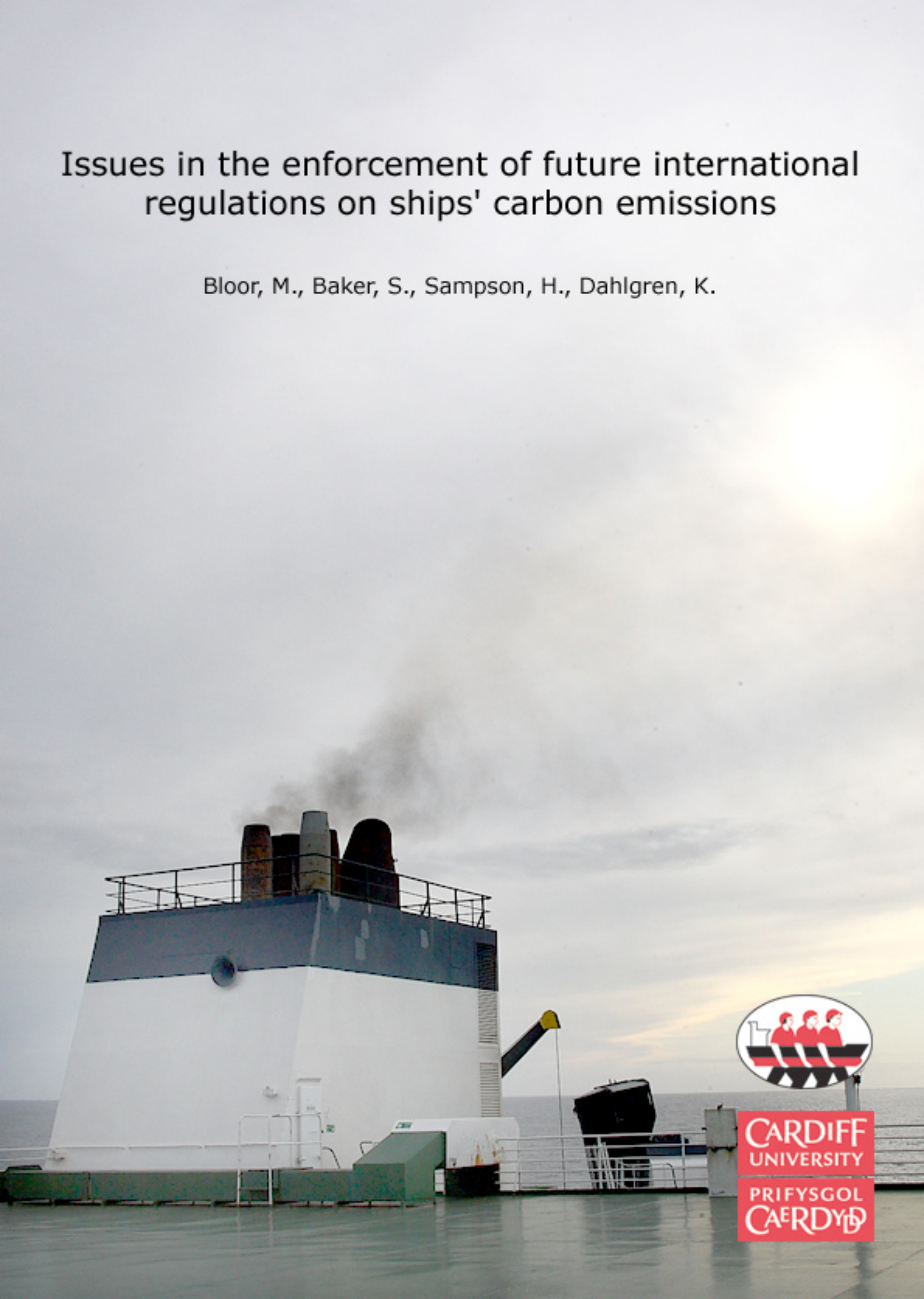
Issues in the enforcement of future international regulations on ships' carbon emissions

Bloor, M., Baker, S., Sampson, H., Dahlgren, K.



Issues in the enforcement of future international regulations on ships' carbon emissions

Michael Bloor, Seafarers International Research Centre, Cardiff University
Susan Baker, Cardiff School of Social Sciences, Cardiff University
Helen Sampson, Seafarers International Research Centre, Cardiff University
Katrin Dahlgren, U&W, Stockholm

Seafarers International Research Centre (SIRC)
Cardiff University
52 Park Place
Cardiff
CF10 3AT
Tel: +44 (0)29 2087 4620
Fax: +44 (0)29 2087 4619
sirc@cardiff.ac.uk
www.sirc.cf.ac.uk

ISBN: 1-900174-45-6

February 2013

Introduction

1. This project is funded by the UK's Economic & Social Research Council (grant reference: RES-062-23-2644) and has the support of the UK's Maritime & Coastguard Agency. We also gratefully acknowledge the help of the Swedish Sjofartsverket (Swedish Maritime Administration) and the Swedish Transportstyreisen (Swedish Transport Agency). The project began 1/9/2010 and finishes 31/12/2012.

2. The project has the dual aims of, firstly, identifying issues in the enforcement of current international regulations (both those of the IMO and those of the EU) concerning ships' sulphur and particulate emissions, and secondly, seeking to identify possible future enforcement issues relating to future IMO and/or EU regulations on ships' carbon emissions. A final report on the first of these aims has already been made available on the Seafarers International Research Centre website. This report is concerned solely with the enforcement of possible future regulations on carbon emissions, and in particular with possible market-based measures such as emissions trading schemes and fuel levies. Note that this focus on enforcement issues means that the report does not examine the wider issue of the relative effectiveness of different measures in reducing ships' carbon emissions, except insofar as the effectiveness of enforcement itself influences 'carbon leakage'. Thus, to be clear, a regional fuel levy may be easier to enforce than a regional emissions trading scheme, but whether or not the levy would be more effective in reducing EU carbon emissions might depend crucially on the level at which the levy is set – this report is silent on those wider issues of effectiveness.

3. The project draws on observation of 16 ship inspections in selected UK and Swedish ports, involving visits to seven different port-State control offices in the UK and Sweden, and 50 interviews with inspectors, regulators, shipping industry stakeholders and interested NGOs.

Current Regulations

1. In July 2011 IMO adopted new regulations to restrict ships' carbon emissions. In respect of new builds, IMO has set out a minimum Energy Efficiency Design Index (EEDI) for all new oil and gas tankers, bulk carriers, general cargo vessels, refrigerated cargo vessels and container ships delivered after July 1st 2013 (EEDIs for other types of vessels are expected to be added later), which will require all new-builds to take into account technical improvements in engine design and propulsion systems, improved hull designs, recycling of waste heat, etc. In respect of all current vessels over 400 gross tonnes, IMO has required all vessels to carry and implement a Ship Energy Efficiency Management Plan (SEEMP) incorporating such measures as speed optimisation and weather routeing. Both sets of regulations come into force on January 1st 2013. Neither of these two sets of new regulations are expected to produce major enforcement challenges. Thus, a vessel's SEEMP would be evaluated and certified by class, with port-State control (PSC) simply checking that the class certificate was on board and up-to-date.

2. A technical study by IMO estimates that the EEDI and SEEMP together could, in the longer term, cut the emissions rate by 25% to 75% below the current level, depending on different modelling asumptions[1]. But these measures are considered less than adequate by themselves because of the anticipated future growth of world trade beyond the current level: '... the technical and operational measures will not be sufficient to satisfactorily reduce the amount of GHG emissions from international shipping in view of the growth projections

of human population and world trade. Therefore, market-based mechanisms have also been considered...'[2]. This report is concerned with the potential difficulties in enforcement of future market-based measures.

Multiplicity of Market-Based Measures

1. A major complication in considering the enforcement issues associated with market-based measures to reduce ships' carbon emissions lies in the large number of different measures proposed. Thus, 'the Report of the Expert Group on Feasibility Study and Impact Assessment of Possible Market-Based Measures,' made to the 61st Session of IMO's Marine Environment Protection Committee[3], considered 10 different schemes proposed at the 60th Session. One of these proposals (from the Bahamas Maritime Administration) was essentially an argument against market-based measures, stating that rising oil prices would provide an incentive for further operational and technical innovations to reduce carbon emissions and mandatory emission reduction targets should simply be applied to every vessel (leaving it up to the individual ship operator to decide how to achieve the vessel's target). Another proposal (from the International Union for the Conservation of Nature) dealt solely with how to provide developing countries with compensatory rebates on the costs of market-based measures. The remaining eight proposals concerned: (a) variants on an emissions trading scheme (proposals from Norway, the UK and France); (b) variants on a fuel levy (from Jamaica and a joint proposal from Cyprus, Denmark, the Marshall Islands, Nigeria and the International Parcel Tankers Association); and (c) variants on incentive schemes for accelerated technical and operational innovations to cut carbon (proposals from Japan, the US and the World Shipping Council). Each different market-based measure could, in principle, be enforced in different ways.

2. A number of other schemes have been suggested which fall quite outside the ambit of the IMO, for example, the proposal from Cambridge University's Tyndall Centre for a Global Emissions Trading Scheme (GETS) for transport, administered by a new World Carbon Authority[4].

3. The European Union has a pre-existing emissions trading scheme that now includes the aviation industry. Frustration at what has been seen to be lack of progress at IMO in securing carbon reductions has led to repeated statements from the Commission of the European Communities (the Commission) that Europe may set up its own regional scheme to reduce ships' carbon emissions. In 2011, prior to a public consultation on reductions in ships' carbon emissions, DG Clima set out 4 main policy options, all of which include alternative variants[5]. These are:

   (a) A mandatory fuel levy/compensation fund which would apply to all vessels visiting EU ports, based on the Cyprus-Denmark-Marshall-Islands-Nigeria-IPTA scheme above, where the amount of the levy could be determined by the carbon content of the fuel and which would fund maritime sector technical and operational projects to cut emissions. A variant on this (based on what is seen as a successful Norwegian programme to reduce local NOx emissions) would be an industry-managed compensation fund with penalties, whereby the maritime sector would be encouraged to implement their own compensation fund, but where Member States would set penalties for non-members which were higher than the subscription fee for the fund. The industry fund would support technical and operational improvements.

(b) An emissions trading scheme, which could involve the incorporation of shipping into the existing EU scheme, or could be a stand-alone maritime ETS. Emissions would be capped based on historical data and 'a monitoring/reporting of vessel emissions [would be] required'[5]. The scheme would draw on the above ETS proposals to IMO. Inclusion in the scheme could be phased according to vessel size, type or routes. Such a scheme could be a prototype for a future global IMO scheme, or for other future regional schemes covering the major world ports.

(c) A tax on fuel supplied by EU bunkerers. A more complex variant would be a tax on a vessel's GHG emissions levied on all vessels visiting EU ports.

(d) Mandatory ship-level emission reductions applied to each vessel visiting EU ports, based on vessel characteristics such as age and ship-type, as in the Bahamas IMO proposal. A variant would provide incentives for ships that exceed their reduction targets in the shape of credits that could be traded on carbon markets.

4. However, in an interview with Lloyds List in October 2012[6], the European Transport Commissioner indicated a change of policy, in that, rather than immediately develop separate regional EU ships' carbon controls in lieu of an IMO regime of market-based measures, the Commission would now seek to set up a 'monitoring, reporting and verification' system (MRV) for ship operators which would provide baseline data on carbon emissions that could be used to form the basis for future IMO market-based measures to control ships' carbon emissions. The above (item 3.) DG Clima policy options were not abandoned, but were described by Commissioner Kallas as 'conceptual discussions'.

5. We consider that dealing with the enforcement issues entailed in each one of these separate IMO and EU schemes is beyond the scope of this report, partly because the resulting report would be too long, and partly because some of the schemes are unlikely to be implemented (for example, a tax on EU bunkerers would lead to a partial shift towards non-EU ports for bunkering, possible regulatory avoidance through the use of off-shore bunker barges operated from outside the EU, and a substantial decline in bunker business for EU bunkering ports such as Rotterdam[7]), but mainly because many of the schemes provide little or no detail on enforcement mechanisms. Accordingly, this report is organised so as to attempt to identify *possible* enforcement issues, firstly in respect of generic emissions trading schemes for shipping, and secondly in respect of generic maritime fuel levy schemes, with separate consideration (where appropriate) being given to global and regional (EU) variants of both generic schemes. Inevitably however, this will involve a degree of speculation about the enforcement practices likely to be associated with such schemes. A further section of the report discusses some of the issues associated with a future EU system for MRV, as suggested by Commissioner Kallas.

Enforcement of Emissions Trading Schemes

1. *Generic ETS Enforcement Problems*. While this report is primarily concerned with enforcement issues which are particular to the shipping industry, it should not be forgotten that there are a number of enforcement and monitoring issues that have been reported as general problems with ETS and could therefore also apply in the present case of shipping. These are:

(a) *Bogus 'offsetting' projects*. Instead of, or in addition to, cutting emissions themselves companies can choose to invest in emissions-savings projects elsewhere in return for

emissions reduction credits (known as CERs) to off-set the company's own emissions. Investments in developing countries can occur under the Kyoto Protocol's Clean Development Mechanism (CDM) and investments in other developed countries (usually the transitional economies of Eastern Europe) can occur via Kyoto's Joint Implementation Projects. Substantial bottlenecks have occurred in approving these schemes: a 2010 World Bank Report stated that it took an average of 572 days for a CDM project to go through validation and registration and a further 607 days until first issuance (i.e. over 3 years in total)[8]. Despite extensive verification processes, there have been numerous reports of off-setting projects of dubious environmental value and others of simple fraud[9]. Ship operators who find that they have to purchase additional carbon credits (a likely feature of a regional EU ETS where some vessels are only occasional visitors to EU ports) may only be interested in securing those credits as cheaply as possible, and there will always be brokers prepared to offer cheap credits tied to fraudulent or environmentally dubious CDMs or JIPs. The environmental campaigner, George Monbiot, has called the CDM 'an exuberant global market in fake emissions cuts'[10]. There is also the difficulty that off-setting CDM projects involving afforestation can only be a temporary expedient, given future food needs of an expanding world population. Nevertheless, expenditure on CDM projects may be crucial to convincing developing countries that a global shipping ETS is compatible with the principle of 'common but differentiated responsibilities' in combating climate change.

(b) *Distortions in carbon markets*. The world's largest carbon market, the EU ETS, has a past history of periodic price distortions. It is possible that speculative flows in and out of the market could cause distortions, but it is believed that most previous price fluctuations have been due to large-scale VAT/sales-tax frauds, taking advantage of the lack of harmonised tax regimes across the EU[11]. A single international registry, instead of different national registries for each flag-State, might be necessary to avoid such tax frauds. The report of the expert group on market-based measures to IMO's Marine Environment Protection Committee considered that, at the auctioning of allowances, it might be necessary to limit the quantity of allowances that may be purchased relative to the tonnage associated with a given company, in order to avoid price manipulation by third parties and financial institutions[3].

(c) *Additional reporting and workload costs***.** In respect of the recent establishment of an aviation sector EU ETS, Mr Stefan Mast of Lufthansa claimed that his company was required to report 800,000 single flight events, each with 20 different datasets, i.e. 16 million datasets in total, and that Lufthansa had consequently spent 3.5 million Euros on IT services[12]. Some shipping industry interviewees were acutely conscious of the administrative costs of an ETS:

> '... in the examples that were given to us, there seemed to be so many other additional parties involved that the cost of administering such a system seemed illogically high [...]' [Interviewee A].

The IMO expert group reporting on market-based measures estimated an additional cost to the industry of $0.7 billion, in respect of the additional onboard workload alone, of the Norwegian ETS proposal[3].

2. *The Responsible Entity*. While legal action for non-compliance would take place against the vessel (for example, detention of the vessel for not having the required carbon credits), responsibility for fuel purchases currently often lies with the charterer. The ship operator or owner would then be penalised for the sins of the charterer. Successful operation of an ETS

may therefore depend on changes in the framing of charter documents to make charterers, where appropriate, responsible for obtaining the necessary carbon credits. Since the introduction of the low-sulphur regulations have already led to similar changes in chartering practice, the issue of the responsible entity may not prove a serious problem for the operation of an ETS.

3. *Flag-State Enforcement, Verification and Allocation***.** The International Maritime Organization is a representative body of national maritime administrations ('flag-States') and it would thus be a natural consequence of the formation of an IMO ETS for each flag-State to be (as the UK's Chamber of Shipping document on ETS puts it) 'responsible for monitoring compliance in respect of its registered ships [...] and for issuing compliance certification'[13]. Monitoring compliance, if it were to be an annual scheme, would entail making sure the vessel is registered in the scheme and that its emissions in the previous year did not exceed its carbon credits. The flag-State could then issue a document (paper and electronic), certifying that compliance had occurred in the previous year, which could be inspected by the port-State. In practice, many flag-States would contract with class societies, such as Lloyds Register, to undertake verification on their behalf. Informed opinion seems to agree that free allocation of credits would not be feasible for a shipping ETS – carbon credits would need to be allocated by auction. Again, the flag-States would be the natural bodies to undertake the auctioning, as the legal bodies responsible for the oversight of their ships.

   The difficulty with flag-State enforcement, verification and allocation lies with the presence of 'open' or 'commercial' flag-States. While some commercial registries have sought to position themselves as quality flags offering quality services at competitive registration rates, others have provided a haven for sub-standard ship operators seeking to save on operating costs by regulatory avoidance[14]. The view of flag-States of the UK judge, Lord Donaldson, is that 'collectively they are a broken reed'[15], when some flags are prepared to be lax in their enforcement of international regulations, then the opportunity that ship operators have to transfer their registrations ensures that, collectively, flag-States are not capable of effective enforcement. In 2003 the Mongolian People's Revolutionary Party granted a license to a Mr Chong Koy Sen, a Singaporean businessman, to operate the Mongolian Ship Registry, although Mongolia is 850 miles from the sea. Mr Chong previously operated the Cambodian Registry under license until 2002, when the license was withdrawn following international protests at Cambodia's failure to police its ships[16].

   Expert interviewees took different positions on the difficulties posed by flag-State oversight of ETS. Thus:

   > '...as long as the flag States in the larger proportion of the world enforce the scheme consistently, you're ok. Even if you lose a few ships down the side [...]. As long as you've got China in the right end of the scheme' [Interviewee B].

   In contrast:

   > 'You have nearly 1,500 ships changing flag every month world-wide [...]. So if we start to base our work on the flag, then we will have difficulty' [Interviewee C].

   And, as it were, in reply:

   > '...once you've re-flagged your ship with a flag that isn't very good at enforcing it [ETS], then you are really permanently attached to that flag – right? You can't flag back in. You can't sort-of-flag-out of Bahamas or Panama - to take two open flags - into something that is temporary [...]. And then flag it back in. Because if I was Bahamas or Panama, I

wouldn't let you back in, until you were in compliance [...]. And there are market penalties for re-flagging [...]. I would really worry about that ship being impounded in another port because of that flag State being known for not enforcing...' [Interviewee B again].

Thus, while some experts would argue that, in the longer term, most ship operators will find that the attentions of port-State control and the commercial disadvantages of operating under lax flags together outweigh the financial advantages of regulatory avoidance, other experts believe that the propensity for operators to change to lax flags is such that ETS oversight has to be in the hands of a single central authority (rather than the flag-States), with enforcement being the responsibility of port-States. It is clear that it would be easier to establish such a single ETS oversight authority for a regional scheme, than for a global IMO scheme.

4. *The Bunker Delivery Note*. In principle, technology is already available which can directly measure emissions and transmit those measurements electronically to a central authority. Similar technology is already in use to monitor power station emissions, and *WR Systems* has recently contracted to supply its Emsys laser emissions monitoring system on four new-build cruise ships[17]. But concerns have been expressed about the cost of such technology and doubts have been expressed about its robustness, once installed on ocean-going ships. Thus, where ETS proponents deal with enforcement issues at all, the commonest stated enforcement procedure is that of checking documents of fuel consumption (as a proxy measure for carbon emissions) against a vessel's carbon credits. The fuel consumption document (which could, in principle, also be an electronic record) is the Bunker Delivery Note [BDN]). Thus, the UK Chamber of Shipping's proposal:

   'When a ship enters a port, the Port State Control Officer will check the ship's BDNs and compare them with the electronic carbon account balance also provided by the ship. If the officer has reason to believe there is a discrepancy, he may call up the ship's account with the central register in the administrative body using the ship's IMO number to check if the ship's account is order, i.e. that sufficient emission allowances corresponding to the BDNs are deposited and thus the ship's carbon account is in balance. If not, the ship is detained until the account is settled'[12].

   Note that the UK Chamber scheme envisages an ETS scheme where a vessel's carbon account must be continuously in credit, whereas some other schemes only envisage an annual account-reckoning. In the latter case, it would normally be the flag-State (or a class society acting for a flag-State) that would balance the ship's bunker purchases over the year with the ship's carbon credits, and port-State's role would normally be simply to ensure that the vessel had a document certifying that the vessel had been in credit in the last year. However, whether it is port-State or class that is checking bunker purchases, a number of interviewees doubted whether the BDN in its current form was up to the new job that is being proposed for it:

   'The bunker delivery note is no longer just a commercial document, it is a statutory document as well. So this has brought whole tiers of regulatory control to an existing activity' [Interviewee D].

   'We are concerned sometimes - we hear people who are quite keen to use the BDN in its current format for some other purpose [..], documents which are purely commercial. If we want to use them we should make them more robust...' [Interviewee C].

The problems in using the BDN for enforcement purposes were discussed in detail in the separate project report on the enforcement of the low-sulphur regulations[18]. The ship's copy is a carbon copy and is not always legible, particularly after a period of storage. It is frequently hand-written. It is frequently supplied by a subcontractor, rather than the registered bunkerer and the registration number of the bunkerer does not appear on the BDN. Civil litigation is common between bunkerers and ship operators over the quality and quantity of fuel. But an expert interviewee was clear that collusive fraud between both parties was also a possibility:

> 'What is perhaps more likely [than forgery] would be collusion between the ship's crew and [...] a shore-side supplier, to work some sort of fraud' [Interviewee E].

The use of the BDN for ETS enforcement purposes would, for the first time, provide a financial incentive for the collusive *under*-reporting of bunkering quantities. It is not clear how far electronic reporting of bunkering would mitigate this problem, since the collusive under-reporting could apply to both the paper and the electronic record. Detection of fraud would depend on being able to estimate, for comparison purposes, what quantity of bunkers a ship of this type and size would actually require over its previous tracked voyages, a calculation that Interviewee B described as 'a nightmare for the port-States'.

Further, Interviewee E was sceptical about the possibility of complete electronic record-keeping occurring in the near-future 'because it [bunker supplies] is such a fragmented industry'.

The ability of IMO to exercise statutory control over the bunker industry is currently limited to the requirement that national maritime administrations keep a register of approved bunkering firms. There is little evidence that, in the past, maritime administrations have used the threat of withdrawal of registration against recalcitrant bunker operators.

5. *Variation in Port State Control Practice*. The enforcement role for port-States in an ETS would vary according to whether the scheme in question required a vessel to be continuously in credit, in respect of the balance between its emissions and its carbon vouchers, or whether the scheme only required a vessel to be historically in credit (i.e. in credit at the last annual accounting period). In the former case, port-State has an important enforcement role. In the latter case, the major enforcement role would lie with class, acting on behalf of the flag-State. An EU ETS, assuming that it would be flag-neutral and embrace occasional visitors to EU ports as well as those continuously trading in EU waters, would need to operate on the basis of emissions and carbon credits being balanced on a 'per journey' basis for occasional visitors – again, this would require port-States to have a large and potentially complex enforcement role.

   While it may be possible, in principle, for the revenues from an ETS scheme to defray administration and enforcement costs, it is also the case that port-State control is not a revenue-generating activity for governments, so resourcing may be quite limited, especially in developing countries. Even in developed countries, resourcing constraints may be such that the present may not be a good time to extend the responsibilities of the current PSC workforce: in the UK, the Maritime and Coastguard agency has to find budget cuts of 22% over the period 2011-2015[19]. Salaries are sometimes insufficient to attract suitably experienced officers: the salary of Indian port-State inspectors, for example, is said to be only about a fifth of what senior Indian officers can earn in the international fleet. In some failing States, port-State control is simply a cover for local extortion[20]. All this makes for international variation in port-State control practice.

Variation is, in any case, a central aspect of PSC practice in many States, where officers are required to exercise their discretion in deciding the appropriate penalties for non-compliance. For example, the Paris MoU Port State Control Instruction 43/2010/05 lists the PSC inspection instructions on the low-sulphur fuel regulations as requiring a surveyor to use 'professional judgement to determine whether to detain the ship or allow it to sail with deficiencies which do not pose an unreasonable threat of harm to the environment'. Some maritime authorities, most notably the US Coastguard, adopt a more military-style inflexibility in enforcement practice, but many ship operators prefer an explicitly discretionary approach to enforcement. All variation in practice, whether due to resourcing or the exercise of discretion, poses a potential problem of carbon leakage where PSC is made responsible for checking whether ships' carbon credits are in balance. PSC variation is perhaps a larger problem for a global ETS (as opposed to an EU ETS) because global variations in enforcement practice are greater than cross-regional EU variations. Certainly, the practice of extortion under the cover of PSC in some failing States makes it inadvisable to make inspectors responsible for collecting payments for overdue carbon credits. However, this seeming advantage for an EU ETS is off-set by the fact that, in the European scheme, PSC would have to try and calculate the carbon credits that were owed by deep-sea vessels which only entered European waters on an occasional basis. Such calculations would require additional training for inspectors and could be a source of uncertainty, contention and dispute:

> 'Administering that is going to be a bit tricky, I guess it is just going to be down to tracking the vessel, knowing when it entered European waters, try and make some sort of assumption on how much it has emitted during that period, converting that into whether it has got to pay for [credits]' [Interviewee A].

Two further disadvantages of port-State enforcement are that it is not universally applied across all berthing vessels, and that the foci of a port-State inspection on any one vessel will be selective. Thus, within the Paris MoU area (i.e. European and Canadian ports), ships are targeted for inspection on the basis of their 'risk profiles' (type of trade, age, flag-State, etc) – a vessel with a low risk profile may berth repeatedly in Paris MoU ports with little immediate risk of inspection or detection for non-compliance. And a vessel undergoing port-State inspection, although it would find itself subject to checks on its certificates (including certificated carbon credits), would not necessarily find itself subject to further investigations on its carbon compliance – that would be a matter for the Port State Control Officer's discretion. Port State Control, in an oft-used phrase, is 'a sample, not a survey'.

And finally, although detention for non-compliance is powerful deterrent tool, many ship operators are most concerned, not by the threat of detention per se, by the threat to reputation and freight rates that is posed by the publication of detentions on THETIS (the Paris MoU website) and subsequently on industry websites, such as Equasis. Non-compliance with EU, as opposed to IMO, carbon regulations would be punishable by detention in EU ports, but under present arrangements those non-IMO detentions would not appear on THETIS and other websites.

6. *Hypothecation*. If flag-States were made responsible for allocating carbon credits and receiving the revenues of an auctioning process, then some of those States (notably the UK) would resist the principle of re-allocation of those revenues as a fund for maritime technological innovation and climate mitigation, since they also resist the principle of hypothecation of revenues[21]. The preference of some industry experts for a fuel levy rather than an ETS (and both the International Chamber of Shipping and the European Community

Shipping Association have now expressed a preference for a fuel levy) is in part related to fear that States would simply treat the ETS as a form of corporation tax:

> '...we recognise that the shipping industry has got to pay for its CO2 emissions [...] in some way, but we believe that [...] the money that is generated should be used [...] to mitigate climate change, not to line the coffers of the governments that choose to collect funds from an emissions trading scheme' [Interviewee F].

7. *Distortion of trade*. Just as with the low-sulphur fuel regulations, there is a fear that additional fuel costs for shipping will result in a modal shift, to some degree, from shipping to (high carbon emission) road transport. Distortive effects could of course be potentially greater for a regional (EU) ETS, with shipping (particularly container shipping) being diverted to non-EU ports, and with goods then being transported on by road. The establishment of a container hub port in, say Morocco, might be countered by conditionality clauses in EU trade/aid agreements with the country concerned. Nevertheless, distortive effects would be potentially greater for a regional ETS, while the carbon leakage from frauds of various kinds, ineffective enforcement, etc would be less for a regional ETS than a global ETS.

Enforcement of a Fuel Levy

1. *Point of payment*. Ostensibly, the most straight-forward payment point for a fuel levy would be at the refinery. However, in all schemes where the payment point is stated, the point-of-sale between the bunkerer and the ship-operator or ship-charterer is the selected payment point. Seemingly, this is because a substantial fraction of the refinery capacity is now in oil-producer countries such as Saudi Arabia (some of which are strongly opposed to controls on ships' carbon emissions) and because of the lack of commitment from refineries:

> '...the higher up the supply of fuel you go, the more simple it is actually to apply a levy, so if the refineries could be persuaded to charge a levy and then submit the funds generated to some international fund, then that would be the simplest way forward. Clearly, that is not going to happen because you get into problems of national jurisdiction and the power of the oil industry...' [Interviewee F].

However, the multiplication of payment points that are entailed when the selected payment point is that of bunker sales, clearly raises the possibility of carbon leakage through widespread fraud. As previously stated, the bunker industry is an industry where legal disputes over deliveries are quite common (hence the use by many ship operators of commercial fuel testing laboratories to check fuel samples) and fraud is frequently alleged, for example:

> 'The master claimed that a bunkerer operating in a non-European port required the [bunker ship] crew to keep a log of the fuel that had been 'saved' on each delivery' [fieldnotes].

Further, although it is the ship operator that is the party that is legally responsible for paying the levy, the actual remittance is made by the bunkerer. Nevertheless, in order to ensure that the bunkerer does actually remit the levy, it should in principle only be necessary to alter the standard terms of the contract between the bunkerer and the ship operator. Under a revised contract, a ship operator whose vessel was detained, because the bunkerer did not remit the levy, should be able to claim damages from the bunkerer through the civil courts.

However, the legal position may be complicated by the large-scale use of sub-contractors (see item 2 below).

2. *Bunker delivery method*. A PSC inspection was observed of a 7606 gross tonnage, 13-year-old, Maltese-flagged, ro-ro (roll-on-roll-off) cargo vessel: bunkering was a very straight-forward operation with delivery taking place from a road tanker driven onto the car deck. The inspector thought that:

   > 'too often [...] fuel was delivered by sub-contractors, rather than the registered supplier, and sub-contractors had no strong knowledge of, or interest in observing, [IMO] regulations' [fieldnotes].

   It seems likely that, where bunkers are delivered by a range of unregistered sub-contractors, there is a potential for fraudulent evasion of a fuel levy.

   A bunkering operation was also observed at sea from a bunker ship. Bunker ships and bunker barges are frequently used for deliveries to larger vessels. The observed bunkering took place in a heavy swell. It has been suggested that it would be technically possible for a regional (EU) fuel levy to be circumvented by vessels taking delivery from off-shore bunker barges, operated from outside the EU.

3. *Bunker Delivery Note*. Exactly the same problems as those listed above in respect of the use of the BDN in ETS enforcement apply to the use of the BDN in enforcement of fuel levy. In particular, the report of the IMO expert group on market-based measures makes the point in relation to a fuel levy that 'the control of bunker suppliers will be organised and undertaken according to the national law and administrative organization of the port State'[22] – measures could not be introduced in IMO to mandate member States to act against rogue bunker companies. Currently, there are very considerable cross-national differences in the regulation of bunker operations:

   > 'If you see the bunker industry in Singapore, the way it's regulated, for me it's the perfect system. And look at the European system – it's in the pre-historic age compared to this [...] - who is controlling the bunker provider?' [Interviewee C].

4. *Distortion of trade*. Again, the problems listed above in respect of the trade distortions that would occur as a consequence of a regional (EU) ETS, also apply to a regional fuel levy:

   > '...all ships would start to bunker elsewhere – the market would be as swift as lightning then' [Interviewee G].

   The case that is most frequently cited in this connection is that of the impact on bunker sales of the introduction of an 8.25% sales tax on bunker fuels in Californian ports in 1991. This was said to have resulted in a 60% decline in bunker fuel sales in the ports of Los Angeles and Long Beach in a single year[23]. An EU bunker fuel levy could also involve a modal shift, to some degree, at the margin from short sea shipping within Europe to road transport, and would also produce marginal increases in the prices of European-produced, sea-transported goods set against foreign goods shipped from outside Europe. Although bunker sales to vessels operating continuously in European waters might be unaffected, the overall impact on bunker sales could be substantial. The possibility of the establishment of bunker hub ports outside the EU (for example, in Morocco) might be lessened by conditionality clauses in EU trade/aid political negotiations with neighbouring countries, however the threat remains of possible off-shore bunkering operations under lax jurisdictions. Evidence suggests that the modal shift and impact on transported goods

prices would probably be small: evidence given to the House of Commons Environmental Audit Committee suggested that a 5% levy on shipping fuel would translate into an average price increase on transported goods of only 0.1%[24].

5. *International taxation*. Again, just as some governments are opposed to the hypothecation of ETS auction receipts, so also some governments (including the UK government) are opposed to international taxation schemes such as a fuel levy would entail[25].

6. *Variation in Port State Control Practice*. An arguable advantage of a levy over an ETS is that, as one interviewee put it, 'the flag-State has nothing to do with it'. However, the enforcement problems of a fuel levy for the port-State are similar to those for an ETS. The IMO expert group was explicit that, in order to enforce a fuel levy, PSC would be required, not just to check the BDNs but also (in order to combat fraudulent under-reporting of fuel in the BDN) to compare the BDNs with the Oil Record Book and the ship's log 'which may require additional appropriate training for Port State Control Officers and additional inspection time to undertake'[26] – an implicit recognition that not all Port State Control Officers in all parts of the globe are currently capable of this kind of detection work. Additionally, not all berthing ships would in any case be subject to such comparisons, as not all berthing ships are inspected, and as PSC is 'a sample, not a survey'. In some parts of the world, the performance of this additional checking work may open the door to either bribery or extortion.

7. *Equivalence measures*. The EU aviation ETS provides for exemptions for those airlines which can demonstrate that they are subject to equivalent carbon taxes from other States. If there is a similar equivalence provision in an EU shipping ETS, then there may be a financial incentive for the establishment of bogus equivalence schemes.

8. *Generic Problems of Market-Based Measures*. To the extent that an IMO fuel levy is meant to generate a Greenhouse Gas Fund for mitigating climate change, then the levy fund would be subject to some of the previously mentioned policing problems of bogus off-setting projects in the CDM and the JIP. However, there would not be a 'market' for cheap bogus off-sets with a levy, as there would be through the involvement of brokers in an ETS. A regional EU (as opposed to a global) fuel levy would not necessarily need to expend the proceeds of the levy on CDM projects (dubious or otherwise), such funds could go instead to investments in technologies to further reduce ships' carbon emissions, but those investments would also need to be scrutinised. Finally, a levy should be cheaper to police than an ETS and clearly it would not be subject to the potential ETS difficulty of carbon price fluctuations.

Monitoring, Reporting & Verification Systems

An MRV system, as proposed by the EU Vice President and Transport Commissioner, is a necessary precursor for the introduction of market-based measures. For a fuel levy, evidence of current levels of fuel consumption could be used to estimate the likely yield of a levy and the optimum size of the levy. For an ETS, baseline consumption data would be needed for the initial allocation of carbon credits. Both schemes would require fuel consumption data to in order to set emission reduction targets. While several schemes for market-based measures envisage the need for baseline data on fuel consumption (for example, that proposed by the UK Chamber of Shipping[13]), no published schemes specify in detail how an MRV system to provide that data would operate.

No announcement will be made about the details of the planned EU MRV system until Spring 2013 (i.e. after this research project has ended). However, it is likely that the system will operate as follows:

- The recording system would apply to all vessels calling at all EU ports, regardless of ownership or flag. The only exclusions would be for smaller vessels: the cut-off point is currently unclear, but 3,000 tonnes would be a likely candidate.
- The vessels in the scheme would be required to submit an annual report of fuel consumption per tonne/km and would be issued with a certificate of compliance. Vessels which were occasional, infrequent visitors could choose to submit annual reports based on estimates, which could be contracted out to consultants.
- PSC involvement is likely to be confined to checking that the vessel has an up-to-date certificate.
- Penalties for non-compliance would be proportionate and cascading, but would include potential denial of entry. It is likely that penalties would only follow upon a vessel's second EU port-call (to allow for vessels having to make last-minute changes of schedule).
- The body submitting the report would be the ship-owner/ship-operator. Where a charterer was responsible for fuel purchases, the Commission would expect the contract with the charterer to include a responsibility to remit fuel consumption data to the owner/operator.

If these supposed arrangements are correct, a number of relevant observations can be made at this point:

1. Some additional administrative costs will be imposed on ship operators. These additional costs will be nothing like those of the order reported by plane operator Lufthansa above[12] in respect of the EU ETS for the aviation industry, but they will nevertheless be unwelcome at a time when many ship operators are reporting trading losses. A more serious difficulty may lie in the very different structure of the shipping industry compared with the aviation industry: the shipping industry, unlike the aviation industry, is highly fragmented, both vertically and horizontally. Ship ownership is often divorced from ship operation and, depending on the type of vessel charter, operators may or may not be responsible for fuel purchases. Further, most sectors of the shipping industry (unlike the aviation industry), are not dominated by a few large carriers. Rather, it is the case that there are a large number of single ship companies, usually established for tax reasons. Not all of these single ship companies could be relied upon to comply with an MRV system. Thus, compliance with the requirements of an EU MRV system may be skewed towards the larger operators who, in turn, may be operating newer, more fuel-efficient vessels. There is therefore a danger that fuel consumption may be under-estimated.

2. If data from an EU MRV scheme are to be used to estimate global fuel consumption baseline data, then it should also be considered that, thanks to the relative effectiveness of Port State Control in EU ports, vessels trading in EU ports may be newer and more fuel-efficient than those on many other global trade routes.

3. If the MRV system were to be introduced in the near-future, then it would be in operation at time when the shipping industry is experiencing a down-turn in activity. This would need to be factored into any future calculation of, for example, the volume of necessary carbon

credits for a global ETS at time of enhanced trading conditions. However, this would only be a source of difficulty in the unlikely eventuality of a global ETS being introduced in the near-future. It is much more likely that an EU MRV system would continue to operate over a number of years (with varied trading conditions) prior to the introduction of a global ETS or a global fuel levy.

4. The period of the operation of the MRV system also offers a window of opportunity to consider potential regulatory and enforcement changes that would enhance the robustness of future verification systems for market-based measures. Specific regulatory changes one might suggest would include changes to the BDN – at minimum, a requirement to state the bunkerer registration number – and a requirement for national maritime administrations to inspect bunker suppliers as part of their registration schemes. Enforcement changes one might suggest would include better resourcing and training for Port State Control Officers, and exploration of the use of the European Maritime Safety Agency's SafeSeaNet tracking system as a future intelligence source to identify non-compliant vessels.

Conclusion

To reiterate, this report does not seek to provide an overview of the advantages and disadvantages, or the feasibility or unfeasibility, or the political difficulties, of different market-based measures. Rather, it concentrates on the particular enforcement issues that may be associated with these measures, both in a regional and in a global context. In so doing, it draws on some of the lessons learned from the enforcement practice in respect of the low-sulphur regulations[18]. To be clear, just because a particular measure appears to entail particular difficulties in enforcement, that should not be taken to imply that it should not be adopted: the same measure may have particular advantages not considered here which could outweigh the enforcement problems.

It is difficult, in any case, to draw firm conclusions on enforcement problems because of the multiplicity of different market-based measures that have been put forward and because the enforcement schemes associated with these different measures are often lacking it detail. Further, because there is no agreed timetable for the introduction of either EU or IMO market-based measures, it is difficult to estimate how far some of the currently identified enforcement problems could be eliminated by technological hardware and software innovations currently in development – for example, could the development of cheap and reliable emissions monitoring equipment in ships' funnels obviate the need in ETS to monitor fuel purchases? could scrubber systems work for carbon capture as well as sulphur capture? and could the European Maritime Safety Agency's SafeSeaNet tracking system be used to identify and target ships seeking to evade an EU fuel levy by bunkering from off-shore barges in European waters?

Nevertheless, some tentative conclusions can be drawn:

1. At the global level, enforcement of a fuel levy is a more straight-forward measure than an ETS insofar as it need not involve an enforcement role for flag-States. Since there are some flag-States that, to quote Lord Donaldson again, 'ignore their international obligations'[15], and since the number of vessels changing flags every month is thought to be around 1,500, the non-involvement of flag-States in enforcement could eliminate one important source of carbon leakage.

2. But in contrast, at the regional level, an EU fuel levy might be deemed unattractive because of the possible market distortions involved, particularly the damage that might be done to

the European bunker industry. Although the establishment of bunker hub ports in countries outside the EU (for example, in Morocco) might be avoided by conditionality clauses in EU trade/aid agreements, there remains the threat of possible future off-shore bunkering operations under other lax jurisdictions. And additionally, vessels that were detained because of non-payment of the levy would not (as things currently stand) suffer market penalties by having their non-compliance publicised on industry websites, because only IMO deficiencies (not EU deficiencies) are currently publicised on those websites.

3. In respect of a global fuel levy, the greatest enforcement challenge appears to be that of collusion between bunkerers and ship operators or charterers to understate bunker sales in order to evade part, or all, of the levy due. Where BDNs and Oil Record Books fraudulently misrepresent fuel consumption, it will take competent and confident detective work by Port State Control Officers to detect and punish such frauds. Previous research on fraudulent seafarer certification, for example, indicated that only a small fraction of those certification frauds were likely to be detected by port-State control[27].

4. It may be that the unevenness of controls on bunker firms between different nation-States is not a serious enforcement issue for a global fuel levy, insofar as ship operators can obtain, through the civil courts, recourse for damages due to a bunkerer's failure to remit a levy, assuming that contracts between bunkerers and ship operators are amended to cover responsibility for remitting the levy. However, the use of sub-contractors (who provide the BDN) may complicate the issue. It may be necessary to seek legal opinion on this point.

5. In respect of a global ETS, opinion seems to be divided on whether the potential for evasion that is offered by vessels flagging out to lax administrations is such that successful operation requires that the responsibility for issuance of compliance certification, verification, and allocation of carbon credits be vested in a central authority, rather than individual flag-States. In an annual scheme, each flag-State would be responsible for ensuring that in the previous year each registered vessel did not exceed its carbon credits. Comment on the likelihood of flag-States voting to vest these powers in a central authority is beyond the scope of this report, but if a central authority is not established, then *in an annual scheme* there is a likelihood of substantial carbon leakage through the migration of 'free rider' vessels to lax flags. The success of an annual-scheme global ETS would then depend on the effectiveness of port-States in detecting and punishing the would-be free riders.

6. The alternative to an annual-scheme global ETS is one where vessels would have to possess sufficient credits to be in balance, not on an annual basis, but on every trip. This diminishes the enforcement role for the flag-State, but (as well as being administratively more complex) this again makes the port-States pivotally important in enforcement.

7. In some parts of the world, due to problems of resourcing, recruitment, local corruption and other factors, PSC is clearly not up to the challenge of effectively enforcing a global ETS. But this need not be a large problem since few of the world's major shipping routes are part-policed by these ineffective port-States. The enforcement challenge of both a regional ETS and a global ETS for effective port-States is threefold:

   (a) To check that the vessel's carbon compliance certificate is up-to-date (a straight-forward matter);

   (b) To check the vessel's carbon balance and compare that with the vessel's BDNs (less straight-forward, given that BDNs are often hand-written, sometimes illegible, sometimes not in English, etc.)

(c) To check for fraud through the under-reporting of fuel consumption (very difficult).

It seems clear that some of the receipts from an ETS would need to be spent on additional resourcing of PSC to undertake these pivotal additional tasks.

8. An EU ETS has the advantage of being based on accumulated administrative experience (now also incorporating the aviation industry) and additional experience could be accumulated by a phased introduction (for example, by only be applied initially to certain types of trade). It too would be heavily dependent on effective PSC enforcement. While this would be unproblematic for vessels regularly trading in Europe, it would be necessary for PSC (or an alternative authority) to calculate the carbon credits required by occasional visitors to EU ports, based on the length of their voyage in European waters. As with an EU fuel levy, non-compliant ETS vessels would escape adverse publicity on industry websites because they had only contravened EU, not IMO, regulations.

9. Insufficient attention appears to have been given to bunker firms which collude in fraud. Lax flag-States can be made less commercially attractive by the targeting of their vessels by PSC, but similar effective sanctions are not available for fraudulent bunkerers. It would be possible for bunkerers found repeatedly guilty of fraud to have the registration withdrawn, but we are not aware that this has been suggested in any of the published ETS or fuel levy schemes. At present the BDN does not record the bunkerer's registration number.

10. The imminent introduction of an EU MRV system to provide baseline data for future market-based measures also offers a time window in which action could be taken to tighten-up regulation (most obviously in respect of the BDN) and enforcement (most obviously in the better resourcing and training of Port State Control Officers).

References

1. IMO (2009) Second IMO GHG Study 2009. London: International Maritime Organization.

2. IMO (2011) Greenhouse Gas Emissions. http://www.org/OurWork/Environment/PollutionPrevention/AirPollution.

3. MEPC\61\INF-2. London: International Maritime Organization.

4. Barker, T. (2008) Proposal for a Global Emissions Trading Scheme (GETS) for International Bunkers. Tyndall Briefing Note No. 26. Cambridge: Tyndall Centre. http://www.tyndall.ac.uk/publications/briefing_notes/bn26.pdf.

5. European Commission (2011) European Climate Change Programme – WG Ships; background document; main possible policy options. http://ec.europa.eu/clima/events/0047/policy_options_en.pdf.

6. Meade, R. (2012) 'Brussels ditches regional CO2 reduction for shipping', Lloyds List no. 60,774, October 3rd 2012.

7. Organisation for Economic Co-operation and Development (1997) Special issues in carbon/energy taxation: marine bunker fuel charges. Annex I expert group on the UNFCCC. Working Paper No. 11. Paris: OECD.

8. World Bank (2010) State and trends of the Carbon Market 2010. Washington: World Bank.

9. See, for example, Harvey, F. and Fidler, S. 'Industry caught in carbon smokescreen', Financial Times, April 25th, 2007.

10. Quoted by S. Sethi at http://www.carbontradewatch.org/articles/outsourcing-commitments-review-of-carbon-trading-book.

11. The Guardian 11/1/2010.

12. Minutes of Meeting on 'Cost-effective carbon abatement for aviation and maritime sector' organised by the International Emissions Trading Association, Brussels, 4/3/2011.

13. Chamber of Shipping (not dated) Shipping's carbon emissions. Design and implementation of market-based measures. Part 1: a cap-and-trade emissions trading system. London: Chamber of Shipping.

14. OECD (2001) The cost to users of substandard shipping. Report to the OECD Maritime Transport Committee. Paris: Organization for Economic Co-operation and Development.

15. Donaldson (1996) Safer ships, cleaner seas: a reflection on progress. The Wakeford Memorial Lecture. Southampton: Warsash Maritime Centre. p.3.

16. Brooke, J (2004) Landlocked Mongolia's seafaring tradition, New York Times, 2/7/2004.

17. www.ship-technology.com/news 3/9/12.

18. Bloor M, Baker S, Sampson H, Dahlgren K (2012) Effectiveness of international regulation of pollution controls: the case of the governance of ships' sulphur emissions – final report. Cardiff: Seafarers International Research Centre. www.sirc.cf.ac.uk

19. Oral evidence of Sir Alan Massey, head of the MCA, to the House of Commons Transport Select Committee, 8/2/2011.

20. Ozcayir, Z (2001) Port State Control. London: LLP.

21. Evidence of Joan Ruddock MP to the House of Commons Environmental Audit Committee in 2009.

22. MEPC 61/INF.2 p.56.

23. Los Angeles Times 3/9/92.

24. Evidence of Dr Stochniol to the House of Commons Environmental Audit Committee in 2009.

25. Evidence of Peter Lockley of WWF and Joan Ruddock to the House of Commons Environmental Audit Committee in 2009.

26. MEPC 61/INF.2 p.55.

27. Obando-Rojas, B. et al. (2001) A Study of Fraudulent Practices Associated with Certificates of Competency and Endorsement. Cardiff: Seafarers International Research Centre.