduced emissions, there is nothing to stop these vessels speeding up again when the market and economic circumstances make it attractive to do so. Voluntary slow steaming is helpful but it is not an alternative to regulations that would guarantee deep emission cuts into the future.

Possible options

By far the most obvious, logical and effective approach for setting mandatory speed limit(s) would be globally via the IMO. This would capture the greatest quantity of ship GHG emissions and ensure that all shipping was treated equally regardless of where it traded in the world. The Seas At Risk/T&E study currently underway will address this global approach, but here I will focus just on regional EU options which would have to be enacted via an EU legal instrument.

Option 1: Speed limits for all ships in EU territorial waters as a condition of entry to EU ports

Since the GHG emissions in EU territorial waters are a small share of total emissions, the climate benefits of this option would be limited, although there would be substantial benefits in terms of air pollution. International law clearly allows this option.

Option 2: Speed limits for all ships sailing between EU ports as a condition of entry to EU ports

Since a little over half of the emissions on voyages to EU ports are from intra-EU voyages (i.e., from one port in the EU directly to a second port in the EU), there could be a significant benefit in terms of CO₂ emissions and air pollution. Provided that the voyage does not involve travelling through the territorial waters of a non-EU state, international law clearly allows this option.

Option 3: Speed limits for all ships sailing to EU ports as a condition of entry to EU ports

This option would have by-far the greatest benefit in terms of CO₂ emissions (and air pollution), but by applying the limit(s) to foreign flagged vessels sailing on the high seas the situation in respect of international law is less clear. This issue is addressed further below.

Option 4: Speed limits in EU harbours

Many EU harbours are situated in close proximity to large cities or population centres and the related ship emissions are a growing source of local air pollution. In considering the possible benefits of wider ship speed limits the immediate benefits of extending such limits around and in harbour areas should be an essential element. Harbour speed limits should apply to all harbours in specific geographic areas or across the EU to avoid competition issues.

The application of a speed limit to EU flagged vessels only is not an option because of the problem of vessels being able to reflag to non-EU countries.

Issues surrounding speed limits

Jurisdiction

As is clear from these options a key aspect in the feasibility of mandatory speed limits for ships is the ability to enforce them via port State control, and more specifically the denial of entry to a port if a ship has broken a speed limit. Customary international law gives coastal States sovereignty over their ports and internal waters and, except where human life is at stake, allows them to deny entry to a foreign ship, or logically set any condition they like for entry of foreign ships. Setting a speed limit as a condition for port entry on a foreign flagged vessel sailing on the high seas may, however, lead to objections on the grounds that it interferes with freedom of navigation, although one can argue that there is a distinction between “freedom of route” and freedom of speed”. Neither UNCLOS nor other international treaties provide a clear answer to this question, although there are unchallenged legal precedents for port entry requirements of this kind. Our study will look further into this issue examining case law and the precedents that exist.

What do we mean by “speed limit”?

The simplest system would be a single speed limit for all ships, but it might also be possible to have different speeds for different types and sizes of ship. At present there are considerable differences in the speed that various vessel types travel at and this could be reflected in the differentiated limits chosen.

A choice also has to be made between a maximum speed limit that ships must never exceed and an “average speed” speed limit calculated on the basis of the time taken to travel a given distance, say from port of departure to port of arrival. If the former is chosen then a decision has to be made to measure either “speed over the ground” or “speed through the water”. These options are discussed further below.

Need for more ships

If speeds are reduced then the operational fleet has to expand if the same volume of goods is to be transported in the same period of time. If there is overcapacity in the fleet then ships would be brought back into operational service. If the current fleet is fully operational then new ships would have to be built to provide the extra capacity. In this case it would likely be necessary to phase-in speed limits to ensure that sufficient extra fleet capacity could be constructed in time. Concern has been expressed over the extra cost of building and operating the additional ships. This issue will be looked at by the study but initial findings suggest that the extent to which the fuel cost savings compensate for the extra cost varies by ship type and of course fuel price. Similarly, the point has been made that additional CO₂ will be emitted when the new ships are built. This of course has to be taken into account but again initial findings suggest that the CO₂ savings associated with slow steaming are large enough to pay off the CO₂ new building debt in a small fraction of the average ship’s life-span. The extra new building would of course be a substantial economic benefit to the countries that construct ships and provide ship equipment.

Concerns have also been raised about finding sufficient crew for the additional ships. Perhaps this too could be mitigated to a significant extent if speed limits were phased in.

Modal shift

The purpose of mandatory speed limits for ships would be to reduce GHG emissions, so any system must be designed to ensure that cargoes do not shift to other less climate-friendly modes. For certain goods on certain routes shipped by sea this is not a problem as there are no other viable means of transporting them. One potential problem area is short-sea shipping. If modal shift was a problem then certain routes could be exempt, although this might prove complicated. If an average speed limit approach was taken then short-sea shipping could be handled by including a “grace period” at the end of the voyage. This would allow significant deviations from the speed limit for short journeys but make little difference to the ships on longer passages. This would also allow ro-ro and passenger ship services to fit service speeds to the vessel capacity and number of sailings demanded in a particular situation.

Another modal shift issue relates to time-sensitive cargoes on long sea routes. Since most cargoes are not in a hurry one answer might be to licence ships to travel at speeds in excess of the speed limit. This would create a dedicated fast service for goods that need it and give customers another choice when shipping freight. The license would have to be purchased so the cost of shipping goods on faster ships would be higher. Care would have to be taken to ensure that it remains competitive compared with airfreight. This approach would also create a revenue stream that could be used for climate change mitigation.

Safety

Speed limits would have to be set at a level that allowed the safe operation of all vessels. The occasional need to travel faster than the speed limit, e.g., to avoid pirates or deal with very heavy weather, could be accommodated by adopting an average speed limit approach. With this any necessary time spent travelling faster than the limit could be compensated for later by steaming below the limit.

Technical constraints

The study will investigate the significance of these in detail, but at this stage it is worth observing that the greater the speed reduction the more extensive the necessary modifications are likely to be to ensure that the ship’s engine operates efficiently and safely. Substantial speed reductions will require ship operators to de-rate their engines or install “slow steaming upgrade kits”. In the longer term the industry would respond to slower mandatory speeds by redesigning their ships. The situation might be complicated somewhat if the speed limits are not globally applicable in that vessels trading on both speed limit routes and non-speed limit routes might have to make regular changes to their engines. The significance of this will depend on the scale of the mandated speed reduction.

Monitoring compliance

Compliance with any mandatory speed limit would have to be ensured by monitoring the speed at which vessels sail. How this is done will depend on the definition of speed. While speed through the water makes most sense from an environmental point of view it would require a more complicated and likely on-board monitoring system. Speed over the ground on the other hand can more easily be monitored remotely and via existing technologies, e.g., LRIP, S-AIS and AIS. There are advantages and limitations to each of these technologies. With Long Range Identification Tracking (LRIT) coverage is global but speed is not reported directly, and at present data is not openly available or centrally gathered. With the Automatic Identification System (AIS) speed over the ground is reported directly and broadcast openly but the range is limited (c. 40nm from the coast). The Satellite-based Automatic Identification System (S-AIS) seems best suited to the task but will only provide worldwide coverage in the medium term. Monitoring would be simplified if an average speed approach was taken. Then, instead of continuous monitoring, a ship's speed is calculated on the basis of the time it has taken it to travel from one port to another. In this case all that the monitoring system would need to know is when the ship departs and arrives and the distance between the two ports.

Inventory costs

There are differing opinions as to whether slower ships would increase or decrease inventory costs. Conventional logic suggests it increases inventory costs with cargo having to be insured and financed for longer, but others argue that ships acting as “warehouses of the sea” might reduce costs. The study will look in more detail at these issues.

Logistics chain

Certainly this will have to adjust to slower speeds but it has done so already with voluntary slow steaming. The study will look at this in more detail.

Summary

Reducing vessel speed is an effective way of achieving deep cuts in ship emissions quickly. Voluntary slow and super slow steaming has demonstrated the technical and logistical feasibility of the approach. The introduction of speed limits would be a way of securing these GHG emission gains in the long term; without them speeds will likely increase and emissions grow in a way contrary to what is now intended and required.

While a speed limit set globally would capture the greatest emissions, a number of options exist for speed limits at EU level. These have varying degrees of effectiveness with some legal questions attached to the most effective option.

A number of concerns have been raised about the possible negative effects of mandatory speed limits. While some of these warrant further study, initial indications suggest that they can be mitigated by careful design of any scheme.