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Environmental Audit Committee

Reducing CO_2 and other emissions from shipping

Fourth Report of Session 2008–09

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The Environmental Audit Committee

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The emission of greenhouse gases from shipping is a serious problem for international climate change policy. They are growing and there is a risk of considerable delay before they are brought under control. The advent of carbon budgets means it is no longer acceptable to argue that it is too hard to find an adequate basis for dealing with emissions from shipping. Emissions from shipping must be taken into account in the UK's carbon budgets. The Government must work out what the UK's share of global emissions from shipping should be. The Government should commission research on the level of emissions from international shipping that would be compatible with delivering the UK's objective of limiting global warming to 2°C.

Progress of international negotiations

The Kyoto Protocol handed developed economies the responsibility of working to curb emissions from shipping through the International Maritime Organization (IMO). Very little progress has been made. It is unlikely that a proposal will be agreed by the IMO in time to be tabled at the UNFCCC's next Conference of Parties in Copenhagen in December. A lack of urgency shown by industrialised nations and blocking actions by developing economies share the blame. The Government needs to maintain a constructive approach within the IMO, while actively seeking agreements to limit shipping emissions outside the IMO process.

The role of the UK in international negotiations

The Government's position on the use of emissions trading to tackle greenhouse gas emissions from ships lacks coherence. Ministers support the use of revenue from a trading scheme to fund climate change adaptation in developing countries but oppose the hypothecation of revenues for this purpose. The Government justifies emissions trading because this is said to impose a definite cap on emissions; at the same time, it argues that a trading scheme means that reductions can be guaranteed from other areas of the economy and one does not have to put a specific limit on emissions from shipping. The Government should explain how it proposes to transfer funding to support adaptation in developing countries if it maintains its objections to hypothecating revenues. It should clarify what the cap in a shipping emissions trading scheme should be.

Shipping emissions and the Climate Change Act

The Committee on Climate Change recommended that the Government should renegotiate the EU's 2020 climate change targets to include shipping; and that only once this was achieved should it take the UK's share of international shipping emissions into account in setting carbon budgets for the rest of the economy. The Government should not wait for agreement on the EU target, but should consider taking international shipping into account immediately.

The Government admits that the current calculation of the UK's share of international shipping emissions is an underestimate. If the UK's share of these emissions lies at the upper end of the Government's range of estimates then, overall, UK carbon emissions

might not have gone down at all since 1990. The Government should consult on how to improve the methodology it uses to calculate the UK's share of international shipping emissions.

Mitigating emissions from shipping

Government support for research and development should focus on technologies that can be retrofitted to existing ships, and offer a genuine alternative to fossil fuels, such as hydrogen fuel cells.

It should be technically feasible to establish an international emissions control regime that would accurately charge (or require carbon permits from) each ship according to its actual emissions, and securely enforce and verify compliance. In order for a scheme to be a success it must involve as many nations as possible, so as to reduce the scope for evasion. The Government should commission research on the relationship between levels of carbon pricing and impacts on emissions from shipping to ensure its policies are properly informed. The Government should introduce a system of port dues that vary according to the environmental performance of different ships.

Air quality and non-CO_2 contributions to climate change

The IMO has made encouraging progress on limiting the emissions of particulate matter and harmful gases other than CO_2. The Government must ensure that the tighter regulations agreed at the IMO are adhered to in practice. The Government should assess the case for mandating the provision of shore-side electricity for ships to improve air quality in the UK. The Government ought to consider extending stricter air quality regulations to all coastal waters around the UK.

Conclusion

Emissions from shipping cannot be allowed to grow uncontrolled. It will take several years before technical changes start to make a significant difference. Negotiating operational changes within the IMO may also take some time. We need to ensure that emissions from shipping are taken into account in the UK's carbon budgets. The industry, like any industry, needs a clear signal about the level of ambition it needs to have in respect of emissions of greenhouse gases. Clear targets to 2020 and 2050 will help engineers, operators and owners come up with appropriate solutions, provided the targets are backed up by the right incentives and sanctions and support for research and development.

Shipping ought to do relatively well out of a carbon-constrained world, given that it is the most carbon-efficient mode of transport. Modal shift towards shipping will only happen if policy is joined up and ensures that any regime that increases costs or imposes carbon limits on shipping does not act in isolation; doing so might lead to modal shift from sea to road or air.

Given the central importance of shipping to world trade, and to overall economic growth, there should be drastic acceleration of R&D into low- and zero-carbon propulsion systems. All parties connected to international shipping need more fully to address the challenge of climate change. To meet extremely challenging global emissions reductions targets in the next few decades, the absolute scope for emissions from shipping will have to be severely circumscribed.

Introduction

1. In 2006 we conducted a major inquiry into reducing carbon emissions from transport.[1] Emissions from shipping received very little coverage in the evidence we received, and our impression then was that "there may be insufficient attention, from both governments and NGOs, on this issue to generate the kind of pressure […] required to generate a timely solution."[2] In our Report, *Reducing Carbon Emissions from Transport*, we said emissions from shipping had been overlooked by the Government when setting out its climate change policies. The *UK Climate Change Programme Review* (CCPR), published in March 2006, contained little on shipping (what it said is reproduced in full in Box 1).

Box 1 The full content on shipping in the 2006 UK Climate Change Programme Review

The UK is also playing an active role in reducing emissions from **Shipping**.

In the medium to long term, technological improvements may deliver carbon savings. For example, developments in marine engine manufacturing, the use of propulsion systems other than diesel engines and alternative fuels could all offer ways to cut carbon dioxide emissions.

Working within the International Maritime Organization (IMO), the UK made a significant contribution at the latest Maritime Environment Protection Committee (MEPC) negotiations on the adoption of Interim Guidelines for Voluntary Ship CO2 Emission Indexing for Use in Trials. Ships under the United Kingdom flag are being encouraged to participate in these trials, which will help identify a ship's greenhouse gas index.

Source: Defra, Climate Change—The UK Programme 2006, Cm 6764, March 2006, p 73

2. The only concrete action point was the encouragement of UK shipping to participate in voluntary trials to help compile an index of the carbon efficiency of different ships. As part of this inquiry, we asked the Government how many UK ships had participated in such trials. It said:

> Although the Maritime and Coastguard Agency provided guidance for UK flagged ships, in case they wished to take part, none ended up being involved in the trials of the CO_2 index. [3]

Size and nature of the problem

3. A recent study for the International Maritime Organization (IMO) estimated that international shipping was responsible for annual emissions of around 843 million tonnes of carbon dioxide ($MtCO_2$) in 2007, or around 3% of total man-made carbon emissions.[4] To put this in perspective, "international shipping" would come just after Germany and just before the UK in a league table of emissions sources.[5] Only six countries produce more greenhouse gases than international shipping. Shipping emissions are reported to have

1 Environmental Audit Committee, Ninth Report of Session 2005–06, *Reducing Carbon Emissions from Transport*, HC 981

2 Environmental Audit Committee, *Reducing Carbon Emissions from Transport,* para 11

3 Ev 84

4 Ev 21

5 Ev 1

doubled since 1990 and by 2050, in the absence of regulations to limit them, they are projected to grow by a factor of 2.4 to 3.[6]

4. Tackling emissions from shipping is complicated by the international nature of the industry. Ocean-going ships buy their fuel from locations all around the world, and burn it (thereby emitting CO_2) in journeys between different countries; this makes it difficult to measure and attribute their emissions to individual nation-states. Because of these difficulties, international shipping was excluded from the targets set by the Kyoto Protocol. The Kyoto Protocol handed developed economies the responsibility of working through the International Maritime Organization (IMO) to pursue curbs on shipping emissions. There has not yet been any agreement within the IMO on a scheme for capping global shipping emissions.

Focus of this inquiry

5. In this report we follow up our earlier inquiry and examine what efforts the Government is making in three main respects:

- Negotiations to tackle shipping emissions at an international level (within the IMO, the UNFCCC,[7] and the EU);
- Measures by which the UK is to take into account its share of international shipping emissions in domestic carbon budgets (through the Climate Change Act 2008); and
- Support in the UK for operational improvements and technological R&D aimed at reducing emissions from shipping.

6 Ev 21

7 Adopted at the 1992 Rio Earth Summit, the United Nations Framework Convention on Climate Change has the goal of avoiding "dangerous" human interference with the climate system; it is the central international forum for negotiating global agreements on limiting greenhouse gas emissions.

Shipping and global climate change goals

6. Shipping emissions are a serious problem for international climate change policy, both because they are growing and because there is a risk of considerable delay before they are brought under control. Their growth contributes to the continuing increase in CO_2 emissions on a global scale. The longer carbon emissions continue to rise, the harder it will be to stabilise the level of greenhouse gases in the atmosphere at a "safe" level—since this depends on the volume of CO_2 already emitted in preceding years.[8] A delay in establishing a global cap on shipping emissions means that steeper cuts in CO_2 will have to be made by other sectors of the global economy.

7. Witnesses from the Tyndall Centre for Climate Change Research stressed the urgency with which cuts in global carbon emissions are needed and pointed out that the shipping sector will have to make—ultimately very substantial—cuts of its own.[9] Dr Terry Barker said the need to decarbonise *all* economic sectors, including shipping, had become more critical following recent scientific findings on the potential for dangerous climate change.[10] To have a good chance of meeting the UK's 2°C target, he said,

> [...] all sectors will need to substantially decrease their carbon footprint and even completely decarbonise by 2050 or earlier. Comprehensive policies will need to be in place by 2012 with action to 2020 if the rise in [shipping and aviation] emissions is to be checked, let alone reversed.[11]

8. In October 2008 the Committee on Climate Change recommended that the UK should cut its emissions by at least 80% by 2050, based on an implicit target for cutting worldwide emissions by at least 50%.[12] This was based on an assumption that global emissions must peak by as early as 2016.[13] In January 2009, Lord Stern and a number of other leading figures from politics, economics, and climate change research, recommended that "cuts in [global] emissions of 50% by 2050 relative to 1990 should be the absolute minimum for target reductions and the aim should be to make cuts as close to 80% as possible if the cost is not prohibitive".[14] They concluded: "Scientific evidence shows world emissions must peak and decline in the next 10–15 years, to keep the door open for climate stabilization."[15]

8 Scientific debate continues as to the lifetime of increases in atmospheric concentrations of CO_2 from current emissions, but a considerable proportion is expected to remain in the atmosphere for centuries, or even millennia. See "Carbon is forever", *Nature Reports Climate Change*, 20 November 2008, www.nature.com/climate

9 Tyndall Centre for Climate Change Research, *Tyndall Briefing Note No. 26*, June 2008, p 1

10 Tyndall Centre for Climate Change Research, *Tyndall Briefing Note No. 26*, p 1

11 Tyndall Centre for Climate Change Research, *Tyndall Briefing Note No. 26*, p 1

12 Letter from Lord Turner of Ecchinswell to Secretary of State for Energy and Climate Change, Rt Hon Ed Miliband MP, 7 October 2008, www.theccc.org.uk/pdfs/Interim%20report%20letter%20to%20DECC%20SofS.pdf

13 Committee on Climate Change, *Building a low-carbon economy—the UK's contribution to tackling climate change*, December 2008, pp 21–5

14 World Economic Forum Global Agenda Council on Climate Change, *Shaping an Opportunity out of a Crisis*, January 2009, www.undp.org/climatechange/docs/GACmessage.pdf

15 World Economic Forum Global Agenda Council on Climate Change, www.undp.org/climatechange/docs/GACmessage.pdf

9. We are concerned that the shipping industry is reluctant to engage with the need to cut its own emissions in absolute terms. We heard widespread acknowledgement of the seriousness of climate change and the need for measures to improve the carbon efficiency of shipping. But there was an equally widespread belief that total emissions from shipping would continue to grow—and that they should be allowed to. The Chamber of Shipping (CoS) told us that "the shipping industry is absolutely committed to reducing its carbon footprint", but that "in absolute terms, emissions from shipping will grow steadily for the foreseeable future".[16] The CoS explained: "This is because shipping [...] responds directly to growth in world trade (without which expansion in the world economy could not occur) and that growth is likely to be greater than the achievable carbon reductions."[17] Almost exactly the same points were made by the IMO Secretariat.[18] The Chamber of Shipping has endorsed the idea of emissions trading[19] but this was seen as a mechanism by which others could be paid to make reductions that the shipping industry could not make.[20]

10. The written evidence we received from the Government said "shipping emissions must be tackled and […] the shipping sector must operate under carbon limits."[21] But the ministers we spoke to, Joan Ruddock MP (Parliamentary Under-Secretary of State in the Department for Energy and Climate Change) and Jim Fitzpatrick MP (Parliamentary Under-Secretary of State at the Department for Transport), were unable to say whether this meant shipping should make an absolute (as opposed to relative) cut in its emissions.[22]

11. Rather than dividing up global shipping emissions and attributing a share of them to each country, the Government, in line with much of the international community, appears to favour excluding them entirely from national emissions registers and targets, and treating them as belonging to a truly international sector.[23] Joan Ruddock MP explained to us that, domestically, the UK has agreed a target of an 80% cut by 2050 "because that is what we consider to be our contribution to a stabilisation goal of a 2°C temperature rise."[24] The logic of treating shipping as a sector outside any national borders is that it ought to be incorporated into the same kind of projections that yielded national targets for the UK, and given its own emissions reduction targets.

12. The shipping industry would appear to welcome greater clarity on the targets for reducing emissions that the global shipping industry should face. Robert Ashdown, Head of Technical Division at the Chamber of Shipping, told us:

> [...] I think that the UK could do more to talk about what it means in terms of targets. Not a single paper put into the IMO [by any national government] has discussed

16 Ev 30

17 Ev 30

18 Q57, Ev 20–1

19 "Leading the Way: the UK Chamber of Shipping response to global warming", Chamber of Shipping press release, 15 December 2008

20 Q102

21 Ev 66

22 Qq252–5

23 Q282

24 Q254

> what they think an appropriate target for shipping emissions reductions is. Because we do not know the target, that makes life very much harder for us in industry, to try and evaluate the most appropriate scheme for us because it may be that the most appropriate market-based instrument will be dependent upon the target of the emissions the government sets.[25]

13. **Policy must have a rational basis. Given the absence of a consensus within the international community, the Government should take the lead in determining what level of emissions from shipping would be compatible with delivering the objective of limiting the rise in global temperatures to 2°C. This should be used in turn to determine targets for emissions from shipping in 2020 and 2050. The Government should then use these global figures to inform its policies and actions by making an estimate of the UK's share of the global total. The Government should commission research on recommended targets for shipping emissions in 2020 and 2050, and for the trajectory of emissions that should link them.**

25 Q118

Progress of international negotiations to tackle CO_2 from shipping

14. Under the Kyoto Protocol, industrialised nations, listed in Annex I to the United Nations Framework Convention on Climate Change (UNFCCC) were assigned binding targets, aimed at reducing their annual greenhouse gas emissions by an average of 5.2% by 2012, relative to 1990 levels. Developing economies, including Brazil, China, India, and South Africa (the "BRICS" nations), were not assigned national targets. This was in accordance with the UNFCCC principle of countries bearing a "common but differentiated" responsibility for making cuts in emissions, depending on their economic capacity. Emissions from international shipping and aviation were not included within any targets as there was no agreed methodology for attributing such cross-border emissions to individual countries. Article 2.2 of the Protocol stated that "The Parties included in Annex I shall pursue limitation or reduction of emissions of greenhouse gases not controlled by the Montreal Protocol[26] from aviation and marine bunker fuels, working through the International Civil Aviation Organization and the International Maritime Organization, respectively."[27] The UNFCCC Conference of Parties will meet in Copenhagen in December 2009 to try to agree a successor to the Kyoto Protocol. It is unlikely the IMO will be able to present an agreed proposal to this meeting.

Progress towards an international agreement

15. The international nature of shipping has made it difficult to find an agreement to limit emissions that applies only to developed economies. Negotiations have been hampered by the difficulty encountered in reconciling the approach favoured under the Kyoto Protocol, which recognises "common but differentiated" responsibility, with the approach traditionally taken in the IMO, which has been to find solutions that are applied equally across the globe. The blame for this would appear to be shared between a lack of priority shown by Annex I nations and the blocking actions of developing nations within the IMO.

16. While we heard repeated tributes to the efforts of the IMO Secretariat to foster an agreement,[28] the evidence from Gillian Reynolds, Principal Environment and Sustainability Adviser at Lloyd's Register, suggested that this interest in climate change in fact came very late in the day:

> In 2005 most of the activity on [the environment …] was almost exclusively directed to the SO_x and NO_x [air quality] issue. Then there came along the realisation of the seriousness of the greenhouse gas emission issue. For the past year or so IMO have been trying exceptionally hard to get discussion and agreement on this matter […][29]

26 The Montreal Protocol is aimed at reducing emissions of gases which destroy the ozone layer; some of these are also greenhouse gases.

27 Kyoto Protocol to the United Nations Framework Convention on Climate Change, Article 2.2

28 Q208, Q258

29 Q208

Mark Major, a senior official at the European Commission, told us that it was not until 2006 that the IMO announced a timetable for discussion meetings on greenhouse gases leading to the Copenhagen Conference; and that in 2008, while the IMO had held three one-week meetings on this issue, there had only been talk about principles, with nothing concrete decided.[30]

17. The increased interest shown by the IMO Secretariat in recent years may be a result of the threat by the European Commission that it would take unilateral action if progress was not made, and the possibility that the UNFCCC might adopt an agreement on shipping at Copenhagen independently of the IMO. Pressure might be applied if an agreement can be reached outside the IMO process and then imported into it. An agreement (possibly on a regional scale) might be faster and easier to achieve outside the IMO processes, and such external negotiations might pressure the IMO to make faster progress. **With a view to stepping up the pressure to achieve an IMO-wide agreement, we recommend the Government maintain a constructive approach within the IMO, while actively seeking agreements to limit shipping emissions outside the IMO process—notably within the European Union, and through the UNFCCC.**

18. Hopes that a proposal would be agreed by IMO members in time for agreement at Copenhagen faded last autumn; in early October 2008, a meeting of the IMO's Maritime Environment Protection Committee (MEPC) failed to make the progress required for the Copenhagen timetable. Dr Andre Stochniol, author of one of the main proposals under discussion within the IMO, told us that the issue was raised too late in the day in October 2008 for there to be proper discussion; the item will next be raised at the July 2009 MEPC meeting. He said, "This will be too late for the Copenhagen Protocol. The draft text for the Copenhagen Protocol needs to be ready by June 2009, one month before the next meeting".[31]

19. Miguel Palomares, Director of the Marine Environment Division of the IMO, was hopeful that the MEPC meeting in July 2009 could still make "great advances"; he suggested that the IMO might be able informally to present one or more proposals for consideration at the Copenhagen Conference.[32] He admitted that progress had been difficult, and laid the blame at the feet of the Kyoto Protocol:

> […] I might say that the wording of [Article] 2.2 of the Kyoto Protocol itself might have been somewhat in the way of more speedy progress in this. The article starts by saying that the parties included in Annex 1 (that is industrialised countries) shall pursue limitation or reduction of greenhouse gas emissions from […] shipping through the IMO. This is being read by some members as saying that *only* Annex 1 countries have the obligation to pursue this reduction […][33]

Mr Palomares explained that this was considered to be contradictory to the IMO's principle of applying its regulations to all the world's shipping, irrespective of nationality.

30 Annex

31 Q30

32 Q80

33 Q68

Moreover, given the international nature of the industry, the attempt to restrict regulations to Annex I countries would face severe practical obstacles.[34]

20. In Mark Major's view there were no reasons in principle why such practical obstacles could not be overcome, and nor was there anything intrinsically incompatible between the principles of the Kyoto Protocol and those of the IMO.[35] He agreed that the key stumbling block so far had been the sensitivities of developing countries; they appeared unwilling to concede the principle that they—even in the form of ships under their flag—should be subject to national emissions targets, much less to discuss the details of what contribution each of them should make, prior to the Copenhagen Conference.[36] Gillian Reynolds had a similar view and told us: "For the past year or so IMO have been trying exceptionally hard to get discussion and agreement on this matter; but there has been […] this well orchestrated union of non-Annex 1 countries preventing any progress on the matter."[37] Joan Ruddock MP said the Government did not expect the IMO to agree a scheme that it could take to Copenhagen, as some countries were opposed to an agreement, preferring to wait until after Copenhagen, and all other expected agreements were secured.[38]

21. No witnesses believed it was likely that a global scheme to tackle shipping emissions would actually be agreed at Copenhagen. The consensus of opinion was that it would be some years before a global scheme would be ready to come into force. Mark Major of the European Commission believed the Copenhagen Conference could make a useful contribution if it agreed the principle that international maritime emissions should be included in national totals, and indicated what size of cuts the global shipping industry should be making.[39] Phillip Andrews, a senior official from the Department of Energy and Climate Change, expressed a similar view.[40] Gillian Reynolds was hopeful that progress on extending national emissions targets to developing countries would lead to progress in tackling shipping emissions afterwards.[41] Andre Stochniol thought the international community might miss out on the opportunity to bring shipping emissions under control until the Copenhagen Protocol were reviewed, some time in the 2020s.[42] Others were more hopeful that a scheme could still be worked out in the intervening years within the IMO. Even so, Jim Fitzpatrick MP believed that once agreement on the principles of a global scheme had been reached, it would still take between two and three years to legislate for it within the IMO—and if a new IMO convention were required to do this, getting it ratified would take even longer.[43]

22. Despite this prognosis, Jim Fitzpatrick MP explained that the Government was "not completely pessimistic or negative", partly because:

34 Q68
35 Annex
36 Annex
37 Q208
38 Q258
39 Annex
40 Q260
41 Q211
42 Q30
43 Q260

> If we do not get an IMO agreement then the European position is reserved similar to our stance on aviation, which is if we cannot get a world agreement then we might have to look at devising a European scheme to at least start the ball rolling, much as we have done with aviation coming into the EU ETS in due course.[44]

23. The European Commission is reviewing the potential measures that the EU could bring in unilaterally to curb shipping emissions, notably a proposal to include ships visiting EU ports in the EU Emissions Trading Scheme. (Further potential measures are outlined in the Annex to this Report.) Mark Major told us the Commission would focus on creating something that would build on the discussions that have taken place within the IMO, and could lead eventually to a global scheme.

The role of the UK in international negotiations

24. Several witnesses were critical of the Government's effort in advancing negotiations within the IMO on limiting emissions of greenhouse gases from shipping. Three submissions suggested that, while the UK *had* been active within the IMO in pushing for agreement on tackling air pollution, it was not among the leading voices on tackling climate change.[45] WWF suggested that one reason for this is that the UK delegation is led by representatives of the Maritime and Coastguard Agency (MCA) and the Department for Transport, who have historically dealt with more technical issues (such as ballast water), rather than by climate change specialists within Defra.[46] Gillian Reynolds said she had been a member of the UK delegation and had attended meetings since 1990. She told us the UK, which normally had a progressive stance on issues within the IMO, had been rather passive on the issue of cutting greenhouse gases.[47] She explained that there was a disjointedness between the different departments and agencies involved in the UK's delegation to the IMO—the Maritime and Coastguard Agency, Department for Transport, Department for Environment, Food and Rural Affairs (and now DECC), and HM Treasury.[48]

25. These criticisms were vigorously contested by the Government. Jim Fitzpatrick MP told us: "It is our view that we have been the most vocal country in calling for detailed discussions on the merits of, for example, [emissions trading], and we have submitted several documents to the IMO over the last few years on these topics […]".[49] He went on to say that a working group of officials from the Department for Energy and Climate Change, the Treasury, the Department for Transport and the Maritime and Coastguard Agency met every four to six weeks to discuss and develop policy on emissions from shipping. He explained that what the UK was doing at the IMO was overseen at a very senior level; the

44 Q258

45 Ev 3, 11, 54

46 Ev 3

47 Q212

48 Q212

49 Q262

working party reported to senior officials in the cross-Whitehall Climate Change and Energy Strategy Board, which reported directly to Cabinet."[50]

26. Although there are no concrete proposals on emissions from shipping from the UK, the UK is supporting a Swedish proposal.[51] Phillip Andrews, from DECC, explained:

> There is a tactical point […] to our interventions, which is we try not to lead talks […]: if others are bringing forward ideas we agree with, we should agree with them. We are seen as [having] very strong views on climate change; we are setting very strong targets; we are demonstrating the way. Frankly, we waving our flag can scare some of the more nervous countries on what we are actually proposing. If people are doing the work and delivering effective ideas we feel it best to come in behind them as part of consensus rather than be the ones looking to again push the UK kind of approach. […][52]

27. In our view, those that argue that the terms of the Kyoto Protocol had from the start doomed any attempts to agree a global deal to failure are failing to recognise the range of options for unilateral and regional actions, such as efforts by the European Union to get EU-wide agreement on a scheme. Whatever the practical obstacles to be overcome, there is no reason in principle why the IMO could not introduce regionally-based schemes that target Annex I countries. In order to protect their negotiating position at Copenhagen developing nations have hindered discussion within the IMO. But the lack of progress towards an agreement reflects equally badly on Annex I countries. This is particularly true of counties, such as the UK, that have in other forums been vocal about the need to tackle climate change. It took until 2005 for the UK to submit a paper to the IMO on the use of emissions trading to tackle emissions from shipping emissions.[53] The UK has still not submitted a concrete proposal. Witnesses from the Chamber of Shipping praised the efforts and influence of the UK delegation within the IMO,[54] but thought "the UK could do more to refine an Emissions Trading Scheme."[55]

28. **We deplore the ongoing delays in reaching a global agreement to tackle greenhouse gas emissions from shipping. We recommend the Government work with the European Commission to examine the merits and practicalities of its proposals, with the aim of achieving practical action as swiftly as possible. We recommend that the Government follow up its proposals to the IMO on emissions trading with some concrete proposals or makes clear what alternative solution it is working towards.**

50 Q262

51 Q279

52 Q280

53 "Prevention of air pollution from ships—The potential of emissions trading to reduce carbon emissions from ships", paper submitted by the United Kingdom to the IMO Marine Environment Policy Committee, MEPC 54/4/2, 16 December 2005

54 Q115

55 Q118

Shipping emissions and the Climate Change Act

Accounting for emissions from shipping

29. Appearing before us in June 2006, the then Secretary of State for Transport, the Rt Hon Douglas Alexander MP, told us that the Government's position was that it should channel its efforts into securing an international agreement on shipping, and not take domestic action in advance of such a deal, because of the practical difficulties in unilaterally cutting the UK's share of international emissions.[56] This policy was reaffirmed in the draft Climate Change Bill, published in March 2007, where the Government's proposal was that the UK's share of emissions from international shipping and aviation was to be excluded from the proposed system of legally binding carbon budgets (although there was to be a provision enabling them to be included at some future date).[57] In our Report on the draft Bill we characterised the Government's approach as saying: "We don't have the policy instruments to deal with this, so [let's] pretend it doesn't exist". Notwithstanding the practical difficulties, we recommended that international maritime (and aviation) emissions should be included within the system of UK carbon budgets from the outset.[58] Our recommendations on the draft Bill were rejected by the Government.[59]

30. In October 2008 Lord Turner, Chairman of the Committee on Climate Change (CCC), wrote to the Rt Hon Ed Miliband MP, Secretary of State for Energy and Climate Change, to say that international shipping and aviation should not be included within the UK's carbon targets and budgets. But he did recommend that they should be included in the Government's carbon reduction strategy, implying that other sectors would have to make steeper cuts if emissions from shipping and aviation were not themselves being reduced.[60] Before the Climate Change Bill was passed it was amended to include a clause adding international shipping and aviation to a list of factors the Secretary of State must "take into account" when setting UK carbon budgets.[61] This was widely understood to mean that other sectors of the economy would have to make steeper cuts if aviation and shipping did not make cuts in their emissions.[62]

31. When the CCC's detailed advice was published this interpretation was borne out for aviation but not for shipping. Their advice was that the UK's share of international aviation emissions should not be formally included within UK carbon budgets, but the trends in these emissions should be taken into account in setting carbon budgets for the rest of the

56 See, for instance, Environmental Audit Committee, *Reducing Carbon Emissions from Transport*, Q719

57 Environmental Audit Committee, Seventh Report of Session 2006–07, *Beyond Stern: From the Climate Change Programme Review to the Draft Climate Change Bill*, HC 460, Qq126–7

58 EAC, *Beyond Stern: From the Climate Change Programme Review to the Draft Climate Change Bill*, para 96

59 Defra, *Taking Forward the UK Climate Change Bill: The Government Response to Pre-Legislative Scrutiny and Public Consultation* , October 2007, Cm 7225, para 1.31

60 Letter from Lord Turner of Ecchinswell to the Secretary of State for Energy and Climate Change, 7 October 2008

61 Climate Change Act 2008, section 10

62 Q3

economy.[63] The CCC took a different line on emissions from shipping. The recommendation is that the Government should *not* take international shipping emissions into account when setting carbon budgets for the rest of the economy—until emissions from shipping are included in the EU's targets for greenhouse gas emissions:

> It is […] essential that international shipping emissions are allowed for in the setting of the UK's carbon budgets. To the extent that these are not falling, for example, effort in other sectors should be higher to maintain an overall GHG emissions reduction target derived from a climate objective. But, whereas international aviation emissions are included in the EU's 20% and 30% GHG targets, international shipping emissions are not included. The implication is that international shipping emissions are not accounted for in our carbon budget proposals, which are derived from the EU's targets.[64]

32. The CCC recommended that the UK should press for the EU to include the EU's share of international shipping in its 2020 emissions targets. Only once such agreement was reached should the UK tighten its carbon budgets to reflect the extra effort needed by the rest of the economy to account for shipping emissions.[65] The CCC recommended it should report annually on the proportion of international shipping emissions that could be attributed to the UK.[66]

33. The Committee on Climate Change's rationale for recommending that the Government should not take action in advance of agreement by the EU was as follows:

i. It is not clear how to measure the UK's share of international shipping emissions;

ii. If the UK were to act unilaterally, resulting in a tightening of its carbon budgets, it might cut its emissions more steeply than required to meet its share of the EU's 2020 target. The result of this might be that other EU Member States act as "free riders" on the additional efforts of the UK, thus choosing to do less than was required of them to meet the EU target. As the CCC put it: "In this event, there would be a financial implication for the UK with no environmental benefit";

iii. Even if other EU Member States were not to relax their targets in response, unilateral action from the UK would only have a small environmental impact.[67]

34. We are not entirely convinced by the CCC's objections to unilateral action, either that the UK would suffer financially for no net environmental benefit, or that the environmental benefit would only be small. Crucially, the CCC seems to be ignoring the possibility that, by acting in advance of other nations, the UK could help to break diplomatic logjams and encourage other countries to follow suit. **We agree with the Committee on Climate Change that the Government should work to secure the inclusion of shipping emissions within the EU's climate change targets. But we do not**

63 Committee on Climate Change, *Building a low-carbon economy*, p 323

64 Committee on Climate Change, *Building a low-carbon economy*, p 332

65 Committee on Climate Change, *Building a low-carbon economy*, p 307, p 332

66 Committee on Climate Change, *Building a low-carbon economy*, p 332

67 Committee on Climate Change, *Building a low-carbon economy*, p 332

see why shipping should be treated differently from aviation. We recommend the Government consider taking international shipping emissions into account in setting UK carbon budgets from day one, in a similar fashion to emissions from international aviation.

35. This recommendation raises a number of questions, not least: what is the size of the UK's share of international shipping emissions (and how to measure them, and ensure this is consistent with the totals for other countries)? The Committee on Climate Change is certainly right to say there is no clear agreement on how to measure the UK's share of international shipping emissions. This matters so much because of the wide discrepancy between results, depending on which methodology is chosen; according to the Government, the UK's share has an estimated range of between 7 and 24MtCO_2.[68]

Measuring emissions from shipping

36. The method currently used is based simply on the records of fuel sold from international shipping fuel bunkers in the UK and dependent territories. (This is in keeping with international convention: although international shipping emissions are excluded from its Kyoto and domestic targets, the Government is obliged to record these figures in an annex to its national emissions accounts.) On this basis, the UK's share of international shipping emissions stood at 6.9MtCO_2 in 2007, virtually unchanged from its emissions of 6.7MtCO_2 in 1990.[69] If figures for bunker fuel sales globally were reliable (which they are not) then fuel sales could provide a reasonable estimate of global emissions from shipping. But they are not suitable for apportioning emissions to different countries; bunker fuel sales in the UK are not a guide to the UK's share of global emissions. Ships may choose to refuel in a particular country for a number of reasons; some ships visiting the UK may not take on a full load of fuel here if they have just refuelled in another European port.

37. This underlines the importance of measuring and acting on the UK's share of international shipping emissions. Only if we have accurate figures for international shipping (and aviation) emissions can we know whether UK carbon emissions have actually gone down since 1990. There was some confusion over this point during our evidence session,[70] and we asked the Ministers to send us a written note. Their supplementary evidence included the figures presented in Table 1, and stated categorically: "both on a CO_2 only basis, […] for all GHGs, and based on bunker fuel methodology, UK emissions have reduced".[71]

68 Ev 67–8

69 Greenhouse gas emissions arising from use of fuels from UK 'international bunkers', Defra, www.defra.gov.uk/environment/statistics

70 Qq 299–301

71 Ev 85

Table 1 UK emissions including international shipping and aviation

UK Emissions with and without international aviation and shipping, calculated by bunker fuel sales								
			CO_2 Only ($MtCO_2$)			All Kyoto GHGs ($MtCO_2e$)		
Year	Kyoto total	International aviation	International shipping	Kyoto total and International aviation and shipping	Kyoto total	International aviation	International shipping	Kyoto total and International aviation and shipping
1990	593.5	15.7	6.7	615.9	774.9	15.9	6.7	797.5
2006	555.9	35.6	6.8	598.3	653.8	36.0	6.9	696.6
1990–2006 (absolute)	-37.7	19.9	0.1	-17.7	-121.1	20.1	0.1	-100.9
1990–2006	6.3%	126.2%	1.9%	-2.9%	-15.6%	126.2%	1.9%	-12.7%

Source: Ev 85

38. We agree with the Government that, including the UK's share of international shipping and aviation emissions as they are currently measured, UK CO_2 has gone down by around 18 million tonnes from 1990 to 2006, a fall of around 2.9%. This itself would put UK emissions a long way short of the Government's target of cutting CO_2 emissions by 20% by 2010. We also agree with the Government that the method of calculating the UK's share of international shipping emissions is unreliable. Joan Ruddock told us: "[I]t undoubtedly underestimates the emissions from shipping […] I know there was a period in which measuring from bunker fuels we seemed to be on a plateau but actually we know that trade was growing."[72] If the UK's share of international shipping emissions were $24MtCO_2$, at the upper end of the Government's estimate (calculated using a different methodology to recording bunker fuel sales), total emissions in the UK would be around $18MtCO_2$ higher in 2006 than the Government's evidence suggested, and UK carbon emissions would not have gone down at all since 1990.

39. The evidence we received discussed a number of alternative methodologies for measuring the UK's share of international shipping emissions. The Tyndall Centre suggested that, given the correlations between economic activity and demand for imports, a better reflection of a country's contribution to shipping emissions would come from dividing total emissions from global shipping (calculated from global bunker fuel sales) by each country's share of global GDP. For the UK, this would result in much larger figures (for 2005) of around $30MtCO_2$, or around 5% of total UK CO_2 emissions.[73] WWF advocated a route-based system of accounting: e.g. emissions of ships on routes that end at a UK port would count to the UK. The Government confirmed it was looking at the merits of a number of different methodologies, including estimating the emissions arising from vessels' activities in UK waters.[74] None of these alternatives is without its problems (see Box 2). **The current methodology for calculating international shipping emissions underestimates actual emissions. The Government must produce a more accurate estimate, and state what effect this would have on total UK CO_2 emissions were it to be**

72 Q288, Q303

73 Based on global estimates, as per the IMO, of global shipping emissions of around $800MtCO_2$.

74 Qq 288–292

taken into account. We recommend that the Government consult on the methodology it should use to calculate the UK's share of international shipping emissions.

Box 2 Difficulties with alternative methods for calculating national shares of global shipping emissions

Allocation of global shipping emissions to each country, in proportion to its share of global GDP: One problem with this is that there are not comprehensive figures for bunker fuel sales from all countries, thus the reported global emissions total, from which national totals would be calculated, is thought to be too low. Alternatively, a global total could be estimated—though this would be subject to uncertainty and controversy.

Another problem is that, under this proposal, there would be no link between the actions of a government (other than by reducing its share of global GDP) and the emissions that would be attributed to it. Thus there would be no direct incentive for any government to seek to accelerate the carbon efficiency of shipping over which it had some authority.

Allocating emissions to a country, based on the journeys made by each ship docking there (route-based allocation): The main problem with this methodology is that much shipping (e.g. container ships) may dock in several countries on a single journey. Jesper Kjaedegaard of Maersk explained: "Imagine a ship that comes in from, say, Asia calling at three or four ports in Asia, calling at one port in the Middle East and maybe one in Egypt before it reaches Europe, how do we assign the emissions on that particular voyage, to a particular port or a particular region? It would be very, very difficult to manage."

In addition, this method might encourage ship operators to make unnecessary calls in port in order to evade or reduce any financial penalties imposed on the basis of distance of individual journey legs between ports. For instance, the Government argued to us that this method could result in "the establishment of hubs just outside the states implementing the measures e.g. if implemented by the EU, at the African Mediterranean coast, this will lead to increased emissions, transport delays and increased shipping costs."

Allocations to a country, based on the emissions arising from shipping cargo from one port to another: The advantage of this proposal is that it would get around the difficulty discussed above, of ships calling at several ports, since it would track the whole journey of cargo containers, from whichever port they were loaded on, to whichever port they were unloaded. The chief disadvantage is that it would potentially be very complicated to administer.

Other allocation methods
Other suggested methods have their own problems. As previously referred to, allocation on the basis of bunker fuel sales may be inaccurate and is vulnerable to evasion, if ship owners decide to buy fuel in countries outside any carbon pricing or reduction regime. Allocation on the basis of nationality (or "flag") of shipping would be highly unreliable, given that ships can easily be "reflagged" to avoid state regulations. The Government also reports that one of the methods it is considering, vessel activity within national waters, is "data hungry and hence costly".

Source: Q103, Ev 68

40. Another key question is whether, in advance of any international market-based instrument, the Government should take direct action to reduce the UK's shipping emissions (rather than simply leave them alone, and make correspondingly greater cuts in emissions from the rest of the economy)? This idea received sharp criticism from the Chamber of Shipping. Robert Ashdown argued that any unilateral attempt by the UK to impose some form of carbon charge would simply lead to evasion:

> It is very likely then that the container ships would no longer touch at the UK to deliver cargo; they would perhaps go into Rotterdam and then use feeder ships to bring the cargo across from Rotterdam so that you only then paid the carbon on the

> very short journey across the North Sea. The entire leg from Asia up to Rotterdam would be exempt.[75]

Jesper Kjaedegaard, Vice-President of the Chamber of Shipping, observed:

> It would not be very good for Britain if we saw a lot of the bases in Aberdeen and Peterhead move to Bergen or Germany, simply because there is a fee for calling at Aberdeen and Peterhead but there is no fee for calling at Bergen. You can service the North Sea rigs out of both. So we want to make sure it is not detrimental to the British flag and the British bases.[76]

Edmund Brookes, Deputy Director-General of the Chamber of Shipping, also raised the possibility that charges imposed on shipping might lead to "reverse modal shift", with freight being moved around the UK by road instead of by coastal shipping.[77]

41. **In pursuing any policy mechanism designed to curb UK shipping emissions, it will be important to seek to work within a multinational scheme, in order to maximise effectiveness and minimise evasion. We recommend that the Government push for agreement within the EU on measures to tackle shipping emissions at a European level. It will also be important to test policies so that they avoid "reverse modal shift" from shipping to road freight. Until a European or global agreement is reached, we recommend that the Government should simply adjust the carbon budgets for the rest of the economy downwards to compensate for the volume of the UK's international shipping emissions.**

75 Q134

76 Q141

77 Q123

Mitigating emissions from shipping

The scope for cutting emissions

Cutting emissions through new technology

42. The majority of evidence we received argued that new technology has significant potential to improve ships' efficiency—for instance, through new designs for high-tech sails and wind turbines. A summary of some of the evidence we received is at Box 3.

Box 3 Technological possibilities for reducing CO_2 from shipping

Peter Lockley of WWF argued that, unlike the aviation sector, the shipping industry has a number of unrealised technological options to make substantial reductions in its emissions intensity. He drew our attention in particular to a new generation of "sky-sails"—essentially large kites "which run out in front of the ship and describe a figure of eight in order to maximise the pull on the ship." While stressing that these have only been demonstrated on a small number of ships to date, he told us that "in the optimum conditions they save up to 57% of a ship's fuel."

Greenwave, the environmental shipping organisation, also extolled the virtues of wind power. Referring to wind turbines they were developing in the UK (which, similarly, could be retrofitted to existing ships), they told us that four such "full size wind engines can deliver the same thrust as a Boeing 737 at take off"; and that: "Average annual savings of 13% can be achieved representing around 900 tonnes of fuel per ship (for say a 60,000 tonne bulk carrier) equivalent to almost 3,000 tonnes of CO_2."

Gillian Reynolds of Lloyd's Register told us that the potential for technical measures to reduce CO_2 emissions has been estimated at up to 30% in new ships, and up to 20% in existing ships or ships constructed using present technology. Among the technologies which could improve fuel efficiency in the short-term, she highlighted recovery of waste heat from engines to heat crew quarters, new materials to coat hulls and reduce friction in the water, and improved energy efficiency of onboard electrical systems (e.g., lighting, air conditioning).

The Government has "recently commissioned a Shipping Emissions Abatement Techniques Review, which examines the technological and operational options for reducing air quality pollutant and carbon emissions, their applicability, impact costs and potential timescales for uptake." The Department for Transport has also published a Low Carbon Commercial Shipping Study (2007) which concluded that the most promising low carbon technologies were improvements to current propulsion technologies; and wind-assisted propulsion.

Source: Q22; Ev 95, 55, 69; Low Carbon Commercial Shipping: Summary of results, Department for Transport, 10 January 2007, www.dft.gov.uk

43. While there was optimism about the potential for technological improvements to improve the efficiency of conventional oil-driven ships, there was much less confidence in the possibility of new sources of energy to displace fossil fuels altogether.[78] In fact, we received almost no evidence on alternative fuels whatsoever. As an example, when we asked Edmund Brookes of the Chamber of Shipping, "How much research is going on into alternative methods of powering ships, other than using fossil fuel?", he replied: "There have been nuclear cargo ships in the past but I think that has proven not to be acceptable. I am not aware of particular research on things like fuel cells and that sort of thing."[79]

78 For example, Gillian Reynolds told us hydrogen and biofuels might possibly emerge as a solution, but only in the long term, with wind and solar contributing, but only as a supplementary source of energy. Ev 55

79 Q156

Operational efficiencies

44. We heard evidence of a number of operational changes that could make a significant impact on ships' emissions—things such as "enhanced weather routing, optimized trim and ballasting, hull and propeller cleaning, better main and auxiliary engine maintenance and tuning, speeding up ship unloading and slower steaming."[80] On the latter point, Peter Lockley told us: "simply by travelling slower ships can save up to 40 per cent of fuel on some of the routes."[81] Jesper Kjaedegaard explained: "It is like your car, the last 20 miles of speed consumes far more than the first 50, and the same with a ship. If you […] go down to 20–21 knots you are really saving something like 20–25 per cent of the oil."[82] The IMO has calculated that a speed reduction of just 10% across the global fleet by 2010 would result in over a 23% reduction in emissions.[83]

Realising the potential to cut emissions

Government investment

45. We examined a number of ways in which the Government could accelerate the development and deployment of technological and operational improvements. We heard several appeals for government support, both for R&D into new technologies, and directly for ship owners, to help them meet the costs of making technological improvements.[84]

46. All industries might naturally tend to make similar appeals. The Chamber of Shipping attempted to explain why marine technology was an especially deserving case for state support: "[Our] industry suffers from fragmentation. There is no major market leader that has a 20–25% share [and] the size of financial strength to fund the research and development […]"[85] In a specifically British context, the environmental shipping organisation Greenwave made the further argument that investment in green technologies would aid regional economic revival by providing good quality jobs based around historic shipyards.[86] Regarding their own programmes, Greenwave told us: "we have, to date, been unable to identify any assistance from the government to support either our research or the marketing of the developed solutions."[87]

47. The Government told us that there were regular meetings with shipping companies, owners, manufacturers to discuss support for new technology.[88] But it was clear that little is happening domestically beyond these discussions.[89] There is no specific budget allocated to low-carbon marine technology, but funding is available from the Engineering and Physical

80 Ev 55

81 Q22

82 Q153

83 Oceana, *Shipping Impacts on Climate: A source with solutions*, July 2008, p 9

84 Ev 53, 97

85 Q156

86 Ev 97

87 Ev 96

88 Q310

89 Q311

Sciences Research Council, which "has awarded grants for the development of such technology, such as the Advanced Marine Electric Propulsion Systems (AMEPS) developed at Strathclyde University."[90] The Department for Transport drew our attention to a review it had commissioned to analyse the most promising methods for abating emissions from shipping.[91]

48. **We welcome the fact that the Department for Transport has commissioned a Shipping Emissions Abatement Techniques Review. We recommend it work together with the Technology Strategy Board to review the potential for UK universities and industry to develop these technologies, and exploit the economic opportunities arising from them.[92] This review should identify where Government support could help British researchers, designers, and shipyards to become global leaders in technologies that can be applied worldwide. We recommend that particular attention should be paid to technologies that can be retrofitted to existing ships, as this could have the biggest impact in the short- to medium-term. We also recommend the Government encourage more research into technologies which offer a genuine alternative to fossil fuels: if shipping is to be decarbonised it needs truly alternative propulsion systems.**

Putting a price on carbon to encourage emissions reductions

49. The IMO has discussed a number of ideas to encourage measures to reduce emissions, such as adopting 'slower steaming' or retrofitting wind turbines. Of these, the only ideas regarded as having the potential to create a binding international emissions reduction regime are the proposals for a 'market-based instrument'—i.e. a scheme that puts a price on carbon. This could be a tax, a trading scheme, or hybrid of the two, and would create a financial incentive to cut emissions from shipping.[93] (see Box 4).

Box 4 The IMERS proposal for a hybrid levy-and-trading scheme

One of the main proposals under discussion at the IMO is for a hybrid tax-and-trading scheme. This is a based on the design for an "International Maritime Emissions Reduction Scheme" (IMERS), proposed by Dr Andre Stochniol. Under this proposal, an emissions cap would be agreed for global shipping. Emissions charges (based on this emissions cap, combined with the market price for CO_2) would be imposed on ships' journeys, calculated from the amount of fuel used. If emissions remained above the cap, these would be offset by the purchase of carbon credits from other sectors.

The emissions charges on ships' journeys would be varied according to different routes to different countries, in order to achieve differentiation between developed and developing countries. Ship managers would be responsible for reporting the fuel used for the voyages ended in the previous month, with CO_2 emissions, and hence charges, calculated from these data. Those who pay for ships' fuel, typically vessel charterers, would be responsible for payment of emission invoices issued on monthly basis. As an alternative, the fuel data could be based on the records from international fuel bunkers.

Dr Stochniol argues that this proposal would be hard to evade, weight charges towards those countries best able to pay them, and be faster and cheaper to establish than an emissions trading

90 Ev 85

91 Ev 69

92 The Technology Strategy Board is a non-departmental public body (NDPB), sponsored by the Department for Innovation, Universities and Skills. It describes its role as being to "stimulate technology-enabled innovation in the areas which offer the greatest scope for boosting UK growth and productivity" (www.innovateuk.org).

93 Q8

scheme.

Jim Fitzpatrick told us the Government had reviewed this proposal, but decided that "working out an emissions charge for a particular ship based on its cargo would be very complicated, given that many ships have different cargos with various origins and destinations at the same time, so we did not think that that would be a runner."

Source: Ev 9-13; Q 279

50. The Government's preference is for an emissions trading scheme. This would encourage ship owners and charterers to invest in new technology, and make operational efficiencies, by utilising the "polluter pays" principle. By placing a cap on the overall emissions from shipping (whether on a global or regional basis), a cost would be added to each unit of carbon a ship emitted; ships with lower emissions would gain a competitive advantage over those with higher emissions, which would have to pay more to buy extra carbon credits to cover their emissions. Although the Government has yet to bring forward within the IMO detailed proposals for a trading scheme, there are outline plans by the European Commission to include shipping within the EU Emissions Trading Scheme. One option would be to include shipping within Phase III of the EU Emissions Trading Scheme (EU ETS), whether from its start in 2013, or from some future year.[94] In our 2007 report on the EU ETS, we had recommended that the Government "explore with European partners the potential of including the maritime sector within a future phase of the EU ETS."[95] The Government responded: "we intend to press the Commission to build a robust evidence of the economic impacts and practicalities involved in pursuing […] expansion [of the EU ETS] to shipping."[96]

51. Several witnesses stressed the complications in each proposal, some seeming to suggest that the practical obstacles would be overwhelming.[97] But while it often seemed in our inquiry that the possibility of designing a viable scheme were hopeless, certain facts pointed towards there being a solid foundation for a practicable and effective solution. First, ships are required to hold their fuel receipts for the past three years; and all fuel suppliers are obliged to keep copies for the same length of time.[98] Second, two British companies—Martek Marine, and Cascade Technologies—told us they had developed technology that could be fitted to ships to measure their actual emissions, and to allow this information to be collected anywhere in the world in real time.[99] Indeed, the Chamber of Shipping told us there was no technical problem in recording the actual emissions from individual ships.[100] Third, all ships have to dock somewhere, which means governments have the opportunity to enforce compliance of individual vessels through port state control, as a condition of entry.[101]

94 Other potential options for EU action are also listed in the Annex.

95 Environmental Audit Committee, Second Report of Session 2006–07, *The EU Emissions Trading Scheme: Lessons for the future*, HC 70, para 46

96 Environmental Audit Committee, Eighth Report of Session 2006–07, *Emissions Trading: Government Response to Committee's Second Report of 2006–07 on the EU ETS*, HC 1072, p 46

97 For example, Q68, Q103, Q134, Q216.

98 Q140

99 Ev 86–8, 93–5

100 Q125

101 Q49

52. **It is not technically difficult to measure emissions; the difficulty is the political question of how they are apportioned. We believe it would be technically feasible to establish an international emissions control regime—whether on a regional or global basis—that could accurately charge (or require carbon permits from) each ship according to its actual emissions, and securely enforce and verify compliance. A truly global regime would be ideal, but while this is negotiated and constructed we recommend the Government work with European partners to establish a scheme that applies across the European Union.**

53. The Government justifies its support for emissions trading in preference to fuel levies because, it says, trading schemes ensure a minimum level of carbon savings by placing a cap on emissions. Joan Ruddock MP said: "we do believe that the best way is to find some form of emissions trading where that is accompanied by a very specific cap. That is the only guaranteed way to get reductions."[102] But the Government won't say what specific caps should be applied to shipping. Indeed, one of the papers the UK submitted to the IMO stated one of emission trading's advantages was that it:

> […] avoids the need to address the unanswerable question as to "what should the shipping industry be allowed to emit". The shipping industry will be a player in the emissions reductions markets as well as in all its existing markets, and its participants will themselves adjust their activities and emissions as they strive to be profitable in that context.[103]

54. The experience of Phase I of the EU ETS was that too loose a cap meant the system failed to cut emissions at all. Whatever system is imposed to reduce emissions from shipping, there must be an effective overall cap. **The Government's position on the use of emissions trading to tackle greenhouse gas emissions from ships is too vague. It promotes emissions trading because this is said to impose a definite cap on emissions but will not discuss what cap shipping should be given, nor what cap any wider schemes shipping is linked to should have. We recommend the Government clarify what cap should be imposed on emissions from shipping in any trading scheme.**

55. We examined one further issue common to all these proposals: whether *in practice* putting a price on carbon would actually drive any changes in behaviour or investment, and achieve any significant reductions in emissions from shipping. A number of witnesses—notably Terry Barker—argued strongly that once a market-based emissions scheme were applied to shipping, the industry would have an economic incentive to become more fuel-efficient and invest in greener technology.[104] However, the same proponents of carbon pricing also tended to argue that it would be relatively easy for ship owners to pass on the extra costs to importers; and that end-consumers would be unlikely to notice any difference. Dr Stochniol, for example, suggested that a 5% levy on shipping fuel would translate into an increase in final prices of goods transported by sea of only 0.1%—so that "when I import [a] car from Malaysia costing 5000 dollars, I will only have

102 Q275

103 "Prevention of air pollution from ships—The potential of emissions trading to reduce carbon emissions from ships", paper submitted by the United Kingdom to the IMO Marine Environment Policy Committee, MEPC 54/4/2, 16 December 2005, p 4

104 Q178

to pay five dollars".[105] Dr Barker was certain that even if it were easy to pass on the extra costs, ship owners would still respond to a carbon charge by seeking ways to reduce their emissions.[106] Nevertheless, if it were very easy simply to pass on the costs of a carbon charge, we would have some concerns about the effectiveness of any proposed carbon pricing scheme. **Given that carbon pricing lies at the heart of its strategy on shipping emissions, we recommend the Government commission research on the relationship between: (i) levels of charges; (ii) changes in ship owners' investment decisions and operational practices; (iii) consumer behaviour; and (iv) the impact on emissions.**

The contribution of trading schemes to funding for adaptation

56. The Government's position on proposals to use a market-based scheme to raise revenue for climate change adaptation in developing countries is not clear. Jim Fitzpatrick MP told us that one of the reasons the Government was in favour of an emissions trading scheme for shipping was because it could raise funds for climate change adaptation.[107]

57. Elsewhere, according to Peter Lockley, the Government has argued *against* proposals for a scheme designed to work in this manner. He said that the Government's position was inconsistent[108] because of the actions of HM Treasury:

> The problem with the UK position is that they do not have a credible story to tell about how we would spend that money if we were to raise it, because they are opposed to any international form of taxation. Shipping is a global industry. We would advocate a global body to collect that revenue and then to feed it into a fund managed by the UNFCCC to do the climate work, the adaptation and mitigation. The UK explicitly stated they would be opposed to that because international taxation harms our national sovereignty, therefore they cannot really sell the proposal to the developing countries because the developing countries do not believe they will ever see the money […][109]

58. In addition to concerns over the distribution of revenues by an international body, the Government also has objections to the principle of hypothecating revenues to any particular end. For example, Joan Ruddock MP told us:

> I think one could not entirely close off the possibility that […] there might be some hypothecation, but as a principle […] hypothecation is something that we do not accept for ourselves and we do not believe it should be imposed in an international agreement.[110]

This seems at odds with Jim Fitzpatrick MP's statement, which specifically cited the raising of funds for adaptation as one of the Government's reasons for supporting a trading scheme.

105 Q44

106 Q180

107 Q279

108 Q16

109 Q10

110 Q278

59. Another argument against hypothecation made by the Ministers was that it is bound up with proposals for a levy on shipping fuel, rather than an emissions trading scheme. Joan Ruddock MP argued that a levy "is not accompanied by any limit [on emissions, …] it simply takes money but says, 'Go on growing' […]", whereas emissions trading schemes impose a definite cap on emissions.[111] This might have been an argument against introducing a levy, but it was not an answer to the question we had asked, which was about why the Treasury was opposed to hypothecating revenues from a market-based instrument. After all, hypothecation is not solely an issue for carbon levies. Indeed, the Minister confirmed that the issues relating both to hypothecation as a principle, and to the distribution of revenues by an international body, would equally apply to auctioning permits under an emissions trading scheme.[112]

60. **Government statements on the potential for an international scheme to curb shipping emissions to raise funds for climate change adaptation in developing countries are unclear. The Government appears to support this as an objective; but it also has concerns over the distribution of such funds by an international body, as well as appearing simply to oppose hypothecating revenues from emissions trading schemes for this purpose. We recommend the Government explain precisely what its position is, and how it proposes to overcome its objections—given that any proposed scheme, whether a levy or a trading scheme, will involve the collection and disbursement of international funds, at least partly for the express purpose of assisting developing nations with mitigation and adaptation.**

The IMO Design Index and Operational Index

61. While the IMO Secretariat did not expect a proposal for a market-based scheme to be agreed in time to take to the Copenhagen Conference, it was more hopeful in the case of proposals for an Energy Efficiency Design Index and Operational Index;[113] the Government shared this expectation.[114] The Design Index is intended to help those who are commissioning new ships to compare the fuel efficiency implications of different design features—for instance, hull shape, choice of propeller, the use of wind turbines, and waste heat recovery systems. The proposal for the Operational Index is for a voluntary scheme, which would enable ship owners and operators to evaluate the performance of their fleets, with regard to fuel efficiency and CO_2 emissions.[115]

62. We heard some fairly disparaging evidence as to the likely impacts of both measures. Mark Major told us there had been considerable discussion at IMO meetings in 2008 about the Design Index; but that there had been no agreement on when it would come into force, which vessels it would be applied to, how it was going to be enforced, how it would be tightened, or what quantity of emissions it would abate.[116] Peter Lockley cautioned that, in seeking to make the energy efficiency implications of a multitude of design features

111 Q278

112 Q284

113 Ev 22

114 Ev 69

115 Ev 22

116 Annex

comparable, the proposed Design Index might be too complex to be effective. In particular, he warned that "with a formula that complicated there would be a lot of possibility for gaming the system".[117] Gillian Reynolds said its impacts were uncertain, and what effects it would have would only be apparent in the long term, as it would only apply to new ships.[118] This latter point was echoed, not just by Andre Stochniol,[119] but by the IMO Secretariat itself, Miguel Palomares telling us: "we will have to wait to see the benefits of that until those ships are built and operating."[120]

63. Evidence we received on the merits of the proposed Operational Index was scarcely more promising. Mr Palomares was confident that it would be a useful tool, helping ship operators to monitor whether any operational efficiency measures they were taking were having an effect.[121] However, Gillian Reynolds stressed that it was not going to be mandatory; and not just this, but it was only going to apply to individual ships.[122] Godfrey Souter, Head of Branch, Shipping and the Marine Environment, at the Department for Transport, said the Government was pressing within the IMO for the Operational Index to be made mandatory for new ships.[123] When asked what impact this would have on emissions, he replied, "our aspiration is to drive efficiency by 10% by 2020 and 30% by 2050", but admitted, "that is aspiration."[124]

64. **We are unimpressed by the evidence we have heard on the ambition, rigour, and likely effectiveness of the proposed Energy Efficiency Design Index and Operational Index. The weakness of the latter is particularly disappointing, given that very simple operational measures (such as slower steaming) have a significant potential to reduce carbon emissions quickly, and often without large investments. We commend the Government's efforts towards getting agreement on making the Operational Index mandatory for all new ships. We recommend that the Government, working with the European Commission, explore other measures to encourage or compel shipping operators to improve efficiency.** We note, for example, that in California the Ports of Los Angeles and Long Beach have implemented a speed reduction programme, providing financial incentives for ships that remain below a certain speed within 20 nautical miles.[125] This could provide a model for cutting speeds within UK or EU coastal waters.

Portside regulations

65. We heard from Mark Major that among the options under consideration by the European Commission was a proposal to vary port dues (the charges levied by ports to allow ships to dock), according to the environmental performance of different ships;

117 Q24

118 Q232

119 Q32

120 Q92

121 Q92

122 Q232

123 Q268

124 Q269

125 Oceana, *Shipping Impacts on Climate: A source with solutions*, p 9

though he cautioned that this might be complex to implement.[126] We asked representatives from the UK's major ports what they made of this proposal. Alan Cartwright (of the Port of London Authority, and an advisor to the UK Major Ports Group) thought they could work, but that it would be difficult to mandate it in this country since British ports are private enterprises, not state-controlled like many of their continental counterparts.[127] Howard Holt (of Dover Harbour, and the British Ports Association) posed the more fundamental question of whether giving greener ships priority would have a beneficial impact overall, if it meant dirtier ships remained in port, emitting pollution, for longer.[128] On the basis of this evidence, we believe further research is needed. **We recommend that the Department for Transport review the benefits, practicalities and costs of variable port dues, according to the environmental performance of different ships. In doing this, it should work with the European Commission, with the aim of harmonising policy across EU ports.**

126 Annex

127 Q246

128 Q248

Air quality and non-CO_2 contributions to climate change

66. The harmful effects of shipping emissions extend beyond carbon dioxide. Ships also emit sulphur oxides (SO_x), nitrogen oxides (NO_x), black carbon and particulate matter. NO_x and black carbon are significant contributors to global warming. NO_x emissions lead to the creation of ozone, a powerful greenhouse gas, in the lower atmosphere; black carbon (commonly known as soot) both directly warms the atmosphere and indirectly contributes to global warming by reducing the Earth's albedo (thereby increasing the amount of solar radiation that is absorbed by the earth rather than reflected back into space), especially where it settles on ice. Ocean-going ships are responsible for approximately 30% of global NO_x emissions,[129] and 1.7% of global anthropogenic emissions of black carbon.[130] In addition, both SO_x and NO_x exacerbate the acidification of the oceans (itself one of the direct effects of increased concentrations of carbon dioxide) by contributing to acid rain.[131]

67. Emissions from shipping fuel are also associated with a variety of adverse effects on public health. A recent study by James Corbett and others estimated that shipping-related emissions of particulate matter are "responsible for approximately 60,000 cardiopulmonary and lung cancer deaths annually, with most deaths occurring near coastlines in Europe, East Asia, and South Asia."[132] The study suggested that: "Under current regulation and with the expected growth in shipping activity, we estimate that annual mortalities could increase by 40% by 2012."[133]

68. This was one area in which we were able to observe grounds for considerable optimism. Miguel Palomares of the IMO told us: "The 60,000 deaths that [have been] attributed to ship exhaust gases have been contested in any case, but, come what may, we are very, very confident that this would be reduced drastically in the near future."[134] The reason for his confidence was the agreement in October 2008 of the IMO's Marine Environment Protection Committee to introduce stricter controls on the emission of SO_x and NO_x. Describing the impacts of these changes, Mr Palomares told us:

> These are going to be very drastic indeed. In particular, in the case of sulphur emissions, the global cap at the moment stands at 4.5 per cent sulphur content in the fuel. That progressively will be reduced up to 2020, when the maximum sulphur content in fuel will be 0.5 of a per cent. In emissions control areas like the North Sea, the English Channel, and the Baltic, this will be reduced by 0.1 of a per cent by 2015.[135]

129 Oceana, *Shipping Impacts on Climate: A source with solutions*, p 9

130 Oceana, *Shipping Impacts on Climate: A source with solutions*, p 7

131 Oceana, *Shipping Impacts on Climate: A source with solutions*, p 8

132 James Corbett *et al*, "Mortality from Ship Emissions: A Global Assessment", *Environ. Sci. Technol*, vol 41 (2007), p 8512

133 Corbett *et al*, "Mortality from Ship Emissions: A Global Assessment", p 8512

134 Q99

135 Q95

Compliance with these regulations can be achieved by cleaning either the inputs to a ship's engines (i.e. switching to low sulphur fuel) or its outputs (by means of on-board scrubbers, devices which remove unwanted gases and particles from exhaust emissions). Mr Palomares was confident these changes would also reduce shipping's impacts on global warming, as well as reducing its contributions to ocean acidification (via acid rain) to negligible levels.[136]

69. While all the witnesses we spoke to welcomed these new regulations, they were divided on the practicalities of implementation. Peter Lockley cautioned that some IMO member states were already raising concerns over the costs of implementation, and warned that this might lead to pressures to weaken the regulations.[137] The Chamber of Shipping gave some weight to his concerns by warning:

> An unwelcome consequence [of these regulations] for shipping in northern Europe will be an effective doubling of bunker fuel prices from 2015. It is our concern that this will lead to 'modal back-shift'—i.e. a decrease in the amount of intra-European sea-transport and a corresponding rise in the use of road transport. Should this occur it will clearly have a detrimental impact on overall carbon emissions.[138]

70. Jim Fitzpatrick MP told us that "the Maritime and Coastguard Agency will be carrying out a research project in the new year to quantify the cost and benefits" of the regulations.[139] Godfrey Souter said that, leaving costs on one side, shipping companies had the ability to comply with the new targets.[140] Both the Minister and Mr Souter were firmly convinced that these measures would lead to a significant reduction in the non-CO_2 contributions of shipping to global warming.[141]

71. **We welcome the progress made within the IMO on limiting the emissions of particulate matter and harmful gases other than CO_2. This gives us confidence that shipping's environmental impacts from these emissions—on climate change, ocean acidification, and public health—are being significantly reduced. The Government must ensure that the tightening of regulations agreed at the IMO last year is conformed to in practice. The Government ought to investigate the concerns raised by the UK shipping industry that increased costs arising from these regulations will lead to freight being transferred from sea to road; but this must not be used as an excuse for watering down these regulations.** Given the superior carbon efficiency of shipping over road transport, any 'reverse modal shift' from sea to road would suggest that road freight was not paying a fair share for its contribution to climate change; the policy response ought that road freight bears its proper share of the costs of its greenhouse gas and other emissions.

136 Q98

137 Q25

138 Ev 32

139 Q323

140 Q321

141 Q326

Cold ironing

72. The effects of shipping emissions on air quality are inevitably felt most in ports and in the communities that surround them. Ships in port run their engines in order to power their on-board systems, continuing to emit pollutants while in berth. Peter Lockley proposed that "the ports' authorities themselves could tackle that problem, for instance by providing onshore electricity, preferably renewable electricity, directly into the ships so that they did not have to run their engines."[142] The provision of shore-side electricity to berthed ships is known as 'cold ironing'.

73. Representatives of ports and of the shipping industry argued that 'cold ironing' would make little impact on carbon emissions if the electricity were taken from the national grid; Howard Hold told us: "In the UK, where we generate a lot of our power by coal, are we not just transferring that from the port to Stoke-on-Trent, or somewhere else?"[143] They also raised a number of practical concerns—not least about the cost of building new infrastructure; but also about the lack of an international standard for electrical connections to ships—but agreed that it was possible in principle.[144] Alan Cartwright suggested that:

> […] where significant port developments are going ahead, for example London Gateway, Bristol, other areas where they are doing that, then it is sensible for them to put that infrastructure in, trusting that there is a power supply that can be provided with some kind of environmental benefit.[145]

74. Government policy on 'cold ironing' appears to be undergoing revision. The Department for Transport's Ports Policy Interim Review states categorically that:

> […] we would like to see ports work harder to reduce emissions from ships while alongside by the provision, where feasible, of shore-side fixed electrical power supplies to replace ships' generators while in port (a practice known as 'cold ironing'). This can substantially reduce emissions. […] **W]e will in future expect newly developed terminals to make advance provision for 'cold ironing' facilities. We will also expect major ports to formulate plans for introducing such facilities at existing terminals once a standard** [on electrical connections] **has been agreed**.[146]

In evidence to us, however, Jim Fitzpatrick MP said: "the jury is still out on the quantification of savings that can be made through cold ironing, and the latest information we have suggests that it would not be substantial […] O]bviously that does contradict the Ports Policy Review document that we published some little time ago."[147] He told us that

142 Q25

143 Q244

144 Q244

145 Q244

146 Department for Transport, *Ports Policy Review Interim Report*, 19 July 2007, p 9

147 Q316

more work was needed on its economic costs and environmental benefits before the Department could reach a definitive conclusion.[148]

75. The provision of electricity to ships in berth is not a priority for climate change policy. Until grid electricity is decarbonised it would have little impact on carbon emissions, unless ports installed new renewable energy generating infrastructure; while this would be welcome, there might be considerable practical and economic obstacles in doing so, especially at existing facilities. Cold ironing has the potential to make improvements in local air quality and consequently public health. But this potential benefit might be diminished by the general improvement in air quality impacts from shipping—especially in the North Sea—expected to arise from new IMO regulations. **We recommend the Government assess the case for mandating cold ironing to improve air quality in the UK, taking into account the projected air quality benefits of recent IMO regulations. The Government should include this issue in its forthcoming national policy statement on ports. The Government should also consider the potential benefits, as an alternative to cold ironing, of extending the stricter regulations that will apply to the North Sea to other coastal waters around the UK.**

148 Q317

Conclusion

76. Tackling the climate change impacts of shipping is necessarily complex. An international industry, its sources of emissions are, by definition, highly mobile; not only this, but registration of ships can be transferred swiftly from country to country. Its emissions are generated in journeys between different nations (often of markedly different levels of wealth), making it difficult to calculate the size of emissions that should be attributed to each country. Yet there can be no excuse for the lack of progress within the IMO in the years since the Kyoto Protocol was signed. That the IMO has yet to reach agreement even over the type of emissions control regime to take forward, let alone decide any details—much less bring any scheme into implementation—suggest that it is not fit for purpose in this vital area.

77. None of the obstacles discussed as reasons for the lack of progress within the IMO is insurmountable. It is perfectly feasible to track the emissions of individual ships, given they are obliged to keep their fuel receipts, and that it is straightforward to calculate CO_2 emitted from fuel consumed. Nor should it be too difficult to calculate how much carbon has been emitted on individual legs of a ships' journey, for the purpose, for instance, of varying carbon charges according to the port of destination. Most of all, ships must physically enter a port at some point; it is not as though this were an industry beyond the control of individual governments. If the EU, for instance, were to introduce one or more schemes to curb emissions from shipping, the European market for imported goods would not disappear. Vessels would continue to visit European ports; in doing so, the EU, through local port authorities, would have the ability to impose compliance with an emissions trading scheme or levy, or with regulations mandating certain technological or operational measures designed to improve carbon efficiency. There are many details that would need to be considered in designing a policy instrument, not least the potential means by which ship owners might try to evade charges or regulations. But it is clear that a policy instrument, even if imperfect, is an entirely practical proposition; and an imperfect scheme would be much better than no scheme at all.

78. Ship owners ought to have a positive attitude towards carbon reduction policies—so long as these were applied equally to other transport modes. Mark Major argued strongly that shipping ought to do relatively well out of a carbon-constrained world, given that it is the most carbon-efficient mode of transport. Terry Barker stressed the potential for large amounts of air freight to be transferred to ships, with accompanying carbon savings. In order for modal shift towards shipping to be realised, joined up policymaking would be required, so as to ensure that any regime that increases costs or imposes carbon limits on shipping does not act in isolation, which could lead to modal shift back from sea to road or air.

79. Shipping may be the most carbon-efficient mode of transport, but absolute levels of CO_2 in the atmosphere (and oceans) matter more than the efficiency with which they are produced. All parties, within the shipping industry and responsible for shipping policy, need to respond more urgently to the challenge of climate change. This means developing a future path for global emissions cuts that is consistent with avoiding dangerous climate change, and making shipping fit within these efforts. If globally we are to meet extremely

challenging emissions reductions targets in the next few decades, the absolute scope for emissions from shipping is necessarily going to be severely circumscribed. Given the central importance of shipping to world trade, and to overall economic growth, it should be a vital interest, not merely of the shipping industry, but of all industries and all governments, drastically to accelerate R&D into low- and zero-carbon propulsion systems.

Conclusions and recommendations

Shipping and global climate change goals

1. Policy must have a rational basis. Given the absence of a consensus within the international community, the Government should take the lead in determining what level of emissions from shipping would be compatible with delivering the objective of limiting the rise in global temperatures to 2°C. This should be used in turn to determine targets for emissions from shipping in 2020 and 2050. The Government should then use these global figures to inform its policies and actions by making an estimate of the UK's share of the global total. The Government should commission research on recommended targets for shipping emissions in 2020 and 2050, and for the trajectory of emissions that should link them. (Paragraph 13)

Progress of international negotiations to tackle CO_2 from shipping

2. With a view to stepping up the pressure to achieve an IMO-wide agreement, we recommend the Government maintain a constructive approach within the IMO, while actively seeking agreements to limit shipping emissions outside the IMO process—notably within the European Union, and through the UNFCCC. (Paragraph 17)

3. We deplore the ongoing delays in reaching a global agreement to tackle greenhouse gas emissions from shipping. We recommend the Government work with the European Commission to examine the merits and practicalities of its proposals, with the aim of achieving practical action as swiftly as possible. We recommend that the Government follow up its proposals to the IMO on emissions trading with some concrete proposals or makes clear what alternative solution it is working towards. (Paragraph 28)

Shipping emissions and the Climate Change Act

4. We agree with the Committee on Climate Change that the Government should work to secure the inclusion of shipping emissions within the EU's climate change targets. But we do not see why shipping should be treated differently from aviation. We recommend the Government consider taking international shipping emissions into account in setting UK carbon budgets from day one, in a similar fashion to emissions from international aviation. (Paragraph 34)

5. The current methodology for calculating international shipping emissions underestimates actual emissions. The Government must produce a more accurate estimate, and state what effect this would have on total UK CO_2 emissions were it to be taken into account. We recommend that the Government consult on the methodology it should use to calculate the UK's share of international shipping emissions. (Paragraph 39)

6. In pursuing any policy mechanism designed to curb UK shipping emissions, it will be important to seek to work within a multinational scheme, in order to maximise

effectiveness and minimise evasion. We recommend that the Government push for agreement within the EU on measures to tackle shipping emissions at a European level. It will also be important to test policies so that they avoid "reverse modal shift" from shipping to road freight. Until a European or global agreement is reached, we recommend that the Government should simply adjust the carbon budgets for the rest of the economy downwards to compensate for the volume of the UK's international shipping emissions. (Paragraph 41)

Mitigating emissions from shipping

7. We welcome the fact that the Department for Transport has commissioned a Shipping Emissions Abatement Techniques Review. We recommend it work together with the Technology Strategy Board to review the potential for UK universities and industry to develop these technologies, and exploit the economic opportunities arising from them. This review should identify where Government support could help British researchers, designers, and shipyards to become global leaders in technologies that can be applied worldwide. We recommend that particular attention should be paid to technologies that can be retrofitted to existing ships, as this could have the biggest impact in the short- to medium-term. We also recommend the Government encourage more research into technologies which offer a genuine alternative to fossil fuels: if shipping is to be decarbonised it needs truly alternative propulsion systems. (Paragraph 48)

8. It is not technically difficult to measure emissions; the difficulty is the political question of how they are apportioned. We believe it would be technically feasible to establish an international emissions control regime—whether on a regional or global basis—that could accurately charge (or require carbon permits from) each ship according to its actual emissions, and securely enforce and verify compliance. A truly global regime would be ideal, but while this is negotiated and constructed we recommend the Government work with European partners to establish a scheme that applies across the European Union. (Paragraph 52)

9. The Government's position on the use of emissions trading to tackle greenhouse gas emissions from ships is too vague. It promotes emissions trading because this is said to impose a definite cap on emissions but will not discuss what cap shipping should be given, nor what cap any wider schemes shipping is linked to should have. We recommend the Government clarify what cap should be imposed on emissions from shipping in any trading scheme. (Paragraph 54)

10. Given that carbon pricing lies at the heart of its strategy on shipping emissions, we recommend the Government commission research on the relationship between: (i) levels of charges; (ii) changes in ship owners' investment decisions and operational practices; (iii) consumer behaviour; and (iv) the impact on emissions. (Paragraph 55)

11. Government statements on the potential for an international scheme to curb shipping emissions to raise funds for climate change adaptation in developing countries are unclear. The Government appears to support this as an objective; but it also has concerns over the distribution of such funds by an international body, as well as appearing simply to oppose hypothecating revenues from emissions trading

schemes for this purpose. We recommend the Government explain precisely what its position is, and how it proposes to overcome its objections—given that any proposed scheme, whether a levy or a trading scheme, will involve the collection and disbursement of international funds, at least partly for the express purpose of assisting developing nations with mitigation and adaptation. (Paragraph 60)

12. We are unimpressed by the evidence we have heard on the ambition, rigour, and likely effectiveness of the proposed Energy Efficiency Design Index and Operational Index. The weakness of the latter is particularly disappointing, given that very simple operational measures (such as slower steaming) have a significant potential to reduce carbon emissions quickly, and often without large investments. We commend the Government's efforts towards getting agreement on making the Operational Index mandatory for all new ships. We recommend that the Government, working with the European Commission, explore other measures to encourage or compel shipping operators to improve efficiency. (Paragraph 64)

13. We recommend that the Department for Transport review the benefits, practicalities and costs of variable port dues, according to the environmental performance of different ships. In doing this, it should work with the European Commission, with the aim of harmonising policy across EU ports. (Paragraph 65)

Air quality and non-CO_2 contributions to climate change

14. We welcome the progress made within the IMO on limiting the emissions of particulate matter and harmful gases other than CO_2. This gives us confidence that shipping's environmental impacts from these emissions—on climate change, ocean acidification, and public health—are being significantly reduced. The Government must ensure that the tightening of regulations agreed at the IMO last year is conformed to in practice. The Government ought to investigate the concerns raised by the UK shipping industry that increased costs arising from these regulations will lead to freight being transferred from sea to road; but this must not be used as an excuse for watering down these regulations. (Paragraph 71)

15. We recommend the Government assess the case for mandating cold ironing to improve air quality in the UK, taking into account the projected air quality benefits of recent IMO regulations. The Government should include this issue in its forthcoming national policy statement on ports. The Government should also consider the potential benefits, as an alternative to cold ironing, of extending the stricter regulations that will apply to the North Sea to other coastal waters around the UK. (Paragraph 75)

Annex

Environmental Audit Committee Visit to Brussels, 4 November 2008

Participating Members:

Mr Tim Yeo, in the Chair

Mr Martin Caton	Mark Lazarowicz
Colin Challen	Dr Desmond Turner
David Chaytor	Joan Walley

Mark Major and Hans Meijer: The EU and efforts to reduce emissions from shipping

Mark Major and Hans Meijjer are Policy Officers in the Clean Air and Transport Unit, DG Environment, European Commission.

Progress within the International Maritime Organization (IMO)

There have been almost no concrete outcomes on tackling greenhouse gases (GHGs) from shipping since Annex I parties to the Kyoto Protocol committed themselves to working through the IMO to address GHGs from international shipping. It was not until 2006 that the IMO announced a timetable for discussion meetings on GHG to conclude at a meeting of its Maritime Environment Policy Committee (MEPC) in July 2009. To illustrate the lack of progress, in 2008 the IMO had held three one-week meetings on this issue, but there had only been agreement on principles; nothing concrete has been decided.

It is often said that the reason for the lack of progress within the IMO is the conflict between the UNFCCC principle of "common but differentiated responsibilities" and the IMO principle of applying its rules to all shipping, irrespective of nationality. While proposals within the IMO for a global scheme are being blocked by developing countries, there is not necessarily a conflict of principles between the two regimes. Firstly—a wider point—the preamble of the UNFCCC refers to "cooperation by all countries […] in accordance with their common but differentiated responsibilities and respective capabilities and their social and economic conditions"; some non-Annex-I countries have the capabilities to cut shipping emissions. Secondly, the IMO principle applies to all ships, not all nations. Thirdly, and most importantly, the blocking actions of developing countries within the IMO is simply a political strategy, a matter of them reserving their negotiating positions prior to the Copenhagen UNFCCC Conference. In other words, there are no reasons *in principle* why an effective global scheme could not be agreed within the IMO.

There has been considerable discussion at IMO meetings in 2008 about an Energy Efficiency Design Index for new ships; but there has been no agreement so far on when it is going to be applied, which vessels it will be applied to, how it is going to be enforced, how it will be tightened as it progresses, or what size of emissions it will mitigate.

Recently the IMO decided to block a proposal to make public reporting of ships' actual fuel consumption and carbon emissions mandatory. The IMO's position was that mandatory reporting would be difficult to enforce, and thus it was not worth introducing.

It seems to be the majority view within the IMO that any global scheme to limit GHG emissions will require a new convention (as opposed to being included as an annex to an existing IMO convention, e.g. as MARPOL Annex VII). This would probably mean that even once there was agreement within the IMO on such a global scheme, it would take a decade or more to be ratified and then come into effect.

Most national delegations to the IMO are members of their respective transport ministries, rather than environment departments; their focus is not primarily on climate change. There is a need for more/better co-ordination in national capitals delegations to the IMO often do not follow the same policy lines their governments take at the UNFCCC.

Many shipping industry representatives have observer status at the IMO; they are allowed to speak, though not to vote. As the IMO works by seeking as far as possible to achieve consensus agreement, rather than make decisions through voting, such observers can wield considerable influence on the IMO's work.

Copenhagen Conference

It is unlikely the Copenhagen Conference will come to any detailed agreements on shipping emissions. It could, however, make a big contribution simply by agreeing the principle that international maritime emissions should be included in national totals, and by indicating what size of cuts the global shipping industry should be making.

Action by the European Union

The European Commission (the Commission) is reviewing the potential measures that the EU could bring in unilaterally to curb shipping emissions; a proposal should be ready by October 2009. The Commission would focus on creating something that would build on the discussions that have taken place within the IMO, and which would lead towards an eventual global solution.

One option would be to include shipping within Phase III of the EU Emissions Trading Scheme. This may not be ready in time for the start of Phase III in 2013, but could be included some time between 2013 and 2020. Other options for action by the EU (these would not all be mutually exclusive, but could be complementary) could include:

- Varying port dues according to the environmental performance of individual ships (implementation might be complex);
- Regulations to mandate certain environmental standards for ships docking at EU ports (a problem with this is that it might simply displace worse vessels to other parts of the world, with no or little net improvement across the globe);
- Regulations to reduce the escape of greenhouse gases used as onboard refrigerants;
- Improving port infrastructure to reduce incidences of ships steaming unnecessarily fast to their destination, only to have to wait to be unloaded;

- Regulations or incentives to improve onboard energy management;

The legal power of the EU impose measures on ships is under evaluation.

Ships already have an obligation to carry bunker fuel certificates. It would be simple to add an obligation to quantify fuel consumption on each leg of a ship's journey. These figures could be monitored and recorded in each port. Hypothetically, this is something that could be introduced within the EU, and monitored by EU ports.

The shipping industry and its potential to mitigate emissions

So long as all transport modes are treated fairly, shipping will be one of the winners in a carbon-constrained world. Shipping is more carbon-efficient than other modes of transport; and for the majority of intercontinental freight transport there is no alternative to it.

The shipping industry should be able to pass on the extra costs associated with reducing emissions to importing companies, who should in turn be able to pass them on easily to final consumers. The extra cost will be very small relative to the overall costs of finished products to end consumers.

In recent years there has been talk within the IMO of measures to curb emissions that could be taken voluntarily; but the shipping industry universally rejected such options as ineffective.

Emissions reduction schemes that provide ship owners with a financial incentive to invest in new and more efficient technology should be good for the EU ship design, equipment supply and construction industries.

In recent years the global shipping industry has seen a rapid increase in shipping capacity, to cope with increased volumes of trade. The current economic slowdown has already resulted in an overcapacity. This should make slower steaming (which would make ships more fuel- and hence carbon-efficient) more attractive: rather than leaving a ship idle, ship owners could enter it into their supply loops, and simply run their entire fleets more slowly.

Air quality

The Commission has issued a statement on "cold ironing" (i.e. where ships switch their engines off in port, and power onboard systems via electricity provided by the port authority). Cold ironing can be very good for local air quality and reduce GHG emissions depending on local circumstances. However, it may be very expensive, with different ports having different demands; thus it would be very difficult to make mandatory across the EU.

Formal Minutes

Tuesday 12 May 2009

Members present

Mr Tim Yeo, in the Chair

Mr Martin Caton	Mr Nick Hurd
Colin Challen	Dr Desmond Turner
Martin Horwood	Joan Walley

Reducing CO_2 and other emissions from shipping

The Committee considered this matter.

Draft Report (*Reducing CO_2 and other emissions from shipping*), proposed by the Chairman, brought up and read.

Ordered, That the draft Report be read a second time, paragraph by paragraph.

Paragraphs 1 to 79 read and agreed to.

Annex and Summary agreed to.

Resolved, That the Report be the Fourth Report of the Committee to the House.

Ordered, That the Chairman make the Report to the House.

Ordered, That embargoed copies of the Report be made available, in accordance with the provisions of Standing Order No. 134.

Written evidence was ordered to be reported to the House for printing with the Report, together with written evidence reported and ordered to be published on 21 October and 18 November 2008, in the last Session of Parliament.

Written evidence was ordered to be reported to the House for placing in the Library and Parliamentary Archives.

[Adjourned till Tuesday 2 June at 10.00am

Witnesses

List of written evidence

List of unprinted evidence

The following memoranda have been reported to the House, but to save printing costs they have not been printed and copies have been placed in the House of Commons Library, where they may be inspected by Members. Other copies are in the Parliamentary Archives, and are available to the public for inspection. Requests for inspection should be addressed to The Parliamentary Archives, Houses of Parliament, London SW1A 0PW (tel. 020 7219 3074). Opening hours are from 9.30 am to 5.00 pm on Mondays to Fridays.

Dr Andre Stochniol, supplementary written evidence

Lloyd's Register supplementary papers:

(i) Lloyd's Register-DNV paper on technical and operational options for reducing CO2 emissions from shipping.

(ii) Spreadsheet indicating the share of the world fleet calling at European ports in 2007 in terms of numbers of ships, dwt and gt.

(iii) Abstract from a recent Lloyd's Register-Fairplay report to EC DG-TREN. Figures 92–97 indicate breakdown of world fleet in terms of Flag State, Country of owner and Country of operator, both in terms of gt and %gt.

List of Reports from the Committee during the current Parliament

The reference number of the Government's response to each Report is printed in brackets after the HC printing number.

Session 2008–09

First Report	Work of the Committee in 2007–08	HC 108
Second Report	Environmental Labelling	HC 243
Third Report	Pre-Budget Report 2008: Green fiscal policy in a recession	HC 102

Session 2007–08

First Report	Are biofuels sustainable?	HC 76-I & -II (HC 528)
Second Report	Reducing Carbon Emissions from UK Business: The Role of the Climate Change Levy and Agreements	HC 354 (HC 590)
Third Report	The 2007 Pre-Budget Report and Comprehensive Spending Review: An environmental analysis	HC 149-I & -II (HC 591)
Fourth Report	Are Biofuels Sustainable? The Government Response	HC 528 (HC 644)
Fifth Report	Personal Carbon Trading	HC 565 (HC 1125)
Sixth Report	Reaching an international agreement on climate change	HC 355 (HC 1055)
Seventh Report	Making Government operations more sustainable: A progress report	HC 529 (HC1126)
Eight Report	Climate change and local, regional and devolved government	HC 225 (HC 1189)
Ninth Report	Carbon capture and storage	HC 654)
Tenth Report	Vehicle Excise Duty	HC 907 (HC 72)
Eleventh Report	The Exports Credit Guarantee Department and Sustainable Development	HC 929 (HC 283)
Twelfth Report	Greener homes for the future? An environmental analysis of the Government's house-building plans	HC 566
Thirteenth Report	Halting biodiversity loss	HC 743 (HC 239)

Session 2006–07

First Report	The UN Millennium Ecosystem Assessment	HC 77 (HC 848)
Second Report	The EU Emissions Trading Scheme: Lessons for the Future	HC 70 (HC 1072)
Third Report	Regulatory Impact Assessments and Policy Appraisal	HC 353 (HC 849)
Fourth Report	Pre-Budget 2006 and the Stern Review	HC 227 (HC 739)

Fifth Report	Trade, Development and Environment: The Role of FCO	HC 289 (HC 1046)
Sixth Report	Voluntary Carbon Offset Market	HC 331 (HC 418)
Seventh Report	Beyond Stern: From the Climate Change Programme Review to the Draft Climate Change Bill	HC 460 (HC 1110)
Eighth Report	Emissions Trading: Government Response to the Committee's Second Report of Session 2006–07 on the EU ETS	HC 1072
Ninth Report	The Structure of Government and the challenge of climate change	HC 740 (HC 276)

Session 2005–06

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Oral evidence

Taken before the Environmental Audit Committee

on Tuesday 21 October 2008

Members present

Mr Tim Yeo, in the Chair

Mr Martin Caton	Martin Horwood
Colin Challen	Jo Swinson
Mr David Chaytor	Joan Walley

Memorandum submitted by WWF-UK

WWF-UK welcomes the opportunity to contribute to this timely inquiry into an important but little-discussed source of CO^2 emissions. Our responses to the questions are set out below.

How significant is global shipping's contribution to climate change? How is this projected to change in the future?

WWF understands that the provisional figure of 1,200 $MtCO_2$ for the global shipping industry is likely to be an overestimate, and that at the 58th Marine Environment Protection Committee meeting (MEPC 58, taking place in London from 6-10th October) a central estimate of approximately 850 $MtCO_2$ will be presented. Nonetheless, this represents around 4% of anthropogenic CO_2. Global shipping emissions are greater than those of all but the 6 heaviest-emitting countries—more than the UK and almost equal to Germany.

Shipping emissions have roughly doubled since 1990 and the IMO forecasts continued growth as demand increases, even allowing for potential gains in efficiency. Furthermore, the sulphur particles in ship emissions, which exert a cooling effect in the short term, are likely to diminish substantially as tough new standards (that have already been agreed) come into force over the next two decades.

How should the UK's share of international maritime emissions be measured and included in UK carbon budgets? How fast could this be done?

WWF-UK advocates a global sectoral approach to tackling shipping emissions (see further under Q3). In such a scheme the responsible entity is not the country but the shipowner (just as airlines, not Member States, will have to surrender allowances when aviation enters the EU ETS). Contrary to the impression given by the Government, this does *not* mean that the UK should exclude these emissions from its national totals; such an argument could equally apply to all traded sectors in the ETS from 2013 and our national totals would then cover less than half of our overall emissions.

Even if a global scheme can be negotiated (which is far from certain), it would be prudent to include shipping in the UK's account; to ensure that the national effort to combat climate change is a comprehensive one.

Unlike for aviation, calculating shipping emissions from fuel sold in the UK gives a poor picture of the overall level of activity. On this measure the UK's shipping emissions (reported as memo items to our National Inventory under the terms of the Kyoto Protocol) have stayed static since 1990, despite an increase in shipping activity in and out of the UK.

WWF-UK, therefore, advocates a route-based system of accounting: emissions of ships on routes that end at a UK port would count to the UK. This is in line with the principle that the importer generates the demand for, and bears the cost of, the associated transport. This approach was judged feasible in terms of methodology and data availability at a technical workshop last year,[1] and is the most attractive option if it proves politically necessary to differentiate Annex I from non-Annex I emissions for a global climate change agreement (although please note that WWF sees this as less preferable than a global agreement).

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[1] Technical workshop on GHG emissions from aviation and maritime transport in Oslo 4-5 October 2007—conclusions by the organisers. See http://www.eionet.europa.eu/training/bunkerfuelemissions/Conclusions%20of%20workshop.doc

What are the prospects of international agreements to control and reduce carbon emissions from global shipping, or to bring it within wider emissions trading schemes?

Bunker fuel emissions occupy a precarious niche at UNFCCC negotiations. Aviation is barely discussed, and shipping has only recently begun to get a hearing, but some Parties wish to see both sectors left exclusively to ICAO and IMO and therefore struck off the UNFCCC agenda.

These Parties (OPEC, US and others) point to Article 2.2 of the Kyoto Protocol, which states that Annex I parties should "pursue limitation and reduction" of GHGs from these sectors working through IMO and ICAO. Article 2.2 contains a paradox that has blocked progress on bunker emissions for the past decade: IMO and ICAO are charged with tackling Annex I emissions, but IMO and ICAO do not recognise UNFCCC Annexes or operate on the UNFCCC principle of Common But Differentiated Responsibilities; rather they have apparently contradictory principles of treating all ships (or airlines) the same, regardless of nationality.

Over the last 18 months or so, IMO has suddenly begun to play a very pro-active role in seeking to limit GHG emissions from shipping (providing a welcome contrast to the ICAO). Work is underway on a range of measures: a design index for new ships, an operational index for existing ships, a menu of best practice options, but most importantly in WWF's view, and certainly most controversially, a "market-based instrument", of which there are two basic variants: a cap-and-trade scheme, or a levy on emissions / fuel use.

Schemes of this nature have been proposed by Norway, Denmark and Germany and would apply globally, to emissions of all ships, regardless of nationality. The revenues raised (potentially tens of billions of dollars) would be spent on adaptation and mitigation objectives in developing countries. Proponents of such schemes argue that it is not possible to divide up shipping emissions in a way that is not liable to evasion, ie it is not possible to differentiate between Annex I and non-Annex I parties in the *application* of a market-based instrument. They argue, though, that the benefits of the revenue being spent in developing countries outweigh the costs to those countries, and that the principle of Common But Differentiated Responsibilities (CBDR) is thus respected in the distribution of revenue.

Opponents of a global scheme (chiefly the BRICS countries—Brazil, India, China and South Africa) do not accept that CBDR can be honoured in this way. They view a global scheme as an imposition of Annex-I style targets on non-Annex I parties (although the proposals are for operator emissions trading, so liable entity is not the country but the operator of the ship, just as airlines not Member States will surrender allowances when aviation enters the EU ETS).

The alternative to a truly global scheme is one that applies to "Annex I" emissions only, but this requires a definition of what emissions can be attributed to Annex I Parties.

It is widely recognised that differentiation by flag is unfair (77% of ships are flagged in developing countries), contrary to IMO principles, and easy to evade; a ship can be re-registered under a new flag in a matter of hours.

A variant would be to differentiate according to the nationality of the ship owner, as many Panamanian-flagged ships (for instance) are controlled by companies registered in Annex I countries. The UN Convention on Trade and Development (UNCTAD) publishes statistics based on "state of effective control", and the majority of ships by this definition belong to Annex I countries. But the problem still applies, if there were climate policy that imposed a cost only on ships owned by Annex I countries, there would be an exodus of ship-owning companies from Annex I to non-Annex I, much in the same way as some companies currently register in offshore tax havens where it suits them.

A more interesting possibility is a route-based approach (see answer to previous question). Emissions on all routes to Annex I ports would be subject to a cap-and-trade scheme or levy, regardless of who owned the ships or where they were flagged. This would impose the cost on consumers (importers) in the developed countries, as ship owners passed through costs, and it would respect IMO principles as all ships on a given route would be treated the same. The question is whether such a policy would lead to evasion, for instance by ships making an extra port call at a country on the edge of the Annex I zone (eg a ship from Shanghai to Rotterdam docks briefly at Casablanca). Research carried out for WWF by CE Delft suggests that this type of evasion might be attractive to ship owners at a carbon price of around \$30/tCO_2; one of the most frequently quoted illustrative prices for carbon over the next decade.

Our analysis of the political situation is, that many individuals within the delegations of BRIC countries accept privately that any maritime emissions scheme that was less than global in scope would lead to evasion and distortion. Notwithstanding that, the principle of CBDR is absolutely critical to their negotiating strategies in the context of the wider climate negotiations, and they fear that by granting this concession in the shipping sector they risk conceding the principle more widely. Given the stance of the United States, there is some justification for this suspicion.

So for example: India and China have tabled a proposal to MEPC 58, that differentiation according to nationality of ship owner should be explored further. This is a delaying tactic; it is inconceivable that they do not understand that such a policy would lead rapidly to a re-location of company headquarters to non-Annex I countries. But while this game is played out, it will be difficult to reach an international agreement on maritime emissions.

How well is the UK Government playing a role in developing such agreements?

At IMO, the UK delegation is composed of representatives of the Maritime and Coastguard Agency (MCA), who have historically dealt with more technical issues (ballast water, anti-fouling paint etc) and of DfT. Although the composition of the delegation is evolving, it is perhaps not evolving as rapidly as the agenda of the MEPC, and the UK is not among the leading voices in the debate around Market-Based Instruments. There is no "UK proposal" that builds on work done by the Norwegians and Danish.

At UNFCCC, where the EU speaks as a bloc through the Presidency, it is a little harder to pinpoint the exact contribution of the UK. Again though, our sense is that the UK has played a disappointingly passive role to date, despite its stated preference to see maritime emissions included in the next global agreement. There is a tendency to place "bunkers" in a category off to one side, rather than exploring the linkages with other elements of the climate package. To elaborate: one of the exciting features of the maritime proposal is that it could raise substantial amounts of revenue (potentially tens of billions of dollars annually) for adaptation and mitigation work in developing countries. This should be a very strong selling point when building support for such a proposal, particularly with those countries most vulnerable to climate change. But the diplomatic spadework has not been done (and the wider EU is culpable here too), the concerns of such countries over (say) the cost of imports have not been addressed (other than by WWF research) and opportunities have been missed; for instance in the recent Bangladesh-UK conference on climate change. Bangladesh has been one of the developing countries most interested in financing adaptation through a levy on bunkers, yet the Secretary of State for International Development did not mention the topic in his address.

Overall, the UK Government must develop a strategy for achieving its objectives in maritime emissions that is more pro-active and more co-ordinated across the different Departments and agencies that share the responsibility.

What are the prospects for developing new engine technologies and fuels, as well as more fuel-efficient operations?

Unlike the aviation sector, the shipping industry has a number of unrealised technological options to make substantial reductions in its emissions intensity, so that increasing the cost of burning fuel is more likely to drive efficiency within the sector than to limit demand.

For instance, the new generation of "sky-sails", essentially huge kites harnessing the wind to power ships, could reduce fuel burn by 10-15%. Cruising at slower speeds in order to do "just in time" deliveries of cargo can reduce fuel burn by up to 40% on some routes (figures from personal correspondence with IMO).

Several more detailed assessments of the mitigation options within the sector are available and we do not attempt to summarise these here. See for instance: http://www.regulations.gov/search/redirect.jsp?objectId=090000648063a431&disposition=attachment&contentType=pdf

What are the effects of shipping on UK air quality and public health? How well is the Government tackling this, and what more could it do?

There is significant harm to public health in UK port towns through emissions of sulphur dioxide, particulate matter and polycyclic aromatic hydrocarbons from ships that run their engines while berthed. Ships do this in order to power on-board electrical systems while they are in port, but with a little investment in infrastructure this power could be provided by shoreside renewable generation; and clearly this move would also have a positive impact on overall shipping GHG emissions. WWF recommends that the Government legislate to encourage or compel port authorities to include the provision of shoreside electricity in a standardised port due. In this way, ship operators would already have paid for the power and would have no incentive to burn extra fuel to provide their own. (Incidentally, the same model would work for Port Waste Reception facilities—ships would have no excuse for dumping waste at sea if they could dispose of it safely in port at no extra cost.)

September 2009

Witness: **Mr Peter Lockley,** Head of Transport Policy, WWF-UK, gave evidence.

Q1 Chairman: Good morning and thank you for coming back to the Committee. We are taking up the subject of shipping which we have referred to on a number of occasions but have never investigated in detail; this is our first ever session, as you know. We have had your memorandum[1], but would you like to say how significant you think the contribution of shipping to global climate change actually is and how you see that changing in the future?

Mr Lockley: Certainly, and actually now, for the first time, we can make a reasonable estimate of what shipping emissions are because there has been quite a lot of uncertainty about them. The updated Greenhouse Gas Study published at the recent MEPC meeting has come to a consensus estimate of around 850 million tons of CO_2 and that is around four per cent of global emissions of CO_2. As a country, if shipping were a nation, it would be I think seventh in the world, above the UK but below Germany, but it is growing. Those emissions have roughly doubled since 1990. That same update study did some projections up to 2050 and whilst there is obviously a lot of uncertainty surrounding those it seems that shipping emissions are likely to at least double again by 2050. So, they are a significant contributor to climate change and one that is predicted to grow. As we always say with aviation, at a time when global emissions have to come down, they are going to become an even more significant contributor in the future.

Q2 Chairman: Shipping often gets linked with aviation in discussion about climate change and I guess there are similarities in terms of international activities. It is hard to pinpoint exactly where responsibility lies and of course they are both currently excluded from the Kyoto process. What do you think the differences are between aviation and shipping?

Mr Lockley: There are differences in how you would allocate emissions. It is harder to allocate emissions for shipping; we think it is quite straightforward for aviation. Ships tend to do multiple leg journeys so, for instance, they might drop half their cargo in Rotterdam and pick some more up, travel on to the UK; they also do the same thing with fuel, it is quite easy for a ship to tanker fuel around the world because they are very efficient at carrying cargo, so equally they are very efficient at carrying a large bulk of fuel around the place and they can pick up wherever it is cheapest. It is harder to attribute emissions to countries on a bunker fuels basis as you would do with aviation. As you say, they are treated very similarly to date in climate change policy both in the UK and in the Kyoto arrangements. They are roughly of the same magnitude, but the non-CO_2 effects of shipping, unlike for aviation, actually have a cooling effect; so although shipping's total CO_2 is greater when you look at the overall impact, it is smaller than aviation. There are differences as well in the technology profile, if you like, over the last fewdecades. While aviation has become more and more efficient and jet engines are now extremely efficient bits of technology, historically shipping fuel has been so cheap that there has not been the driver to make those technological improvements. I think it is fair to say there are still a lot of technology options around in terms of improving the efficiency of engines as well as some other possibilities which we may come onto later.

Q3 Colin Challen: In the interim advice from the Committee on Climate Change a couple of weeks ago and the eight per cent target, Lord Turner wrote that the 80 per cent target should apply to all sectors in the UK economy including aviation and shipping, but did not really seem to think that it was practical to actually measure shipping's contribution, but still thought that other sectors would have to pick up the tab if shipping was not reduced by 80 per cent. What do you make of that? What are the implications? Is this going to lead to confusion or is it the result of confusion?

Mr Lockley: I think what Lord Turner said is that our overall target has to take account of aviation and shipping. He cannot, at the moment, see a way in which you could include aviation and shipping emissions within the target in a legally robust way. We can debate that, but what he has said is that other sectors should come down further in as much as aviation and shipping do not make an 80 per cent cut themselves. In order for the others to pick up the tab we will have to know the size of that tab. I think he has opened a space where we can define what shipping emissions mean for the UK in a way that is robust enough to adjust our overall targets accordingly even in advance of an international agreement which may take some time to negotiate. I think there is now a bit of work to be done and we will be pursuing this to work out what a reasonable allocation of emissions for the UK would be for shipping so that we know the extra effort that has to be made in the other sectors. That is why Lord Turner was at pains to say that the overall target for the UK should be at least 80 per cent and there is scope to go further if we do not make those reductions in aviation and shipping.

Q4 Colin Challen: How long do you think it will take to actually make that UK assessment of shipping's contribution?

Mr Lockley: I think it need not be a very complex exercise. I think you can get quite good estimations on the basis of imported cargo to the UK. We have data on what percentage by ton, by value and by bulk the UK imports and we are ready today to make a first order estimate that around four per cent of global shipping emissions belong to the UK. The theory behind this is that the importer who generates the demand; it is the importer who bears responsibility for the emissions and therefore for shipping you would allocate on the basis of how much demand is being generated by consumers in the UK.

[1] See Ev 1

Q5 Mr Chaytor: If there is already very good data on cargo imported to the UK, what is the advantage of your proposed system, the route-based method of calculating emissions?
Mr Lockley: A route-based method would give you quite exact figures on which ships are coming to the UK. The problem, which we acknowledge with the route-based system, is if you then try to apply, for instance, a carbon trading scheme that was on routes only to European ports or only to Annex 1 country ports, then there would be a possibility of evasion. An individual ship could decide to dock at Casablanca on its way from Shanghai and will only have to pick up the tab for the emissions from Casablanca to Europe, whereas taking a percentage of import data you step back and you look at a ship's annual emissions, for instance. It has been sailing around the world and say it has emitted a hundred tons of CO_2 you can then ask what proportion of that work was done in order to bring cargo to the UK or to Annex 1 countries if you are thinking about the global scheme. In that case, it would not have benefited that ship to have stopped at Casablanca because you are simply looking at the final work done for import.

Q6 Mr Chaytor: In terms of the likely estimates that would emerge, how different would they be from the Government's current system of just recording fuel taken from the international bunkers?
Mr Lockley: They would be considerably higher so at four per cent of global emissions the UK would be responsible for around 35 million tons of CO_2. I cannot, off the top of my head, remember what the bunker fuel estimate is but it is definitely lower than that. In defence of the Government, that is not because they think that is the best way to tally up these emissions; it is because it is the UNFCCC recommended method for reporting, as a memo item, your shipping emissions.

Q7 Mr Chaytor: What are the downsides of the proposed route-based system?
Mr Lockley: The downsides of a route-based system would be possible evasion—ships doing extra docking—which would obviously incur extra CO_2. If it were valuable enough to them to avoid the emissions on the longer part of the journey they might well do that rather than incur a CO_2 penalty. We are optimistic that a percentage of cargo based approach could get around that. It is a variation on a theme which may be able to cut through that problem.

Q8 Jo Swinson: Two weeks ago the MEPC met; what would you say were the main outcomes of that meeting?
Mr Lockley: Firstly, the market based instruments that we are interested in discussing here. There was only one sub-agenda item of a one agenda item on a long list, so there was progress on things like ballast, water and so forth. In terms of greenhouse gases things were a little bit more fraught and more difficult. There was a long exchange in the plenary about whether it is possible to impose a market based scheme on all countries or whether you have to do a differentiated approach. In our view that exchange was not particularly fruitful; it was just a trading of positions. Developing countries raised their flag to say that any scheme should apply to Annex 1 parties only, that we should respect the principles of UNFCCC, common but differentiated responsibilities, and therefore they would object to any global scheme. In response, all the Annex 1 parties raised their flags to say that this was a shipping issue, it fell under the International Maritime Organisation. The International Maritime Organisation always develops global policies and therefore any shipping scheme has to be global. There was no rapprochement between the two sides in saying, "How can we think creatively about reconciling these two principles?" That is what we have been trying to do in finding a scheme that is both global but differentiated. We fully accept the contentions of Annex 1 countries; that it is impossible or impractical to do a scheme based only on which country a ship is registered to because it is very easy to change your flag, you can do it in about 12 hours, and if it became more expensive to operate a ship out of an Annex 1 country then there would just be an exodus to non-Annex 1 countries. Everyone acknowledges that, everyone at IMO understands that, and yet they are not prepared to go beyond that in looking at other ways in which you could differentiate a scheme. I think that exchange rather sets the tone for the rest of the work on greenhouse gases and although there was progress on the technological and operational measures, there was certainly no progress on designing a global scheme. The thinking behind this—the UK was very clear on this in its submissions—is that despite the good work that IMO is doing to improve the fuel efficiency of ships, to come up with a design index for how you would rate the efficiency of ships, to come up with ship management plans, practical suggestions for improving their efficiency, we expect the overall CO_2 from ships to go up. Therefore, if we are going to have a comprehensive global climate change agreement it is going to need to cover all sectors and it is going to have to take control of shipping emissions. That, in our view, means capping emissions.

Q9 Jo Swinson: That would suggest that in the meeting the UK was sort of standing up there and saying, "Well, let's find an innovative solution". Was that the case? What was the UK voice at the meeting?
Mr Lockley: The UK is in a bit of a difficult position because the suggestion from the UK and from Annex 1 countries is that you do a global scheme but you would respect the principle of common but differentiated responsibilities in the way that you spend the revenue that you raise from that scheme. The revenue would be collected around two-thirds from Annex 1 countries (by that I mean the revenue would be collected from the ship operators but the costs would be passed on to importers and therefore consumers in Annex 1 countries), so about two-thirds of that cost would be borne by developed

countries but you would spend all of that revenue on adaptation, for instance, or reducing de-forestation or technology transfer, all of these vital blocks of a global climate change agreement. You would spend that money in developing countries in such a way that they receive more than they pay. That is the theory behind a totally uniform scheme for all ships but whilst keeping developing countries on board by spending the revenue that you raise in those countries.

Q10 Jo Swinson: Where would the BRIC countries come into that? They are not quite at the stage of the UK, but equally they are not in such dire straights as many developing countries. Clearly, getting them on board with any solution would be important.
Mr Lockley: You have hit the nail on the head and the problem with making progress at IMO is that the BRIC countries are reserving their position on this question of common but differentiated responsibilities and they see it as two important principles to concede in the IMO because they would see they had then conceded something in the wider UNFCCC negotiation. At the simplest level you have a stand off between the US and China about whether China is going to come onboard, is the US going to come onboard; and everyone is waiting to see how that resolves itself. They are not prepared to make the first move in their shipping forum. The problem with the UK position is that they do not have a credible story to tell about how we would spend that money if we were to raise it, because they are opposed to any international form of taxation. Shipping is a global industry. We would advocate a global body to collect that revenue and then to feed it into a fund managed by the UNFCCC to do the climate work, the adaptation and mitigation. The UK explicitly stated they would be opposed to that because international taxation harms our national sovereignty, therefore they cannot really sell the proposal to the developing countries because the developing countries do not believe they will ever see the money because it has to come through our national Treasury, our Treasury objects to hypothecating revenues and so on and so forth. There is a real structural difficulty there in how we could deliver on the proposal that we are advocating in this country.

Q11 Martin Horwood: You have answered some of my question actually, but it was on the same sort of theme of how you resolve the BRIC countries pretty legitimate attachment to common but differentiated responsibilities. It is all very well for you to say that the revenue from this scheme would be spent in developing countries, but not according to the way they would have done it originally. The moral justification for common but differentiated responsibilities is that they are not as responsible for the situation we are in as the rest of us. WWF, as I understood it, had always supported that principle of common but differentiated responsibilities, so surely any kind of universal capped scheme that you are advocating conflicts with that and are the BRIC countries not justified in objecting to it?
Mr Lockley: There is a question of how you would interpret that principle. We think that potentially, with the right governance structures in place, you can be distributing more money to those countries than they have paid out themselves. In the case of the least developed countries or the small island states, quite substantially, and the ones most vulnerable to the effects of climate change could get five or ten times the revenue that they were subject to pay. We are also looking at possibilities for exempting the least developed countries. You could do that, for instance, on ship size because smaller ships tend to trade with developing countries. There are ways in which you could design a scheme to exempt the smallest and most vulnerable countries. Do I think Brazil, India and China can afford quite a modest charge on shipping? Yes, I think they can. However, nonetheless we would like to see the scheme go through to meet mitigation objectives as well and therefore would be prepared to consider compromise schemes whereby you would not charge the shipping that was going through non-Annex 1 countries. This is what I was mentioning, the idea of a route-based scheme or a scheme based on imports; those would be imports only to Annex 1 countries so the consumer in the developing countries would then not bear the costs because ships carrying goods to Annex 1 countries would be charged under the scheme.

Q12 Martin Horwood: So that would be a levy rather than a cap and trade scheme.
Mr Lockley: We are agnostic on whether we do a levy or a trading scheme, but what we are talking about is the scope of any scheme that you choose to do.

Q13 Martin Horwood: This would be insanely difficult to administer. You would have levies on some bits of ships' cargo but not another bit.
Mr Lockley: If you did a scheme that looked at each individual bits of cargo and where it was going, yes, I think that would be administratively quite difficult. Otherwise, from a design point of view, that is probably the ideal way of doing it but the data requirements are quite heavy, whereas simply taking a percentage would be quite simple because we know the overall percentage of imports to the UK from Annex 1 countries and we know the overall bubble of shipping emissions. Therefore it should be possible to differentiate in that way.

Q14 Martin Horwood: Let me just get this straight, so you would apply the levy or the cap at almost a national level, a governmental level, not on the ship itself as it docked.
Mr Lockley: No, these would be operator based schemes so the levy would be on the ship operators and owners, but only for trade that they were doing to Annex 1 countries. It is not coming in at a government level.

Q15 Martin Horwood: Can you tell me what your impression is of the UK Government's position on these different mechanisms?

Mr Lockley: They have pegged themselves to a global scheme. They said they were interested in exploring the sorts of thresholds I was talking about where you say that this scheme only applies to ships over a certain size as a way of exempting the most vulnerable countries, particularly the small island states who are most reliant on shipping for food imports. They are prepared to consider differentiation at the margin but essentially their position is to have a global scheme. However, as I said they are not able to deliver on how they would spend the revenue because it is based on hypothecation or international taxation. This is quite a difficult position for them to reconcile because domestically they are saying that shipping is an international industry and perhaps best dealt with internationally. We do not want to take those emissions within our own targets, but as soon as there is any money going then the Treasury would like to have a portion of that.

Q16 Martin Horwood: So you are saying basically that the British Government position is inconsistent with itself.
Mr Lockley: Yes.

Q17 Chairman: Indeed, is VAT not an international tax as far as the 27 EU countries are concerned?
Mr Lockley: If you wanted to change the VAT structure on shipping, yes.

Q18 Chairman: I meant in terms of the Government's position about international taxes. We accept that we do not have complete freedom to set VAT rates in this country and the proceeds are now essentially an international tax.
Mr Lockley: The proceeds go into the UK coffers.

Q19 Chairman: Not quite all of them; some of them go to pay for the running of the EU.
Mr Lockley: My understanding is that that is a portion that the Treasury chooses then to give to the EU. It has been routed through the UK coffers and that is the important thing so far as they are concerned. We would be concerned that if the money were coming into the Treasury, as with the ETS auction revenues, it might not then come out again in the proportions that we would want it to.

Q20 Mr Caton: While we are talking about the European Union, the European Commission has said that it is prepared to take regional action in the absence of international agreement. What form do you see that action taking? How effective could it be?
Mr Lockley: I would imagine that would be a regional emissions trading scheme so shipping would join the existing EU ETS much in the way that aviation has done and then you would need some way in which to define the scope of the emissions that you brought inside that emissions trading scheme. The obvious one is routes to European ports but then we get back into the issue of evasion. There are difficulties with doing any regional only schemes. You can have ships docking at North Africa, for instance, and there is also a possibility of a modal shift so the ship not only docks at North Africa it then puts all the cargo on a truck and takes it through Spain in order not to be subject to the shipping charge. The extent to which that would happen I think has not been studied a great deal and given that shipping is extremely efficient at transporting a ton of goods, I would be surprised if there were a wholesale switch to a different mode of transport. The possibility of simply touching at a non-EU port in order to be liable only for the emissions on the last leg into the EU is a more real possibility. The Commission's position has been useful in stimulating the IMO to take the issue more seriously because the IMO, certainly the secretariat, has been quite pro-active in pushing the idea of a market based instrument. I think they take their responsibilities under the Kyoto Protocol now quite seriously—perhaps belatedly—and they have set up a process in order to report back to UNFCCC, to COP15 in Copenhagen about what they have achieved in this area. It was the realisation that something regional would come along if they themselves did not take action and they clearly looked over at the aviation industry, seen what has happened there and realised that they do not want to be in the same position.

Q21 Mr Caton: So what has been the UK's position on EU action on shipping emissions?
Mr Lockley: As far as I know they have supported the EU line that this is a fall back. We would rather see something global but if we do not get sufficient progress then yes, we would support regional action. However, I would check that with the UK Government.

Q22 Colin Challen: What real potential is there for further emissions reductions from improvements and technology in shipping and operational practices? I was reading the Chamber of Shipping's memo[2] which rather suggested to me that they thought we had got to as good a place as we could with these things and there are problems in changing some of the operational practices. What do you think is the situation and what should the Government be doing to help develop emissions reductions from shipping?
Mr Lockley: There is potential around. For instance, simply by travelling slower ships can save up to 40 per cent of fuel on some of the routes. The reason they do not do that is to do with the structure of their contracts and the way port charges are worked out. I would speak to the industry in more detail about why exactly that happens, but if it were possible to change the incentive structure for ships in order that they crossed oceans at the optimum fuel speed then there are significant savings to be made just on that alone. Perhaps the most inspirational thing that happened during that quite difficult week at IMO

[2] See Memorandum submitted by The Chamber of Shipping Ev 29

was the presentation by a company called Sky-Sails who have a very high tech take on a very old idea which is sails for ships. They now produce very large power kites which run out in front of the ship and describe a figure of eight in order to maximise the pull on the ship. Although these have only been demonstrated on a couple of ships to date, they are quite promising as a piece of technology and in the optimum conditions they save up to 57 per cent of a ship's fuel. That is not going to be the case for every route and every wind direction, but clearly there are substantial savings there. I think while perhaps the status quo does have to change quite significantly, there are clearly substantial reductions available.

Q23 Colin Challen: It certainly sounds to me like the idea of developing world trade on the basis of sail is innovative and we ought to investigate that further. Does the Government have a role to play here because if we were saying to the shipping companies and their operators that things have to slow down, they have to save emissions by reducing speed and so on, that is going to affect the whole business culture of just in time. You cannot simply say to one sector that they must go slower when all the other sectors are saying they want things just in time because they are not prepared to pay for warehousing costs. We would just end up with warehouses on the oceans.
Mr Lockley: My understanding is that ships quite often do not do that. They will steam across the ocean and then wait two weeks in a port because there is a first come, first served basis in the port, whereas if that could be restructured they would be perfectly happy to spend that time on the high seas and still do a just in time delivery. I think there are instances when it is a case of hurry up and wait and they are rushing across the oceans just to wait to deliver their cargo.

Q24 Colin Challen: Will the IMO's proposed design index and operational index make much of a difference, do you think? How quickly would that difference occur if it did?
Mr Lockley: I cannot pretend that I understand the design index. It is a mathematical formula stretching across an entire page which was being designed by a committee of a hundred people at IMO. I occasionally raise my head and hear the words "wave co-efficient" and go back to my e-mails! I think that is something you would have to ask the technical experts within the shipping industry. However, my sense is that with a formula that complicated there would be a lot of possibility for gaming the system. That would be my concern.

Q25 Joan Walley: I would like to turn to emissions which are affecting air quality. I think there is quite a lot of concern about the direct cause from shipping emissions of something like 60,000 deaths a year, including 27,000 deaths in Europe. I just wondered what difference you felt the latest IMO agreement under the MARPOL Annex could make in respect of actually reducing the impact of shipping emissions. I am talking about sulphur dioxide, particulate matter, that kind of thing.
Mr Lockley: The MARPOL VI agreements regulate sulphur emissions within special areas and in those areas ships will have to be emitting considerably less sulphur than they do in the current heavy fuel oil. There are two options, one that they switch to distilled fuel—essentially diesel—instead of burning very heavy fuel off the bottom of the refinery as they do at the moment; or they have SOx scrubbers on board. My understanding from talking to people in the shipping industry is that those SOx scrubbers are not really up to scratch yet, they are not robust enough to survive life at sea. I think there are problems about meeting those Annex VI obligations and already the other week we saw at the MEPC countries raising concerns and making first moves to dilute those because some of the cost estimates of what it would mean to actually meet them have started to come through and it is going to be very expensive. I am not saying it is going to happen, but there is concern that those regulations might be watered down which would be a great shame because they are very important in fighting that marine pollution. Directly in ports, which is where there is the human health impact, ships are waiting in ports and running their engines in order to generate energy for functions on board, there are ways in which the ports' authorities themselves could tackle that problem, for instance by providing onshore electricity, preferably renewable electricity, directly into the ships so that they did not have to run their engines. Our recommendation is that there could be legislation for that so that port dues would automatically cover that charge, so a ship would already have been charged for its shoreside electricity therefore it would not be saving anything by running its engines, whereas currently electricity is a charge on top and it is probably cheaper for the ship just to sit there chugging over its engine to generate electricity.

Q26 Joan Walley: Could I just check in respect of MARPOL VI, is that just about sulphur dioxide or is that about other emissions as well?
Mr Lockley: I think the latest amendments to MARPOL VI are specifically about sulphur dioxide. In the wider Annex VI there are other pollutants covered, although I would have to check that. I am happy to do that and get back to you.

Q27 Joan Walley: Thank you. In the comments you have just made about shoreside renewable generation, if that is not explicitly covered under this latest amendment to the MARPOL convention, how could that be addressed by the European Commission? Are you aware of talks within the EC about trying to get across Europe a common approach towards dealing with ships in harbour and using electricity in this way?
Mr Lockley: I am not aware of any. Clearly a European-wide approach would be preferable to simply doing it in the UK because it is a problem

right across Europe. Potentially that is something the Commission could legislate for. I will speak to my marine colleagues to see if there are any moves afoot either in the UK or in Europe, but my understanding is that there are not at the moment.

Q28 Joan Walley: My reason for asking was that we have picked up from *The Naval Architect* back in January that "the UK Government and industry leaders have appealed to UK ports and their shipping line customers to unite in persuading the European Commission to move away from favouring shoreside electricity for ships in port". I just wondered if you had been involved or had any knowledge of those discussions and how we go about getting across those talks a common approach to the kind of dues you are talking about that would give a level playing field but provide that shoreside renewable generation.

Mr Lockley: I was not aware of that; that is interesting. I will take that up.

Chairman: Thank you very much indeed; that was a very helpful session for us.

Memorandum submitted by Dr Andre Stochniol, Founder, International Maritime Emission Reduction Scheme, London

This note discusses options for reducing CO_2 emissions from fuels used in international maritime transport, particularly using a market-based approach.

The memorandum has been prepared for the UK's Environmental Audit Inquiry, entitled Reducing CO_2 and other emissions from shipping.

SUMMARY

A. The UK's share of maritime emissions is estimated at 4% by import data, seven times higher than the share estimates based on fuel sold in the UK.

B. Maritime emissions should be excluded from national CO_2 targets, and addressed globally instead.

C. International agreement for maritime emissions can be achieved in 2009, providing it differentiates responsibilities.

D. The UK can lead the creation of the scheme to reduce maritime emissions by 20% by 2020, that provides $4 billion+ for adaptation, and $2 billion+ for technology.

E. A traditional cap-and-trade regime is inappropriate for complex maritime emissions in the short-term, but a cap with emission charges (cap-and-charge) would work.

MEMORANDUM FOCUS

1. It is widely accepted that shipping should contribute to climate stabilization and significant overall reductions of greenhouse gases (GHG). However, reducing CO_2 emissions from fuels used in international maritime transport (maritime emissions or ME) is one of the most methodologically complex and politically difficult issues facing the international community.

2. Industry experts and stakeholders agree that efficiency improvements—from technical and operational measures—will probably only slow down the growth of ME in the short-term. Therefore, this memorandum focuses on market-based instruments to bring absolute emissions reductions and stimulate technological transformation, including technical and operational improvements.

3. Addressing the growing level of ME and unlocking the deadlock in negotiations is also a major diplomatic and public good opportunity for the UK Government.

A. The UK's share of maritime emissions is estimated at 4% by import data

4. Maritime emissions are driven by the level of international trade. It is consumer/end-user demand that results in transport, and thus emissions. Therefore, on an equity basis, a country's share of ME should be related to the quantity of emissions from transporting goods into the country.

5. However, ships often transport goods to many countries during the same voyage. This is especially true for container ships. Therefore, making a direct calculation of emissions attributable to different goods is administratively complex and prohibitive at this stage.

6. Instead, I estimate the UK's share of ME as approximately 4% based on:
   - The UK's share of maritime import freight costs, calculated as 3.9%;[2]
   - The UK's share of imported goods unloaded by weight, calculated as 3.6%;[3]
   - The UK's share of merchandise imports by value of 4.7%.[4]

7. The precise quantity of ME is unknown. Estimates vary significantly, most ranging from 0.7 to 1.1 billion tonnes of CO_2 ($GtCO_2$) in 2005. I use 1 $GtCO_2$ as a working estimate.

8. Therefore, the UK's share of ME is estimated as 40 $MtCO_2$ in absolute terms.[5] This is:
   - Nearly seven times more than ME currently reported based on fuel sold (6 $MtCO_2$);[6]
   - More than emissions from international aviation.[7]

9. Such quantity of emissions would add an extra 6% to the UK's carbon budget,[8] and more with time. The quantity of ME attributable to the UK will most likely increase by more than a third (1/3) by 2020, growing annually at a rate of 2%+.

B. Maritime emissions should be excluded from national CO_2 targets

10. After extended deliberation, some EU experts have concluded that including ME in national totals is not feasible due to data problems, evasion possibilities, competitiveness issues, fairness and the polluter pays principle.[9] The difficulty in calculating the UK's share of ME has illustrated these problems to a degree.

11. A global solution to reduce ME is preferred in the International Maritime Organization (IMO). Shipping is a global industry with the majority of CO_2 emissions occurring outside national jurisdictions. The structure of shipping does not correlate well with any division between developed and developing countries.

12. Industry stakeholders prefer global regulations over local ones. The worst-case scenario for them is a patchwork of different regulations in different parts of the world that would inevitably lead to competitive distortions and increased end-user prices.

13. Local regulations aimed at reducing global ME will be ineffective as ships can easily avoid them by registering under a different flag, or tanking up large amounts of fuel in countries along their route which do not participate in the emission regime.

14. Therefore, ME should be excluded from national CO_2 targets, including in the UK. Instead, ME should be addressed globally through one or more maritime emission bubbles. In this global approach emissions would not be allocated to countries or flag states.

C. International agreement can be achieved in 2009

15. The current challenge in negotiations can be defined as the following: providing global uniform rules (typical for shipping), while delivering on the differentiated approach embodied in the UNFCCC and the Kyoto Protocol. Without differentiation of responsibilities, political agreement on and participation in international agreement for ME, particularly from developing countries, it is unlikely to be secured.

16. The possibility of using emission charges to address global ME has been largely discounted, at least until very recently. Charges have been seen to be too similar to unpopular taxes. The possibility was conspicuously absent from the work done in Europe in the last 5 years or so.

17. In mid 2007 Norway submitted a proposal to the IMO for a scheme based on implementing a CO_2 charge.[10] The scheme proposed to raise funds to reduce and mitigate maritime emissions, *and* to provide some funding for adaptation to climate change in developing countries. The proposal was developed and initiated by the author of this memorandum. Prior to the submission by Norway, a similar proposal was also discussed with the UK Department of Transport but due to coordination difficulties with other departments it was not taken further.

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2 For 2005; based on data from IMF DOTS, and UNCTAD RMT 2006.
3 For 2005, imports unloaded in the UK 257 Mt, imports unloaded world-wide 7,122 Mt, sources: UK Maritime Statistics 2005, UNCTAD RMT 2006.
4 WTO, for 2005. This metric is likely less well correlated with the UK's share of ME than the other measures, but is readily available.
5 This value seems realistic when compared with the domestic shipping emissions of 4.6 $MtCO_2$ in 2005 for two reasons. The foreign import traffic is nearly three (3) times higher than domestic inwards traffic (in tonnes unloaded). Second, international voyages are on average much longer than the domestic ones.
6 Emissions from fuels for international transport are reported based on fuel sold in the UK. On this basis, the UK's ME are 5.9 $MtCO_2$. The current approach significantly underestimates the ME that should be attributed to the UK. The main reason is that many ships buy their fuel outside the UK.
7 UK's emissions from international aviation bunkers: 35.4 $MtCO_2$, source UK statistics.
8 Based on 2005 UK's GHG emissions of 654 $MtCO_2e$; or CO_2 emissions of 554 $MtCO_2$.
9 http://unfccc.meta-fusion.com/kongresse/AWG_08/downl/0403_1000_p2/EU%20GHGs.pdf, Graichen (2008); a relevant webcast is also available
10 IMO MEPC 56/4/9, by Norway, Elements of a possible market-based CO_2 emission reduction scheme, 2007.

18. The Norway proposal has initiated multilateral discussions and follow-on submissions to the IMO in 2007 and 2008, including two follow-on proposals from Norway, and a proposal from Denmark for a global fuel levy. The proposal has also been discussed within the UNFCCC, during formal negotiations and side events at the Bali conference, and thereafter.

19. The recent submissions and discussions within the IMO have confirmed that a global market-based scheme based on charges or levies is feasible, without requiring the allocation of emissions to countries.

20. At the same time it has been recognised that current financial mechanisms for adaptation to climate change, aimed at helping the world's poor deal with the consequences of global warming, are inadequate in both design and scale. The adaptation needs of developing countries are estimated at tens of $billions per annum; the funding gap is currently about 100 times higher than all anticipated contributions.

21. The first Intersessional Meeting of the IMO Working Group on Greenhouse Gas Emissions (GHG) from Ships took place in Oslo in June 2008. All the delegations that spoke on the issue supported the notion that revenues aggregated through any economic instrument should mainly be used for mitigation and adaptation measures in developing countries, together with transfer of technology and capacity-building.

22. Within the UNFCCC and the IMO, developing countries argue strongly that a uniform maritime scheme would not fulfil the UNFCCC principle of common but differentiated responsibilities and respective capabilities. Allocating significant funding for adaptation to climate change is not seen as solving the issue entirely. The need for differentiation should be familiar to the UK; within the EU, different member states have different emission reduction commitments.

23. Contradictory to first perception, differentiating obligations for ME can be implemented but doing so requires new thinking. In the proposed scheme emission charges are based on fuel sold. To achieve differentiation on certain routes, emissions could be exempted from charges or subject to an agreed multiplier. This could be based on point of origin, destination point, or both. These emissions charges can be differentiated by exempting certain countries or by using a country-specific multiplier.

24. In its simplest form, differentiation may follow the division between Annex-I and non-Annex I parties to the UNFCCC. Even if after negotiation non-Annex I countries were totally exempt from emission charges, the scheme would still cover 60% of total emissions;[11] a big step up from existing zero coverage under the Kyoto Protocol. Importantly, such a scheme could be legally enforced through ports in Annex I countries.

25. This binary differentiation may even be replaced with country-specific obligation factors, which could be used to scale (upwards or downwards) the basic emission charges calculated under an emission reduction scheme. This provides further flexibility to adjust the scheme participation in the future.

26. The above approach would allow the proposed scheme to be fully compliant with the UNFCCC principles of common but differentiated responsibilities, and allow flexibility to negotiate the goal and country obligations. The participation principles could be negotiated and agreed by parties in Copenhagen in 2009.

27. An effort to incorporate differentiated responsibilities further is urgently needed if a deal for ME is to be agreed by 2009.

D. The UK can lead the creation of the scheme to reduce maritime emissions by 20% by 2020

28. In multilateral negotiations, progress can be slow until a concrete submission from a party is put forward. This requires a proactive approach from officials, openness to consider new approaches, and a joint search for a solution.

29. The UK has not submitted or co-sponsored any proposals for ME reduction to the IMO in the last two years. However, very recently a high level proposal to develop a new international convention to address GHG emissions from shipping was submitted. Nevertheless, it seems that there is a gap between statements on the need to address climate change and action on ME. In other environmental areas addressed by the IMO, such as air pollution (SOx, NOx), ballast water, and ship recycling, the UK has been quite active. This may reflect lower coordination barriers between departments in these topics.

30. Development, ratification, and entry into force of a new maritime convention may take a decade or longer. A significant amount of work has already been done, including building momentum for action in the IMO. The proposed scheme below has been further developed through discussions with representatives of more than 30 different countries, half of which are from developing countries.

[11] The Annex I 60% share of emissions has been estimated as for the UK. The estimate calculated from the import costs is 59%. The other estimate based on the share of goods unloaded in Annex I countries, by weight, is 58%. Data sources: IMF DOTS, UNCTAD 2006.

31. The International Maritime Emission Reduction Scheme (IMERS) is a hybrid scheme that combines emission mitigation, adaptation to climate change and technology action in one scheme. It is novel, ambitious but affordable, and legally feasible. Over the last year the scheme has gained significant traction[12] and has been discussed within the climate change community. It is seen as one of the most promising proposals to fill the adaptation gap.[13]

32. The instrument is based on an emission charge to be applied to the entire international shipping community, or part of it. The charge is calculated based on the prevailing forward market price for CO_2 and a negotiated emission reduction goal. This makes it an alternative to cap-and-trade. The emission charge is not a levy or a tax set at some arbitrary level. The goal (cap) together with the market (via the market price for carbon) dictates the level of emission charge, rather than any single body that may be subject to outside influence.

33. A long-term emission reduction goal is the key measure employed in the scheme, which will enable the shipping industry to equitably and effectively contribute to the reduction of total GHG emissions. To calculate the charge for emissions, IMERS uses a long-term notional emission reduction goal for CO_2 for the ships under the scheme. The goal allows the unrealised reductions to be purchased from other sectors and projects, by acquiring emission credits.

34. The setting of such a goal for international maritime transport is within the domain of the UNFCCC. The goal could be established and subsequently adjusted with the changing climate change framework. It could be agreed in Copenhagen in 2009.

35. It is anticipated that the impact of the scheme for a 20% emission reduction goal by 2020 would be about 0.1% increase in prices of imported goods. This is equivalent to $1 for the price of $1,000. The charges paid by fuel buyers are anticipated as equivalent to 5% of fuel price. The level of charge would be announced one year in advance, thus providing enough time for the shipping industry to pass it on to end customers.

36. Therefore, shipping could contribute to climate stabilisation through an ambitious yet achievable goal. Furthermore, the aggregation of demand for emission credits, which are required to offset any emissions above the emission goal in a given year, would provide access to cheaper emission credits on primary markets, or through government forestry schemes. This would generate gains which could be utilised to address adaptation issues.

37. The contribution of the shipping industry to climate change action will be substantial: the scheme aggregates small emission charges into approximately 10 billion dollars annually, of which $4 billion is for mitigation of ME, $4 billion for adaptation to climate change in developing countries, $2 billion for maritime technology development and transfer.

38. There is an opportunity for the global maritime solution to be created and operated in the UK. The IMO, the only UN organization in the UK, is in London. London is also the pre-eminent financial centre in Europe and vies to become the centre for carbon markets.

39. Addressing ME globally is also a major diplomatic and public good opportunity. The risk of inaction is twofold: repeat Kyoto's failure to address ME, and fail to provide financing for adaptation to climate change crucially needed for the most vulnerable.

E. A cap with emission charges (cap-and-charge) would work for ME

40. The proposed hybrid scheme can be called cap-and-charge. It sets a cap on the ME and delivers it through charges. It is an alternative to a cap-and-trade scheme.

41. It totally eliminates the three central barriers associated with the cap-and trade-system:

- Emissions baseline: In the proposed scheme an emissions baseline is not required, removing the need for reliable emissions data as a pre-requisite for scheme operation.
- Allocation of emissions: There is no requirement to allocate emissions between countries, which has been a stumbling block in maritime negotiations.
- Distribution of allowances: No allowances need to be distributed to participating ship owners and charterers.

42. The proposed hybrid method reduces the impact of several key implementation issues.

- Impact on competition: The impact on competition of the hybrid scheme will be very low, as it is based on a harmonized emission charge, which secures a level playing field to all participants transporting goods to a country, small or large.
- Cost: The costs to participants, including the set-up and transactional costs are anticipated to be lower under the cap-and-charge scheme than a standard cap-and-trade scheme. The charges in the proposed hybrid method are set only to have enough funding to purchase the relevant number of

[12] See: www.imers.org/buyin/achieve

[13] See: Grubb, Michael *et al*., (2008), Climate Strategies, Energy and Climate: Opportunities for the G-8, http://www.climate-strategies.org/uploads/2_ClimateStrategiesG8report.pdf

emission credits, plus additional contributions for technology. o Set up time: Compared to cap-and-trade, the set up time is reduced from approximately 5-6 years to 2 years; as implementation barriers are eliminated and data requirements lowered.

43. Furthermore, in addition to removing barriers and reducing costs, the proposed cap-and-charge scheme delivers greater value in terms of effectiveness, flexibility and scale.

— Effectiveness: Due to the compliance mechanisms, the coverage of a cap-and-charge scheme can be extended to smaller ships, including ships covered by different registration authorities. This would be difficult and highly costly under a cap-and-trade scheme.

— Flexibility: The proposed cap-and-charge scheme is flexible enough to incorporate new ships, and changing accountability of charterers for emissions. Furthermore, it allows differentiating charges to reflect differentiated responsibilities and capacities.

— Scale: The proposed solution can be extended to a global scale, superceding the regional basis of a potential extension of the EU ETS to shipping.

44. The critical component of the proposed approach is that resources saved on barriers eliminated, and implementation issues reduced can be redeployed to raise and create value elsewhere. The proposed approach moves beyond delivering only emission mitigation benefits to:

— Technology benefits, namely near and long-term improvements.

— Adaptation benefits, mainly from contributions to the Adaptation Fund.

45. The short-term and long-term technology improvements are essential to dramatically reduce the rapidly growing emissions from transport. Additionally, the reduction of the huge gap in financing of adaptation to climate change in developing countries is essential; as the most vulnerable countries are likely to be hit hardest by the impact of a changing climate. A new global scheme could deliver on these in an affordable manner.

Concluding Remarks

46. The deadlock to address CO_2 emissions from international maritime transport can be resolved through the proposed global scheme, balancing the interests of all parties. The cap-and-charge instrument described is flexible and avoids emission allocation issues. It is politically compelling, providing both a quantitative emission reduction goal and a differentiation of responsibilities. It combines mitigation of emissions, adaptation to climate change and technology development in a single maritime scheme. By being global, the scheme is efficient and cheaper than proposed alternatives. Additional effort will however be required to generate the necessary momentum to achieve the deal in time for the Copenhagen climate change negotiations in 2009. The UK has an opportunity to take a lead here and make a lasting contribution to the resolution of the emission problem from international maritime transport.

15 September 2008

Witness: **Dr Andre Stochniol,** Founder, International Maritime Emission Reduction Scheme, gave evidence.

Q29 Chairman: Dr Stochniol, thank you for coming in; welcome to the Committee. As it is your first meeting with us I wonder if you would like to say a bit about your own personal background and how you came to be involved in the subject of tackling emissions from shipping.

Dr Stochniol: In early 2007 I developed a proposal for a hybrid scheme to reduce CO_2 emissions from shipping that includes mitigation, adaptation and technology, as has been mentioned before. The proposal was embraced by Norway and submitted to the IMO. This submission exceeded all our expectations and initiated multi-lateral discussions and submissions from Norway, Denmark and others. I have worked full time on the shipping scheme since then, funding the initiative myself. This has included consultations with maritime and climate change representatives from over 30 countries, half of which are from developing countries. Before that I was director of international consulting for a global leader in technology enabled business solutions and that company employs 90,000 people around the world. For ten years I was advising and leading large transformation programmes for multi-national companies who work across the globe. I resigned in December 2006 and decided to dedicate my business and academic experience of 28 years to climate change. I am happy to be here to contribute to your inquiry.

Chairman: Thank you very much. Joan?

Q30 Joan Walley: I think you sat in for our previous witness session when we referred to the recent meeting of the IMO's Marine and Environmental Policy Committee which was held in London earlier this month. I would like to have your views on what you think the implications of the outcome of that meeting were and whether or not you think there will be a proposal to tackle greenhouse gases from shipping that is ready to agree by the Copenhagen conference?

Dr Stochniol: Thank you, that is a very interesting question. I am afraid market based instruments were pushed aside at the recent MEPC, as has been

highlighted by my previous speaker. There was chasm between the position of developed countries and developing countries and the principles of why and how to use these schemes. In effect market based instruments were only introduced on Friday, on the last day of a week long session. More proper discussion has now been moved to the next MEPC meeting in July 2009. This will be too late for the Copenhagen Protocol. The draft text for the Copenhagen Protocol needs to be ready by June 2009, one month before the next meeting. Basically the route through IMO and MEPC regarding market based schemes is not viable for Copenhagen any more; that is my assessment. One opportunity of progress is to bring a deal that reconciles the positions of the different parties through a ministerial approach, through the UNFCCC (United Nations Framework Convention on Climate Change). In Poznan in Poland later this year there is a meeting of climate change talks and there is also COP14 which is a meeting of the Conference of Parties. That is where I believe might be the last chance to resolve the deadlock between the developed and developing countries. Importantly there was a proposal in the last two months on how to break the deadlock, how to reconcile the position and this is really creating a global but differentiated scheme. I will describe it in more detail. Basically we did present that but it was just too late. Every country came with a prescriptive position. I did, however, make some additional important conversation and I will update you on those later. If the UNFCCC track is not taken then I think the next chance of dealing with it is going to be in about ten years' time with the review of the Copenhagen Protocol or with the new convention. So we are talking 2020s. My assessment is that the risk of inaction right now is twofold. One, we will repeat the Kyoto failure of addressing the maritime emissions; secondly, we will fail to address the funding needs of adaptation to climate change for the most needed, most vulnerable nations and people in the world. My view is that it is not possible, there was a chance of having a so-called inter-sessional meeting; this meeting is happening in March but that meeting is not going to deal with market based schemes, it is only going to deal with the indexes, the operation and design index. So, no chance.

Q31 Joan Walley: Can I just try to understand what you are saying in the sense that if there is no chance and nothing can be got ready for Copenhagen for the reasons you have just outlined, presumably you are saying that whatever then came about it would be too late to do anything. What would be the earliest time that you think something could be prepared by?
Dr Stochniol: We are talking about global. If we talk about global, if global is not ready then Europe can take unilateral actions et cetera. If the positions are not reconciled, that a scheme can be both global and differentiated, then the parties are not ready to talk about a global scheme and the conversation does not happen. So the next time my belief is that it would be in ten years' time after Copenhagen, when the Copenhagen Protocol came to be reviewed. Maritime and aviation issues have been discussed for the last 15 or 20 years. If we do not start with a new creative approach—which is the key to what has been said for the last 20 years—obviously we would not find a solution. That is why the idea of looking at cargo imported is very appealing because we can differentiate a scheme for shipping based on imported cargo.

Q32 Chairman: That is quite a bleak assessment. You are saying that if we miss this chance it could be 15 years from now before any effective action is implemented. The previous witness said that emissions from shipping have doubled since 1990. If they continue to rise at that sort of rate they would then form quite a significant percentage of global emissions and would still be outside any kind of international framework to reduce them, so they are becoming quite a substantial proportion of the total at that time.
Dr Stochniol: The part that I was mentioning was referring to the market based scheme. Obviously there might be some mathematical formula regarding the operational and design index that might have an impact, but we have had this report on the market based scheme, and ship owners might simply not see the need to buy an engine which is ten million dollars more expensive. Secondly, the design index will only take effect in a very long time because the life of a ship's engine is 30 years. So if someone is buying or ordering a ship now it will have an impact over a very long time.

Q33 Mr Caton: I think it would be useful at this stage if you could tell us a bit more about your proposal for an International Maritime Emissions Reduction Scheme. Can you briefly outline its key principles?
Dr Stochniol: Let me focus on what I believe can unlock the principle, what can really unlock the multilateral deadlock. As I mentioned, Norway has submitted the elements of a potential scheme in 2007, last year, MEPC—56/4/9 was the most important submission. Then the multilateral discussions started. However, all of the proposals are now saying it has to be global and uniform, all the countries pay the same; it does not matter whether you are rich or poor. So until very recently everyone thought that was the only way to address the emissions from shipping. In Bonn, India brought the question: why do we not look at imported cargo? The negotiators that I have been working with from India and other countries in a way challenged me: find a way that you can differentiate the charges or differentiate the principle that can be both global and differentiated according to the common but differentiated responsibilities. So really it became obvious only in the last two months that a global and differentiated is actually viable. You can say it is innovation or a breakthrough but you have to listen to everything so let me go through it very quickly, the principles and the details. The principle is that any market based instrument to address CO_2 issues from international maritime transport shall be both global (as per IMO) and differentiated (as per UNFCCC). Let me now describe why it is possible

and there are several aspects. A differentiated policy is based on cargo imported. You can think about charges for the time being. It will apply to all ships irrespective of flag or nationality. So any ship that comes to London is treated the same; any ship that comes to Hong Kong or Shanghai is treated the same. It is always the same based on coming to a port. So only two destinations are defined: Annex 1 and non-Annex 1 countries. The destinations are treated the same as per the climate change regime, so Annex 1 destinations are included fully, a hundred per cent; non-Annex 1 countries currently are not included, zero per cent. That is the regime. The ship that transports goods to both countries—Annex 1 and non-Annex 1 countries because they go round the world—is included in a regime based on the share of goods unloaded in Annex 1 countries, so on average 60 per cent. That means that only the emissions that are really attributable to my demand of importing a car from Malaysia or from the USA are included. Worldwide, the Annex 1 share of emissions based on unloaded goods is 60 per cent, so if that would be implemented on day one we would cover 60 per cent of emissions. That principle fulfils, according to the discussions I had, the question of global and differentiated. So there are three advantages, and I stop after that. First, it will deliver on the IMO principle of being global for CO_2 emissions. Second, it is compliant with the current climate change regime and the future climate change regime; other countries coming to Annex 1 countries are included automatically. Finally, the environmental results of that scheme would be very high and might be even higher than a uniform scheme because it only applies to Annex 1 so we can decide 20 per cent, 50 per cent reduction, whatever Annex 1 wants to lead the global world with. Basically what we are saying is that only because of the pressure of negotiations and discussions we found a way that could be global (as per IMO) and differentiated (as per the climate change regime). That is the breakthrough but unfortunately delegations had prescripted responses and not many people wanted to discuss. I did have conversations with delegations and many countries of the developing world were very interested.

Q34 Mr Caton: It sounds, on the face of it, that you have resolved this impasse between the Annex 1 and the non-Annex 1 countries but, from what you say, the delegations—certainly the delegations from Annex 1—were not open to that idea at this stage. Is that the case?
Dr Stochniol: It is not that the delegations were not open, the delegations are very often messengers of people who are coming with a decision and they have to stick with what the government has decided already. I have been working with these representatives for the last two years, so in individual private conversations many people have said that this can actually work. Secondly, just to validate that, there were plenty of experts so we convened a group of experts. We also had a side event. Out of the side event and out of the group of expert discussions everyone was saying that it could work. We would not get the evasion problems with the route based schemes or anything like that. We asked the head of the working group who has spent decades of work on this whether that proposal had ever been raised. He said it has not been raised in such a way.

Q35 Mr Caton: What about the shipping industry and the port authorities? Clearly you have spoken to them, what is their response to this approach?
Dr Stochniol: They would be happy to have a global approach. Just three days ago the ship owners from France explicitly said, "We prefer a simple scheme based on charges than a complex scheme based on trading that actually creates more problems than it solves". For them their key business is to transport goods from A to B and the additional charge, the economic impact on fuel, is so small (around five per cent) that they do not want to trade. They do not see a benefit and actually it would increase the cost and the money would go to goals that are not climate change.

Q36 Mr Caton: Your scheme is on the table. Are there any other viable schemes on the table?
Dr Stochniol: The scheme that I have just described started with the proposal of Norway and then came the proposal from Denmark which is more or less the same. It is simply that we are going to pay our own charges or levy and at the same time, because people want to have the trading of quantitative targets, there were some proposals regarding trading. There was a proposal from Germany that is based on the so called Maritime Emission Trading Scheme. I think the differences are profound only between charges and trading. When you compare the Norwegian proposal or my scheme or the Danish levy there are questions how do we differ where the money is collected and how it is spent, but there is no principal question regarding economic efficiency. The biggest difference is the difference between charges and trading and the latest difference is only related to ships coming to Annex 1 ports. That has never been proposed. Trading can also be created like this but it is a bit more complex.

Q37 Jo Swinson: Assuming that this scheme or a similar scheme were actually implemented, what actions would you expect the ship owners to take and what would you expect the shipping industry to actually do to reduce the emissions?
Dr Stochniol: I think it is basically changing behaviour; it is incentives to implement the thingsthat are already available like more efficient engines and of course future changes are very important. I would probably categorise it in four elements. One is the behaviour short term and really because the viability of the costs and especially the cargo costs would make the use of operational efficiency measures more attractive. Secondly, because we start collecting data, we will see transparency and comparability between the ships and some companies are already asking, "Can I know how efficient your ship is?" Therefore suddenly if we have the data we can compare their efficiency. So that is the behaviour. The second part

is technology short term. Part of the scheme is funding for technology transfer because it is not a good point just to change the technology in one of the part of the world. That would be wider acceptance of the clean technologies. Finally, in several places in the world there are bottlenecks and no-one wants to fund it because it is common good, for example Malacca Straights. So with additional funding you can reduce congestion and implement electronic highway as done in Malacca Straights. Long term is a completely different story but even more important because the emissions are related to economic activity. So, first of all, more efficient engines will be ordered. I mentioned, for example, a ten million dollar engine. It is available now but it is not being bought because there is no case. There is no predictability regarding the cost of carbon for the next 20 years. They cannot make their business case to actually buy it. So that is very important. Regarding technology long term there would be additional investment in research and design and therefore the step changes like hydrogen transport can come forward and with this you can really save a lot of emissions and that is what everyone is asking for.

Q38 Jo Swinson: The charges you are proposing are about five per cent added onto shipping fuel costs. Is that going to be enough to get some of those big decisions changed, whether it is spending ten million dollars extra on a different type of engine for example or replacing part of the fleet? As you say, these are decisions that maybe only get made once every 30 years. Is that going to be enough of an incentive to change those kinds of decisions?
Dr Stochniol: I believe yes. I have been working in consulting as a manager and some of our programmes have been stretching for 50 years. In that case you are not looking at the cost of today, you are looking at the total cost of that and therefore I am absolutely certain that even that small charge would really change the business case into a favour of buying a more efficient engine.

Q39 Jo Swinson: Are there any other barriers that you would see to the shipping industry taking action that would need to be overcome?
Dr Stochniol: It is political. Most of the shipping industry is saying, "As long as it is global and it does not change the competitive landscape we are happy with that". As I mentioned even recently the French ship owners use the forbidden word "tax" but they would accept a tax.

Q40 Joan Walley: Just going back to your scheme, how quickly do you think it could come in and, if it were to come in, will it be done as an annex to an existing convention or would it be a brand new convention? If so, would that not take a huge amount of time in terms of negotiation?
Dr Stochniol: Absolutely. There are two answers here. One of course is the technical feasibility. From a technical point and also taking into account the climate change negotiations this scheme could start as soon as 2012 or 2013. There are no technical difficulties for such a rapid start. The necessary data is available and some of the issues such as an emissions baseline we do not have to worry about because this scheme does not require detailed data. For instance, I will give you some examples, the fuel receipts are available so every single ship has to have the fuel receipts for three years. If they buy fuel for 500,000 dollars they have to keep the receipt for three years. The receipts are also kept by suppliers therefore it is a very good tracking and foolproof method of doing that. Enforcement would only be done in Annex 1 countries therefore it is relatively easy to implement. Legally we already have a law that is dealing with international obligations and on the dominance of international law over domestic. This is the law of the sea, so called UNCLOS. All of the delegations, including Denmark, said that this is the starting point; we do not need a new law, it is already there. So basically it could be included in the Copenhagen Protocol, the one that is going to be negotiated in Copenhagen. Going for a new convention, this might be a disaster because developing a new convention takes a few years and entering into force in maritime takes a decade or longer very often. I will give you an example. There is a convention that has been developed in 1996 called HNS Convention which stands for Hazardous and Noxious Substances, for transporting these dangerous substances on the sea. It was adopted in 1996; it has not yet entered into force. Twelve years later it has not been ratified by enough countries to enter into force. Even though, for example, the European Union has urged all of the nations in Europe to adopt it, only eight countries worldwide have ratified it. The UK, for example, was one of the countries that developed that convention in 1996 and accepted that they would ratify subject to the process in the UK. Twelve years later it still has not done. So basically it could enter in 2012 if it is done within climate change; if it is done as a separate convention we are talking about 15 years.

Q41 Joan Walley: We are almost across the River from the IMO and I think what you are saying really begs the question of where the IMO fits in relation to the international architecture about how these issues have been dealt with. Presumably the leadership would come from the IMO.
Dr Stochniol: The IMO is a multi-lateral organisation that really depends on the government and the representatives of the government to make any decisions. When we talk about IMO we have to understand that there is a secretariat and people who are facilitators and there are 150 or so governments that are part of that. Therefore they work together. If the government is not bringing anything on the table you cannot talk about it. Therefore the key issue here is that the CO_2 emissions are part of a climate change and who decides on the priority, it depends who you talk to. In some of the nations they would say that it is the IMO that has to decide irrespective of what UNFCCC—the climate change people—say. In the UNFCCC they say that it is their priority to decide what happens to greenhouses and CO_2 emissions

and what they agree on the convention here is absolutely applicable everywhere. Therefore what you have is two kinds of languages in a way. One language of the people from maritime, one language of the people from climate change. They speak English but not the same language in the sense that they understand each other and that is a big problem that you have to reconcile on an international level, on a very high political level, that it is a global issue and we should not try to see it as a compartment of only maritime or only CO_2 in climate change. It cuts across.

Q42 Joan Walley: Finally on that, do you have any suggestions as to what role the UK could take if it is playing a leading role in all of this to, if you like, give the IMO the language of environmental sustainability?

Dr Stochniol: What happens in the next few weeks or few months is really essential. In my humble view the UK Government and perhaps even this Committee has a big diplomatic and economic opportunity. I spent two years which has been a rollercoaster because several times I thought we were getting into a deal. Let me give you some quotes on some of the issues from my experience and then I will come back to the solution. The issues are very often the opportunity. Quote number one, "We have only two hours a week for this topic". That quote comes from a small team working in a major maritime nation on maritime and climate change; two hours per week on such an important topic. Quote number two: I spoke to many countries who said, "Why us? Why not country X, Y, Z?" Basically because it is a global problem, a complex problem, everyone is free-riding, waiting for someone else to take a leading role despite the high promises or occasional rhetoric. Quote number three: "It seems like a great proposal but it may be incompatible with our policy". "What is your policy?" The answer, "We do not have one yet". Some of the quotes are coming from governments in Europe. Very often the officials are not asked to take initiative or ownership, let alone provide vision and leadership on the global stage. Lack of inter-departmental clarity, not understanding shipping and the climate change makes it even worse because people speak different languages: climate, maritime, treasury, for example. Engaging non-state experts is really very often against the official's pride or policy. Basically they say "We can do it ourselves". Final two quotes (and I will not make any comment to shorten it). After a couple of months of communication I get the following response: "Our experts are uncomfortable". "What about?" "I don't know yet." And the last quote: "It might be too early. We still have time until 2009." In this context I truly believe that the opportunity to unlock the deadlock in shipping CO_2 emissions is now and for the taking. Based on my experience and recent consultations including in the IMO I believe there are three steps that are achievable. Step number one for the UK: identify a senior leader that will own the opportunity.

Q43 Joan Walley: Sorry, I did not get that.

Dr Stochniol: A senior leader, a senior official or minister; a leader. This person will own the opportunity and can therefore have the time, energy and remit to drive it forward. Step number two: bring the global but differentiated principle or approach to the climate change talks in Poznan in December. Step number three: when the deadlock between conversations on global and differentiated is unlocked you can capture the opportunity to create a scheme for CO_2 emissions and this new supra-national organisation can be based in London and created by London and people here. In a way what I am saying is that a global problem requires a global solution but the initiative can be taken by the UK Government and it is really feasible to implement. I would be happy to clarify any other details on this subject.

Q44 Mr Chaytor: You suggest that about ten billion dollars could be raised through your kind of carbon charging scheme. What are the assumptions underlying that and how have you calculated the ten billion dollars?

Dr Stochniol: First of all these ten billion dollars are coming assuming there is a global uniform. If we just constrain it to Annex 1 countries we will come to six billion (60 per cent) and that is the latest view. The assumptions are based on the emission growth that is currently happening and the target that we will put on the shipping so I assume that the global community could agree to 20 per cent of reduction of emissions of CO_2 by 2020. So the gap is driving the demand for emissions and the carbon price drives the charge. Basically in 2012 the charge may be around five per cent of the fuel but by the way translates only to 0.1 per cent on the end customer. Myself, when I import that car from Malaysia costing 5000 dollars, I will only have to pay five dollars, and most of the public in the UK would pay 0.1 per cent. The assumption is that it is the quantitative target for the emissions and the carbon price on the market because the emissions are so large we get to six billion dollars from a very small charge which translates to one dollar in one thousand dollars on imported goods in the countries that people can afford and are willing to pay for it.

Q45 Mr Chaytor: What mechanism are you proposing for collecting the charge? Who would be responsible?

Dr Stochniol: Shipping is complex. So far no-one has designed an emissions trading scheme. There are multiple parties who can pay for the fuel so what we say is that it is the party that pays for the fuel, very often a charterer. It might be the ship owner; it might be the ship manager. The one who pays for the fuel pays the emission charge. In a year we know that that ship has spent 100,000 tons of fuel, for example; we know the percentage of goods delivered to the Annex 1 countries; we know the price and the charge. It may be paid directly to the central account bypassing the national coffers. Basically what is very important in this scheme is that it is a supra-national to avoid the domestic revenue problem. If we collect

it nationally then we have a problem like we had in the UK. After two months of talks finally someone said, "We have found the word "fund" in the Norwegian proposal; we have to send it to Treasury" and then everything happened, we cannot hypothecate revenue. There is a precedent like international oil pollution compensation fund that the money is collected directly, bypassing national.

Q46 Mr Chaytor: Who would be the members of the fund? How would the fund be established?
Dr Stochniol: It would be a supra-national organisation like IOPC which is a supra-national organisation that has a remit to deal with that and has a formula—that is very important—that tells you how the charge is being calculated. Otherwise you cannot implement an international charge unless it is transparent.

Q47 Mr Chaytor: In terms of the distribution of the fund, how would that money then be used? Would there be a formula for that?
Dr Stochniol: Let me give you the example of the six billion dollars. Let us say that six billion dollars are coming to the fund based on the target of emissions.Nearly half of that would go to reducing emissions by purchasing forestry credit or CDM credit by reducing emissions elsewhere. So it is 2.5 billion dollars for that. Then 2.5 billion dollars is proposed to go to the adaptation fund under the UNFCCC. That is therefore adaptation climate change. The remainder, about one billion dollars, would go to the technology fund that is looking for near-term technology transfer and long term technology transformation. Importantly the money that is going to adaptation, are the gains that we are getting from aggregating the money together. We can buy forestry credits, we can buy credits on primary markets which are 40 per cent cheaper than on a secondary market. Therefore, the efficiencies create money for adaptation to climate change.

Q48 Mr Caton: Would this supra-national body that you mentioned be responsible for setting the emissions cap for shipping and also determining the carbon price?
Dr Stochniol: This is the kind of execution body, so the cap is really under the convention for climate change. In Copenhagen there are going to be negotiations and of course Annex 1 countries, including the European Union, would take some quantitative targets. That proposal is compatible because it is going to be driven by a quantitative target. If the agreement is that Annex 1 countries take 20 per cent emissions reduction by 2020 this is being accepted by that multi-lateral organisation. The second point of the equation is the carbon price and this is being set externally by the market so they do not do anything about it. They only take the forward price one or two years in advance and announce the charge for the ship owners what is the charge going to be in two years' time? Therefore the ship owners and the whole of shipping can include the price in their pricing scheme and pass it on to end customers. The multi-lateral organisation does not decide on the cap; that is being decided by UNFCCC. It does not decide on the charge because it is decided by the market. It does not decide how the money is being split because it should be part of the setting of the fund, whether 50 per cent goes to adaptation or not. This is a call from multiple nations around the world that adaptation to climate change should be treated on the equal footing of mitigation and therefore it might be very similar but it is only one option.

Q49 Chairman: How easy would it be to audit independently the emissions figures from individual ships?
Dr Stochniol: It is already legal and obligatory. Every single ship or 99 per cent of the ships world wide, every merchant ship, is required to keep the receipt of fuel for three years at any time on board. The emissions are directly proportional to the fuel; we know that one hundred per cent. If we do it globally for Annex 1 countries you can always enforce it in the port, it is under so-called Port State Control which is a way to enforce the safety of ships and fulfilment of bilateral obligations. The liability will stay with the ship. It is not the charterer of the ship this month or the charterer of the ship next month, it is the ship. If a ship comes to the port and the information is not available on the central data base or emissions have not been paid for the last three months or whatever, it is not allowed to come in until it settles the charges. It is a hundred per cent auditable by the authorities legal instrument under MARPOL Annex VI which is the Bunker Delivery Note, the fuel receipt.

Q50 Chairman: So it is robust against fraud.
Dr Stochniol: That is correct. There was an example given by Peter Lockley from WWF about this, on a route-based. That a ship can divert to Casablanca. It does not matter because we are only looking at where the cargo is being unloaded or is destined to. If a container is on a ship going to the UK it does not matter whether it goes into Casablanca or whatever route it takes.

Q51 Chairman: You have suggested that the British Government have not been very active in pushing agreements on greenhouse gases within the IMO. Which countries have been more active in doing that?
Dr Stochniol: The reason I suggested that it has not been active was because I was initially asked to contact the UK Government by the secretariat of IMO and other people who knew the process. They said that the UK at that time—two years ago—wanted to do something about CO2 emissions and my initial proposal has been put forward to the UK but then it slowed down because of departmental questions of responsibility and other things that I do not go into in public session. Norway has been very open, has embraced the proposal and put it forward within three or four weeks into the IMO, to MEPC56. Denmark has been extremely active afterwards by preparing the global levy proposal and at the same time pushing internationally through

diplomatic channels to get it working. From the other countries, Australia has been much more active recently arguing for a global approach. From the developing countries I think South Africa has been the most open to consider this kind of scheme as part of a package or similar. Basically there are several countries that are working intensively to put this forward. Of course the European Union as a whole was supporting the Norwegian proposal two years ago.

Q52 Chairman: Are you not able to say why you think Britain is being a bit of a laggard now?
Dr Stochniol: Can you repeat the question, please?

Q53 Chairman: You have identified some other countries that are now being more energetic in pursuing this agenda but Britain is not among them. Can you say why you think Britain is being rather slow?
Dr Stochniol: I think it would be a question of ownership, the one that I have suggested in my recommendation. Around 2007, at the beginning of the year, the issue of CO_2 emissions had been very much politicised. In the past it was the maritime coastal agency that always had a lead on all technical issues. Suddenly Defra came into the equation and there was a question of coordination and agreement of the position. What happens now is that we are coming to these two different languages, maritime and climate change. There is the question of who is to decide. For example, all of the countries in Europe have agreed a position on the Norwegian paper; the UK Government was not able to agree the position on that paper before the coordination meeting. My meeting that was scheduled with the senior directors for two months has been basically shortened to five minutes of conversation saying that the experts are not available. Then the word "fund" has been found in the proposal and that was sent to Treasury which does not speak climate change language or maritime language whatsoever. I do not know who put the question, but I can bet anyone that these people do not know about the UNCLOS Convention for law of the sea and I can put the different references to that. I have spoken to the creator of a convention in Malta and he told me that anyone who is looking at this kind of international funding should first read the convention or talk to experts before they say, "We have to hypothecate" or whatever. It is international; it is outside our boundaries; it is heritage of mankind. These are the words that are being used. One article is saying that whatever is discovered in the seabed belongs to everyone and the revenue is to be shared between the nations. Basically I think it is a question of coordination, a very much politicised agenda and perhaps lack of ownership. I was at one stage asked, one year later, "When you find out who is responsible let us know". That came from the other side of the Government.

Chairman: Thank you very much for your time for coming this morning. It has been a very interesting session from our point of view.

Tuesday 28 October 2008

Members present

Mr Tim Yeo, in the Chair

Colin Challen
Mr David Chaytor
Martin Horwood
Mr Mark Lazarowicz
Jo Swinson
Dr Desmond Turner
Joan Walley

Memorandum submitted by International Maritime Organization (IMO)

Background

1 Work on the prevention of air pollution and control of greenhouse gases emissions from ships engaged in international trade started within IMO in the late 1980s. The first steps were the out phasing of ozone depleting substances; both as refrigerant gases and in fire fighting systems. Later prevention of air pollution in the form of cargo vapours and exhaust gas were targeted by, *inter alia*, through the adoption of strict limits for nitrogen oxides and sulphur oxides in ship exhausts. In recent years the focus has been on the control of greenhouse gas (GHG) emissions from ships. IMO as a United Nation's specialised agency responsible for regulating all aspects of ships engaged in international trade, plays a key role in ensuring that lives at sea are not put at risk and that the environment is not polluted by international shipping—as summed up in IMO's mission statement: Safe, Secure and Efficient Shipping on Clean Oceans.

2 Although to date no mandatory instrument to regulate GHG emissions from international shipping has been adopted, IMO has given extensive consideration to the matter and is currently working in accordance with an ambitious GHG work plan, adopted by the fifty-fifth session of IMO's Marine Environment Protection Committee (MEPC 55) in October 2006, that is expected to culminate with adoption of binding regulations on all ships in 2009.

3 Shipping is probably the most international of all the world's industries, carrying up to 90% of global trade by weight, in a cost and energy efficient way, as well as cleanly and safely around the world. The ownership and management chain surrounding ship operations can embrace many countries; ships in international trade; and spend their economic life moving between different jurisdictions, often far from the country of ownership or registry. It should be noted that an overwhelming portion (77% of the tonnage by dead weight) of all merchant vessels engaged in international trade is registered in developing countries (countries not listed in Annex I to the UNFCCC).

Shipping and Sustainable Development

4 Shipping is a crucial force in sustainable development, making a massive contribution to global prosperity with only a marginal negative impact on the global environment. Both the poor and the rich benefit from seaborne trade. Moreover, due to the nature of shipping, developing countries can and do become major participants in the industry itself and, by so doing, generate income and create national wealth. However, the significant increase in global trade and international seaborne transport over the past decades (500% growth over the past 40 years) has also brought negative consequences, as does all human and industrial activity through increased emissions of air pollutants and greenhouse gases.

Maritime Transport and Sustainable Development

5 There is no doubt that shipping is a clean, green, environmentally-friendly and very energy-efficient mode of transport. Overall, it is only a small contributor to the total volume of atmospheric emissions. Nevertheless, significant reductions in harmful emissions from ships and increases in fuel efficiency have been achieved over the past decades; through enhancements in the efficiency of engine and propulsion systems and improved hull design. Larger ships and a more rational utilisation of individual vessels have also contributed significantly to reducing the amount of energy needed to transport a given unit of cargo.

6 What is often overlooked in any discussion about overall levels of GHG emissions from shipping is that the total amount of shipping activity is not governed by shipping itself, but by global demand for shipborne

trade, and not only is this high, but it continues to grow. The international shipping industry is the life blood of the global economy. Without shipping, it would simply not be possible to conduct intercontinental trade, to transport raw materials in bulk or to enable the import and export of affordable food and manufactured goods.

IMO's GHG related work

7 The IMO Assembly adopted, in December 2003, resolution A.963(23) on "IMO Policies and Practices related to the Reduction of Greenhouse Gas Emissions from Ships", urging the Marine Environment Protection Committee (MEPC) to identify and develop the mechanisms needed to achieve limitation or reduction of GHG emissions from international shipping. The Assembly resolution requests the IMO Secretariat to continue co-operating with the Secretariats of UNFCCC and the International Civil Aviation Organization.

IMO Study on Greenhouse Gas Emissions from Ships

8 The 2000 IMO GHG Study is the most comprehensive assessment to date of the contribution made by international shipping to climate change. The Study estimated that in 1996, ships contributed about 1.8% of the world's total CO_2 emissions, and clearly stated that there is no other mode of transport with a better CO_2 record in specific terms.

9 The 2000 IMO GHG Study is currently being updated to facilitate future decisions. The contract for the update was awarded to an international consortium of renowned research institutions, co-ordinated by MARINTEK of Norway. The updating has been divided into two phases:

1. Phase 1, covering a CO_2 emission inventory from international shipping and future emission scenarios, will be reported to IMO by August 2008 for consideration by MEPC 58 in October 2008; and
2. Phase 2, also covering greenhouse gases other than CO_2 and other relevant substances in accordance with the methodology adopted by UNFCCC, as well as the identification and consideration of future reduction potentials by technical, operational and market-based measures, will be submitted to IMO by February 2009 for consideration by MEPC 59.

10 The preliminary conclusions on Phase one of the updated study was conveyed to an intersessional meeting in June this year. The main conclusion of the study was that the contribution of international shipping to global CO_2 emissions from ships above 100 GT engaged in international trade was deemed to be 843 million tonnes in 2007 or 2.7% of the world's total anthropogenic CO_2 emissions. The report also indicates that this percentage would rise to 3.3% (1,091 million tonnes) if ships in domestic trade and fishing vessels are included. The study projected ship's CO_2 emissions to grow by a factor of 2.4 to 3.0 by 2050, assuming there are no explicit regulations (base scenario) on CO_2 emissions from ships. For 2020, the base scenario predicts increases ranging from a factor of 1.1 to 1.3. These predictions take into account significant efficiency improvements resulting from expected long-term increases in energy prices.

GHG Considerations Within IMO

11 MEPC 57 was held in London from 31 March to 4 April 2008 and considered further follow-up actions to resolution A.963(23) on "IMO policies and practices related to reduction of greenhouse gas emissions from ships", including the progress made in line with the "GHG Work plan to identify and develop the mechanisms needed to achieve the limitation or reduction of CO_2 emissions from international shipping".

12 The Secretary-General of IMO highlighted the need for IMO and the maritime community as a whole to act in concert with, and contribute to, the wider international efforts aimed at swift and substantive action to combat climate change under the UNFCCC process, by proactively addressing the principles and objectives enshrined in the roadmap agreed at the Bali Conference, out of genuine concern for the atmospheric environment. He stressed the importance for the Committee to ensure that the complex challenges associated with the limitation and control of greenhouse gas emissions from shipping were properly understood by the international community and that IMO should continue to show leadership, not only by moving in parallel, but also keeping one step ahead of the agreed UNFCCC process.

13 MEPC 57 decided, by overwhelming majority, to take the principles listed below as its reference for further debate on GHG emissions from international shipping and also for further reflection on the nature and form of the measures to be taken. A coherent and comprehensive future IMO framework should therefore be:

1. effective in contributing to the reduction of total global greenhouse gas emissions;
2. binding and equally applicable to all flag States in order to avoid evasion;
3. cost-effective;
4. able to limit, or at least, effectively minimize competitive distortion;

5. based on sustainable environmental development without penalising global trade and growth;
6. based on a goal-based approach and not prescribe specific methods;
7. supportive of promoting and facilitating technical innovation and R&D in the entire shipping sector;
8. accommodating to leading technologies in the field of energy efficiency; and
9. practical, transparent, fraud free and easy to administer.

14 A number of delegations expressed reservations on the principle stated in paragraph 13.2 above. The Chairman proposed to carefully reflect on the contested principle in the intersessional period and the intention of the reflection would be to reach consensus on the issue of the principles at the next session of the Committee. MEPC 57 accepted the proposal of the Chairman and encouraged Member States to submit their views to that session.

Intersessional Meeting Held in June 2008

15 The first Intersessional Meeting of the Working Group on Greenhouse Gas Emissions from Ships (GHG-WG 1), which was attended by more than 210 delegates comprising experts from all over the world, was held in Oslo, Norway, in June 2008. The week-long session was tasked with developing the technical basis for the reduction mechanisms that may form part of a future IMO regime to control GHG emissions from international shipping, for further consideration by MEPC 58 in October 2008.

16 The intersessional meeting in Oslo addressed market-based, operational and technical measures needed to achieve limitation or reduction of GHG emissions from international shipping.

17 In particular, the meeting further developed a formula and the methodology, as well as draft text for the associated regulatory framework, for a proposed mandatory CO_2 Design Index for new ships based on submissions by Denmark and Japan. Once finalised, the index will serve as a fuel efficiency tool at the design stage of ships; enabling the comparison of fuel efficiency of different ship designs, or a specific design with different input, such as installed propulsion power, hull shape, choice of propeller or the use of wind, solar or waste heat recovery systems. With this outcome, and a number of submissions containing comments on the formula and proposals to improve the robustness, MEPC 58 should be in a position to approve the CO_2 design index for new ships and agree on the final details when it meets in London in early October 2008.

18 The intersessional meeting also considered the interim CO_2 operational index and identified areas where changes have been proposed. The interim CO_2 operational index was adopted by MEPC 53 in July 2005 and has been used to establish a common approach for trials on voluntary CO_2 emission indexing, enabling shipowners and operators to evaluate the performance of their fleet with regard to fuel efficiency and CO_2 emissions. The draft CO_2 Operational Index is put forward to MEPC 58 with the view to finalising the indexing scheme at that session.

19 The intersessional meeting reviewed best practices for voluntary implementation and developed further guidance for the ship industry on fuel efficient operation of ships. The meeting considered best practices on a range of measures as identified by earlier sessions of MEPC and how they can be implemented by ship builders, operators, charterers, ports and other relevant partners to make all possible efforts to reduce GHG emissions from ship operations. Operational measures have been identified as having a significant reduction potential that can often be achieved without large investments, but would require cooperation with a range of stakeholders such as those identified above.

20 The Oslo meeting had a thorough and in-depth discussion related to the further development of different economic instruments with GHG reduction potential. Including, *inter alia*: a global levy on fuel used by international shipping, and the possible introduction of global emissions trading schemes for ships in international trade. Proposals for both open emission trading schemes, where ships will be required to purchase allowances in an open market; in line with power stations or steel mills, and closed schemes; where trading will only be among ships, were considered. Grandfathering or auctioning of the allowances, how the cap is set and by whom, managing of any system, banking of allowances and the impact on world trade, as well as legal aspects, were also among the issues considered. The meeting had an extensive exchange of views paving the way for further discussion at MEPC 58 in October on possible introduction of market-based measures to provide incentives for the shipping industry to invest in fuel efficient ships. However, there are still obstacles to be surmounted on how to observe the basic rules of IMO on non-discriminatory rules applicable to all ships irrespective of the flag they are flying, and at the same time respecting the special needs and circumstances for developing countries.

Further GHG Considerations Within IMO

21 MEPC 58 will be held in London from 6 to 10 October 2008 and will further consider the reduction mechanisms developed by the intersessional meeting, with a view to developing further an IMO regime applying to all ships. MEPC 58 is also expected to consider the related legal aspects and decide whether the

GHG regulations should form part of an existing convention or whether an entirely new instrument should be developed and adopted.

22 MEPC 58 will also decide on the work needed prior to MEPC 59, to be held in July 2009, when the final adoption of a coherent and comprehensive IMO regime to control GHG emissions from ships engaged in international trade is planned.

The Way Ahead

23 MEPC 59 is expected to adopt the first global mandatory GHG regulations and efficiency standards for any international industry. This first package will comprise technical and operational measures that most probably will include a mandatory CO_2 design index for all new ships, and a requirement for energy efficient operation of ships through the introduction of a mandatory energy efficiency management tool. The mandatory technical and operational requirements may form part of the existing regulations to prevent air pollution from ships contained in Annex VI to the MARPOL Convention. MEPC 59 is also expected to adopt non-mandatory mechanisms such as guidelines for best practices and CO_2 operational indexing to complement the mandatory instrument.

24 MEPC 59 is further expected to have in place the needed framework for a future market-based instrument (eg an emission trading scheme or a fuel levy mechanism) and to agree on the timeframe for this part of the work.

25 The fifteenth Conference of Parties (COP 15) to the UNFCCC will be held in Copenhagen in December 2009, to adopt the successor instrument to the Kyoto Protocol. The Secretary-General of IMO will submit a position paper to COP 15, informing the Conference of the outcome of MEPC 59 on the mandatory and non-mandatory instruments, as well as the agreed work on a possible market-based instrument, to enable the shipping sector to offset its growing emissions in other sectors.

26 IMO will continue its Endeavours to reduce any environmental impacts from international shipping, a transport industry that is vital to world trade and sustainable development.

25 September 2008

Witnesses: **Mr Miguel Palomares** and **Mr Eivind S Gagslid,** International Maritime Organisation, gave evidence.

Q54 Chairman: Good morning. Thank you very much for coming in. As you know, this is our second session on this current inquiry on shipping. We are very interested to hear from you as one of the key organisations involved in the industry. We have received your written comments already. I would like to start with a fairly general question. One of the studies that you commissioned projects that, under business-as-usual, carbon emissions from ships are set to double and possibly to double again by 2050, so quadrupling by 2050. That is quite a significant rate of increase over a time period when, as you know, the global target is for a substantial reduction. What level of emissions do you think shipping could realistically hope to achieve? How much could that business-as-usual scenario be reduced?
Mr Palomares: Probably the study you refer to is an update of an original study that was commissioned by the IMO and published in 2000. Last year the IMO decided that this was outdated, for obvious reasons, and an update has and is being undertaken by a world consortium of research institutions. We have received Part I of this study, the results, of which indicate that international shipping emits 843 million tonnes of CO_2. This is a consensus estimate, representing about 2.7% of the global total anthropogenic CO_2 emissions. If left unregulated, this level might increase by a factor of 1.1 to 1.3% by 2020 and 2.4 to 3.0% by 2050. This is, of course, if left unregulated.

Q55 Chairman: Even the lower end of that 2050 figure is almost a tripling of where we are today.
Mr Palomares: No, 1.3%. That would be 30% more.

Q56 Chairman: Yes, but by 2050 you are talking about 2.4 to 3.0%.
Mr Palomares: Almost tripling, yes.

Q57 Chairman: That is over a period in which more and more countries are committing themselves to making a substantial reduction. How much do you think could be realistically achieved by the shipping industry over that period? How much below that business-as-usual forecast?
Mr Palomares: We know that by introducing the regulations that are being developed at the moment in the IMO, there are some studies that indicate a reduction per tonne mile of up to 70% by 2050. This would entail regulations for ship design and construction and there would also be operational measures. We can talk about those, if you wish. Of course there is another component, which is the market-based measures, which are being considered somewhat separately from the technical and operational measures. It would be, I think, irresponsible of me to venture a total level of reduction from the industry because this is very much dependent on how world trade will be performing by that time. The growth in shipping correlates very well with GDP in the world and, therefore, if world trade continues growing there will be a demand on more shipping and therefore more emissions.

Q58 Joan Walley: First of all, could I ask you how much importance you give to the forthcoming conference of the parties to be held in Copenhagen in 2009?
Mr Palomares: We hold that in the utmost of respect and importance, of course.

Q59 Joan Walley: That is an important milestone.
Mr Palomares: Yes. We are fully participating in all the meetings of the subsidiary bodies to the United Nations Convention on Climate Change, keeping them updated on what the IMO is doing and what decisions are being made at committee level. We intend to participate in the forthcoming 14th conference in Poznan in Poland. The idea will be that after the Marine Environment Protection Committee of the IMO in July of next year, completes a framework of regulations and recommendations on how to reduce greenhouse gas emissions from shipping, this will be presented to the Copenhagen Conference by the Secretary General of the IMO as a position paper.

Q60 Joan Walley: From your submission to us[1], we understood that the Marine Environment Protection Committee—which I think met at the beginning of October—
Mr Palomares: Yes.

Q61 Joan Walley: [en rule] would be making key recomendations in respect of the action plan to reach Copenhagen from here. It seems to me, from what we have heard, that you did not take any decision or action on greenhouse emissions at that meeting of the IMO MEPC in October.
Mr Palomares: Let me clarify that. The MEPC 58 which met at the beginning of October, as you correctly said, discussed, of course, the greenhouse gas emissions from shipping in detail. All the aspects of this discussion will be reported to the Poznan Conference in December 2008. In accordance with the approved action plan of the Committee, it is not until MEPC 59 in July 2009 when the plan will be completed and, therefore, it is the outcome of that session of the Committee that we will be reporting to the Copenhagen meeting. There are two steps. From MEPC 58 in October this year, we will go to Poznan and report there, and then, when we expect the action plan to be finalised next year, in July, that will be reported to Copenhagen.

Q62 Joan Walley: We heard evidence last week before our Committee that this postponement of any decision on a market-based approach to tackling emissions was very disappointing. It does not seem to me that you have got the necessary time within the schedule that is available to get it properly back on the agenda by the time of Copenhagen 2009. Do you agree with that? Are you disappointed by that?
Mr Palomares: There has not been any postponement.

Q63 Joan Walley: There was no decision reached, was there?
Mr Palomares: No, but the MPEC 58 was not expected to reach a decision on this issue.

Q64 Joan Walley: It reached a decision on other issues, did it not, in terms of emissions other than carbon?
Mr Palomares: Yes.

Q65 Joan Walley: And on recycling.
Mr Palomares: The work is in progress. There is no final decision on how, for instance, a design index should be applied, et cetera, et cetera. The MEPC 58 was not scheduled to agree finally on anything. There has been quite substantive progress made on the development of the technical and operational measures. There was a debate, and a deep debate at that, on market-based measures, and this discussion will be continued at the next session of the Committee. It is possible that some Member States will present feasibility studies on ways on how to apply these market-based measures. As a matter of fact, we have to know, first of all whether the environment will benefit clearly from the application of market-based measures, and, second, how these market-based measures can be applied to international shipping on a global scale.

Q66 Joan Walley: Are you confident that you will have a proposal that will be ready to be included in what gets debated at Copenhagen?
Mr Palomares: At least there will be a clear understanding within the Committee and the members on where we should be going regarding market-based measures.

Q67 Mark Lazarowicz: Taking up Mrs Walley's line of questioning, you suggested that at least your Committee will be aware of the options available by next year. Do you seriously suggest, therefore, that there is a possibility you will not have a concrete proposal at Copenhagen next year?
Mr Palomares: There is a possibility of that occurring, but I cannot say for sure. I mean, we cannot pre-empt what the Committee will be deciding in July of next year. I can tell you that the application of any market-based measure, be it a global fuel levy or an emissions trading scheme to shipping is an extremely complex and intricate question. We are not talking of applying this within national borders or within a particular region; we are talking about a global region and, as such, it presents with challenges that probably the IMO has not been facing before.

Q68 Mark Lazarowicz: It is precisely because it is, indeed, such an intricate issue that I, and I am sure other members of the Committee, have fears as to what can be achieved in time for Copenhagen next year. Do you understand that, given that the IMO was given responsibility after Kyoto 10 years ago to develop some proposals, there is a lot of concern that we do not appear to have any certainty of proposals coming from Copenhagen next year?

[1] See Ev 20

Mr Palomares: You have mentioned Kyoto, and I might say that the wording of 2.2 of the Kyoto Protocol itself might have been somewhat in the way of more speedy progress in this. The article starts by saying that the parties included in Annex 1 (that is industrialised countries) shall pursue limitation or reduction of greenhouse gas emissions from aviation and shipping through the IMO. This is being read by some members as saying that only Annex 1 countries have the obligation to pursue this reduction, while others say that the article in its present form does not exclude non Annex 1 countries from also taking action as might be agreed in the international forum. Now, this is where the problem emanates. Many members believe that the selective application of any IMO regulations to ships on account of the flag they fly is something totally impractical, and we could quote many examples given by them. I would give you a simple example that has been quoted in IMO meetings. Sometimes you take two identical ships, sister ships, carrying the same cargo and doing the same route, and in a port in the United Kingdom what would port state control do if one of the ships was flagged in Panama and the other one was flagged in Norway. Would port state control give different treatment to the two ships, given that they emit more or less the same amount, *et cetera*? In the international arena there are many obstacles like the one I just mentioned that many members suggest would be detrimental to shipping as a whole, to fair competition, and would probably introduce market distortions. Other countries obviously do not think that is the case and that there might be a way out of this, and that is what the IMO is engaged in, in trying to find a solution that will be amenable and acceptable to all the membership of the IMO.

Q69 Mark Lazarowicz: I understand that you have a wide range of views amongst the membership and that you have to work with that and reflect that in what the IMO does, but do you not consider that the apparent failure to make progress, as we would see it, does put a question mark over whether the IMO should have responsibility for agreeing an emissions regime which should be empowered for the post Kyoto arrangements.

Mr Palomares: The IMO has the mandate under its own constitutive convention to deal on a universal basis with all the regulations that affect shipping. This covers, of course, maritime safety, maritime security, and the protection of the marine environment. This is something for members to decide. There are very serious hurdles and obstacles to solve, not least, as I was saying, the wording of article 2.2 and the different interpretation that is being made by different members of the IMO.

Q70 Colin Challen: The European Commission seems to be indicating that if the IMO does not speed up its act and come to some sort of conclusive decision on this, the Commission itself will perhaps take unilateral action. Is that something that you foresee happening? What are your views on it?

Mr Palomares: We have heard from the press, and possibly, also, in sessions of the Committees, statements from the observer of the European Commission saying more or less what you were referring to a moment ago. This is obviously a matter for the European Commission and the European Union and its members to decide. They will have to gauge the speed at which they think that the IMO should be acting and whether what the IMO is doing at the moment is not sufficient or not sufficiently speedy. In the opinion of many members, I would say most members of the IMO, any unilateral or regional action in an industry as international as shipping is would be detrimental to the industry itself and probably to international trade. As I was saying, the IMO Secretariat itself has no say in this. The EU is sovereign to do whatever they wish to do or their members agree, but I am hopeful that the IMO will, like it did with Annex VI to MARPOL only a month ago, take action sufficiently speedily and substantially so as to allay any fears that might be in the minds of EU members or the EC itself, so that they do not have to take unilateral or regional action, which, as I said, would be, indeed, detrimental.

Q71 Colin Challen: Does it not weaken your case on this, given the fact that aviation seemed to be falling head over heels to get involved in the ETS. British Airways have long sought to get in. It is supposed to happen in a few years' time. Does public opinion perhaps have something to do with it? If you were the recipients of the kind of attention that has been given in the press to the impact of aviation, you too might change your views very quickly if you felt that the shipping industry was going to become the next *be[circ]te noire* of public opinion. You are operating beneath the horizon at the moment—if you will forgive the pun, with reference to shipping. That does seem to be the case, does it not? Perhaps the time has come for a campaign by Friends of the Earth and all the others to throw the spotlight on you. Would that help to motivate your discussions?

Mr Palomares: I hope that by "you" you mean the IMO members.

Q72 Colin Challen: Exactly.

Mr Palomares: I think every one of the IMO members is conscious of the risk. There are reasons for the perceived slowness of action on the greenhouse gas issues. There are reasons that go beyond the strictly technical and operational matters that the IMO is usually involved with. After all, we have in excess of 50 international conventions adopted: most of them are applied universally and by the vast majority of ships. Of course the parallel with aviation that you have drawn, I cannot comment on, but I am not sure about the enthusiasm of the maritime industry itself. You might be able to find out in the second session. I believe the maritime industry will be in this Place. Whether they would welcome regional or unilateral legislation for international shipping, I personally cannot comment on that.

Q73 Colin Challen: If the European Union did say that the IMO was just drifting and not really coming to a quick conclusion, and they said, "You're going to the Emissions Trading System in the European Union," do you have any views on what impact that might have on shipping?
Mr Palomares: No, I cannot comment on that from a personal point of view. I think the industry itself would be in a much better position to answer that, if I may.

Q74 Colin Challen: What views might the IMO secretariat have on the design of market-based schemes to tackle global shipping emissions? Do you have any preferences between the types of trading schemes?
Mr Palomares: The IMO secretariat has no preferences per se. We are just there to assist members to take some decisions. If we can provide information and the technical backup to do that, then we would be doing our job, but we as a secretariat have no preference one way or the other.

Q75 Colin Challen: You have no views on the impacts of emissions trading schemes on global shipping emissions? You do not offer any views to your members? There is no research?
Mr Palomares: No, the impact is for members to decide, or, indeed, if we are mandated by members to commission studies—and that might very well be the case—to find out what impacts would either a fuel levy or an emissions trading scheme have on, first, the environment or on the shipping industry itself, then we will commission those studies.

Q76 Colin Challen: No**,** Members have not sought any guidance or advice or research on the impact of emissions *trading* on global issues?
Mr Palomares: No. We have received proposals by members, and some members, we understand, are undertaking these exercises, but up to now the IMO, as mandated by the Committee, has not started any such study.

Q77 Colin Challen: At this stage of the game you would not express a view on whether new agreements on emissions trading would be perhaps annexed to the existing MARPOL convention or whether it should be an entirely new convention.
Mr Palomares: That has been discussed, although not very much in depth. It would be difficult to include something that is eminently of a financial nature into an existing IMO instrument. Most of them are of a strictly technical and operational nature. There might be a possibility that a market-based mechanism, adopted under the aegis or umbrella of the IMO, might necessitate a stand-alone instrument. **Colin Challen:** Thank you.

Q78 Jo Swinson: You mentioned that you had had some proposals from some of your member countries about market-based mechanisms, but they have not progressed in the same way that the technological advances and the design index have managed to progress in October. Which countries were particularly reticent to take up those ideas on market-based mechanisms and what were their particular concerns?
Mr Palomares: You mean those that did not accept the proposals or that did object to the proposals?

Q79 Jo Swinson: Yes. When you were having the discussions about the market-based mechanism, which were the countries that were particularly opposed to it and what were their reasons for opposition?
Mr Palomares: I cannot cite by memory which countries they were, but suffice it for me to say that probably non Annex 1 countries would rather wait for Copenhagen to take decisions, and then the IMO would have a free hand in regulating the market-based measures in accordance with the principal agreements of Copenhagen.

Q80 Jo Swinson: Surely this is a Catch-22. You are saying that they are not going to support market-based mechanisms until Copenhagen, but surely the IMO needs to come together and have a common view on the market-based mechanism that it would want to put to Copenhagen. How can you square that circle?
Mr Palomares: The IMO can make great advances in preparation to that occurring by developing the framework or developing two alternative possible measures and then have it all in place and ready until Copenhagen take a decision. It might very well be that somebody will come with a proposal that will be accepted by all or the immense majority of the Committee in July, and then of course we will be going to Copenhagen with something already accepted.

Q81 Jo Swinson: What do you think are the key things to get those non Annex 1 countries to agree to something in July? What characteristics would be really important for a proposal to have?
Mr Palomares: I think fundamentally it is the common but differentiated approach that is enshrined in the UNFCCC. This means that the onus on taking action on reduction, as I said at the beginning, lies on Annex 1 countries. What non Annex 1 countries wish is that this principle of common but differentiated approach is reflected or is incorporated into any market-based measure that is agreed at the IMO. Of course, market-based measures are intricate and complex by nature, but then if you have to differentiate, in the case of shipping, by the flag that ships fly, this introduces yet again a further complication, making the problem even more complex. If somebody can sort this conundrum and come to MEPC 59 with a solution that would, indeed, incorporate the common but differentiated approach and also a fair treatment of the shipping industry as a whole, then probably that would stand a fair chance of agreement in July next year.

Q82 Jo Swinson: We heard last week from Dr Stochniol, who had put together a scheme that, from what we heard, seems to fit some of those

characteristics. If I understand it rightly, it had been submitted or proposed by Norway. Do you not think that that kind of scheme would fit the bill?
Mr Palomares: Yes, this is one scheme that might stand a chance of being further developed, but that scheme has not been proposed formally to the IMO as yet. It was introduced verbally under the banner of WWF during the MEPC 58 as a possible solution, but it was not discussed then in detail. If, indeed, that proposal is further developed and submitted in time for MEPC 59, I am sure that that one, together with others that we expect would be put forward, would be fully discussed in July.

Q83 Martin Horwood: Can I ask you about one Annex 1 country in particular, the United Kingdom. How would you characterise the UK Government's contribution to the process of trying to reach an international agreement so far?
Mr Palomares: Within the?…

Q84 Martin Horwood: Within the IMO.
Mr Palomares: Greenhouse gases in particular, or in general?

Q85 Martin Horwood: On emissions trading generally, yes.
Mr Palomares: Of course, the United Kingdom delegation is one of the key delegations of the IMO. There is a permanent representative who attends all the meetings of the IMO. That delegation, which is usually composed of several members coming from different disciplines within the administration, is very active and very supportive of the aims and principles of the IMO. In the case of greenhouse gases, they have been supportive from day one. I cannot quote from memory, but probably they have been submitting papers to the Committee ever since the greenhouse gas issue was raised in the IMO for the first time, probably 12 years ago.

Q86 Martin Horwood: With this level of representation and involvement would you expect them to be very active?
Mr Palomares: They are extremely active.

Q87 Martin Horwood: Our impression to some extent is that they have been more active on air pollution than they have been on emissions from shipping. Is there a specific example you can tell us about their contribution to the policy debate within the IMO?
Mr Palomares: We have papers. I cannot quote from memory the symbol of the paper and exactly on what issue they submitted to MEPC 58. I can tell you that they are totally committed. An example of this, for instance, is a donation of #50,000 that they made to the upgrade of the study that I was referring to at the beginning in answer to Mr Yeo's question. For us, the delegation of the United Kingdom is second nature within the IMO itself. They are very active. I do not know where you get the perception that they are not so much so on greenhouse gases. That is not the perception of the secretariat.

Q88 Martin Horwood: Are you under the impression, following on from the question that Ms Swinson asked you about the difference in emphasis between Annex 1 and non Annex 1 countries, that they have been actively trying to engage non Annex 1 countries, for instance, in supporting a market mechanism?
Mr Palomares: They have been active, again from memory, on extolling the virtues of universal application of any IMO regulations to all shipping. Again from memory—and Eivind will correct me if I am wrong—they have not engaged in directly confronting countries that advocate for the application of any regulations to annex 1 countries only, but they have done their bit in a more positive manner in the sense of extolling the virtues of going to a universal application.

Q89 Martin Horwood: Given that the British Government is based on the other side of the river to your organisation and it has such a history of involvement in the IMO in a support role, you would expect this to be possibly the most active government in support of trying to reach this international agreement which seems to be so elusive within the IMO. Can you give us one specific example? If not now, perhaps you could write to the Committee with specific examples of what they have done to try to advance that agreement.
Mr Palomares: Yes, we can do that. We can go back to the past few sessions of the Committee and give you specific examples of interventions by the UK delegation.

Q90 Mr Chaytor: Can I return to the last meeting of the MEPC. In your memorandum[2] you accept that you expected the operational index and the design index would have been agreed at that last MEPC meeting. What went wrong? What were the complications?
Mr Palomares: Nothing went wrong apart from the inexorable passing of time. There were quite a number of interventions by members on matters of principle, in particular on application and the relationship with UNFCCC, et cetera, that took a long time of the Committee in plenary. That was at the beginning of the week and that unfortunately put back the time that had been set aside from planning to a working group. An ad hoc working group would be working not only on the operational index but also on the design index, the management tool, and also the best practices. The group simply did not have time to do what was expected that we would achieve.

Q91 Mr Chaytor: Is this the first time that such a document has been prepared? Is there no previous version of a design index for the shipping industry or no previous version of advice over ways in which emissions can be reduced by improvements to ships?
Mr Palomares: Let me start with the operational index because that is the oldest. Interim guidelines on the operational index were approved by the

[2] Ev 20

Committee some three years ago. These have been useful. We have an enormous amount of data that is being sent back from ships that will be, of course, fundamental in deciding on a final formulation of the operational index. The Committee started working over a year ago on the design index. Indeed, the Committee approved the use of that design index for trials, so we now have guidelines on how to utilise the formula—fundamentally, the design index is a formula—so that ship designers and shipbuilders can use the formula now and then provide feedback about any shortcomings, some obstacles or, indeed, some virtues that it might have, in order to refine it at a later stage before it becomes mandatory.

Q92 Mr Chaytor: I can see that the operational index, once it is agreed and perhaps put in place, could have an immediate impact on reducing emissions, but the design index is advice to shipbuilders, so presumably that would take some time to have some effect on emissions. Is there potential for elements within the design index to be retrofitted to the existing fleet or is it entirely for new build?
Mr Palomares: No, the design index is meant for new ships only. Obviously retrofitting is a delicate issue in ships. Also, the formula in itself is more of a design philosophy. Rather than "Thou shalt install certain things onboard" this is a philosophy that entails more efficient propellers, more efficient appendages, the hull hydrodynamics, interaction between the hull and the propeller, et cetera, et cetera, so that you design a ship that is intrinsically efficient. Of course, we will have to wait to see the benefits of that until those ships are built and operating. The operational index by itself would not mean that a reduction would be achieved. The operational index is an indicator that will enable ship operators to apply the management tools and the best practices that are nearing completion at the moment, to be applied and to be able to ascertain how much savings and how much efficiency has been increased in a particular voyage. The operational index is a tool to tell you whether the measures you are taking are being effective or not.

Q93 Mr Chaytor: I appreciate that it is only if the advice within the operational index is followed that emissions would then follow. Perhaps I could come back to the issue of retrofitting. Is there not a third index somewhere that deals with the question of retrofitting, or is this just not possible in most ships? Is there any good practice anywhere of individual shipbuilders deciding to change propellers, for example, or other components to improve efficiency?
Mr Vagslid: The operational index would give you that indication over time if you installed a new propeller, a waste-heat recovery system, less resistant renewed painting, for example, you would see that on the operational index over time.

Q94 Mr Chaytor: That could be used for retrofitting, could it?
Mr Vagslid: Yes, and to monitor the ship in operation, the performance of the ship in operation.
Mr Palomares: Of course, in a non-mandatory way, ship operators have had, ever since the greenhouse study was published in 2000, a long menu of measures that they can take for existing ships in order to increase efficiency in their ships. That sometimes includes retrofitting—like more efficient propellers or rudders, or machinery, heat recovery systems, as Eivind was saying. There is a myriad of things that a ship operator has at its disposal to increase the fuel efficiency, and that is where the operational index enters into being: How do you monitor and how do you know how much the efficiency has increased or, indeed, might be decreased by this.

Q95 Dr Turner: Mr Palomares, I am sure you are well aware of the epidemiological studies of James Corbett and co-authors which suggest that emissions from shipping are responsible for 60,000 deaths worldwide; particularly, carbon, nitrous oxide, sulphur dioxide. How seriously does the IMO take these concerns?
Mr Palomares: The IMO has taken these concerns extremely seriously, to the extent that less than a month ago, on 10 October, it made a milestone decision to adopt a revised Annex VI to the MARPOL Convention and a revised the NOx technical code. This is introducing further reductions on the sulphur oxide, nitrogen oxide, and, by inference, particulate matter from shipping emissions. These are going to be very drastic indeed. In particular, in the case of sulphur emissions, the global cap at the moment stands at 4.5% sulphur content in the fuel. That progressively will be reduced up to 2020, when the maximum sulphur content in fuel will be 0.5 of a per cent[3]. In emissions control areas like the North Sea, the English Channel, and the Baltic, this will be reduced by 0.1 of a per cent by 2015.

Q96 Dr Turner: Do you mean 2.1%?
Mr Palomares: No, it will be reduced from 1.5%, as it is now. In 2012 it will be reduced to 1% and in 2015 it will be reduced to 0.1% of 1.0%.

Q97 Dr Turner: That is what I understood.
Mr Palomares: You can see that the reductions will be drastic. With this comes the particulate matter, which is nasty to human health. It has been demonstrated that by reducing sulphur content in fuel you are reducing, equally, the amount of particulate matter coming out of the funnel.

Q98 Dr Turner: These actions will themselves contribute to the amelioration of global warming effects. How are you going to achieve them, given that most ships run on bunker fuel, which is the leavings of the refinery process, which is intrinsically very filthy stuff indeed? Are you going to have to change the fuel that is used by ships in order to achieve this?

[3] *Note by witness:* The correct percentage is 0.5%, not 0.5 of a percent, as stated during the evidence session.

Mr Palomares: The regulations have been structured as: you can either put cleaner fuel into the engine or you can wash the emissions. In actual fact, the fact will remain that the exhaust, the stuff that comes into the atmosphere, is what is tested. You will not be able to have the sulphur or the nitrogen or the particulate matter that nowadays is allowed. This is coming to the fore only of late. This is not a very old thing, but the speed with which the IMO has reacted to this has to be commended, because the current Annex VI only entered into force in 2005 and here we are in 2008 and we have revised the Annex in a very drastic way. So the concern of the IMO for the atmospheric environment is clear for everybody to see.

Q99 Dr Turner: If you are going to scrub exhausts for nitrous oxide and sulphur, you could almost do carbon capture while you are at it. Having considered that, what is your view on the contribution of shipping and its emissions to acidification?
Mr Palomares: Nitrogen oxide and sulphur oxide have been a cause of acidification. With the cuts that I just explained, the reduction in the contents of these two gases from exhaust gases, obviously the effect on acidification will be diminished to perhaps negligible levels. These reductions in sulphur and nitrogen and particulate matter will benefit, first of all, the population in coastal areas, where the effects of these gases and particulates were the most noticeable. The 60,000 deaths that you mentioned at the beginning attributed to ship exhaust gases have been contested in any case, but, come what may, we are very, very confident that this would be reduced drastically in the near future.

Dr Turner: Thank you very much.

Q100 Mark Lazarowicz: Can you give any indication at this stage of how the global economic developments are having an effect on both volumes of maritime trade and, from our point of view, the consequential emissions? What can you tell us so far; or what are your thoughts about what may happen in terms of the effect of the current economic circumstances, insofar as any of us knows?
Mr Palomares: I wonder if we are qualified as the IMO secretariat to talk about this issue. I can only tell you what I said before that world trade and economic development worldwide correlates very well with the volume and type of transport needed, and therefore on the shipping industry, and how the shipping industry will grow or will stay stable or decrease. This is something that is not discussed within the IMO, other than when predicting or trying to predict whether the emissions will increase or not. This will always be an unknown quantity. We are living nowadays in a period of ups and downs which has very few precedents, and with it presumably will go shipping. As I was saying, I am not qualified to say that. Probably my colleagues at the back would be in a better position to say that.

Chairman: That is the moment when perhaps we might turn to your colleagues at the back. Thank you very much for coming in. That was a very helpful session.

Memorandum submitted by The Chamber of Shipping

The Chamber of Shipping is the trade association for the UK shipping industry, working to promote and protect the interests of its members both nationally and internationally. With 140 members and associate members, the Chamber represents over 860 ships of about 23 million gross tonnes and is recognised as the voice of the UK shipping industry.

Summary

1. In the climate change debate shipping should be regarded as the best available solution to the global need for transportation. Shipping is the most energy-efficient mode of transport and the backbone of global trade. Seen in light of the enormous volume of goods carried by ships, the CO_2 emissions from shipping is small. The reason for this is that shipping for many decades (even without regulation) has had a strong market-driven incentive to focus on reduction of fuel consumption. However, the Chamber of Shipping fully acknowledges the need for further reduction of air emissions from shipping and believes the way to achieve environmental protection must be found in a holistic manner. To be successful, such an approach should take into consideration the availability of technology to reduce emissions, the need to encourage innovation and the economics of world trade.

2. The recent revision of Annex VI of the International Maritime Organization's International Convention for the Prevention of Pollution from Ships (MARPOL), delivers an exceptionally ambitious programme for the reduction of emissions to air, of what may be termed 'classical pollutants'. It must be remembered that agreements to reduce pollutants such as sulphur oxide (SO_x) and nitrogen oxide (NO_x) may have a negative effect on the simultaneous efforts to reduce CO_2 emissions. This may arise either from technical "trade-offs" in engine efficiency, or from the significant additional costs of cleaner fuels, which may lead to a modal shift to other less carbon-friendly transport modes. Net environmental benefit for the long term must therefore be the objective of any future government policy.

How significant is global shipping's contribution to climate change? How is this projected to change in the future?

3. Precise figures concerning the contribution of international shipping to global carbon emissions are hard to come by. A variety of studies put the figure at anywhere between 1.5 and 5%. The IMO and most scientific commentators agree that a figure in the range 2–4% is realistic. While a precise figure would be helpful for measurement purposes, it is not necessary to wait for this before taking policy decisions. This is for two reasons; firstly, even at the higher end of the estimates of shipping's contribution to carbon emissions, when seen in the context of the enormous amount of work performed, shipping remains by far the most efficient way to move bulk cargoes of goods and this position is unlikely to be usurped in the medium term. Secondly, despite its excellent carbon performance, the shipping industry is absolutely committed to reducing its carbon footprint, in line with society's expectations.

4. Looking at future trends, it is likely that, in absolute terms, emissions from shipping will grow steadily for the foreseeable future despite efforts to improve the carbon performance of individual ships. This is because shipping is a service industry, which responds directly to growth in world trade (without which expansion in the world economy could not occur) and that growth is likely to be greater than the achievable carbon reductions. It is worthy of note that no serious politician or government body has ever called for shipping's carbon emissions to be reduced at the expense of slowing down the world economy. Any reductions in ships' carbon emissions must therefore be achieved in a way that permits growth in the volume of goods shipped by sea.

How should the UK's share of international maritime emissions be measured and included in UK carbon budgets? How fast could this be done?

5. Measuring the UK's share of international maritime emissions is extremely difficult, with almost all of the options failing to provide an accurate representation. Do we, for instance, wish to measure the relative contribution of the UK shipping industry (however defined) to that of the global shipping industry? Or do we wish to measure the amount of carbon generated by shipping in order to provide the UK with the goods and services required? Or should the UK accept responsibility for all carbon emitted by ships within its territorial waters? When considering the most appropriate methodology for allocating the share of global shipping emissions to the UK's Carbon Budgets, it should be remembered that shipping is the only truly international industry. Not only will ships make multiple calls in any one voyage, but they will often carry cargo destined for onward transport to a number of other countries. This makes allocating emissions extremely difficult and carries with it the distinct possibility of introducing error into the UK's overall Carbon Budgets.

6. When considering questions of measurement, the other side of the coin, enforcement, must also be borne in mind. The UK Climate Change Bill, the Kyoto agreement and the EU Emissions Trading Scheme have all excluded shipping for the same reason; it is virtually impossible to legislate for such a mobile and international industry, except at the global level. For any country to impose unilateral legislation on a global marketplace is to deliberately impose additional costs on its own stakeholders, which will not be shared by their competitors.

7. It is unclear to the Chamber what mechanisms for the enforcement of any national measures will not be capable of being easily and legitimately avoided by operators. This means that the total emissions reductions will, in practice, be less and may paradoxically be even higher; if legitimate avoidance measures result in longer voyages. For instance, if the UK were to impose a carbon charge on a ship's final voyage into the UK, a ship coming from China may decide to make an otherwise unnecessary call in France or Ireland in order to minimise the technical 'final voyage' into the UK.

8. If the Government were clear that it only wished to *measure* the UK's contribution; a position that the Chamber of Shipping could support; to international shipping emissions, this could be done as soon as an agreed methodology was decided upon. A "bottom-up" approach (ie obtaining data from individual ships) would yield more accurate data than a "top-down" (eg averages of bunker fuel sales etc) approach, but it should be recognised that this would place a considerable burden on both shipowners and administrations.

What are the prospects of international agreements to control and reduce carbon emissions from global shipping, or to bring it within wider emissions trading schemes? How well is the UK Government playing a role in developing such agreements?

9. Measurement and control mechanisms for carbon are being actively discussed within the International Maritime Organization (IMO). Its Secretary General has announced his wish for the body to have agreed upon a concrete package of proposals in readiness for the UNFCCC Conference of the Parties (COP15) meeting in Copenhagen in 2009. Meanwhile the EU have indicated that, should IMO not deliver a satisfactory package of measures by that date, they will then look to include international shipping within the EU ETS by 2012. It is therefore clear that shipping will be included within some form of international/regional regime within a very few years.

10. The UK Government has played an active and constructive role in the negotiations at IMO and its policy position reflects well the realities of dealing with this particular sector. The Chamber of Shipping is keen that the UK Government should remain committed to an international solution delivered through the IMO. While we accept that measures delivered either regionally or unilaterally will always be an option open to governments, we would stress that these, especially the latter, should be seen as options of last resort, both in terms of effectiveness and ease of administering. To that end we would consider the inclusion of international shipping in the UK Climate Change Bill (while negotiations are building to a climax in the international arena) to be a retrograde step, and one likely to hinder rather than help the broader discussions.

11. Emissions trading and market-based instruments (MBIs) are politically very sensitive topics within the IMO. A significant number of developing, non-annex 1 countries are of the opinion that they are not duty bound to seek carbon emission reduction measures through the IMO. While they are not unwilling to discuss measures to improve operational and technical efficiency, they are extremely unwilling to contemplate the introduction of MBIs. The Chamber of Shipping recognises that MBIs must play a part in efforts to reduce the sector's carbon footprint. it is actively working with its international parent body; the International Chamber of Shipping (ICS); and sister associations throughout the world, to develop an approach that takes account of these concerns, while maintaining the necessary level playing field, ensuring that any solution does not discriminate between national shipping registers.

What are the prospects for developing new engine technologies and fuels, as well as more fuel-efficient operations? What more could the Government do to assist these developments?

12. Shipping is a mature technology and the scope for improvement by full application of existing technologies is limited. Ships engines have improved steadily since their inception, while hull and propeller designs are almost fully optimised. New hull coatings may provide significant savings in the order of 5%–10%. While there is always room for improvement (and much is dependent on what constitutes an 'existing' ship), it is thought that a modern, well-maintained vessel may be able to improve its performance by about 5%, if cost/benefit is considered immaterial. Given that fuel costs account for 30–50% of total voyage costs, it should be recognised that shipowners have long had every possible commercial incentive to optimise fuel efficiency.

13. New technologies will certainly come on stream in time. But they are not available now, and, no matter how many prototypes or concepts are developed, owners cannot be expected to invest in anything other than robust, proven technologies that are commercially available. However, owners are keen to see new technologies emerge and are willing to offer ships to assist in trials and development processes. Again it should be stressed that, given the direct link between fuel efficiency and carbon emissions, shipowners also have a direct commercial interest in the development of fuel saving technologies.

14. Alternative fuel sources may also have a role to play and bio-fuels can be used in ships engines. However, given the volume of fuel used by the shipping industry and the current uncertainty surrounding the net benefit of bio-fuels, the industry would consider it prudent for legislators to better assess the impact of a substantial take-up of bio-fuels by such a large consumer as international shipping before reaching any decisions.

15. Fuel cells, solar-power, wind kites etc are all theoretically possible alternative technologies, but they are best viewed as supplementary power sources rather than alternatives to the main propulsion systems on board. Nuclear power is technically feasible for ships and there are examples of nuclear-powered merchant as well as military ships. Issues of security and acceptability are, of course, dominant in that particular debate.

16. Reducing the speeds at which ships travel is often seen as a "quick win" in terms of reducing carbon emissions from ships. While it is true that reducing ships' speed has a dramatic effect on fuel consumption, the full range of underlying factors which have hitherto determined the speed at which ships generally travel remain relevant. It should be noted that shipowners/operators have relatively little say over the speed of their vessels as this is invariably determined by the charterer. Any reduction in ships' speed would therefore require the consent of major customers, as they would in general have to wait longer to receive their goods. Shippers seek to maintain supply continuity and time of delivery is an essential competitive parameter. To maintain an acceptable service at slower speeds would mean an increase in the number of ships required; negating much of the fuel savings otherwise expected. Furthermore, very little can be achieved on traditional slow-steaming bulk carriers. For ferries, travelling time for the passenger is a key issue in the extensive competition with other (less carbon efficient) transport modes; they should also be considered as a bridge between areas forming essential and reliable infrastructure. Any policy decision requiring vessels to slow down would need to be underpinned by a robust and detailed analysis of all the implications of such a measure.

What are the effects of shipping on UK air quality and public health? How well is the Government tackling this, and what more could it do?

17. The need to improve the emissions or air pollutants from ships has long been recognised. Indeed, no sooner had the IMO's MARPOL Convention Annex VI entered into force than efforts were made to revise it. The revised Annex VI is an ambitious and far-reaching set of proposals which represent a major stretch target for both the shipping and refining industries.

18. The revision process is almost complete with the IMO's Marine Environment Protection Committee (MEPC) 58th session set to agree a draft text at its meeting next month. This draft text, already universally accepted at MEPC 57, is almost certain to be adopted unchanged and will enter into force by spring 2010. It is considered to be virtually impossible for either the shipping or refining industries to meet more exacting standards. The UK Government played a key role in reaching this agreement and, as a signatory to MARPOL Annex VI, will be bound by the changes. In the Chamber's opinion, further efforts by the UK government to address the issue of air pollution from ships should now be focused on ensuring that the review of the EU Sulphur Content of Liquid Fuels Directive mirrors the text of the Annex VI in terms of reduction levels, implementation dates and areas of application.

19. As noted at the top of this paper, care must be taken to ensure a holistic approach. An unwelcome consequence of the provisions of Annex VI for shipping in northern Europe will be an effective doubling of bunker fuel prices from 2015. It is our concern that this will lead to "modal back-shift", ie a decrease in the amount of intra-European sea-transport and a corresponding rise in the use of road transport. Should this occur it will clearly have a detrimental impact on overall carbon emissions. We would therefore urge the UK Government to work with its European colleagues to develop a policy that implements the revised MARPOL Annex VI, but seeks to minimise any subsequent modal shift caused by the introduction of those provisions.

Additional Industry Comments

20. The shipping industry has been working through the IMO, EU and national governments on how best to reduce carbon emissions for some time. As a result, it may be helpful for the Committee to note the broad principles which we feel will deliver a mechanism that delivers its environmental objectives, while maintaining the competitiveness of the industry.

21. Firstly, and perhaps obviously, industry is only interested in delivering a solution that is effective in contributing to the reduction of total global greenhouse gas emissions.

22. In order to achieve this and avoid evasion, such a system must be binding and equally applicable to all Flag States.

23. Across all maritime legislation, the shipping industry consistently argues for a goal-based (as opposed to a prescriptive) approach, as being better suited to such a diverse industry and also allowing ship owners the flexibility to meet their environmental responsibilities in the most cost-effective manner.

24. Linked to cost-effectiveness are considerations that seek to limit or at least minimise competitive distortion, and that, within the parameters of sustainable development, do not penalise trade and growth nationally or globally.

25. It has been suggested that shipping suffers from the lack of a Formula 1 to lead and drive technological improvements. Whereas the aviation industry has benefited from the civilian application of military technologies and also from the space-race, shipping has had no such high-end sector motivated by a completely independent set of cost considerations. We would therefore suggest that any control measures for shipping should actively support and encourage the promotion and facilitation of technical innovation and R&D in the entire shipping sector.

26. In addition, it is clear that any regulatory mechanisms adopted must be flexible in order to accommodate likely future technologies in the field of energy efficiency.

27. Finally in our checklist, the industry would look to ensure that the "back-office" side of any regulation is given due thought. For any system to be workable, and for true environmental benefit to be gained, it is clear that the approach must be practical, transparent, fraud-free and easy to administer.

Domestic Shipping

28. We note that the subject of this inquiry is the possible inclusion of international shipping emissions within the UK Carbon Budgets. However, the Chamber has concerns that emissions from domestic shipping (which can take place as part of an international voyage) should be properly attributed. We are unclear how this will be done. For example, it is not clear how foreign-owned competitors, which have had the opportunity to refuel abroad before making UK domestic voyages, will be treated? We would ask the Committee to satisfy itself that the methodology for including domestic shipping (and its definition) within the Climate Change Bill are likely to achieve the stated objectives.

15 September 2008

Witnesses: **Mr Jesper Kjaedegaard**, The Maersk Company, Vice-President, **Mr Edmund Brookes**, Deputy Director-General, **Mr David Asprey**, Head of Shipping Policy, **Mr Robert Ashdown**, Head of Technical Division, Chamber of Shipping, **Mr Philip Naylor**, General Manager, Carnival UK, gave evidence.

Q101 Chairman: Good morning, and welcome to the Committee. I think you heard the previous part of this morning's evidence. Can I kick off by asking you, in your own memorandum[4] you say "the shipping industry is absolutely committed to reducing its carbon footprint"; but you also say that "in absolute terms, emissions from shipping will grow steadily for the foreseeable future", because of the growth in world trade. Can you reconcile those two statements?
Mr Brookes: Yes, we can, Chairman. We have identified potential technical modifications that could occur to ships that we foresee making small reductions in usage of fuel but obviously we are an industry which reacts to demand. We carry cargoes that people want to be carried around the world, and we will respond to that. If I come back perhaps to the last question of the previous session: in some areas there is evidence of ships being taken out of trade because of reduced cargoes; equally, others are extremely buoyant, as in the North Sea where Mr Kjaedegaard's offshore vessels are working flat out to supply the oil industry.

Q102 Chairman: Are you saying there is a temporary economic slowdown which has a reduction in demand? We do not know how long it will go on for—I do not think we are qualified either to judge that—but at best, or at worst, it is not going to be more than two or three years, we trust. Between now and 2050 the assumption we have to make is for further economic growth, and therefore further demand for shipping. Is it realistic to think that the technical improvements which you briefly alluded to are going to be sufficient to offset this long-term upward trend in demand?
Mr Brookes: The simple answer is, no. I will ask Mr Ashdown to elucidate.
Mr Ashdown: I think what has been identified by the IMO secretariat earlier this morning is that there are a number of technical and operational improvements that we can make. However, as you will have noted, shipping is a high growth industry and, while individual ships will become more efficient and every generation of ships has been cleaner than the last, the growth on the world fleet will offset those emissions. This is why in the Chamber of Shipping we accept absolutely that some form of market-based instrument will be inevitable for the industry, so that we can pay others to make the reductions that we ourselves cannot make. If you take into account a market-based instrument then it may be that we can start to bring our emissions down much further than we can manage through operational and technical improvements. Without a market-based instrument that will be very, very challenging for the industry.

Q103 Colin Challen: What is your perception of the European Union's indications that it may take unilateral action if the IMO cannot, shall we say, "get its act together" on this?
Mr Kjaedegaard: I think any regional decision would be detrimental to the long-term objective of cutting emissions. What we like to see is a global solution, of course, working through the IMO, and anything that is on a regional basis will be very difficult to administrate. Imagine a ship that comes in from, say, Asia calling at three or four ports in Asia, calling at one port in the Middle East and maybe one in Egypt before it reaches Europe, how do we assign the emissions on that particular voyage, to a particular port or a particular region? It would be very, very difficult to manage.

Q104 Colin Challen: It is a very difficult question but, let us face it, the EU has got its ETS. A lot of other people in different sectors say, "It is hurting us. It is anti-competitive; our costs are increasing" and so on. You have to start somewhere, do you not? Is shipping a lasting queue, as it were, because of all the complexities? I cannot really see a great difference between shipping and aviation, frankly.
Mr Kjaedegaard: With aviation for the most part it starts and finishes in two different countries and it is fairly easy to assign that. So we can in bulk shipping; so we can in certain other shipping entities where we have only one origin and a destination. How we assign emissions can be agreed over time between the countries involved. Where you have international trade going via a number of ports on the way—it is like a bus and sometimes you have more passengers getting off in one place than another—how do you actually go in and find a mechanism through which we can find a practical way to assign emissions.***Mr Brookes:*** If I could add to that. We note what the European Union may well do if the IMO does not, and we are prepared for that. Mr Kjaedegaard has explained why we do not particularly like it as a solution. If we see the detail of what is required we will work then and abide by it, given the various constraints as to how international shipping operates. The European Union has started some studies but, until we can see the actual detail of what is planned—whether it is a levy system, whether it is a trading system or whatever—it is very difficult to actually plan how we will react and how we will plan. I do not seek to avoid the issue.

Q105 Colin Challen: This comparison with aviation I think is relevant, because they were keen to get into the ETS, and that did raise a few suspicions in my head. Putting that to one side, they showed a willingness to get involved, whereas shipping seems to be reluctant, resistant in fact; and one of the senior EU officers said that the industry lobbies were simply playing ping-pong. Do you accept that characterisation? Are you willing partners in this process, or resistant partners?
Mr Ashdown: I think we need to be clear about the actors involved here. Undoubtedly at IMO there is an element of what you rightly describe as "ping-pong" between certain Member States advocating this be dealt with through the UNFCCC; and then telling the UNFCCC that this should be dealt with

[4] See Ev 29

through the IMO. However, let us be very clear, the people who are saying this are not industry representatives, but Member States—primarily non-Annex 1 Member States at the IMO. The industry is united and completely committed towards finding a global solution to greenhouse gas emissions.

Mr Kjaedegaard: Your point is correct, because as a shipowner you prefer to work through a recognised international body, being the IMO. This is what we have always done and, hopefully, we will find a global solution. We started working through various regional bodies as well. Of course the EU is a big body. I think we will confuse the issue if working both via the IMO and the European Union. Certainly as a shipowner we prefer to work by the IMO.

Mr Naylor: I wonder if I could talk directly to your question, Mr Challen, in relation to the comparison between the shipping industry and the airline industry. The latter generally speaking works on a system of flying rights and routes, which generally operate on the basis of bilateral agreements between nations for their carriers to operate routes between their respective countries. What we have in the shipping industry is a global industry which is essentially analogous to a complete open skies policy worldwide within the aviation industry which, as we know, does not exist. The worldwide shipping industry, with a few exceptions relating to cabotage within individual nations, is essentially free and open for any entrant to come in and ply a trade between any two countries in the world. That I think would make it more difficult to then apply any kind of market-based initiative, or any kind of Emissions Trading System. I would not want anybody to think that it was something to which we as an industry were resistant; it is just that, absent any clear indications as to how it would work globally and without distorting the global nature of competition within our industry, I think we are apprehensive.

Q106 Colin Challen: I thought the age of the tramp steamer was dead, but it sounds to me like it is alive and kicking.

Mr Naylor: It is alive and kicking.

Q107 Colin Challen: This whole thing is just a complete tangle. What percentage of shipping actually follows that formula; or is it more a case of ships just ploughing the same routes over and over again?

Mr Brookes: There are a number of different sectors in the industry which behave differently. The Maersk line follows schedules which are set a year or two in advance. Cruise ships travel the world, going all over the world but not on a regular basis. They might do one round-the-world voyage a year. If you are talking about bulk carriers and tankers they are tramping the world from Brazil to China, from Australia to India, up to Europe, up to the United States; it like a cat's cradle of voyages going all over the world. Then on top of that you have got the local services, the ferries—which are both international, say, around north-west Europe, or domestic as we have in this country. So there is quite a mix.

Q108 Colin Challen: If the shipping industry is forced to enter the ETS, say by 2012, how prepared would it be for that?

Mr Brookes: We will be prepared so long as we know the rules by which we have to operate. At the moment we do not know the rules by which we have to operate. When that is specified and the rules are issued from the European Union, or they are from the United Kingdom government, we can work out how we will achieve compliance.

Q109 Dr Turner: You must have some suggestions though?

Mr Brookes: We are talking through ourselves ideas at the moment; whether we look at a levy to buy fuel; whether we have an Emissions Trading Scheme; or whether we look at a hybrid mix. To be quite honest with you at the moment, we have not come to our own conclusions as to which we would recommend. We are actively looking at it I can assure the Committee of that. Obviously each scheme would affect different shipping lines in different ways because of the nature of their operations; and we are in the process, and hopefully will soon, be coming to our own decision on which way we would wish and prefer to go.

Q110 Jo Swinson: When do you expect that decision to be taken?

Mr Brookes: I would like to think that possibly the early part of next year.

Q111 Jo Swinson: With a view to be able to have a united British front in the IMO?

Mr Brookes: Yes, a united British shipping. At IMO the representatives are the United Kingdomgovernment, who we actively work with.

Q112 Jo Swinson: Exactly. Presumably there will be very close discussions once the British shipping industry has come to its own conclusion. Assuming that somehow these difficulties are overcome and a market-based scheme actually comes in, what will you as shipowners and managers actually do differently as a result of a market-based schemes being in operation?

Mr Ashdown: Really how long is a piece of string? It would depend upon the type of market-based instrument, and it would depend upon the aggressiveness of the levy imposed. If the levy or the fee is very, very expensive then undoubtedly shipowners will need to look at all their routes and assess the economic worthiness of them. Equally, if the levy or the fee is low then it may not impact on behaviour very much. The challenge for the politicians will be to devise a system which can affect behaviour, but without destroying the competitiveness of the industry—in particular the competitiveness of the British shipping industry.

Q113 Jo Swinson: It was mentioned earlier, and I cannot remember who said it, that when a scheme came in then of course it would be used to buy credits from elsewhere. To what extent can the emissions be reduced from the industry within itself; or to what extent is it really just a question of guilt payments to get others to reduce carbon instead?

Mr Ashdown: It is very difficult to get a handle on what can still be achieved for existing ships, because it is very hard to define what an existing ship is. If we take a ship which was launched last year then that ship, if it was a UK modern ship, would have the latest hull coatings; it would have the latest hull design; it would have the latest propeller design; so if you take that as an existing ship then it is very, very difficult to improve on that. Even if money was not an object, perhaps you could make an extra 5% if you really went all out on everything; but of course there are economic considerations. However, if you take an existing ship; a ship that was launched in 1990 and was a very low calibre ship at the time of its launch, then that ship with today's technology and some of the new things which have been introduced since that time could have more potential. It is very hard to generalise when we talk about existing ships.

Mr Naylor: I think recent experience with oil prices perhaps gives us an indication of the types of behaviour change that we will see in our industry in the way we operate our ships; in the sense that most shipping sectors within the industry are operating on fairly tight margins compared with the level of investment that we need to make in the ships that we operate. What we have seen, for example, in our industry, which is cruising, probably over the last two or three years as we have seen fuel prices increase, is to look to every opportunity that we can identify to actually change the way we operate our ships. For example, in the case of a cruise, making sure we arrive no earlier than we have to; trying to streamline the clearance formalities on arrival; staying no longer than we need to in order to give our passengers the experience of the ports that they visit, to be able to go to the places that they have purchased from us as part of their holiday. We have an active programme within our particular company of re-coating our hulls as the ships enter refit to some of the more modern paint systems, which offer what we believe in our terms are quite significant fuel savings. Also, importantly on board the ships, making sure the ships themselves are operating as efficiently as they can in terms of lighting, the types of lights we use—low energy light bulbs; making sure we are operating our galleys efficiently; and, importantly, recently a great deal of work we have done to refine and really hone the use of the heating ventilation and air-conditioning on our ships, which do make quite a considerable contribution to our shipboard domestic consumption; and trying to make sure that the rooms are the right temperature and we are conserving energy in that area; and importantly, and it is analogous to a huge domestic central heating system, making sure you have got the whole thing balanced properly, and you really are making optimal use of your systems. In terms of the future, there clearly is an opportunity for some research, I would say, to identify and perhaps to develop and commercialise some improvements in engine efficiency. That really is outwith our direct control, in the sense that we are customers of the shipyards and they, in turn, tend to be customers of the engine builders and the engine designers. From our point of view, we would welcome any initiatives that would encourage the development of technical advances in engine efficiency and, in particular, efficiency and improvements in emissions from engines.

Mr Kjaedegaard: From the cargo perspective, in certain trades we have seen a reduction in the emissions. The container industry is one example. You have bigger ships, better engines and other associated issues; waste heat recovery systems; better propellers, as mentioned earlier; and all these things have added up. When you talk about paying $500 or $600 per tonne of fuel, as you were just a couple of months ago, then of course the sense of innovation increases and you bring back some of the issues that may not have been profitable before and say, "Lets invest in this, and this and this", because it will bring down the number of tonnes you consume, and with $600 per tonne this is a worthwhile investment. We have also looked at slow steaming to save oil—and perhaps that is a bad expression—but steaming at a speed below the actual design capacity of the engine. There is actually a window you can operate within, if you go too slow then the stress on the engine is such that you actually end up emitting more at the end of the day. Generally, shipowners have brought down the speeds of the vessels around the world by some 10 to 20% to save on the oil. Yes, there are a lot of rumours going around where the emissions will be brought down, but I will also have to say fairly and squarely that in the past shipowners have invested where there was a net present value on the investment; and when you get into other issues where you invest without a return on that investment that is when you distort the competitive situation. Very few shipowners actually have the funding to do that as of today.

Q114 Jo Swinson: Just to pick up the point you raise, that there is not even consensus amongst British industry yet about what kind of market-based mechanism would be the right way forward, but hopefully that will come: how do you think we are going to break the deadlock with developing countries about agreement on a global market-based initiative?

Mr Brookes: That is really a political question, is it not, and we are here to operate ships. I think there are some very big shipping lines in the Annex 2 countries, in India and China. I think we have got to demonstrate how we operate. We will get a commercial advantage if we operate more efficiently and if we operate more economically. Some of the issues that are being discussed around this table—when I actually worked for a shipping line we re-engined four ships to make a significant reduction; now that is taking it to an absolute degree. If we can

demonstrate to lines in those countries what we are doing, we are in a competitive industry with $200 or $300 per TEU from the Far East to here; if we can make it competitive we will get the business and that will force them to be more competitive. It does not directly answer your question, because there are much bigger issues and shipping is just one part of the big equation. China is building a big power station every week for instance, and we cannot countenance that. That is responding to demand to produce goods, which at the end of the day, we are then transporting to Europe.

Q115 Jo Swinson: You are right it is a political question but it is one that has a potentially huge impact on your business, because if a global solution is not reached then, as has been pointed out earlier, the alternatives may include a regime through Europe, for example, which means there is not a level playing field between yourselves and your fellow companies in other parts of the world. What are you doing to encourage those other industries in the other countries to actually lobby their governments to change their position on getting agreement globally; and what are you encouraging the UK government to do to that end?
Mr Ashdown: I think it is important to be clear that the open debate we are having within industry is all about the best market-based instrument; which one has the least administrative burden; which will be the most effective; which will least damage our competitive position. That is entirely separate from the debate the Member States are having, which is about whether or not they are actually obliged to reduce carbon emissions from their shipping if they are a non-Annex 1 country. It is on a much more fundament level at the Member State level. As I say, the industry throughout the world, even industry operating in non-Annex 1 countries, is committed to reducing its carbon emissions. As Edmund indicates, we hope to have an agreement within industry by early next year, and then we will be using what weight we do have in the IMO, and our intentional parent association the International Chamber of Shipping will be advocating a solution which the industry would like to see adopted. Of course, we can try and persuade our individual governments once we have reached a decision; we will be trying to persuade the UK government to adopt that position; but essentially this debate will stand or fall on the wider political considerations which come out of the Kyoto Protocol and the idea of common differentiated responsibilities.
Mr Brookes: The previous witnesses were asked about the influence of the United Kingdom—the United Kingdom is a very significant player in the International Maritime Organisation. We welcome that; we support it; we work with it. We are very pleased obviously now the government has reorganised energy and climate change so effectively about three government departments are involved—there is energy and climate change; there is the Department for the Environment, and the Department for Trade and Industry, under which the Maritime and Coastguard Agency works—and there rests PRIMO, the Permanent Representative of the International Organisation. We support those; we work with them; we urge them. We are always going to external briefings with them to make certain that they are pushing the UK line, the line we are advocating, hard. I used the phrase "punching above their weight", and I am proud to say that, and it does, and I believe it should continue to do so.

Q116 Chairman: How hard do you think the British government is trying to find an international agreement on shipping emissions?
Mr Brookes: I think it is trying pretty hard. We could always have a closer dialogue with government; we try and work closely with them. They want a solution; we want a solution. I am not directly answering your question, Chairman. We only know what we believe they are doing. One would alwayswant government to do more.

Q117 Chairman: Supposing the government decide this afternoon to accept the efforts some of us are making to get shipping included in the Climate Change Bill, would that be helpful to the process of driving an agreement internationally?
Mr Ashdown: That would be completely contrary to helping agreement at the international level. If the UK were to decide this afternoon to include shipping within the Climate Change Bill then it will inevitably have to decide upon its own baseline, the target of reductions and the particular types of ships and voyages to which it decided to apply those measures. Having done that unilaterally it would then be very difficult for the UK to go to the IMO and negotiate with other Member States to try and broker a global agreement, because of course its position would already be known; and if the standards were lower it would be hard to see how the UK could sign up to a lower standard than is already permitted in its national legislation; and if it is higher would the UK have to come back and re-write the Climate Change Bill? I think that the UK, to include shipping in reduction measures of the Climate Change Bill at this stage would be an entirely retrograde step.

Q118 Chairman: But you have just said that Britain is an important maritime nation. Would it not be entirely appropriate for Britain to exercise some leadership internationally, and would this not actually have quite a big impact, and might drive the process of reaching international agreement much more quickly?
Mr Ashdown: There is always a role for leadership and the UK can show that. An aspect where the UK could show more leadership is in two areas: firstly, I think the UK could do more to refine an Emissions Trading Scheme. So far at the IMO we have seen papers around the concept of emissions trading, but we have not seen a definitive refined model of a particular Emissions Trading Scheme. Secondly, I think that the UK could do more to talk about what it means in terms of targets. Not a single paper put into the IMO has discussed what they think an

appropriate target for shipping emissions reductions is. Because we do not know the target that makes life very much harder for us in industry, to try and evaluate the most appropriate scheme for us because it may be that the most appropriate market-based instrument will be dependent upon the target of the emissions the government sets.

Q119 Chairman: Just remind me, what is the target you think should be put in?
Mr Ashdown: Really you are asking us to be judge, jury and executioner. We are not environmentalists. We look to government to tell us what you think should be an appropriate target; and industry, as always, will meet the legal requirements.

Q120 Martin Horwood: Do not worry it is increasingly clear that you are not environmentalists. This idea of it being dangerous in some way to set a precedent and pre-empt international agreements, do you think in retrospect it was wrong for Britain to pioneer emissions trading, which it did before it was adopted at European level?
Mr Ashdown: I believe emissions trading was pioneered by the US with regards to sulphur emissions.

Q121 Martin Horwood: We introduced an Emissions Trading Scheme in advance of the European Union scheme. Do you think that was wrong?
Mr Ashdown: No, not necessarily, because the Emissions Trading Scheme applies to land-based industries and it is very difficult for those industries to relocate themselves abroad, or to relocate their head offices. Shipping is entirely international, and what we are talking about here really is not the principle of emissions trading, but it is about the policy levers you use to allocate and to enforce those legislative measures.

Q122 Mr Chaytor: Just pursuing the Chairman's question about the Climate Change Bill, surely it would be possible to include shipping as a sector within the Bill, and agree that it should be within the carbon budgets, without deciding now what the precise methodology should be? The Bill does not say anything about methodology either for shipping or for aviation.
Mr Ashdown: We have always been very supportive of the concept that shipping emissions, or the UK's share of global shipping emissions, should be included within the UK carbon budgets for the Climate Change Bill; and that is because we believe the logic of the argument put forward by Friends of the Earth et cetera, that if you were to have a clear trajectory you would need to know what that trajectory is when shipping eventually comes in as part of an international agreement. We think that logic is impeccable and we can agree upon a measurement process. I had a meeting with WWF last week and we all worked together to try and define the most appropriate form of measurement. So measurement is absolutely fine; but the difficulty comes in when you try and include shipping unilaterally within the reduction targets, because it is at that stage when you start changing behaviour, when you may see unintended consequences.

Q123 Mr Chaytor: How can the carbon budget be separate from the reduction target?
Mr Ashdown: Because I think, as the government has recognised, you set the budget as a minimum of 80%, with recognition that other sectors may need to do more if the subsequent reductions made by shipping and aviation do not quite meet up to expectations.
Mr Brookes: We could talk about modal shift, for instance, the big coastal shipping industry in this country which takes traffic off the roads and rail. All we ask for is a level playing field. Therefore, it is a national concern. Equally well, and my colleague David Asprey will comment further, around the UK there are also international competitors; and if they are buying their fuel outside the UK it could be outside the UK system. If we are not careful we will end up distorting the market with even possibly more traffic on the roads.
Mr Asprey: Just a brief comment and, oddly enough, it follows on from something that Mr Challen was saying earlier about tramp shipping. British coastal shipping is characterised by that in terms of the movement of bulk cargoes: not ferries; not so much those sorts of trades and aggregate trade; but in bulk cargoes moving port to port it is part of a European-wide, if not wider than that, source of shipping calling at one UK port and another which has come from somewhere else; is going to go somewhere else; has bought its fuel somewhere else; shipowners and operators who have no place in business in the UK; they charter their ship to a UK cargo owner and they move that cargo from Lowestoft to Scotland. Bringing that kind of coastal shipping into a UK scheme is going to be very difficult. It is difficult to see how it would be done. The important thing is that if it is done it has to be done in a way which does capture all trades equally, and faces up to this difficulty from overseas.

Q124 Mr Chaytor: On the point about refuelling elsewhere, surely that is only relevant if the method of calculating emissions is based on bunker fuels? If there were a different method of calculating emissions that would not be a relevant point because it would not matter where they buy the fuel?
Mr Brookes: You are quite correct, but at the moment we do not know what the ground rules are. I think that is the biggest uncertainty in our minds. If we are seeming diffident on this, that is because ultimately the government will lay down the policy as to how an ETS which, say, includes UK shipping will apply. When we know how it does we can work it out. If bunker fuels are bought abroad the effect can be brought into the UK. What we do not want to see is a distortion which could potentially have negative environmental effects as well.

Mr Kjaedegaard: Above all, we do not want to create a sea of uncertainty whereby people may not know where they stand in respect of the British flag. What registry am I going to build my new ship towards? Under what flag am I going to fly my future ships? If we do not make that very clear now that, yes, we may include it in the Climate Change Bill, however it will be with an objective of creating a level playing field; and we should not in any way disadvantage the British flag.

Q125 Mr Chaytor: If I could give an analogy that every heavy goods vehicle has a device in the cab which logs the mileage travelled in order to regulate the driver's hours. Is there not a similar device that could be easily installed in each ship to log the miles travelled or calculate the emissions? I understand that is some technology out there which does that.
Mr Brookes: It is already there.***Mr Asprey:*** The difficulty is not counting the miles, just as it is not difficult to count the miles of a lorry. The difficulty is when you apply a tax to that lorry or to that ship, because an overseas lorry driver does not have a base here.

Q126 Mr Chaytor: It is about the methodology of calculating emissions. All I am saying is, it is not the simplest methodology to install some technology on each ship which calculations emissions? The bunker fuels issue is a complete digression.
Mr Asprey: No, it is to do with measures. Counting is not the problem. I agree with you—counting is not a problem. It is when you come to apply measures.

Q127 Mr Chaytor: It is the assignment?
Mr Asprey: Yes.**Q128 Mr Chaytor:** At the moment we are not counting. We are still argument about different methods of counting—whether it should be based on bunker fuels, or whether it should be based on the cargo that is delivered to each country. Why do we not just forget that and concentre on an accurate method of counting by installing the technology on the ships?
Mr Brookes: If you do that we can do it.
Mr Ashdown: What I understand you are seeking to do is you are seeking to determine the appropriate bubble of shipping emissions that the UK should be responsible for. If a ship comes into Felixstowe from Asia you will know that it has travelled X thousand miles and you can use a carbon calculator to work out the associated greenhouse gas emissions, carbon emissions, from that journey. If only 2,000 of those boxes have unloaded at Felixstowe and then it goes on to Rotterdam, which proportion do you take of that journey? If it stopped two or three times en route, at which stage do you start to break down the emissions which we can count and then decide that they are appropriate for the UK government to take responsibility for? That is the difficulty.

Q129 Mr Chaytor: The assignment is the difficulty; not the calculation?
Mr Kjaedegaard: It is not impossible but it just has to be agreed globally. That is what we are aiming at.

Q130 Martin Horwood: Obviously connected to this is the Climate Change Bill in which shipping is almost certainly to be included this afternoon or this evening. You have already accepted that to have a truthful picture of UK carbon emissions you must include shipping; and, therefore, surely you must also accept that for us to budget accurately ourcarbon emissions we must include shipping, surely?
Mr Brookes: Yes.

Q131 Martin Horwood: The only issue is, on a provisional basis pending a global scheme, how we decide what is our share of shipping emissions? The same question you have been discussing with Mr Chaytor.
Mr Brookes: Agreed.

Q132 Martin Horwood: Would you be in favour of presumably any scheme that was not taking emissions based on the flag of the vessel but on either something linked to the economic activity or the volume of goods landed, or something like that?
Mr Brookes: Our biggest concern is unforeseen consequences and distortion—not only distortion of trade but distortion of emissions equally. If you can address that concern in legislation I think we are comfortable.

Q133 Martin Horwood: How would including something on that basis in the UK Climate Change Bill or its subsequent regulations distort shipping? Can you just explain that to us?
Mr Brookes: It would not distort shipping if you can allocate purely to the UK. That is the point.

Q134 Martin Horwood: The reason that the UK is trying to set its own targets initially—just explain to us how doing that, or how one methodology rather than another might distort the market specifically?
Mr Ashdown: The reason we always advocate legislation through the International Maritime Organisation is because the policy levers for international shipping are very, very weak for enforcement and allocation. The more global a scheme is the more effective it is. If you talk about a unilateral scheme, if the UK was to impose a carbon tax on shipping, how would that impact shipping? It is very likely then that the container ships would no longer touch at the UK to deliver cargo; they would perhaps go into Rotterdam and then use feeder ships to bring the cargo across from Rotterdam so that you only then paid the carbon on the very short journey across the North Sea. The entire leg from Asia up to Rotterdam would be exempt. That is one way. There are many, many other ways that that could happen. Some ships may choose not to make port calls here; and those who touch for cruise purposes may choose not to call at a certain port.

Q135 Martin Horwood: Surely the nature of the port call would determine whether or not they need to do it, not whether or not it is included in a UK carbon budget? Inclusion in the UK carbon budget does not

actually mandate any particular form of taxation, levy or anything else. Why would a ship that had been planning to make a port call, and presumably either take on fuel or land goods, not do so just because it was in the UK carbon budget?
Mr Ashdown: If you are talking purely about measurement, which I think is what the Bill is talking about, then you are absolutely right; that would not change behaviour at all

Q136 Martin Horwood: We are talking about inclusion in the budget, just to be clear?
Mr Ashdown: Yes, but for measurement purposes only, not for the target reductions.

Q137 Martin Horwood: The budget—not just measurement but the budget? In other words, a self-imposed limit but without mandating a particular way of taxing that?
Mr Naylor: The answer perhaps is whether it costs any money to the shipping company. The behaviour will be conditioned by the cost of the activity. Just to include it within an inventory for the UK, or within the UK's carbon budget if you want to put it that way, would not alter behaviour. If the inclusion and behaviour then resulted in the imposition of a cost on the shipper or the company bringing that ship to the UK then there might be some unintended consequences as a result of them trying to avoid incurring that cost.

Q138 Martin Horwood: What I am trying to get at is you said they might avoid port calls at UK ports. They are not calling at those UK ports just to have a look round Southampton, are they? If they are landing goods and, let us say, it was goods ordered by UK companies designed for the UK market, they are not going to not do that because of inclusion.
Mr Kjaedegaard: Instead of a huge ship coming into the UK and only discharging one-third of the capacity, you might discharge everything in Rotterdam and then use that as a satellite and then just move with small ships with lower levies and lower costs into the UK.

Q139 Martin Horwood: That implies that the carbon budget would include the material that was destined for other economies. Why would that be the case?
Mr Kjaedegaard: On the carbon base maybe then that could be a solution, rather than on the ship.

Q140 Martin Horwood: Have you suggested that to government?
Mr Kjaedegaard: I am not suggesting anything at this point in time; I think it is premature.

Q141 Martin Horwood: In fact one of the amendments down this evening is to link it to the economic activity in the country. So in fact you would not be charged on cargo that was designed for another port.
Mr Brookes: As we said before, we are looking at all these ideas at the moment to try and rationalise in our minds how to do it, and this discussion is helpful.
Mr Kjaedegaard: Another example would be the offshore sector where we are heavily involved in the North Sea. It would not be very good for Britain if we saw a lot of the bases in Aberdeen and Peterborough move to Bergen or Germany, simply because there is a fee for calling at Aberdeen and Petershead but there is no fee for calling at Bergen. You can service the North Sea rigs out of both. So we want to make sure it is not detrimental to the British flag and the British bases.

Q142 Martin Horwood: You think we should be able to agree a system that does not just involve charging a fee every time you call into Britain? I think that is probably likely to be a basis for a lot of agreement. I do not think anyone is really suggesting that, are they?
Mr Brookes: No.

Q143 Martin Horwood: Are you aware of anything actually suggesting that is the basis of a scheme?
Mr Kjaedegaard: No, but if we are applying a fee for oil consumption if you call at the UK then that supply ship does not have to call at the UK. You can service the same rigs from Bergen where there may not be a fee.

Q144 Martin Horwood: Have you already raised these concerns with government? What kind of reaction have you had from government?
Mr Ashdown: We have extensive and ongoing discussions with government. This issue of allocation has been around for a number of years, and it is a real stumbling block. The European Parliament mandated the Commission to find a method for including shipping back in 2002; they still have not managed to do so. They have commissioned yet another study which started in October of this year to again investigate the best ways of doing this. It is very, very difficult to try and find a method of allocation which meets all of the diverse sectors within the shipping industry. This is what we are working on; we are going to work with WWF again internally to try and present a case to government which we think covers most of the bases but it certainly is not an easy task to do.

Q145 Dr Turner: Can I just try and get to the bottom of the importance of fuel costs in shipping emissions. Your memorandum[5] says that CO_2 emissions from shipping are relatively small because "shipping for many decades has had a strong market-driven incentive to focus on reduction of fuel consumption". That was contradicted by witnesses last week who said the opposite. They said that shipping fuel had been so cheap that there had never been a financial incentive to invest in more efficient technology. The truth lies presumably somewhere in between. Could you enlarge on it?

[5] See Ev 29

Mr Brookes: Fuel is a significant cost, irrespective of the current price and what it was six months or two years ago. We are not in the business of burning fuel for burning fuel's sake. We want to use the minimum amount of fuel to do our business as economically as possible, so that we are as efficient and can offer as an economical a service, so that cruise ships do not have to charge too much for the tickets; so that the cost of bringing a container from the Far East or taking a bulk load to China is the minimum. It is in our interests to minimise the use of fuel. That has always been the case and the shipping industry has been practising that I would suggest since it changed from coal to oil. We went from oil, to steam turbines; we went from steam turbines to high speed diesels; we went to medium speed diesels to slow speed diesels and all these sorts of things from a pure engine room perspective—apart from the hull form and the coatings, which have been referred to—there is an incessant drive to reduce costs and fuel is a large part of that.

Mr Naylor: I think you put the question very well in the sense that the reality lies somewhere between the two. It is fair to say that for many years fuel prices were comparatively low and did not form a significant proportion of our operating expenditure, sufficient really to capture people's attention within the industry, in the sense that there were other levers to pull, or there was (to use the jargon) other low hanging fruit that people could focus in on to actually achieve the economies and the cost efficiencies. Having said that, as I say the other side of that is over the last 18 months to two years we have certainly seen a huge increase in the cost of fuel, as we have all seen as we fill our cars up. That certainly has captured the imagination of shipping company managers; has encouraged all kinds of ideas to improve fuel consumption and fuel economy in the shipping industry; and I think it is also fair to say, in the design of future ships, is encouraging the idea of technical innovation and development of ships into the future. I would also think it is fair to say that any absence of an Emissions Trading Scheme, or any kind of taxation on carbon emissions, that continued or resumption of high fuel prices will act as a sufficient spur on the shipping industry to reduce its emissions in the medium to long-term. I think fuel prices themselves will do the job.

Q146 Dr Turner: Is this going to be complicated by other costs that affect profitability of shipping? The impact of the recession, for instance, at the moment seems to be fairly drastic. We are told that the cost of hiring a large container ship has gone down from around $\$\frac{1}{4}$ million per day to less than $10,000 per day, which seems really quite extraordinary, if it is true. If you have got such a range as that, does that impact on your ability to invest in energy saving technology?

Mr Kjaedegaard: I think you are talking extremes here. Firstly, it is not containers it is bulk; it is the tramp trades where we have seen extremes; when there is a huge shortage of supply then the rates are high for a very, very short period of time and, yes, it has been reported that some ships are fixed at $250,000 a day. That is exceptionally unusual. It hasnow also been reported that some, what we call, back-haul trades have been fixed at less than $10,000 a day. A big container ship which could have been chartered for, say, $35,000–$40,000 some months ago may now have dropped to $25,000–$30,000.

Q147 Dr Turner: How do these other costs affect your investment?

Mr Kjaedegaard: At the peak, fuel used to be more than 50% of the operating costs. Of course it costs a lot of money to build a ship; it costs a lot of money to operate in the ports and crewing et cetera; but typically you would say that about 25% of a container ship's costs are related to the handling of the containers on and off, and about 50% in recent months being related to fuel.

Mr Brookes: Could I add to what Mr Naylor said earlier. We are now ordering ships for delivery in 2012 and they will have a 30-year life. That is the sort of scale we work on. Ships that are being delivered now were ordered two or three years ago. Orders for ships in the Far East yards are being cut back, so far as they can be. In one sense the downturn further incentivises us to reduce our operational costs and look at any way we can minimise operation costs, accepting that at all times safety must be absolutely key. That is one thing we are not prepared to compromise on—I must stress that. They are looking at innovative hull forms. You design a hull for a particular speed and, as I said, if you drop below the envelope it actually has a negative effect. The answer to your question is not a straight yes or no, I am afraid. It is a long pipeline. There are ships being ordered by my colleagues which will be delivered this year, next year and the year afterwards; by which time hopefully the economy will have picked up. Obviously China is stockpiling at the moment and we have just got to be very careful and watch how we spend our money, bearing in mind that we are making an investment for over 30 years.

Q148 Chairman: Why can we not save lots and lots of fuel and emissions by simply moving ships much more slowly?

Mr Brookes: I just covered that slightly. You can save fuel by slow steaming. As I think we have already indicated, there is a limit to what you can do. You can cut the speed and keep outside tankers and bulk carriers only typically sailing 12–14 knots. With the container ships which go at 20, 22 and 24 knots you can cut those back; but if you cut them back significantly you actually increase your costs because the hull form is less efficient; the engines are less efficient; you are burning more fuel and you also then need more ships to carry the same volume of cargo.

Q149 Chairman: Why do you need more ships to carry the same volume of cargo?

Mr Kjaedegaard: To keep the schedule on a fixed weekly service. If you slow down in between you need an extra ship to maintain a weekly service.
Mr Brookes: A typical container loop might have seven or eight ships in. You might have to increase that from seven or eight to nine or 10 to carry the same —

Q150 Chairman: Hang on, customers do not require truck operators on land to break the speed limit to meet their requirements; they accept the speed limits. Why could we not have an international speed limit for ships based on emissions?
Mr Kjaedegaard: You could do that in theory but it would mean that if you operate a schedule today of 22 knots and you are suddenly being asked to reduce that to 20 knots to operate the same schedule you will need one extra ship in the loop to service, say, China to the UK.

Q151 Chairman: Most of the customers in your industry are incredibly sensitive now about their carbon footprint and about the carbon footprint of their suppliers, their contractors and so on. They would be delighted if you came up with a scheme which said, "Hang on a bit, we're going to cut the carbon footprint", and they would go and tell their shareholders and customers, "We're the greenest company in this industry".
Mr Kjaedegaard: We have already done it. We were driven by the high oil prices and we did it six or eight months ago. Most carriers in the world actually initiated slow steam measures so that the loops that they had, particularly from Asia to Europe, were slowed down to the most economic speed.

Q152 Chairman: How many ships have you had to bring into service as a result of that?
Mr Kjaedegaard: Probably on average one for every string. We used to have eight or nine ships on a string servicing China to Europe.[6]

Q153 Chairman: So it did not reduce the emissions in that case?
Mr Kjaedegaard: We reduced the emissions, yes, because there is equilibrium. It is like your car, the last 20 miles of speed consumes far more than the first 50, and the same with a ship. If you take the top off at the end and go down to 20–21 knots you are really saving something like 20–25% of the oil.

Q154 Chairman: I am not quite clear whether you are in favour of this or against it now. Some of you seem to be saying it is a good idea and some of you seem to be saying it is a bad idea.
Mr Kjaedegaard: We are in favour of reducing the speeds but not necessarily at a nominal number, because what is 20 knots? It is a slow speed for a container ship but it is very, very high speed for a bulk ship.

[6] *Note by Witness:* This was required to maintain a weekly service. lowering the speed and adding a ship will not change the current weekly capacity provided to the market.

Q155 Chairman: Could it not be done on an emissions basis; that is the point? As you say, different ships travel at different speeds. If everyone said, "We're going to have a 25% cut in our emissions", whatever the appropriate speed cut would be, why could that not happen?
Mr Kjaedegaard: In theory it could.
Mr Ashdown: There are a number of other difficulties here. We have spoken exclusively about the difficulties that the shipowners might face, but of course if you have more ships with a slower timetable then you will need more port capacity to be able to handle the greater number of ship arrivals. At the moment in this country we are already up to about 98% port capacity, so we are really on the limit. If you have more ships then inevitably you will need more crew. Crewing is one of the biggest challenges that the industry faces over the next five years. A key point which we have not touched on here today is that for many of these issues the shipowner does not have control of speed; the speed is set by the charterer. What you would need to do is you would need to incentivise the charterer to tell the shipowner to steam at optimum speed. It is not something which is necessarily within the shipowner's gift.

Q156 Chairman: How much research is going on into alternative methods of powering ships, other than using fossil fuel?
Mr Brookes: There have been nuclear cargo ships in the past but I think that has proven not to be acceptable. I am not aware of particular research on things like fuel cells and that sort of thing. There are a number of devices which "assist" the ship that are on the margins to help reduce the fuel consumption.
Mr Asprey: It is true that, along with inboard technical innovations, whether it is waste heat recovery and all those kinds of things, are external energy producing devices which are subject to commercial development—some of them have been trialled in a small way—which might assist to reduce the consumption of the diesel engine, not as an alternative but as a way of conserving fuel.
Mr Kjaedegaard: I think you can say our industry suffers from fragmentation. There is no major market leader that has a 20–25% share who have the size of financial strength to fund the research and development and do something about it. The global shipping industry is so fragmented with the players and individuals having 8 or 9% maximum market share.

Q157 Chairman: It makes an unhappy contrast with the motor industry which is pouring huge amounts of money into researching a low emission alternative for cars, vans and trucks. Given you are saying it is a 30-year investment cycle, roughly speaking, what you have just told us really is that there is no serious technological breakthrough which is going to be achieved much before 2050. New ships going into service now are going to be ones that are as polluting as the ones in the immediate previous generation, so your industry is going to really struggle to make any

meaningful contribution towards cutting emissions through technological advance. Is that what you are saying?

Mr Asprey: No, that is not true, because the emissions efficiency of ships has changed continually over the last 50 years and will no doubt continue to do so; but what there will not be is a sudden step change in that arising from a different form of fuel.

Q158 Chairman: You have just said you are not even investing in research into it, because it is too fragmented?

Mr Kjaedegaard: We are looking at the engine providers. You mentioned the manufacturers of cars. The manufacturers of cars in our business would be the yards and the engine providers. We are buying the product from them and we are joining them in research and development. They are really the ones to come up with the ideas to work with.

Mr Ashdown: Another point which can usefully be made is that each ship is almost a unique build. It is very, very rare to build ships in quantities of more than perhaps eight or 16; whereas of course what we see in the motor manufacturing industry and the airline industry is thousands and thousands of the same type being produced, which means that you can really hone down and refine the efficiency of that particular car, that particular plane. We just do not see that in shipping because a ship is very much unique. As Jesper has said, we do not have the research. We mentioned earlier, that would be an area where we think government could offer a useful helping hand. What we have not seen in shipping is that we have never had a Formula 1 where you have had a high end of shipping which has been completely outwith current market conditions. In the aviation industry we have seen developments in the space race, and from military aviation, which has fed down into the commercial sector. In shipping we have not really seen that to the same degree.

Q159 Martin Horwood: With respect, the car industry is not about refining models. There are electric cars now coming on the market which have emissions six or seven times lower than the average. Looking forward to 2050, it is quite plausible to talk about zero carbon emission cars using either hydrogen or electric technology. You are saying that really there is no such step change on the horizon in shipping?

Mr Brookes: At the moment, no, we do not see it. We have to also look at the scale of the thing. Mr Kjaedegaard's company which introduced the famous Emma Maersk, that had a step change because it increased capacity by 20% and cut consumption. We are talking here of engines of 100,000 shaft horsepower to drive these ships. If you want an electric ship—

Q160 Martin Horwood: I am not saying it is electric.

Mr Brookes: No, but if you want an electric ship you have got to have the capacity to generate that sort of power to run a ship of that sort of size which already gives the economics of scale. It is well known there were a small series of nuclear ships. We have discounted that because they did not prove particularly successful in the 1950s.

Q161 Mark Lazarowicz: On this point which we are discussing which quite interests me, is there anything which the UK government itself should be doing pending some of these international discussions and agreements? Could we do stuff domestically which would make a difference?

Mr Ashdown: I think a large part of shipping emissions are not necessarily generated when the ship is at sea but when the ship nears land and comes into port. I think we could make some very quick wins if in this country we were to free up port access and reduce port congestion. I think we would see some quite major reductions in emissions from shipping if that were to happen.

Mr Naylor: Alongside that certainly some studies I have seen associated with Nox emissions, where air quality has been monitored in ports, at berths or around berths in ports, suggest that most of the Nox emissions particularly derive from motor vehicles which are waiting in the vicinity of the ships to collect cargoes or to deliver cargoes to the ships, generally speaking as a result of congestion in that port and not being able to handle the ships as quickly as might be the case. There is a transferred emission there from the ship not being able to be handled particularly expediently.

Mr Brookes: I think we have also addressed the concept of "cold ironing", where it is possible to put a ship onto a shore supply, provided that supply is cleaner than its own generating system where it is appropriate, and I must stress that. If a ferry is turning round in an hour it shuts its main engines down anyway and goes onto auxiliaries to run the fans, to run the electric supply. That is an option which can be looked at. Equally, if you are going to supply several megawatts of power you have to have the infrastructure to put it in which is expensive; and you also have to generate that electricity itself in a friendly way otherwise it is a pointless exercise.

Mr Naylor: Our company in fact did pioneer the use of shore electricity for ships in Alaska, which was predicated largely on concern from the local stakeholders in those communities. Huge investments were made to adapt the ships to take the shore power, and of course corresponding investments needed to be made ashore to deliver the power to the quayside and to have the appropriate gantries that put the wire on the ship and go up and down with the tide. In those particular places it was obviously a net environmental benefit. It was sustainable in the sense that the electricity itself was very inexpensive and was generated by hydropower. We have also seen some other suggestions, ideas and proposals to put shore power at berths which ships could use when they call, which I would say are manifestly unsustainable; in the sense that they are looking to provide the power from electricity sources where the incremental level of demand is provided by fossil fuels in some cases even with oil-powered production, which inevitably, because of the nature

of the technology used in oil-fired power stations, is going to be less environmentally friendly than using the ships' own generators to produce that corresponding amount of electricity. These are always interesting discussions. It was said that we are not environmentalists—that was an observation which I think may not be entirely fair in the case of our industry because, whilst we may not be environmentalists per se, we certainly have a very high interest in conserving energy, resources and materials, notwithstanding the fact that we make our living from the sea. Presenting the environment in a very friendly way to our customers is obviously of vital importance to us. We do have a very strong desire and a very strong motivation—provided we are doing things in the right way.

Q162 Mark Lazarowicz: Would it be helpful if shore-side electricity would be charged as part of a port's fees and then recouped that way? Would that be an incentive to a change in the way things are done?
Mr Naylor: It would be fair to say if it was done on an economic basis then using shore power would be no different from using the ship's own generators to produce electricity. Provided there was an economic rationale for that then that would be something we would be interested in, because there would perhaps be some other benefits to us in having some downtime on the ship's own engines, for example, to do some maintenance. I think the other thing which might be interesting, though not necessarily a debate associated with carbon but with other forms of emissions, particularly sulphur, come 2010 as a result of the European regulations, the European directive on fuel quality, ships at berth in European ports will in any case need to burn a distillate grade of fuel which is going to essentially double the cost of producing electricity on those ships when they are in port. I think all of these things will alter the position in relation to the viability of shore power.

Q163 Mark Lazarowicz: How far could a difference be made by streamlining clearance procedures, rather than the other technical measures we have talked about?
Mr Naylor: That is a very interesting question because I deal with that with our ships all over the world, because our ships trade worldwide and they clear into and out of ports all over the place with 2,000, 3,000, 3,500 passengers on board and a thousand crew. As you can imagine, in some places around the world the clearance procedures can be quite protracted. Happily in this country the clearance procedures, and I would say the adoption of e-Borders, is actually facilitating the clearance on board our ships. When we bring one of our ships to the UK we do not actually suffer from any delays in clearing the passengers ashore. As a result of that, we are able to operate with the shortest possible port calls. I think some of the developments that are being mooted perhaps have the potential to elongate those clearance procedures as we go into the future and to that extent, purely from a port call duration point of view, would not be helpful in relation to the emissions from the ship.

Chairman: Thank you very much for your evidence—it has been very helpful and interesting.

Tuesday 18 November 2008

Members present

Mr David Chaytor
Mark Lazarowicz
Jo Swinson
Joan Walley

In the absence of the Chairman, Joan Walley was called to the Chair

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Memorandum submitted by Dr Alice Bows, Tyndall Centre, MACE, University of Manchester

The points made within this evidence are based on ongoing preliminary research into the UK's shipping industry and associated emissions, being carried out as part of the Tyndall Centre's core research programme at the University of Manchester. Much of the evidence is based on qualitative interviewing, and is therefore gathered through dialogue with shipping industry stakeholders. This evidence will, in some cases, require further quantitative research to add weight to the arguments made.

For the UK Government to assess its contribution to global climate change, it is essential to be able to account for all emission producing sectors. It is clearly more straightforward to do this for some sectors than others, however given the scale of the global climate change challenge faced (Anderson and Bows, 2008), calculating all of the emissions being generated to high precision is likely to be unnecessary. Rather, it is important that any method of apportioning emissions to the UK for the more "international" sectors; such as aviation and shipping, aggregates to the global level. In other words, if the sum of all national emissions apportioned through a particular method does not at least approximate to the global total, the method will not be consistent with the climate change target chosen.

At Tyndall Manchester, we have looked at what the impact of including a "fair" proportion of emissions from the international aviation and shipping industries has on the UK's carbon budget (Anderson and Bows, 2007; Anderson *et al,* 2008). Within the Anderson *et al* paper published in *Energy Policy*, an estimate for the UK's shipping CO_2 emissions was made, based on a crude method apportioning the global figure for international marine bunker fuel sold, using the UK's proportion of total global GDP. The estimate for CO_2 from shipping for 2005 was $\sim$20MtCO_2 (compared with 35MtCO_2 from aviation)—see table 2 within the paper; an estimated 3% of total UK CO_2 emissions when including land use and forestry. However, this estimate is also based on a relatively low assumption for global marine bunker fuel, around 520MtCO_2, similar to figures published by (Endresen *et al*, 2004) which are considerably lower than many other estimates for example (Corbett and Kohler, 2003; Eyring *et al,* 2005)). If one of the higher figures of 800MtCO_2 is taken, then the UK's shipping contribution increases to 30MtCO_2 (5% of the UK total) using this GDP-based method.

Although the bunker fuel consumed is often recorded by ship operators, a transparent method through which the data can be collated and used by governments is not currently operational. Understanding more clearly this total global marine bunker fuel figure will greatly assist in the calculation of national emission budgets.

How significant is global shipping's contribution to climate change? How is this projected to change in the future?

The global shipping industry represents a considerable contribution to climate change; due to the very high percentage of goods transported world-wide for industrial and public consumption, coupled with a reliance on heavy fuel oil. Currently, attempts at estimating the CO_2 emissions from global shipping have been subject to considerable uncertainty. Figures vary from study to study depending on the method used to make the estimation. The table below summarises some of the estimates available:

Study	*Total fuel consumed in 2000–01 international bunkers (Mtons)*	*Total CO_2 emissions (MtonsCO$_2$)*	*Baseline year*	*Method employed*
Endresen (2003)	165–200	500–560	1996–2000	Bottom up indirect modelling based on engine type, routes, activity.
Corbett (2003)	290	850	2001	Bottom up approach independent from fuel sales statistics.

Study	*Total fuel consumed in 2000–01 international bunkers (Mtons)*	*Total CO_2 emissions (MtonsCO_2)*	*Baseline year*	*Method employed*
Corbett (2004)	240–290	705–850	2001	Bottom up approach independent from fuel sales statistics and updated from 2003.
Eyring (2005)	280	810	2001	Bottom up approach independent from fuel sales statistics and updated from Corbett in 2004.
Endersen (2007)	200	634	2002	Activity and fuel-based estimates.
IMO expert group (2008)	375	~1,125 but 867 if international only	2007	Various.
National Techinical University of Athens (2008)	297	943	2007	Bottom up approach incorporating the development of a web-based tool for calculating CO_2 emissions and involving industry data.
IEA marine bunker sales	170	543	2005	Based on international fuel sales.

The proportion of total global CO_2 emissions for shipping, if calculated using a top-down method, depends on a reliable global CO_2 emission figure. According to CDIAC, global CO_2 from fossil fuels is estimated to be some 30GtCO2[1] in 2006, therefore shipping accounts for between 3%-4% of this, depending on which estimate is used.

Clearly, shipping is a very efficient mode of transportation considering the amount of freight moved globally. However, the global shipping industry is expected to continue to grow. Given the very limited global carbon budget available (Anderson and Bows, 2008), if the UK Government is to play its part towards a 2°C target, curbing emission growth, and ultimately reducing the CO_2 from shipping is desirable.

How should the UK's share of international maritime emissions be measured and included in UK carbon budgets? How fast could this be done?

Currently the UK's share of international maritime emissions is based on the sales of bunker fuels. If this figure is divided per head for the UK and compared with the similar figure for the Netherlands, using this method, Dutch consumers appear to be using 28 times more bunker fuel per head. Clearly, this method of allocation is unreasonable. There are a number of methods for apportioning shipping emissions to the UK, with no single method likely to appeal to all parties. However, the method should respect the following criteria:

1. The method should ensure that if it is applied to all nations, the aggregate is equal to the global sum of CO_2 emitted by world-wide shipping.
2. Reflect the UK's shipping activity rather than arbitrary fuel sales.
3. Where possible, be based on actual fuel consumed rather than modelled data.

Possible methods of apportionment that could aggregate on a global scale include:

— Allocation based on the UK's proportion of global GDP applied to global bunker fuel data: nb the figure obtained will depend heavily on the global bunker fuel figure recorded which is subject to great uncertainty—*see* (Corbett and Kohler, 2003; Eyring *et al*, 2005) (see table).

[1] This total will itself vary depending on the estimate used for the international bunker CO_2

— Allocation based on the actual fuel consumed by incoming or outgoing ships docking at UK ports (avoiding double counting).

— Allocation based on a percentage share of global bunker fuel derived from the total freight-tonne-km associated with incoming or outgoing ships docking at UK ports (avoiding double counting).

— Allocation based on a percentage share of global bunker fuel derived from the total freight-tonnes associated with incoming or outgoing ships docking at UK ports (avoiding double counting).

Possible method of apportionment that will not aggregate on a global scale is:

— Allocation based on a particular geographical location—ie all emissions within 100 miles of UK ports.

To incorporate shipping into UK carbon budgets, it is firstly essential that the UK's budget reflects the UK's climate change target (2°C), and begins with a total that reflects not only the UK's domestic CO_2 emissions, but also emissions from international aviation and shipping. This is a critical point, as the higher the starting total, the more rapidly the UK's carbon budget will be consumed. See (Anderson *et al,* 2008) and (Anderson and Bows, 2007) for more details.

According to industry stakeholders, ship crew record fuel consumed on each journey, but the information is not publically available for various administrative and competitive reasons. In addition, Lloyd's register includes a variety of data on the global shipping industry. Given the data is already collated at this level, a first step in measuring CO_2 associated with UK shipping would be to work through the UK Chamber of shipping, the various ports associations to develop a method for facilitating the collation of this data for the purposes of UK CO_2 inventories.

What are the prospects of international agreements to control and reduce carbon emissions from global shipping, or to bring it within wider emissions trading schemes? How well is the UK Government playing a role in developing such agreements?

My understanding is that the IMO decision-making process is very slow due to its organisational arrangements. However, the pressure of knowing the EU is likely to regulate in the form of emissions trading, has somewhat accelerated discussions. Most importantly, any international agreement to control and reduce carbon emissions from global shipping must take account of the underlying evidence base linking emission pathways with 2°C. See Anderson, Bows & Mander 2008 and Anderson & Bows 2008 below for further details.

What are the prospects for developing new engine technologies and fuels, as well as more fuel-efficient operations? What more could the Government do to assist these developments?

In relation to more fuel efficient operations, ports have a role to play in smooth throughput of the loading and unloading of ships. On many occasions, ships travel quickly to reach a destination, only to find they must then queue for several days to unload. In other words, ships have used more fuel in the transit than necessary; as the relationship between fuel burn and speed is a cubed law. I.e. speed is proportional to the cube of fuel consumed. If there were a mechanism by which port operations could be managed more efficiently, to ensure ships could know well in advance when the next available slot for unloading or loading might be, shipping speeds and hence fuel burn may be reduced. More research needs to be carried out in this area to overcome the current constraint of inefficient port operations.

Anderson, K and A Bows, 2007. A response to the Draft Climate Change Bill's carbon reduction targets. Tyndall Centre Briefing Note 17, Tyndall Centre for Climate Change Research, from http://www.tyndall.ac.uk/publications/briefing_notes/bn17.pdf

Anderson, K and A Bows, 2008. Reframing the climate change challenge in light of post-2000 emission trends. *Philosophical Transactions A.* In press.

Anderson, K, A Bows and S Mander, 2008. From long-term targets to cumulative emission pathways: Reframing UK climate policy. *Energy Policy.* In Press, Corrected Proof.

Corbett, J J and H W Kohler, 2003. Updated emissions from ocean shipping. *Journal of Geophysical Research.* 108,(D20, 4650).

Endresen, O, E Sorgard, J Bakke and I S A Isaksen, 2004. Substantiation of a lower estimate for the bunker inventory: Comment on "updated emissions from ocean shipping" by James J Corbett and Horst W Koehler. *Journal of Geophysical Research.* 109, (doi:10.1029/2004JD004843), D23302.

Eyring, V, H W Kohler, J v Aardenne and A Lauer, 2005. Emissions from international shipping: 1. The last 50 years. *Journal of Geophysical Research.* 110,(D17305).

September 2008

Witnesses: **Dr Terry Barker**, Programme Leader—Integrating Frameworks and **Dr Alice Bows**, Tyndall Senior Research Fellow, Tyndall Centre for Climate Change Research, gave evidence.

Q164 Joan Walley: Thank you both very much indeed for coming along. We value the contributions that Tyndall has actually made to our Committee. The Government has repeatedly affirmed that its overall climate change goal is limiting the rise in global temperatures to no more than 2°C, but to help set our current inquiry into context, could you briefly describe the scale and urgency of the cuts in annual emissions required by countries such as the UK in order for us to have a good chance of meeting this target? We really need to know what urgency there is about meeting the targets on an incremental level?

Dr Bows: The issue of aiming for 2°C means that when you apportion emissions to different nations you need to be aware of the cumulative amount of emissions over a particular amount of time that can be released by each country in order to meet that 2°C goal. If you look at what that actually means, if you look at what has come out of the latest IPPC report, they produce a carbon budget, if you like, for the century and if you know what your emissions are now and you know what the emissions are that you have released in the first few years of the century, you can work out what you have left for the remainder. What the results seem to illustrate is that if we do not peak our emissions globally by around 2015 then the kind of emission reductions that will be required post-2015 will be extremely challenging and we will essentially need to be decarbonising by between 2030 and 2050 globally to meet this 2°C target. What that will mean for countries like the UK that release a lot of emissions already, so per capita emissions are very high, is that the sooner we start to reduce those emissions the better and really we need to be looking at peaking our emissions within the next five years or so, otherwise the emission reductions that will be required per year within the UK will need to be between 6–10% per year, so extremely challenging and far in excess of those percentages that we are currently discussing.

Q165 Joan Walley: If what you are saying is so clearly supported by the evidence, which I think certainly our Committee accepts is the case, can you help us understand why national targets in this country and elsewhere are so far apart from the very steep emission cuts in the years to 2030? If what you are saying is based on the evidence, and that makes sense about the need to get there in this incremental way, why do we still have this gap?

Dr Bows: One of the problems is that what we are not doing is looking at the emissions that we have already released and also the emissions as they are growing at the moment. The emissions in the last six years have grown globally at around 3.3% per year, I believe it is, which is greater in percentage terms per year than it has been in the last 100 years on average. Thus the rates of growth are increasing but often when people do an analysis they will assume that emissions can start to decrease from next year and because it is the accumulative emissions that are important, so because the area under the curve matters, if you like, between now and some future date, say, 2050 or 2001, if you do not account for the fact that the emissions are still rising and eating up a proportion of that budget very rapidly then your end point target will not be consistent with the climate change goal for which you are aiming. You need to account for those emissions in the short term and we tend to forget that emissions are still growing and we tend to forget that the emissions are already very high. In addition to that, we generally omit from our budgeting international aviation and shipping which will also eat up a proportion of our budget, and within the UK that is a reasonable proportion, so for aviation it is around 6% in any one year and shipping it is difficult to say based on the data but it could be between 5 and 6% as well.

Q166 Joan Walley: Did you want to add to that, Dr Barker?

Dr Barker: First of all, I would like to thank the Committee for inviting me to give evidence this morning. Secondly, I would say that my evidence is based on the Summary for Policymakers of the Fourth Assessment Report of the IPPC Working Group III, which I have worked on over the last four or five years. The Summary for Policymakers has a chart in it which shows the 2°C target and its relationship with greenhouse gas concentrations and emissions. The main thing to be said about this chart is the degree of uncertainty and risk between trying to achieve a 2°C target and the profile of emissions to achieve that target, and so there are uncertainties throughout the global climate system, from the scale of emissions right through to the effect of the damage at the end. As you know, the UNFCCC Framework for Climate Change has as its objective the "avoidance of dangerous climate change", and the European Commission has interpreted that as the 2°C target and the UK Government has signed up to this 2°C target. Going from 2°C to the emission profile is fraught with uncertainties and indeed the science is far from complete. There were not enough studies covered at the time of the Fourth Assessment Report to say anything with certainty or even with reasonable scientific reliability. What we could say is something about a target which was much weaker than the 2°C. This is a question of the probability of achieving that 2°C. In fact, the evidence on the basis of the studies that have been done gives us, for the lowest category of studies, a 50% or less chance of achieving 2°C. Since we are talking about dangerous climate change we want to have a much higher probability of achieving it. In my view, it should be more like a 80 or 90% chance of achieving it but to do that we would have to have a much lower concentration level, probably more like 350 ppm CO_2 equivalent which is the kind of target that somebody like Jim Hanson would advocate and the group 350°C, which is a group which was formed earlier this year. The issue really is that there is not enough scientific evidence on the modelling of these more stringent targets.

Q167 Joan Walley: So there is not enough scientific evidence?

Dr Barker: Scientific evidence to look at the more stringent targets. We have done a meta- analysis of what there is to work out the costs of going to the more stringent targets, and we have worked out that the costs are a very wide range of costs including benefits depending on the policies being followed whether the revenues from carbon taxes and auctions were recycled or not, and even that excludes some extremely substantial potential benefits, for example improvements in air quality in developing countries' urban areas.

Q168 Joan Walley: You are saying there is not enough scientific evidence. Are you involved in any further research?

Dr Barker: We are indeed. There is a major initiative by the European Commission's Directorate for Environment looking at 400 ppm CO_2 equivalent. That is probably not sufficiently stringent but it is much better than the 450 and 550 which had been looked at in the earliest days. This is being complemented by work elsewhere. The different modelling approaches attempt to achieve these targets using the models and this yields different profiles of the emissions over the next century. There are widely different profiles possible. For example, at the moment we are at the beginning of a major global depression which may be greater than the Great Depression. During the Great Depression in 1929–32 global CO_2 emissions fell by 35%. In my view, it is possible that global CO_2 emissions could fall by 40 or 50% if the policies are going to be followed by world governments as we have been seeing. In other words, we might achieve the target much more quickly than we expect but in a most unfortunate and damaging way to the world's economy.

Q169 Joan Walley: This particular inquiry is about shipping and so in the context of what you have just referred to could I just move on to shipping because we were very much aware that previously you had criticised the Climate Change Bill for not including international aviation and shipping. This Committee is very interested in your views on the very welcome announcement that the Government is going to take these emissions into account when setting UK carbon budgets. We would be very interested in your response to that.

Dr Bows: Personally I would like to know what "taking them into account" means and how they are actually going to be considered. We often club aviation and shipping together as though they are one very similar entity and my view is that they are quite different. We have a lot better understanding of the emissions from the aviation sector and how perhaps to apportion them to a nation whereas international shipping is more problematic due to the kind of routing that you get so there is often not just a start and a destination, there might be many points in between which, makes it much more problematic. Personally I would welcome the idea that we are going to be considering international aviation and shipping emissions when budgeting and it is therefore important to make as best an approximation as possible as to the emissions in order that we can tell how well the other sectors are doing in relation to our overall climate change goal. That does not necessarily mean that you would have to have a sophisticated method of emissions apportionment for aviation and shipping but just to have an idea of the quantity so that you can also look at the quantities from the other sectors and see how they are reducing over time. In my view, I think that we could actually put international aviation into the Climate Change Bill sooner than international shipping simply because we have a better understanding of the overall emissions from aviation.

Q170 Joan Walley: In terms of understanding all of that in relation to shipping, whose role would you see that as being?

Dr Bows: To improve the data?

Q171 Joan Walley: Yes.

Dr Bows: My understanding—and Gillian Reynolds will be able to give more information on this—is that there is a lot of information and data that is collated or gathered from different shipping organisations perhaps the International Chamber of Shipping or some intermediary would have a role in gathering this data for the purposes of something such as this. They could take the data from the shipping organisations and gather it in such a way that it is useful.

Dr Barker: There are differences between aviation and shipping but I think it is probably wise to treat them together for various reasons. The first one is that they are both outside the Kyoto Protocol and are not covered in the negotiations so they needed to be treated together. They both concern international waters and airspace and of course they both have activities in remote areas of the globe and pollute the environment in remote areas which are not covered by the usual national protocols and treaties. The most important reason is that there is actual substitution between them, particularly on freight. If you look at the relationship between the carriage of freight you will find that the huge increase in freight by aviation is partly because of a substitution away from shipping. There is a possibility of substitution between them and so from an economic point of view it makes it quite important to treat them together, particularly if we are decarbonising. I do have various other reasons for arguing that they should be treated together. I suspect if there is a scheme to decarbonise international transport it will be much more efficient and the effect of having lower costs if shipping is treated with aviation. I have various arguments about that which are in this paper.

Q172 Joan Walley: Assuming that all of this could be done, and that the UK's share of international shipping emissions could be assessed and audited in that way, how do you think that would affect the size and the urgency of the carbon cuts that our country should be making in any case?

Dr Bows: If you have a set budget then obviously if you start from a higher value because you have included international aviation and shipping then you will be using up your budget more rapidly. I would imagine that you would be looking at an increase in the percentage reductions per year depending on the period over which you look at your carbon budget. I do not know the actual detail on that but I think the idea is that you will be using up your budget more rapidly so you would need to account for that and make sure that you consider that when looking at your interim targets.

Q173 Mark Lazarowicz: Dr Barker, you proposed earlier this year a Global Emissions Trading Scheme in international shipping and aviation (GETS). What has been the reaction to your proposal since you put it forward?
Dr Barker: There has been considerable interest in developing countries basically because of the potential for large flows of incomes to fund Clean Development Mechanism projects or adaptation projects in developing countries. I do not know exactly what was put on the table at the G-20 but I would not be surprised if there was some mention of our scheme. The G-20 meeting is in progress or has just taken place. There are various developing countries that have shown great interest. We have had a lot of interest also of course from the IMO and the aviation bodies, IATA, which is a private body and then the UNFCCC body which ICAO are on.

Q174 Mark Lazarowicz: How would that differ from the strategy of moving forward by linking to regional schemes?
Dr Barker: The linking to regional schemes is complementary to the international schemes. The scheme is for international transport, ie it is outside national boundaries. I include in national boundaries the fictional boundary there is above us in the air. Your Committee might have come across these rather odd definitions of what is an emission and whether it comes to a country or whether it suddenly goes into the world atmosphere. The scheme as here is about international emissions and that is outside national boundaries. That would be complemented, for level playing field arguments, by national schemes which would cover aviation and shipping within national jurisdictions. Obviously you would not want any difference between the two and the great advantage of complementing it is that the large continental economies such as China, the United States, Russia, which have got huge aviation fleets with very substantial emissions, which until the Greater Depression, as I am calling it, would appear to be growing out of control (there is a 20% per annum growth rates in Latin American countries) could be covered by such a scheme and yield very large amounts of revenues as the growth is curtailed by the Emissions Trading Scheme now.

Q175 Mark Lazarowicz: Have you had any sympathy to these proposals in precisely those countries?
Dr Barker: No, we have not. The countries which are most interested are countries which tend to be desperately in need of funds.

Q176 Mark Lazarowicz: Can you clarify under your proposal what size of cuts would need to be made from the shipping sector itself, ie rather than buying credits from other sectors?
Dr Barker: From shipping?

Q177 Mark Lazarowicz: Yes, I mean, is it an integrated shipping and aviation scheme?
Dr Barker: Yes it is and we have not done any in depth studies. My work has been dominated by the events of the credit crunch, but we have very great plans to work on looking at the effects of decarbonising transport. We intended to do some of it but events took hold.

Q178 Mark Lazarowicz: In which case you may not be able to answer this question fully at this stage but can you give us your assessment of how very ambitious cuts in shipping would require new technology rather than more incremental type of improvements?
Dr Barker: That is a very interesting question. Typically if there is no carbon price at all, there is no price signal, then industry sectors like shipping do not care about CO_2 emissions, it is just not in their budget. As soon as there is a carbon price, even a tiny one, there will be remarkable changes because they will suddenly look at things that they had never thought of before and start doing them and old, very wasteful emitting ships will suddenly disappear from the fleets, especially at a time when the fleets are being reduced because of a global depression. I do not know if the Committee is aware that, for example, shipping rates have collapsed, things like this are happening on the most frightening scale at the moment. If there was a carbon price in there or a signal was put into the system, then you would find there would be enormous differences in how the system responded in the face of the cut down in the trade. In other words, they would focus much more on high CO_2-emitting shipping. That would be what would go first because why would you keep that going and have to pay prices on it when the others would be much less?

Q179 Mark Lazarowicz: I am interested in what you say because we have had other evidence submitted to the Committee which has suggested that whether you use a levy system or a market-based system, shipping companies would be able to pass the cost quite easily on to the end consumer precisely because it is fairly small part of the overall cost.
Dr Barker: Absolutely.

Q180 Mark Lazarowicz: Would that suggest it would not be such a strong incentive to reduce carbon?
Dr Barker: They may pass on the cost but it is not going to stop them responding to a price signal and cutting their costs. They can pass it on but they will still respond. This is what the Emission Trading

Scheme is about. In the ETS the electricity companies pass on their prices but they still respond by shifting their inputs to lower carbon fuels. It is exactly the same with shipping and aviation. Less so in aviation because aviation tends to be more sensitive to fuel prices than shipping for obvious reasons.

Q181 Mr Chaytor: Do we know within a "reasonable" margin of error what the total global emissions from shipping are?
Dr Barker: It depends what you mean by reasonable margin of error. I think my colleague is more expert on this. We are working closely with our Atmospheric Chemistry Group who have access to data which is quite different from ours, a different data source. We came up with estimates of emissions, we were comparing our data sources for the year 2000, and they were remarkably similar, but then similarity is a 20% difference and you might not consider that reasonable, I am not sure.
Dr Bows: My understanding is that there has been great uncertainty but because this issue has come to the fore somewhat there are more studies going on to try and look at the total CO_2 emissions from bunker fuels. The IMO have recently released a figure which is somewhat higher than some of the other estimates. It appears to depend on whether you take a bottom-up approach or a top down approach, so you either count the fuel that has actually been sold or you have a look at the actual activity that is going on, and it would appear that there has been a significant under-reporting of the fuel being sold. My understanding is that the estimate base of the International Energy Agency is too low and the actual figure for CO_2 is considerably higher, but I think more studies probably need to be done just to narrow down the uncertainty.

Q182 Mr Chaytor: What is your best estimate?
Dr Bows: My understanding is that it is something around 800 to 900 million tonnes.

Q183 Mr Chaytor: Does that include all shipping? Does that include fisheries and domestic freight as well?
Dr Bows: It is challenging to separate international from domestic shipping because sometimes some of the domestic shipping may then go off into international waters or may have purchased their fuel from an international source, et cetera. The IMO estimate of around 800 for international and another 200 or so for domestic does not seem unreasonable, but I am not collating the actual data so I think more studies need to be done.

Q184 Mr Chaytor: In terms of the methodology, if you try and extrapolate from the sale of bunker fuels how does that deal with the fact that different ships will be working at different levels of efficiency? It not a simple, straightforward calculation from the volume of bunker fuels sold, surely?
Dr Bows: If you are just looking at the bunker fuels sold you can make some estimate for the emission factor that would have to be based on an average of the different types of fuel being sold and how that is used, whereas obviously if you do activity then you can make more accurate calculations based on the type of fuel, the type of engine efficiency and the CO_2.

Q185 Mr Chaytor: It is not a totally scientifically valid method, is it; it is like sticking your finger in the wind and hoping for the best?
Dr Bows: The thing with the emissions data is that they are always going to be estimates.

Q186 Mr Chaytor: Is there no other way? The IMO has a responsibility presumably to produce an annual report as to what fuel is sold but is anybody else trying to get a more accurate methodology? Is anybody working on this?
Dr Bows: I am not aware of that, I do not know.
Dr Barker: Yes, the atmospheric chemists can get a handle on it just from an observation of what is in the air. Quite accurately, they can know where the smoke has come from, which fuels, and which countries are emitting them, so it is quite remarkable and of course there are great advances in satellite monitoring of the emissions and the air quality. I think that was one of the alternative data sources. I am not an atmospheric chemist so I cannot verify that but I could ask my colleagues to give some evidence to you if you are interested.

Q187 Mr Chaytor: That would be very useful to us to have a supplementary note about that aspect, thank you.
Dr Barker: I think the expert on this is somebody called Professor David Lee. Have you come across him? He is the expert on collecting this. He has had a large project on collecting data on emissions which is just about to report or has just reported earlier this year.
Joan Walley: We shall look forward to receiving that. Jo Swinson?

Q188 Jo Swinson: Assuming you can get an overall estimate for the international emissions, what is the best way of apportioning that between the different countries?
Dr Barker: Proportioning it in the sense of allocating what?
Jo Swinson: What the emissions would be.

Q189 Joan Walley: Apportioning a national share.
Dr Barker: A national share?

Q190 Jo Swinson: If you have got some confidence about the amount of international emissions, what do you think is the best way for estimating how much of that should go to the UK, how much of that should go to Spain, how much should go to Russia and America?
Dr Barker: You mean reductions?

Q191 Jo Swinson: Even just in terms of the emissions.

Dr Barker: I see, I think that is a hopeless issue, a hopeless question, partly because the emissions react in the atmosphere to sunlight and all the rest. The thing about emissions is that they are not just CO_2. I think you are just talking about greenhouse gases. There is a very big scientific problem about answering that question and that is because we are talking about emissions, so here we have got a cocktail of some which are fairly toxic, some which are benevolent and some which is just dirt and dust that comes out of the tailpipes of planes and the ships, and this spreads and interacts with each other. Some of it causes damage to crops and human health, et cetera. This is in our ports and it is in the air above us and we have to breathe it in. When you say you are allocating, I am not quite sure what you are allocating in these emissions and of course there are different stories attached to each of them. If it is just CO_2 that diffuses throughout the atmosphere, it gets washed out, so once you are outside the national boundaries and even within national boundaries it is rather odd.

Q192 Jo Swinson: But if countries are going to take action to reduce emissions or indeed buy credits to reduce their share of emissions, there needs to be some way of allocation. I know, Dr Bows, you have outlined various different schemes in your memorandum. Which do you think would be the best of those ways? Obviously they all have their plus points and minus points.

Dr Bows: Just talking about carbon dioxide I think it is a lot clearer for aviation than it is for shipping. For aviation you can proximate 50% on departure and 50% on arrival. I think it is really problematic for shipping and I would not want to push any one method over another. It depends what you are going to do with the apportionment once you have done it, so if you are just literally trying to get a handle on roughly the amount of shipping CO_2 emissions associated with the UK, that is one thing, but if you are going to then use it in any sort of trading scheme and if there are going to be any incentives associated with it, then you have to be more careful. It depends what it is going to be used for. In an ideal world perhaps what you could have is several tiers where you could suggest that a certain amount of the journey that you knew was associated with the UK, say out to a certain particular distance, and then you could allocate that portion, and then for the rest you could have some sort of apportionment based on the amount of activity loaded and unloaded at UK ports or something along those lines, but the important thing is to consider the distance as well. If you are just looking at freight tonnes then you are not necessarily accounting for the fact that it may also be going a very long distance.

Q193 Jo Swinson: One of the issues here is a lack of information. What can be done to encourage shipping companies and owners to make sure that they log their fuel use and their journeys made and that that information is not just kept within that company but passed up to the international organisations and the national countries?

Dr Barker: I think it is a great mistake to try and allocate these international emissions to countries, which you are suggesting. They actually should be allocated to the shipping companies and the airlines that are actually doing it with their ships and aeroplanes. This is international waters and international airspace and it is genuinely international, unless you are going to say there is a global authority, in which case you can allocate it to this global authority. Going down the route that the European Commission has done in proposing this 50% start of the journey/50% at the end of the journey, it is a terrible mistake and all it does is give rise to quarrels between countries. The European Union is quarrelling with the United States over this. It is really a waste of time and effort and it gives rise to disputes. This is an international problem and it needs to be addressed by international consensus.

Q194 Mark Lazarowicz: But it requires national governments ultimately to enforce any consensus on the ships or aeroplanes involved? Someone has got to take the action of enforcing it.

Dr Barker: Yes but someone does take action. There are a large number of international regulations which in fact are monitored and enforced by international bodies to do with safety and health at the moment.

Q195 Jo Swinson: The International Maritime Organization has not exactly been setting a pace on this issue.

Dr Barker: Surely it could be strengthened and its remit could be extended to cover pollution as well as health and safety? And surely it could be merged into a global authority to cover both shipping and aviation and to manage these industries much more effectively than they have been managed in the past? We see appalling degradation of the environment and these industries are even proposing, and have started building, deep water ports in the Arctic to take advantage of global warming and the opening up of new waterways. I think this has very serious potential for further environmental damage and acceleration of climate change by essentially putting a coating of soot on the pristine Arctic environment by shipping going up for example along the northern shores of Canada and Russia. We can already see in Russia examples of great problems, largely, I agree, due to the Soviet Union but some of them have been perpetuated. Imagine that going on along the northern shores, which could happen in the next 50 years if things go on as they have been going on.

Dr Bows: If you are apportioning or not, I think that we could improve the collation of data from the international shipping sector and have some sort of reporting standards and just make the distribution of the data more transparent and more open and free because I think at the moment, even if you allocated on the basis of charterers or whatever it may be, the UN standard or whatever it may be, you need to be able to say what is the data, how is it collected, what do you actually need to collect in order to understand the CO_2 emissions associated with

shipping, so whether we are apportioning or not we need to improve the transparency of the data that is available.

Q196 Jo Swinson: What are the barriers to doing that? Is there anyone standing in the way or is it inertia?
Dr Bows: My understanding is that one of the barriers is protection of competitiveness. At the moment that data is confidential and they would rather not release it just for competitiveness reasons, but I do not know what the legal barriers are to getting that data.

Q197 Jo Swinson: Just turning to those emissions other than carbon dioxide which we have already touched upon. We had some interesting evidence from the IMO Secretariat where they said the non-CO_2 contributions to global warming like nitrous oxide and black carbon would be being tackled through the measures they have already agreed to tackle air pollution. Do you share their confidence in this?
Dr Barker: International measures to tackle air pollution by the shipping industry? Are you serious?

Q198 Jo Swinson: That is what they told us.
Dr Barker: That is what they told you. I have seen no studies of this, I did not even know they were considering it. I do not want to be rude but it sounds a bit like a PR exercise. My colleagues are here and I hear some murmuring behind me. I must qualify this. I am talking about international shipping. I am not talking about Port of London which of course is in national waters. Clearly there are major regulations but I am not sure how effective they are. I was in Hong Kong and I have not seen such pollution in my life than in Hong Kong Harbour. "Hong Kong" stands for "fragrant harbour"!

Q199 Jo Swinson: I might guess your answer to my next question but, just for completeness, there are some who would say that as a result of some of the aerosol particles that shipping gives rise to that it actually has a cooling effect and therefore shipping should not be required to make as deep cuts as other sectors. What would your response be to that?
Dr Barker: It is true, absolutely, we can cool the planet by emitting a large amount of sulphur dioxide pollution. Do we really want that? Do we really want our health to be damaged in order to save future generations? It seems nonsense to me; the whole lot should be stopped.

Q200 Joan Walley: We are coming to the end to this part of our evidence session with yourselves but I just wonder in view of what you have said and some quite vigorous shaking of the head a little bit earlier on, if there is anything finally that you would like to say to the Committee particularly in respect of the role of the IMO in terms of its co-ordinating effect internationally?
Dr Barker: I think the shipping industry and aviation would greatly benefit from a global scheme to decarbonise these sectors. They would benefit not only in PR terms; they would benefit in large flows of revenue to these industries to modernise them and to make them much cleaner and improve their safety record. In my view, some of the kinds of things that some of these trade bodies (not the IMO) have been undertaking are misplaced and they should be seeking ways of improving the social and corporate responsibility of these sectors.
Dr Bows: All I was going to say is given the urgency of the climate change challenge that we face, whatever mechanism is going to make emissions reduce more rapidly in the short term would be favourable. At the moment, my view is that ICAO and the IMO have not acted quickly enough in order to bring about schemes that actually start to reduce emissions, so if the scheme proposed by Dr Barker is going to reduce emissions more rapidly than the kind of actions that are currently going on, I think that has to be welcomed.
Joan Walley: On that call for action we would like to thank you very much indeed once again for coming before us this morning.

Memorandum submitted by Lloyd's Register

1. Summary

- CO_2 considered the most significant greenhouse gas (GHG) emission from ships.
- CO_2 emissions from shipping in 2007 = 1,120 million tones, equivalent to approx 4% global anthropogenic CO_2 emissions.
- CO_2 emissions estimated to increase to 1,475 million tones by 2020.
- Unrepresentative to calculate UK share of international shipping emissions using traditional apportionment measures eg. on the basis of fuel sold in UK to shipping trading internationally or on the basis of fuel consumed by UK flagged ships.
- Allocating UK international shipping emissions on basis of UK percentage of world GDP would be simple and could reflect loosely the benefit the UK derives from international shipping.
- The International Maritime Organization (IMO) has been attempting to develop and introduce measures to control greenhouse gas (primarily CO_2) emissions from ships for the past decade. Major problems have been encountered in the form of objections from Kyoto Protocol "non-Annex I" countries, who advocate any measures agreed would not apply to "their ships".

— Most progress achieved in developing guidance on technical and operational measures to reduce CO_2 emissions, formulation of a ship Operational CO_2 Index and a potentially mandatory Design CO_2 Index for new ships.

— Regulatory options for the stabilisation and/or reduction of GHG emissions from the world fleet are also under evaluation at the IMO, including: a marine fuel levy, an emissions trading scheme and efficiency standards for new ships plus energy efficiency management plans for existing ships.

— Principal ways of reducing CO_2 emissions currently are operational improvements, eg improved vessel utilisation, enhanced weather routing, hull and propeller cleaning, slower steaming, optimisation of logistic chains and reduction in port congestion, together with technological improvements in ship design and efficiency of engines and other energy consumers.

— Further reductions achievable in medium-long term through use of low/no carbon fuels. Natural gas (LNG or CNG) is the front runner as lower carbon fuel for the short-medium term. Hydrogen may be viable in longer term. Wind and solar energy could form a supplementary source of energy.

— Financial support by Government could encourage uptake of new technologies/ use of alternative lower carbon fuels.

— Exhaust emissions are most significant source of air pollution from ships. Key components include oxides of nitrogen (NOx), oxides of sulphur (SOx), particulate material (PM) and products of hydrocarbon combustion eg PAH.

— Exhaust emission components are generic products of combustion. Apportioning contribution from shipping is difficult.

— Extensive review of subject undertaken by IMO in 2007 as preluded to a revision of MARPOL Annex VI on Control of Air Pollution from Ships.

— IMO recently addressed control of NOx, SOx and PM from shipping, assuming adoption and implementation of revisions to MARPOL Annex VI. UK and IMO now needs to focus effort on the more difficult challenge of achieving GHG emission reduction from shipping globally.

2. *How significant is global shipping's contribution to climate change? How is this projected to change in the future?*

2.1 CO_2 is considered to be the most significant GHG emission from shipping. However, there will also be emissions/leakages of various refrigerant gases and methane, which will have global warming potential. Published data on refrigerant gas leakage from shipboard systems and refrigerated containers is not available. Data on methane emissions associated with carriage of gas and oil by gas ships and tankers is also difficult to locate, as is data on the methane component of exhaust emissions:

— Estimated CO_2 emissions from shipping in 2007 = 1,120 million tonnes (IMO, 2008a).

— Equivalent to approx 4% global anthropogenic CO_2 emissions.

— Projected CO_2 emissions for 2020 = 1,475 million tonnes (IMO, 2008a).

2.2 The projection takes into account: decommissioning and fleet replacement requirements, fleet growth to handle the forecast increase in seaborne trade and an assumed 15% efficiency improvement during the period from 2007 to 2020 for all ships irrespective of type, size and age.

3. *How should the UK's share of international maritime emissions be measured and included in UK carbon budgets? How fast could this be done?*

3.1 The UK share of international maritime emissions is currently calculated (in the UK). This is not representative of emissions generated by shipping visiting in UK ports or trading in UK waters. Options such as estimating emissions on the basis of fuel consumed by UK flagged ships or whose owners are registered in the UK are equally flawed.

3.2 Sharing emissions generated by ships calling at UK ports between the port of departure and arrival would appear more equitable, but could be difficult to calculate for all international ship port callings. However, allocating the total emissions generated by international shipping on the basis of UK percentage of world GDP would be very simple and could be expected to reflect loosely the benefit the UK derives from international shipping. Using GDP figures for 2006 (Table 1), a simple calculation provides a figure of 54 million tones as the UK share of international shipping emissions.

GDP BY COUNTRY AND AS PERCENTAGE OF WORLD TOTAL 2006

Country	*GDP (millions $US)*	*% of total world GDP*
US	13,201,819	27.36
Japan	4,340,133	9.00

Country	*GDP (millions $US)*	*% of total world GDP*
Germany	2,906,681	6.02
China	2,668,071	5.53
UK	2,345,015	4.86
India	906,268	1.88
Greece	244,951	0.51
Panama	17,097	0.04

Source: World Development Indicators Database, World Bank, 1 July 2007.

4. *What are the prospects of international agreements to control and reduce carbon emissions from global shipping, or to bring it within wider emissions trading schemes? How well is the UK Government playing a role in developing such agreements?*

4.1 The International Maritime Organization (IMO) has been attempting to develop and introduce measures to control greenhouse gas (primarily CO_2) emissions from ships for the past decade; however the development has been blocked by a number of non-Annex I countries in terms of the Kyoto Protocol; who do not have to control greenhouse gas (GHG) emissions in the same way as developed "Annex I" countries. These States maintain that any IMO requirement would not apply to "their ships" and have acted together to block discussion at IMO on the issue of CO_2 emissions control.

4.2 However, with organisations eg UNFCCC (UN Framework Convention on Climate Change) and EC are poised to introduce GHG emission control measures for shipping, if the IMO fails to secure agreement by July 2009, the IMO is working hard to develop and secure agreement for suitable control measures.

4.3 Much of the IMO activities focus on technical and operational measures to reduce CO_2 emissions. These include:

— Guidance document on Best Practice for Fuel-Efficient Operation of Ships. Draft to be available October 2008 and text finalised by July 2009.

— Guidelines for calculating an individual ship's Operational CO_2 Index—in terms of CO_2 emitted/unit of freight carried/unit distance. Draft guidance available in the IMO Circular MEPC/Circ.471 "Interim Guidelines for voluntary CO_2 emission indexing for use in trials". Due for finalisation October 2008. This operational index is not likely to become a mandatory requirement but is proposed as a management tool which could be used for tracking the CO_2 emissions per unit of cargo carried per unit distance for an individual ship.

— The Design CO_2 Index is a separate concept from the operational index, although it has similar units (CO_2 emitted/unit of freight carried/unit distance). Mandatory application of this index is proposed for new ships, potentially linked to mandatory performance standards.

4.4 In addition to the above measures, which are aimed at decreasing GHG emissions from individual ships, the IMO is examining regulatory options for the stabilisation and/or reduction of GHG emissions from the world fleet. These options include:

— Marine fuel levy.

— Emissions trading scheme where ship operators are required to obtain allowances for GHG emissions which would be capped at a finite emission level.

— Specific efficiency standards, similar to the design index, for new ships which could be further improved in second and third tier standards in later years. These could be coupled with energy efficiency management plans for existing ships, with mandatory efficiency improvements at a later date.

4.5 The IMO is aiming to reach agreement on regulatory control measures by July 2009. Should agreement not be achieved by this time, it is almost certain that the European Commission will introduce an emissions trading scheme for ships within the European Community.

4.6 To date the UK Government has played a relatively passive role at the IMO during the GHG emission control discussions. There has been little evidence of aproactive proposal of potential regulatory mechanisms for ship emission control.

5. *What are the prospects for developing new engine technologies and fuels, as well as more fuel-efficient operations? What more could the Government do to assist these developments?*

5.1 At present, there is no viable large scale low or no carbon based fuels which could significantly reduce or eliminate CO_2 emissions. Electrification is not viable for shipping. The principal ways of reducing CO_2 emissions are operational improvements and technological developments.

5.2 Existing propulsion systems with carbon based fuels are likely to be the only realistic large volume fuel for shipping over the next 20 years and probably longer. Natural gas is currently the front runner in terms of a lower carbon fuel for the short-medium term, either as liquefied natural gas (LNG) or compressed natural gas (CNG). With currently available propulsion machinery, use of natural gas could achieve around 20% reduction in CO_2 emissions compared to residual or diesel oil fuels.

5.3 In the longer term, hydrogen could emerge as a viable solution. Sustainable biofuel may also have a role to play if sufficient fuel were to be made available to shipping. Alternatively, radically new fuels and/ or technologies may emerge to play an important role.

5.4 Wind and solar energy could also contribute to reduced CO_2 emissions, but as a supplementary source of energy rather than a total provider. Nuclear propulsion has been successfully used in naval vessels. However, nuclear propulsion requires a special infrastructure and emergency response capabilities. Added to general societal fears, it is not considered that nuclear propulsion will play a significant role in merchant ships.

5.5 Technologies which are available to improve fuel efficiency in the short to medium term include:

- Improved engine energy efficiency, hull form optimisation, propeller design, high efficiency rudders, stern flaps, improved steering configurations;
- New antifouling materials to reduce hull friction;
- Waste heat recovery from engines;
- Zero or minimum ballast configurations by design;
- Improved efficiency of minor energy consumers (lighting, air conditioning etc); and
- Use of lighter materials.

5.6 Different technologies will have different impacts for different ship types and sizes in different trades. The potential for technical measures to reduce CO_2 emissions have been estimated at up to 30% in new ships, excluding the effect of fuel switching, and up to 20% in existing ships or ships constructed using present technology. Reductions due to alternative fuel and power systems are additional and could be significant.

5.7 The potential savings from operational improvements are also significant. Operational measures to reduce the fuel consumption and CO_2 emissions include:

- Fleet optimisation; better planning, large-scale improvements in vessel utilisation.
- Enhanced weather routing, optimized trim and ballasting, hull and propeller cleaning, better main and auxiliary engine maintenance and tuning, slower steaming.
- Optimisation of logistic chains; fewer ballast legs, larger cargo batches, optimised arrival times.
- Reduction in port congestion and other limitations on quick port turn-around.

5.8 Further information on technical and operational measures may be found in IMO, 2008b.

5.9 Technological advance in the industry can be hampered by a reluctance to try or invest in new technologies. Encouragement to do this, by for example, providing grants to help meet the cost of new technologies considered to improve energy efficiency/ reduce CO_2 emissions, could assist the uptake of new technologies. A requirement to report publicly on the performance of the new technology would further improve uptake.

6. *What are the effects of shipping on UK air quality and public health? How well is the Government tackling this, and what more could it do?*

6.1 Exhaust emissions are the most significant source of air pollution from ships. Key components include oxides of nitrogen (NOx), oxides of sulphur (SOx), particulate material (PM) and a range of products of hydrocarbon combustion including PAH. These components are however generic products of combustion and apportioning the contribution from shipping is a challenging task.

6.2 An extensive review of the generic health implications of SOx and PM plus a compilation of those studies globally, which have tried to examine the contribution of shipping emissions to land based air quality, can be found in the report of the IMO Secretary General's "Group of Experts", established to evaluate the effects of the different fuel options proposed under the revision of MARPOL Annex VI (IMO, 2008a). However, with the significant reduction in SOx, particulate and to a lesser extent NOx emissions, associated with the revision of MARPOL Annex VI on the Control of Air Pollution from Ships (IMO, 2008c), the future contribution of shipping to air pollution will change significantly in step wise improvements to 2020.

6.3 IMO has to a certain extent successfully addressed control of NOx, SOx and PM from shipping, assuming adoption and implementation of the revisions to MARPOL Annex VI proceeds. The UK Government played significant role in achieving this (through provision of a Chairman of the IMO Secretary General's Group of Experts and the Co-ordinator of the Health & Environment sub-group). The UK now needs to focus its effort on the more difficult challenge of achieving GHG emission reduction from shipping globally, rather than revisiting control of SOx, NOx and PM.

7. References

IMO, Report on the outcome of the Informal Cross Government/Industry Scientific Group of Experts established to evaluate the effects of the different fuel options proposed under the revision of MARPOL Annex VI, MEPC 57/4, 2008a

IMO, Per Marius Berrefjord, Oyvind Endresen, Bo Cerup Simonsen, Hanna Behrens, Sverre Alvik, Gillian Reynolds and Zabi Bazari, CO2 Emissions from Shipping_Technical and Operational Options for Emission Reduction, MEPC 58/Inf.14, 2008b

IMO, Draft amendments to MARPOL Annex VI Draft amendments to the NOx Technical Code, MEPC 58/5, 2008c.

17 September 2008

Witness: **Dr Gillian Reynolds**, Principal Environment and Sustainability Adviser, Lloyd's Register, and Fellow of the Institute of Marine Engineering, Science and Technology, gave evidence.

Q201 Joan Walley: Good morning. Thank you very much indeed for appearing before us this morning. I think you have sat in and heard some of the exchanges we have just had; and I think what we have just heard is really how current research is putting the focus on the need for more to be done more quickly, and for shipping emissions to be included in that. I just wonder how far apart you think what the last witnesses were calling for are from where the shipping industry is? What kind of cuts are you prepared to contemplate?

Dr Reynolds: Let us be clear, I am not really the shipping industry. Lloyd's Register is an independent certification body and works on behalf of governments worldwide to ensure standards, mandatory requirements and statutory requirements are being met. We inspect on behalf of ship owners but also on behalf of governments worldwide. What I would say in general to the last session is something that I found last year: with the Secretary General of the IMO's Group of Experts looking at controlling air pollution. I led the environmental sub-group within that; and I contacted a lot of academics to try and get information from them; and there was a general unawareness and a lack of understanding of what was going on within the shipping industry, in the sense of the air pollution controls they already had in place, and the work that was going on to tighten that regulation.

Q202 Joan Walley: I am sorry, I am not quite clear. A lack of understanding amongst?

Dr Reynolds: A lack of understanding and knowledge of what the shipping industry had already done and was now trying to do. There was a lack of knowledge within academia of what is going on. That is where I would like to start from. It was quite widespread and it was a concern. I think it is something that is recognised within the industry itself—that they need to get out there and tell the world what they are doing. That is my first comment.

Q203 Joan Walley: Trying to be specific, Dr Barker has proposed a scheme in which emissions from international shipping and aviation are cut to net zero by 2050. Is that something, from where you sit at Lloyd's Register, you can see being a possibility? What distance is there between you? Would you say that was feasible; or would you say the shipping industry is already doing that?

Dr Reynolds: I am not aware of any details at all of the scheme. I was only made aware of its existence at the end of last week, and then I have had a paper given to me this morning, which I have not read, so I do not know any details. Until I know the proposals of how we would get there [ie net zero emissions by 2050] then I really cannot comment on it.

Q204 Joan Walley: Looking at it from a different angle then, what do you think the maximum size of cuts in absolute emissions from shipping could be by 2050?

Dr Reynolds: There are two questions: one is the maximum cuts from individual ships; and the other one is from shipping as a whole. We ourselves and DNV have recently done a paper looking at technical and operational measures. In that paper we judge that by 2050 for an individual ship we could look at about a 65% reduction in emissions. The question is the growth of the world fleet. Is it going to grow as predicted to 2020 and then on to 2050? My own opinion is that those predictions are somewhat simplistic. I do not think the fleet is going to be growing to 2050 myself. I think there is a lot to take into consideration. One example, if you just look at the climate change predictions, the impact of global warming, the predictions for 2050 and what the world will look like then, I do not think we will see shipping in its current form carrying on. I do not think we will see the world carrying on as it is now. I think we may not see that predicted growth. From

an individual ship 65%, but that has to be set against how the fleet is going to grow or decline over those years and I cannot really comment.

Q205 Joan Walley: Just before I move on to my colleague Jo Swinson, can I just finally ask you: you mentioned just now not being aware of the academic research that there is—
Dr Reynolds: No, I am sorry, I would not say I am not aware of the academic research—I am just not aware of this particular scheme [ie Dr Barker's]. I have not heard of that.

Q206 Joan Walley: Given the spotlight certainly our Committee inquiry wishes to put on shipping emissions, do you feel there is a kind of mechanism which allows all the different specialists, all the different partners, to come together to really look to see how in an ideal world shipping could make its biggest maximum contribution to reducing emissions? Do you feel that there is that vehicle to actually do that?
Dr Reynolds: Currently, and over the past few months, a lot of academics have become involved in the debate about shipping.

Q207 Joan Walley: Does Lloyd's Register welcome that?
Dr Reynolds: Definitely, yes. Last year when I was leading the environmental sub-group within the Group of Experts at IMO on air pollution, I brought in academics to come and talk to us, and it was a two-way flow of information because they did not know what was going on. It seemed that they were doing their research and we were progressing our own research. Yes, I certainly brought academics in then. Within the IMO, the current research it has commissioned on greenhouse gas emissions, there are a lot of academics involved in that. More and more academics are becoming involved in this area. I thought I was reasonably familiar with what is going on: I just was not familiar with this particular piece of work from the Tyndall Centre.

Q208 Jo Swinson: It is ten years since the IMO was given the responsibility of tackling greenhouse gases from shipping and there has been hardly any progress since then. Why do you think that is?
Dr Reynolds: From the outset, when the IMO tried to discuss the issue of CO_2 emissions, greenhouse gases, there were always the objections from some of the non-Annex 1 countries [in terms of the Kyoto Protocol] saying it was not going to apply to them; and there was a very sophisticated and orchestrated goings-on, for want of a better word, that really prevented any progress, and that went on for quite some time. When MARPOL Annex VI came into force it was agreed, and it had been foreseen that this was absolutely necessary, that MARPOL Annex VI (which controls, for example SO_x and NO_x) needed to be tightened. In 2005 most of the activity on air pollution went to looking at tightening up MARPOL Annex VI, which the IMO did very successfully and adopted this year; but all the work on air pollution was almost exclusively directed to the SO_x and NO_x issue. Then there came the realisation of the seriousness of the greenhouse gas emission issue. For the past year or so IMO have been trying exceptionally hard to get discussion and agreement on this matter; but there has been, as I referred to, this well orchestrated union of some non-Annex 1 countries preventing any progress on the matter. There has been limited progress on the technical side mainly because instead of CO_2 reductions, they were able to talk about energy efficiency indices and energy efficiency measures; and that has been more palatable than any talk of greenhouse gas emission reductions. IMO have tried extremely hard but have been prevented from really progressing this issue by Non-Annex 1 Member States.

Q209 Jo Swinson: That is obviously an impact that each of the Member States have had. I understand that members of the shipping industry are able to attend the IMO and although they cannot vote they can speak and can often be quite influential. To what extent has their voice been involved in either speeding up progress towards getting agreement, or slowing it down?
Dr Reynolds: Most of the shipping industry has seen the need to control greenhouse gases and has acted very positively to progress the debate at IMO: providing the information that they can; drafting documents to assist in improving energy efficiency; participating in all the working groups I would say, leading those rather than the Member States, because the progress that is being made is very technical; and most of the shipping industry has supported that.

Q210 Jo Swinson: How optimistic are you, given this sophisticated, well orchestrated campaign, as you call it, that the IMO can actually be the place where a solution will be found?
Dr Reynolds: The IMO will, I am sure, come up with the more technically based ship-by-ship measures: the energy efficiency design index; recommended measures to reduce greenhouse gas emissions and onboard management plans. But as for agreement on an overarching plan to reduce emissions from the industry as a whole, I just do not think that is possible at the present time.

Q211 Jo Swinson: You think it might be better if that responsibility overall for tackling greenhouse emissions was taken away from the IMO and another group found?
Dr Reynolds: I really think the situation will change after Copenhagen in 2009. That is not my specialist area; but I understand it is all linked to negotiating positions at the UNFCCC and non-Annex 1 countries not wanting to compromise their position there. Once their positions have been renegotiated then maybe we can do something on shipping.

Q212 Jo Swinson: You mentioned the role of Member States, and in your memo[1] you have said that the UK has been fairly relatively passive. What behaviour have you observed from the UK that makes you say that? How does that compare with other Annex-1 countries, other EU Member States for example and the role they have been playing at the IMO?
Dr Reynolds: I can say that I feel the UK has been rather passive because I am a member of the UK delegation, so I sit with them. I have been at IMO attending meetings since 1990, so I know the usual progressive stance that the UK has. It has not on this particular issue, and there are a number of reasons for that. I would say most recently there are issues, such as the number of Government departments involved in greenhouse gas emissions—Defra, the MCA, DfT and the Treasury. For example, we wanted to put in through the UK a paper just recommending a scheme by which we could evaluate the different proposals for their merits, and it was very apolitical, and in the end it was the Treasury who said, "No, we won't allow it to be put in through the UK because we don't want to compromise our position. We don't know what our position necessarily is but we'll just keep it open for the future". I think that pervades—that we will keep things open. Also the man at the MCA who led on greenhouse gas emissions, at the IMO he was chairing the Working Group on ballast water and control of transfers of organisms. Therefore, he was the main contact and he was not involved in the discussions at the IMO. He has now left so there is a replacement. Again that is new people coming in to this very difficult environment.

Q213 Jo Swinson: Do you not think it strange the suggestion that the UK does not want to compromise its position, when we hear from top politicians and members of the Government about how vital it is that we tackle climate change, and yet we seem to be equivocating about that at the IMO?
Dr Reynolds: That was the reply I got when we sent our paper (because I am a member of the UK delegation/adviser or whatever) to say "Could you put this in?" That was the response. Maybe it is a private response and I should not have said, but nobody indicated that. That was just the reason the Treasury would not agree to it, because they did not want to compromise their position.

Q214 Joan Walley: Just before we move on to the European action, I just wanted to pick you up, if I may, on what you said about the negotiating stance. I think it is a matter of concern if there does not appear to be a drive and a direction in terms of the outcomes that we want from what is going on inside the IMO. You mentioned a new person: was it Simon Coburn that you were referring to?
Dr Reynolds: No, the UK Permanent Representative (at IMO) has moved on, as has the person who was the focus for greenhouse gas emissions at MCA. Both of them have moved on.

Q215 Joan Walley: What you are really conveying is that there is not a sense of leadership, or someone really championing from the perspective of this agenda? Somehow or another what has been done has been submerged within cross-departmental fog, if you like?
Dr Reynolds: There have been so many factors that have meant there has not been a proactive stance at IMO, I feel, on this.

Q216 Mark Lazarowicz: The European Commission has indicated that if a global deal within IMO is not forthcoming in 2009 it will bring forward plans to include shipping unilaterally in the ETS. What is your reaction to that situation? Will that be achievable in your view, if the IMO does not come up with an agreement, which I must say looks quite possible?
Dr Reynolds: It unfortunately does look quite possible. My opinion is that it would be a great pity because it would undermine the IMO. I also think it may not be optimal—a scheme developed by the EC. I think it probably could be done, but I am just uncertain what the benefits are. There are, I think, some uncertainties as to what the disadvantages might be. For example, would it mean that ships would come to Morocco, offload their cargo onto lorries and truck them through Spain into Europe? Could the same be of ships going to Russia and then onward transfer of goods by road? I do not know. It depends on the level of the penalty for the CO_2 emissions as to whether this would be a reality. I certainly know Malta is very concerned about it, because it is a big transhipment port, and their economy would be severely impacted if they lost that.

Q217 Mark Lazarowicz: Can you give any idea at all—and you may not be able to—how big a share of shipping emissions could be covered by an EU scheme?
Dr Reynolds: I do not want to guess, and so I will not answer.

Q218 Mark Lazarowicz: What is the EU's share of world shipping generally? Leaving aside the emissions, but as a share of world shipping, how much shipping would be potentially covered by such a scheme?
Dr Reynolds: It all depends; it is down to allocation. What do you call "EU shipping"? Is it shipping that is flagged in the EU; or shipping that calls within the EU? It is so very difficult.

Q219 Mark Lazarowicz: Give us some options if you can?
Dr Reynolds: I honestly do not want to put numbers on things I do not know.

[1] See Ev 52

Q220 Mark Lazarowicz: If we cannot go to Lloyd's Register to ask what is the percentage of global shipping which can be regarded as EU shipping, who should we go to? You can provided that later, if that would be helpful.[2]
Dr Reynolds: If you want to specify what you see as EU shipping, whether it is ships flagged in the EU or ships calling at the EU, then I can find out and come back to you.
Mark Lazarowicz: Give us both alternatives; I am sure that would be very helpful. I want us to get an idea of how effective it would be.

Q221 Mr Chaytor: Can I come to the question of allocating emissions between states. There does not seem to be any front-running solution to this. What is your observation on the different suggestions put forward? My recollection is that Lloyd's Register has pointed out allocation according to GDP would be the simplest. What is the downside of that, to start with? How much accuracy does it lose because it is the simplest method of doing it?
Dr Reynolds: I have no idea how accurate it would be. What I do know is that we did work for the UNFCCC on options for allocating emissions and looked at about six different options; whether it was based on Flag; country of departure; country of arrival of the goods; splitting it between the two; where the registered owner was based et cetera. All of those were so widely out from what one instinctively knew to be a fair regime. This issue comes up time and time again. I was talking about it to a colleague in the MCA about what were the UK thoughts on this, and he said there was quite a lot of discussion within the UK Government about allocating on the basis of GDP. Then I did the calculations and it seemed to me it was fairer and more equitable than any of the others and, of course, much simpler. What it does not have though is the link to the individual ship emissions. I would agree with the previous speaker who said international is better if you can keep it as international shipping.

Q222 Mr Chaytor: In terms of individual ships and individual ship owners, fuel that is used on a journey has to be recorded as now. What is the problem of making that information publicly available, because would that not actually give the most accurate basis of calculating emissions, leaving aside the question of apportionment?
Dr Reynolds: If we look at annual emissions, that information is fairly readily available, or rather the fuel consumption is available to the owner. I do not know what the legalities are of making it publicly available. That information technically is not hard to get. The only problem we face is if you are going to be apportioning it, how are you going to apportion it? If you say, "What is UK or European", how do you apportion that; and then how are you going to calculate it? If you simply want to look at the total emissions from a ship technically that is easy—and the previous speakers were speaking about it—because the fuel taken on board is a very good measure. If we focus on the CO_2—the "C" in the CO_2 comes from the carbon in the fuel and nowhere else; the same as sulphur, when we are looking at sulphur emissions.

Q223 Mr Chaytor: The fuel taken on board is recorded and could be made easily available. The ports at which the ship calls are recorded, and could that be made equally easily available?
Dr Reynolds: I do not know; it is completely outside my area as to whether that sort of data could be made available.

Q224 Mr Chaytor: In terms of Lloyd's Register's role, your Fairplay division has the capacity to remotely monitor the movements of ships. Could you just say a little more about how that works, and how accurate and comprehensive that is?
Dr Reynolds: Lloyd's Register's Fairplay is a company that jointly Lloyd's Register owns with Fairplay. They are able, with transponders onboard ship, to track the movements of ships worldwide. The data is particularly good in Europe and other developed areas of the world, and so they can see the ships coming into Europe, say, passing through Europe or coming into port; and they can calculate on the basis of generic emission factors the ship's speed et cetera; the engine data and all the other data we have on ships, the approximate emissions. That can all be done in real time remotely. Again, we come back to the political question of setting the boundary. If you want to set a boundary to look at whether emissions are in European waters, UK waters, or wherever where is that boundary going to be? Technically it [the calculation] can be done and reported.

Q225 Mr Chaytor: The problem outside North America or the EU is the absence of transponders, or the fact the satellite system is not directed at that?
Dr Reynolds: I do not know the details of it, but I do know that in some less developed areas of the world the data is not so good; but it will not be because of the transponders on the ships, because all ships have to have them.

Q226 Mark Lazarowicz: In your paper you highlight two main ways in which you thought shipping emissions could be reduced: first of all, operational efficiencies; and secondly, various types of new technology. What do you consider the main drivers to actually bringing about the operational efficiencies which you discussed?
Dr Reynolds: In the current climate there are obviously fuel savings. A lot of the operational technical measures are being pursued in earnest now, with the high fuel price. That is a huge driver. The work that was going on, on propellers, on hull form et cetera, the last time there was a big driver to look at this was in the 1970s with the oil crisis; then fuel got cheaper and the urgency went away. Obviously things have moved on and are becoming more sophisticated, but now there is the focus again because of the fuel price. An overall cap on emissions from shipping would of course focus the

[2] Supplementary paper not printed but will be available in the Parliamentary Archives from the date of publication.

mind if the industry wanted to continue to grow; or if there was a need for an overall reduction in emissions; and this could be enforced. That would obviously be a huge driver for reducing emissions.

Q227 Mark Lazarowicz: I put it to Dr Barker that it was possible, and was suggested to us, that shipping companies would be able to quite easily pass on the effects of some form of carbon price ultimately to the consumer. He, I think, accepted that but also thought the industry would respond very quickly to the effects of a carbon price being introduced in some way. Do you agree with his assessment of how effective such a carbon price would be on driving efficiencies in the industry, or not?
Dr Reynolds: I am not entirely sure what I was meant to agree with. I think some of the costs could be passed on; but one thing I think no-one seems to mention, with the debate on shipping, is that shipping is a service and is transporting goods. Do you want to pay, as the consumer, the price for transporting those goods? Is it cost-effective if shipping costs more because of tax? I do not know. It does change the economics if there is going to be a tax on shipping, and it may not be as economic to get goods made elsewhere and brought to the UK.

Q228 Mark Lazarowicz: Obviously it would depend from item to item, of course. If the extra costs to the consumer at the end of the chain of the extra cost of carbon was relatively small, quite tiny, then they would simply pay that cost, and that would therefore not lead to real drivers on the industry to make efficiencies or to make improvements; all it would do presumably is give some people in the industry a windfall bonus as a result of being able to pass that cost on?
Dr Reynolds: I think what the driver will be is the overall cap if they want to continue to operate.

Q229 Mark Lazarowicz: You also refer to the opportunities for new technologies and fuels, and we have heard a lot about that. How much research has actually been done on the alternative fuels, and the alternative technologies? How much of that research has been done in such a way it has resulted in concrete outcomes?
Dr Reynolds: A lot of the work on the alternative fuels, like natural gas, is linked to general research; it is not specifically done for the shipping industry. For natural gas, as far as I understand, we are there and that research has been done. It is more a case of the distribution and the availability of the fuel. We have then got bio-fuels, and the shipping industry is in the same position as everybody else—that, at the moment, bio-fuels are not a sustainable option, and it is likely to be some way down the line, if ever. Apart from implications for use onboard ship, regarding the development of bio-fuels, we are in the same position as everybody else.

Q230 Mark Lazarowicz: What about technologies like solar and wind, or sources of power like solar and wind which obviously have different effects on the way the ship would have to operate? How much research has been done there?
Dr Reynolds: That research is fairly limited. It is being done. The feeling is that it could only be a small contribution to the overall power required, but a small contribution is still welcome. There is not that much research going on as far as I know.

Q231 Mark Lazarowicz: We do not really get the impression, I suspect, as a committee that—when it comes to different types of fuel which can replace existing fuels or new technology—there is a great deal actually happening in terms of seeing things which will be used on ships. It does seem very slow in terms research and implementation. Would you dispute that?
Dr Reynolds: I think we have to look at shipping alongside everybody else. As I said with the LNG and the bio-fuels et cetera, there is not that much research specifically for shipping. We have looked at fuel cells and that work is ongoing, but it is only fairly small-scale.

Q232 Mark Lazarowicz: Finally on that theme, the IMO have also been working on the Operational Index and the Design Index. Do you think these will be effective, and how soon will we see such effects?
Dr Reynolds: The plans are that it is only the Design Index that would be a mandatory requirement. The Operational Index has been tried for the past three years or so, and that is seen as being too variable to be a mandatory requirement. That is going to be recommendatory in nature; and the suggestion is that that will apply just to individual ships so you can monitor their ongoing performance, whether they are improving or getting worse. Then we are left with the Design Index; and of course that would only apply to new ships. Allied to the Design Index is: is there going to be a certain performance threshold that the new ships have to meet? That as yet is undecided. If there is a threshold, where is that threshold going to be set? All these issues affect how effective the Design Index will be; but, of course, it will only apply to new ships, so one will have to wait for the fleet to be replaced to realise the full effect.
Joan Walley: On that note, thank you very much indeed for contributing this morning. I hope that through our inquiry we will be putting more of the spotlight on shipping. Thank you very much indeed.

Witnesses: **Mr Peter Barham**, Sustainable Development Manager, Associated British Ports, **Mr Alan Cartwright**, Marine Engineer, Port of London Authority and advisor on shipping emissions and MARPOL to UK Major Ports Group, and **Mr Howard Holt**, Head of Corporate Affairs, Dover Harbour Board and representative of the British Ports Association, gave evidence.

Q233 Joan Walley: Can I welcome you all before our Committee, and I know we have had a fairly lengthy session already this morning and it is perhaps good that you have been able to at least listen to some of the discussions that we have had. Given that there are three of you from three very different organisations or companies, could you perhaps set out very briefly what each of you has responsibility for in the organisation that you represent?

Mr Holt: I am Head of Corporate Affairs for the Port of Dover, which means that I look after all the external stakeholder relations—anything that is outward-facing from the port, if you like. We are probably one of the larger members of the British Ports Association which represents 90 ports, and I am here on behalf of the British Ports Association today.

Mr Cartwright: I am the Marine Engineer for the Port of London Authority and, as such, I am responsible for designing, building, maintaining and eventually disposing of our fleet of vessels that we need, to keep the port open and working well; but, because of some background experience I have got from my Royal Naval jobs and the work I do for the PLA in a broader sense, I provide advice to the United Kingdom Major Ports Group on environmental matters relating to ships, and especially all aspects of MARPOL. I have a colleague who deals with the land issues and marine build issues and so on; but I deal with the interface between the ships and the ports for UK MPG.

Mr Barham: I work for Associated British Ports. We operate 21 ports throughout the company; and we are about 25% of the port industry in the UK. My role is: I am the Sustainable Development Manager, which makes me responsible for environmental management across all aspects in all 21 ports, and also in terms of trying to promote new developments and achieve environmental acceptability for those, so it is quite a big role and I have a small team behind me. I guess I am also here representing UK MPG as well.

Q234 Joan Walley: So we have got fair degree of expertise before us this morning. Let me just start then with the issue of air quality, which we have not really touched on up until now to any great extent, and the issue of MARPOL Annex VI. Could you give us a sense of how big an impact shipping emissions altogether have on air quality in the UK?

Mr Cartwright: Shipping emissions do have an impact on the air quality. The exhaust plumes from merchant ships do travel a long way. There are three aspects to the emissions: if you look at the CO_2—we have heard before that the carbon dioxide emissions affect on a global, certainly large regional basis. The emissions of sulphur and nitrogen have a more local effect—regional; and those are certainly emissions that have an effect on the UK and Western Europe. On a very local basis you get the effect of particulates from what is a fairly heavy diesel fuel, or heavy fuel being burnt in a diesel engine. You get soot and particulates falling out which can have a very localised effect; which has been most widely emphasised on the western seaboard of the USA where a lot of action has been taken there. We do those effects, and from time to time we get people complaining about certain ships with very sooty exhausts and so on.

Q235 Joan Walley: Given the ports connection that you all have, how much do you feel, with extent of shipping activity in coastal regions all the way round the country, that tighter controls over ports could contribute towards reducing some of the more harmful effects of emissions?

Mr Barham: I think the simple fact is, as Alan has said, there is an understanding that ships' emissions do have an impact on local air quality. As I said, we operate 21 ports—in nine of those we are currently working with local authorities on air quality management area studies. There is quite a lot of work going on. One of the things that shows is that, of course, problems with air quality are not entirely the responsibility of shipping. I am not trying to let shipping off the hook. I am saying that there are other aspects of transport infrastructure that also need to be taken into account, in the sense of trying to be equitable; in that there are contributions from road, there are contributions from rail and there are contributions from shipping. It is trying to work across all three areas.

Q236 Joan Walley: We are just concerned with shipping here.

Mr Barham: Just concerned with shipping, yes, there is a contribution from shipping. In some cases it is probably greater than others. Work as I understand is being done in some of the air quality management areas to see what the contribution from shipping is.

Mr Holt: Your question referred to the UK but of course it varies a lot as you go around the UK. The English Channel is of course one of the busiest shipping lanes in the world. What we have effectively noticed is that there is a higher background from traffic that is actually nothing to do with our port. We then have our own traffic which is quite intense which, in effect, has been giving us some exceedences over that fairly high background. Just to give you the really wide picture: we have a suspicion, for example, a steelworks in Dunkirk actually puts some sulphur dioxide in the air as well, because the gas does not respect national boundaries obviously. What we have had to do, with both nitrogen dioxide although that is largely a land-based problem for us, but on the shipping side it is a sulphur dioxide problem, we have actually had to declare an air quality management area in the area of the port. We have been working with all our stakeholders in terms of managing that area and coming forward with some actions.

Q237 Joan Walley: In terms of MARPOL Annex VI, how effective do you think that is going to be, for example, in respect of Dover and other ports around the country? Are you geared-up to really making sure that that gets implemented?

Mr Holt: Obviously that is largely something for the shipping operator in terms of MARPOL. We have our own port to look after and we are very concerned about the emissions from our own port. In terms of the ships, since 2006 when the sulphur content of the ferries was put down to 1.5%, we have actually seen a reduction in the number of sulphur dioxide exceedences. Taking that experience and looking forward, undoubtedly as we go through the various tiers, that will bring an improvement in sulphur dioxide.

Q238 Joan Walley: You say what the MARPOL Annex agreed is largely for the shipping companies. Clearly you must have some indication of how what is happening there affects the operations of ports, and the ability of infrastructure that is needed in ports to link up to putting the new MARPOL agreements into practice?

Mr Holt: If you talk about some of the practical ways of implementing it then, yes, obviously ports have a part to play. We are very keen to work with our stakeholders in order to do that. There are various ways forward. For example, effectively ports like the shipping industry have been working through the NO_x and SO_x problem and we have perhaps taken a little longer to get to the carbon problem. That is really because the others manifested themselves quite obviously to us, if you like. We have actually got air quality management areas which are specific to the port. They are a local problem to us and, therefore, that has been our main concern. We are now looking ahead and saying, yes, in terms of bunker fuel and ways of solving problems, then ports have a particular part to play. Certainly if we begin to talk about things like cold ironing and shoreside supply of electricity then that is a huge issue for us in terms of the infrastructure.

Mr Cartwright: I was just going to remind the Committee that in the UK we have various models of ports within our organisations that are quite different from, let us say, the European model where, typically, ports are either centrally owned or municipally owned and, therefore, can be directed by either central or local government to do this or that. In the UK we have a variety of ports. We have the plc companies, such as ABP; we have privately owned ports, such as Bristol, and Bristol is a member of UK MPG; we have small trust ports such as Whitstable, which are fishing harbours and places like that but nevertheless are still a port; and then we have the larger trust ports, such as the Port of London, where the Port of London Authority is the trust port. We look after navigation, safety and all sorts of aspects. The actual operations that go on within the ports are owned by private companies, either privately owned, plc companies and so on. We have actually got quite a vast array of types of organisation that the lay person might just thing "Oh, it's a port", as in you might think "Oh, that's a shipping company". That introduces some of the complexities and the places whereupon various instructions, guidances, regulations, mandations and so on apply. We cannot just treat a port as an entity because some of them really are quite complex.

Q239 Joan Walley: I think you raise a very interesting question there. I remember the port privatisation legislation very well indeed. I am just wondering in terms of what you said—given the complexity of this issue in relation to the public health, emissions and now the global warming issues that we face—whether or not the regulatory measures that were put into place in respect of the port privatisation are actually consistent with the agenda that we now face, in looking at the way in which port operations which you have said yourself are different from other areas to meet the national objectives that we have. How would you feel about the overarching machinery that is in place to actually address that?

Mr Barham: Perhaps I will lead off because I represent the biggest area of commercially owned ports industry in the country. The simple fact is that alongside our commercial interests we have statutory authorities that we retained at privatisation in 1983, so we are the Harbour Authority in 21 port areas. On that basis we act as a public authority and, therefore, we have to take account of Acts like NERC and CROW. We are a public authority and publicly accountable for the Marine Authority. Where we are working on land as a commercial organisation, clearly we work closely with lots of environmental regulators, not least the MCA. When it comes to the enforcement of shipping issues, then we certainly do not see that as our responsibility; we see that as the responsibility of the MCA. There is quite a background there with things like some of the waste regulations, where we make facilities available for ships to use them, but it is not our job to police them. We would follow that parallel through in terms of some of the IMO stuff.

Mr Cartwright: I would like to support that, in that regulation of shipping should lie with the national authority, which is the MCA. We have a very close relationship with them obviously, both as individual ports and as organisations we have bilateral meetings and so on with the MCA on a whole variety of things. There are some of our activities that are regulated by the MCA; and some of our activities that are regulated by the EA because you pass over that line from the wet side to the land side. The EA take over environmental responsibility there. Clearly we work closely with them when we can to make sure that we are complying with all the requirements. To try and make a port a regulator on shipping in this regard is really quite difficult. We do in some instances, with vessel licensing; and in the PLA's case, river works licensing, yes, we have got certain powers within our Act: but to try and make us regulators of ships, we do not have the mechanism for doing that, whereas the MCA does. The mechanisms that they employ for other aspects of

environmental compliance—be they international regulations or vested in UK law—those work quite well and we work with them on that.

Q240 Mr Chaytor: Is there a forum where the Environment Agency, the MCA and the Harbour Authorities come together to discuss the general issue of regulation, or do you operate entirely in three separate cells?
Mr Barham: I am not aware of any specific forum where they come together. There is quite a lot of linkage in maybe a more informal way. There has been a lot of discussion, for example, over the last two or three years about the Marine Bill. Obviously the Environment Agency will have their views, Natural England, the MCA and others; but I am not aware of any formal body. It is quite a good point actually.
Mr Cartwright: I would like to see a bit more joined-up work going there. It is not air emissions, but there has been a huge amount of trouble just recently which the ports have been having (and I will come back on to this because it impacts on emissions) about dredging. This is all linked into the Marine Bill and other aspects of environmental protection governance. The ports and the MCA have got *a* view, and the Environment Agency have taken a different view which has not been, shall we say, conducive to sensible port management as we would see it, and has actually got in the way of developing measures that would improve efficiency of the ports. A lead from government on drawing together those bodies—the Environment Agency, MCA and the ports—would certainly help.
Mr Barham: One of the things that we have been asking for with the Marine Bill of course is that the new Marine Management Organisation will actually be an opportunity to bring some of that together and reduce some of the overlap. That is an issue we have discussed with this Committee previously and elsewhere.

Q241 Mr Chaytor: Coming back specifically to the question of emissions, we have had some evidence to the inquiry that congestion in ports is a significant factor in excess emissions that could be avoided. Is that the case? If so, what is being done to reduce the volume of congestion in the ports for which you have responsibility?
Mr Cartwright: Congestion I think has been a particular problem that all of us have seen, particularly perhaps with the box trades, the container trades, and ro-ro. It has not been helped. It has been recognised by Government that there is this issue of lack of capacity in ports working, despite various measures to make the landside of the cargo handling as efficient as possible. The sheer bulk of the demand of the market for shipping of goods by container is recognised as leading to congestion. However, in a variety of areas represented here we have seen significant and unexplainable delays in the process of getting that increased capacity through to approval. In the Port of London Authority's case, of course the London Gateway approval process took nine years. It is shameful when the demand for reducing congestion, and building up the ability to get ships in and out and the cargo that the UK needs for its economic wellbeing, is held up in that way. To those involved: unexplainable ways.

Q242 Mr Chaytor: If we are about to enter the worst recession in 60 years then the rapid growth in shipping in the last 15 years is not going to continue, is it? Maybe congestion will be resolved by the slowing down in trade generally?
Mr Barham: In fairness, the trends (and obviously they are forecasts and we have no evidence until they happen) are that container growth particularly will continue once the recession is over. If it does that and comes down, it is going to go back up again. You may be aware that the Department for Transport are asking major ports industries to come up with master plans for the next 30 years; and it is intended that those master plans would include anticipated plans for growth. You are quite right in the short-term, but I think in the medium to longer term there is probably a very different climate.
Mr Holt: It was mentioned earlier, in terms of container ports it is really where it has manifested itself, and those have been peak demands with the early arrivals of goods for Christmas, and those sorts of things. It has not actually happened in quite the same way this year. In terms of ro-ro, congestion is not quite the same sort of problem manifesting itself today. Indeed, the delays when you talk about ro-ro are much smaller. You do not tend to keep a ship full of passengers and vehicles hanging around too long. Certainly looking ahead, and I would endorse entirely what my colleague said, the Department for Transport are still sticking with the work that they did in 2006–07 when they did some really good forecasting. Our own master plan for the next 30 years shows significant growth, really just driven by European trade. Yes, there has been a blip. This year we actually saw the downturn in our figures from spring this year because we are a bellwether for European trade—what passes through the port. We have had these blips before and there seems to be an underlying trend curve and one seems to get back onto that after a number of years. That has been what happened in the past. At the moment certainly I would endorse that we need to do an expansion of our port. We are concerned, and I believe I can say the Department of Transport is possibly a little bit concerned, the process for delivering that will be lengthy and may be overtaken by the demand in the meantime, thus causing congestion.

Q243 Joan Walley: You just mentioned growth projections. I am just curious to know whether or not they are taking into account either peak oil or future carbon price on shipping fuel?
Mr Holt: I doubt that the DfT figures took into account the carbon price, because that study was really based in 2006. I think at that time we all thought that the figures used then were about 2% of carbon globally. The figure has of course gone up. We heard this morning five or six. It is more usually recognised I believe at 4.5%. That has come on to the

agenda in those two years. What has happened in the last year had not happened two years ago. Nevertheless, we are in discussions with Department for Transport now and we will revisit our forecasts and have done, but they are actually based on the growth of European trade. It may all cost more but if UK plc has effectively outsourced a lot of its manufacture into continental Europe and Eastern Europe, and if that is the way it is going to carry on being, then the trade will come.

Q244 Jo Swinson: Earlier the process of generating electricity shoreside not from the ships was mentioned—cold ironing. How much of an impact could that have on improving air quality within ports?

Mr Holt: That again depends—and I think the port representatives here will have the same view but we can put it in slightly different contexts. Certainly in terms of my own port, if you look at it superficially then ferries are probably an ideal vehicle to try this out on straight away because the same vessel will be coming in and out for ten years; and it is going to the same ports all the time; and it looks like a good idea, The problem—apart from the infrastructure side, which is expensive to put in—is the sheer power demand of these ships. These are ships with restaurants, cafes, bars and whatever on board—shopping centres in effect—the power demand is huge. The other problem is that they are in port for a very short time. Our minimum turn-round time in the Port of Dover is half an hour for one of these ferries. Ten minutes to unload; five minutes to re-store; a quarter of an hour to put 120 lorries back on and it is gone. You can imagine in that time that someone coming off the ship with a large plug, putting it in a large socket and then reversing the process before it sails adds to the length of time. It is also, as I say, a very large power demand, and do you really want the possibility of a blackout or brownout while you are changing over? There are a lot of practical problems for that. In terms of at the port—potentially cold ironing will obviously reduce the emissions in the port. In the UK, where we generate a lot of our power by coal, are we not just transferring that from the port to Stoke-on-Trent, or somewhere else?

Mr Cartwright: If I can come in on that point. I gave a presentation to a conference on this very subject just recently and I did some research, and I am very happy to offer the Committee the slides of that presentation which shows some pictures. Cold ironing is not a new phenomenon. I was in the Royal Navy; whenever we came into port we would go on to shore supply. We had standards; we had standard cables; we had connectors; and if we could get on to shore supply then I could shut down and get on with my maintenance, or perhaps go on leave—but never before the cooks and stewards, but never mind! That made it a lot easier because we had a standard. At the moment there is a lot of work going on headed up by the IMO with IAX and the classification societies trying to find standards that will apply to ships. I would agree with Howard that ferries, short sea shipping and frequent runners are the ideal ships. Some shipping companies, Maersk for example, really like to have a dedicated berth at the ports that they go to, and they will run a line and they will have a ship coming in every two or three days and connecting up. Where you have got that situation that is an ideal opportunity because you can then provide a system that can be plugged in. Quite apart from the problem of where does the power come from, and is it environmentally beneficial—which remains a problem in the UK and a lot of Western European countries—there is then also the problem of getting the power to the terminal. In London many of our terminals are in remote locations. The nearest power of the capacity that you need for these sorts of ships might be three or four miles away. Any kind of mandation is going to then place an enormous cost, because it is the user who pays in this world, and the ships will just go elsewhere. It is as simple as that: ships will go elsewhere. They will go to other ports; they will go to mainland Europe; and then we become dependent on a feeder service, which is just not beneficial. However, where significant port developments are going ahead, for example London Gateway, Bristol, other areas where they are doing that, then it is sensible for them to put that infrastructure in, trusting that there is a power supply that can be provided with some kind of environmental benefit. Certainly on the Thames, electricity is lazy and it will come from the nearest power source and that will be Tilbury coal-fired power station or the Isle of Grain coal-fired power station.

Q245 Jo Swinson: On this issue of the environmental friendliness of the power generation, some UK ports have already got on-site renewable generation. How feasible is it to encourage that? What could the Government do to incentivise more ports to take that into account, which would get over some of the problems you have been describing?

Mr Barham: My company is currently looking a lot at shoreside power through wind generation and things like that. We modelled that if we worked hard at it we could be carbon neutral by about 2015, and that would seriously reduce electricity bills. There are real benefits to doing it. The simple fact, of course, is that you have to transmit that electricity produced into the national grid and there are various licensing issues. Clearly you could not guarantee on that supply alone, as a free-standing supply, to supply ships, because if the wind does not blow you have got no electricity. You are still into the technical issues that Alan talked about with regard to making the electricity available for ships. For example, we looked at it in Southampton and you are talking about many, many millions on the infrastructure problem to resolve this; and there simply is not the power generation locally to supply electricity to the ships. Sure, there are more and more companies looking to reduce our electricity bills.

Mr Cartwright: Yes, where it can be done. For example, Port of Bristol Company and Liverpool have got quite large generators in. There are some mechanisms that Government could help with in

this regard: one is the Capital Allowances Environmentally Beneficial Plants and Machinery Order 2003, which gives a list of systems of plant and so on, on which a company can gain capital allowance benefits which helps everyone; but for some reason this Order seems almost specifically to exclude anything that is helpful to ports—our new boats that we are bringing in and so on. The other thing is with planning—these need planning assistance.

Q246 Mark Lazarowicz: The European Commission has indicated that it would consider varying port dues or giving unloading priority to ships with higher environmental standards. Would such a system work in UK ports?
Mr Cartwright: In the European model then, yes, it can. Ports at Helsinki have been very proactive with this, but they are municipally controlled ports. They are not a plc; they are not required to make a profit; they simply can act as the servant of their national or indeed European government.

Q247 Joan Walley: It is actually not privatised?
Mr Cartwright: Yes.

Q248 Mark Lazarowicz: Is it quite an effective way of achieving a result?
Mr Cartwright: It would be. I think that would work very closely with the Design Index that we heard about earlier, and you have heard about from the Chamber of Shipping. That would be a level playing field, but of course only on new ships. The difficulty comes, of course, in the UK model where we have got the different models of ports. Sure, we could offer an incentive in terms of the conservancy charges on either the ships or the cargoes for ships that have got a low index number and they are environmentally beneficial. We are not subsidised so we have got to make a profit. We would therefore have to charge other ships more. That is a model that needs a lot of research to see if it could be worked. It would be difficult to mandate it because we do not have that state control of our ports.
Mr Holt: I think you asked two questions there: one was about priority treatment of a ship that was greener. Everything that has been said about dues I support; but in terms of giving priority to a certain ship that turns up because it is a bit greener, I think that begins to give real problems to ports in terms of the relationships they have with their shipping operators and so on. That one is a little bit more problematic. I would question whether speeding the green ship to the berth and putting the dirtier ones to circle longer is actually a good solution.

Q249 Mark Lazarowicz: My last question is of a technical nature and it may be better to give you time to respond in writing. Can you give us information on what data on fuel consumption is already collected by ports; and whether that data could be used to calculate and record emissions? In addition, it has also been suggested that emissions could be apportioned based on a country's imports. Do you collect enough data to make that possible?
Mr Holt: I think it is a fairly qualified no in both cases. In the case of most of the ferries, although some bunkering takes place in Dover, the majority of the bunkering takes places on the other side of the water, as it were. We would not have those figures. We probably do not have the bunkering figures particularly for Dover, although those might be more obtainable but it would only give a very small part of the picture.

Mr Barham: I think it is important to emphasise that, by and large, the UK ports industry is about operating berths, operating quaysides et cetera. The arrangement between ships, their owners, their fuel providers, their waste removers, is a relationship between the shipper, his agent and whichever company he is dealing with, either to provide fuel or else to take away his waste. We are simply there to provide a landlord for tenant's operations, or to provide safe navigation in harbours. So it is not information that we would routinely measure.

Q250 Mark Lazarowicz: We either go to the shipping companies, the fuel suppliers or the agents?
Mr Cartwright: The bunker companies would be the best place. They are required for weights and measures reasons to keep a very accurate record of what is transferred to which ship and what flag it has. I remember from my days at sea the forms that you have to fill in, get signed and so on and they go off to the bunkering companies and so on. The Treasury takes an interest through the VAT and duty. If it is a small ship there might be some duty or VAT impact so that is measured very carefully; but, as my colleagues have said, it does not come through the port authorities. On the grounds that the user pays, the user being the UK Government, you would have to pay us for gathering this data because I can see it being a really complex bureaucratic exercise. The best place to go is to the bunker companies.
Joan Walley: On that note, I would like to thank all three of you very much for coming along. I think we have covered a lot of ground and probably opened up some other aspects. I could see when you were sat there in the public gallery there was some headshaking going on. Genuinely, if there are issues you think have been raised during the course of this morning then please feel free to submit further supplementary evidence. Mr Cartwright, the paper you have produced, we would very much welcome a copy of that. Thank you very much indeed.

Tuesday 25 November 2008

Members present

Mr Tim Yeo, in the Chair

Mr Martin Caton	Martin Horwood
Colin Challen	Dr Desmond Turner
Mr David Chaytor	Joan Walley

Memorandum submitted by the Department for Transport

SUMMARY

— The available evidence shows that emissions of both air quality pollutant and greenhouse gases from ships are increasing substantially as the volume of maritime traffic continues to grow. Air quality pollutant emissions from ships are predicted to outweigh those from all land sources combined by 2020[1], and greenhouse gas emissions from ships are predicted to double by 2050[2] in business-as-usual scenarios.

— However, recent developments in the International Maritime Organization (IMO) on revisions to Annex VI of MARPOL (the International Convention for the Prevention of Pollution from Ships) to further limit emissions of sulphur oxides (SO_x) and nitrogen oxides (NO_x) from ships demonstrates the commitment of the international community to improving maritime environmental performance. This commitment is reinforced by efforts within the IMO to agree measures to limit greenhouse gas emissions from ships by its Assembly in late 2009, which the UK fully supports and in which we are playing an important role.

— The Government is clear that shipping emissions must be tackled and that the shipping sector must operate under carbon limits. We believe that a coordinated multilateral maritime carbon emissions trading system (ETS) is the best option for delivering cost effective reductions, while maintaining a thriving shipping sector. We are working with industry and our European partners to develop this concept. But it is paramount that anything we do in the UK takes us closer to a global solution and does not have the detrimental impact on international negotiations, carbon leakage and the wider UK economy and UK employment; that could result from unilateral action.

— The Government is also assessing other options for reducing greenhouse gas emissions from ships. We have commissioned research into the technological and operational abatement potential for reductions of both pollutant and greenhouse gas emissions, with a view to maximising any synergies between the two areas.

1. *Shipping in a carbon constrained world*

1.1 When comparisons on a Carbon Dioxide (CO_2) per tonne/km basis are made, shipping is the most carbon efficient method of mass transport. However, it is vital that the shipping sector plays its part in reaching any carbon targets set at the global, EU or UK level. Ideally this share would be determined by the cost of abatement relative to other sectors so that the most efficient solution is found across the whole economy. The Government therefore believes that the maritime sector must operate under carbon limits.

2. *Global shipping's contribution to climate change*

2.1 Estimating global greenhouse gas emissions from shipping is challenging due to a lack of data and scientific uncertainty on overall impacts. Research on quantification of impacts of shipping emissions impacts had previously focussed on emissions of CO_2, although some studies have also estimated Methane (CH_4) emissions. There are also believed to be global climate impacts from the emission from ships of black carbon and NO_x. Work continues to reduce the uncertainty around these impacts.

2.2 Within the guidelines of the Intergovernmental Panel on Climate Change (IPCC), shipping emissions are classified as either national navigation (which includes domestic waterborne navigation and fishing) or international.

[1] According to the Impact Assessment accompanying the Thematic Strategy on Air Pollution
[2] Unpublished, presented at the intersessional meeting of the IMO's Greenhouse Gas Working Group in June 2008)

2.3 According to an interim report[3] of the International Maritime Organization's (IMO) updated study on greenhouse gas emissions from ships, international shipping emissions in 2007 were estimated at 847Mt of CO_2 ($\pm$ 20% to reflect uncertainty inherent in the calculation method). This equates to 2.7% of total global anthropogenic CO_2 emissions. If domestic, non-military shipping is included CO_2 emissions are estimated at 1019 Mt ($\pm$ 20%), ie 3.3% of global emissions.

2.4 The table below compares the IMO central estimates for the base and forecast years with an earlier study by Eyring et al:

Global emissions from shipping	*Updated IMO study (unpublished draft)*			*Eyring et al., 2005*		
Year	*2007*	*2020*	*2050*	*2001*	*2020*	*2050*
CO_2 (million tonnes)	1019	926-*	2036-*	813	1110-	1109-
*mid-range estimates		1073	2989		1188	2001

2.5 The IMO figures were calculated using a "bottom-up" approach: an analysis of activity data which estimates the total fuel consumption (and thereby emissions of CO_2) of an inventory of a variety of ship types above 100 gross tonnage, based on factors such as their installed power, average load and fuel-type. Eyring et al developed an activity based inventory using fuel consumption and fleet numbers.

2.6 The IMO's updated study is expected to predict significant increases in CO_2 emissions from international shipping, to over double current emissions, by 2050, if globalisation continues on its current trend. Historically, emissions have risen with global GDP growth, leading to higher demand for international transport. As the primary mode of international freight transport, demand for shipping services has increased; leading to higher CO_2 emissions despite improvements in the efficiency of ships. Forecasts therefore predict continued increasing emissions in the absence of new policy.

3. *Assessing the UK's share of international maritime emissions*

3.1 According to the UK national atmospheric emissions inventory (2006), which is compiled using current IPCC guidelines, CO_2 emissions from international shipping attributable to the UK constituted 3.9% of the UK's total transport emissions.

3.2 These emissions were calculated using sales of marine bunker fuels in the UK (including Crown Dependencies and the Overseas Territories that have ratified the Kyoto Protocol: Bermuda, Cayman Islands, the Falkland Islands, Gibraltar and Montserrat) for international navigation. This methodology assumes that responsibility for emissions stems from the country that possesses the ship fuel before it is purchased by the ship. Vessels trading internationally are likely to buy fuel where prices are lowest. Emissions measured in this way are therefore sensitive to changes in the relative price of fuel in the UK and its trading partners and may not be an accurate measure of emissions from international shipping attributable to the UK. In addition, the ability of vessels to bunker fuel for long periods of time means that much of the international seaborne traffic between the UK and its partners may not be captured by the UK national atmospheric emissions inventory.

3.3 There are several other possible ways of splitting emissions between countries. In 2005 Entec carried out a study for the European Commission to quantify global emissions (the total of emissions from national and international navigation) at the European Union and UK levels using different methodologies, and these gave radically different results:

European and UK shipping emissions, 2000, million tonnes carbon dioxide

Assignment methodology		*Coverage*	*Method*	*EU27+2*	*UK*
A1	Location of emissions: 12 mile zone	European waters	All vessel activity in EU/ UK waters	38.34	6.00
A2	Location of emissions: 200 mile zone	European waters	All vessel activity in EU/ UK waters	120.64	13.35
B	Flag of ship	EU/UK registered vessels	Worldwide EU/UK vessel activity	196.63	11.76
C	Bunker fuel sales	EU/UK reported sales	Top-down	159.24	9.69
D	Reported bunker fuel consumption	EU/UK reported fuel consumption	Top-down	158.91	9.51
E	A2 EU result divided between countries in proportion to freight tonnes loaded	European nations	Top-down	120.64	16.59

[3] Unpublished, excerpts presented at the intersessional meeting of the IMO's Greenhouse Gas Working Group in June 2008

Assignment methodology		*Coverage*	*Method*	*EU27 + 2*	*UK*
F	A2 EU result divided between countries in proportion to land based national emissions	European nations	Top-down	120.64	16.14
G	Country of departure/ destination	EU/UK port activity	Vessel activity 500 + GT	152.42	23.82

Source: Entec 2005

3.4 The United Nations Framework Convention on Climate Change (UNFCCC) Subsidiary Body for Scientific and Technological Advice considered these, and other options for allocating international maritime emissions to national totals. However, there are difficulties with each option:

- Allocating maritime emissions in proportion to national economy-wide emissions (method F) or freight tonnes loaded (method E) without reference to additional use of shipping services—this contradicts the principle that the "polluter pays".
- Nationality of carrier (method B)—shipping operates in national and international markets and shipping companies have weak ownership, management and operational links to individual nation states. Ships can easily change their nationality (or "flag") to avoid flag state regulations.
- Country of origin or destination of the ship (method G)—measures based on this kind of allocation could result in evasion through the establishment of hubs just outside the states implementing the measures eg if implemented by the EU, at the African Mediterranean coast, this will lead to increased emissions, transport delays and increased shipping costs.
- Origin or destination of cargo—this presents data difficulties, especially in the case of vessels on multi stop itineraries.
- Nationality of passenger—only relevant for cruise ships and ferries and presents data difficulties.
- Fuel sales (method C)—is subject to distortions, see paragraph 3.2.
- Reported fuel sales and fuel consumption (methods C & D)—are based on data believed to underestimate significantly actual maritime fuel use.
- Vessel activity methods (A, G)—are data hungry and hence costly.
- 12/200 mile zone method (A)—better suited to assigning local pollutants.

3.5 Because of the difficulties outlined above, the UK and the EU are exploring the possibility of a trans-national sectoral approach in the UNFCCC. Unilateral action by the UK before these negotiations are completed and an international allocation method agreed upon would prejudice the UK position in these and other negotiations on greenhouse gas emissions from ships.

3.6 The Government is clear that we must address international shipping emissions. But it is paramount that anything we do in the UK takes us closer to a global solution and does not have the detrimental impact on the wider UK economy and UK employment; which could result from unilateral action.

4. *Work in the International Maritime Organization on Greenhouse Gas Emissions*

4.1 The Secretary-General of the IMO has declared his intention that parties within IMO should agree on measures to reduce greenhouse gas emissions from ships at the IMO Assembly in late 2009. The IMO should be able to report good progress to the UNFCCC Conference of the Parties in Copenhagen in December 2009.

4.2 Many countries in the IMO are concerned about the adverse impacts any action might have on world trade and economic development. Developing and newly industrialised countries maintain that the Kyoto Protocol principle of "common but differentiated responsibilities" should apply to IMO solutions—ie that only developed countries (those listed in Annex I to the UNFCCC) should take action. They are also keen to avoid prejudicing their position in the UNFCCC negotiations on a post-2012 agreement on climate change.

4.3 A number of technological and operational solutions are already being discussed at the IMO by states and by environmental and industry NGOs; such as more efficient ship design, harnessing wind power, using alternative fuels and reducing speed. The IMO is also currently engaged in an update of its 2000 study into shipping's contribution to greenhouse gas emissions and the potential for abatement. The interim report will be presented to IMO's Marine Environment Protection Committee in October, and the final report will be submitted to the Committee when it meets in July 2009.

4.4 The UK Government supports the Secretary-General's goal to deliver a global solution. That solution must apply irrespective of the nationality (ie flag) of a particular ship. Any system must limit the risk of "carbon leakage" by the transfer of goods to shipping not covered by the system, or to alternative less efficient transport modes. We support and contribute to the IMO work on improving data and identifying abatement options.

4.5 In the Government's view, the most likely progress within the IMO by 2009 will be agreement on the CO_2 design index for new ships, along with the voluntary operational CO_2 index for current ships and a range of voluntary operational and technological improvements.

4.6 However it is vital that ship owners, operators and charterers are also encouraged to implement technological and operational solutions through applying a carbon price and setting absolute caps. The Government believes that a global greenhouse emissions trading scheme for ships may best provide incentives to the shipping industry to improve its carbon efficiency; reduce emissions at minimum cost, and send a message to the world that the industry is serious about making its fair contribution to combating climate change. The UK is proposing that in the medium term (beyond 2009), the IMO negotiates a new convention to deal with greenhouse gas emissions from ships, using economic instruments such as an emissions trading scheme.

4.7 The European Commission is also stressing the importance of carbon pricing, but is focusing on a regional approach (such as inclusion of maritime emissions in the EU ETS) in the short term: it has made it clear that if there is not significant progress in the IMO by 2009 it will bring forward its own measures. The UK welcomes this and is therefore exploring the option of including maritime greenhouse gas emissions in the EU ETS, but believes that regional action should not be an end in itself, but a step towards a global solution. We are working with our European partners to explore how best to achieve this.

5. *Work in the United Nations Framework Convention on Climate Change*

5.1 The Kyoto Protocol requires Annex I countries to pursue the limitation or reduction of greenhouse gas emissions from shipping through the IMO. In addition, the final text of the UNFCCC Bali Action Plan contains references that ensure emissions from maritime transport are not excluded from future negotiations on a post-2012 global agreement on climate change.

5.2 EU member states are therefore working with the Commission to develop proposals for the maritime sector that can be considered by the Kyoto Protocol Ad hoc Working Group and the Ad hoc Working Group on Long-term Cooperative Action. The UK is working to ensure cohesion between the developments in IMO and the UNFCCC.

6. *Developing new technologies and fuels, as well as more fuel-efficient operations*

6.1 In order to identify and provide a better understanding of the technological options for low carbon commercial shipping and their long term economic viability, the Department completed a Low Carbon Commercial Shipping Study in March 2007. This research produced an overview report into the future technological options for low carbon commercial shipping and their long term economic viability. It will inform the Low Carbon Transport Innovation Strategy which will be used by other stakeholders as a basis for further work into meeting the UK's carbon reduction targets.

6.2 The Government has also recently commissioned a Shipping Emissions Abatement Techniques Review, which examines the technological and operational options for reducing air quality pollutant and carbon emissions, their applicability, impact costs and potential timescales for uptake.

6.3 The IMO is currently developing guidance on best practices for fuel-efficient operation of ships and on limitation of leakage rates for refrigerant gases and coolants in ships. Areas covered include:

- Improved voyage planning and weather routeing.
- Optimum trim, ballast, propeller, rudder and autopilot.
- Hull maintenance.
- Propulsion system maintenance and modification.
- Improved fleet management.
- Improved cargo handling.
- Energy management.
- Use of alternative fuel oils.
- Renewable energy sources.

6.4 Agreement on this guidance is expected at the IMO's Marine Environment Protection Committee in October 2008. The UK will be looking to optimise air quality and climate change improvements. Should a CO_2 design index for new ships be mandated by the IMO in 2009, this would also result in measures to make ships more fuel-efficient being incorporated into ship design in the long-term.

6.5 In recent years, the UK has worked with other governments to explore and develop the concept of ships designed, constructed and operated in an integrated manner to eliminate harmful discharges and emissions throughout their working life, known as the "green ship" or "clean ship" concept.

6.6 The concept has been the subject of a great deal of work by the North Sea States, and was fully endorsed by the North Sea Ministerial Meeting on the environmental impacts of shipping and fisheries, held in Gothenburg on 4–5 May 2006. The "green ship" or "clean ship" concept needs to be developed further in the IMO.

7. *Shipping and UK air quality and public health*

7.1 While shipping has a generally good environmental record, it now accounts for a large (and growing) percentage of global emissions of atmospheric pollutants. Emissions from sea-going vessels can have a major impact on air quality on land. These emissions impact on the UK's ability to meet standards set by EU legislation concerning ambient air quality and national emission ceilings.

7.2 Many of the abatement measures to reduce greenhouse gas emissions, such as hull modifications, speed reductions and the use of solar/wind energy bring a concomitant reduction in emissions of air quality pollutants. The UK strongly supports such "win-win" measures and the need to be aware of measures that reduce emissions of either greenhouse gas emissions or air quality pollutants, at the expense of the other.

7.3 The main pollutants which ships emit are:

— Sulphur oxides (SOx) and Nitrogen oxides (NOx). These both have adverse effects on both human health and ecosystems.

— Particulate matter (PM). Both short-term and long-term exposure to ambient levels of PM are consistently associated with respiratory and cardiovascular illness and mortality as well as other ill-health effects.

7.4 Polluting atmospheric emissions from ships are regulated via Annex VI of MARPOL (the International Convention for the Prevention of Pollution from Ships), which places limits upon SOx and NOx emissions, although it does not explicitly address particulate matter (although these controls will reduce the formation of secondary PM). Controls are also required under the EU Sulphur Content of Liquid Fuels Directive (1999/32/EC), which as amended provides additional restrictions on the sulphur content of some marine fuels including gas oils and those fuels consumed by passenger vessels operating between community ports. The directive additionally establishes a requirement for member states to monitor compliance of marine fuels sold within their territory.

7.5 The UK is in the process of implementing MARPOL Annex VI into domestic law. The public consultation on our draft law was completed on 15 August.

7.6 Once Annex VI had entered into force internationally, the IMO set the process of revising Annex VI in motion. The former UK Permanent Representative to the IMO, Mike Hunter, led an expert group to study the impacts on climate change, of the options for revision of Annex VI.

7.7 IMO's revision of Annex VI to the MARPOL Convention has made good progress and the UK has played a full part in negotiations, supporting the introduction of significantly more demanding targets, as well as the extension of the scope of Annex VI to cover particulate matter. The Government welcomes the agreement which was reached at the meeting of IMO's Marine Environment Protection Committee in April of this year, and the fact that all the outstanding issues relating to sulphur oxides and nitrogen oxides were resolved. The Marine Environment Protection Committee is expected to adopt the revised MARPOL Annex VI when it next meets in October. Implementation and enforcement of the agreement on sulphur levels in fuel is likely to be very challenging, but it does have potential to substantially reduce emissions of SO_x and NO_x from ships.

7.8 MARPOL Annex VI introduced the concept of a SOx Emission Control Area (ECA), which specifies tighter controls on sulphur emissions within its boundaries. The sulphur content of fuel oil used onboard ships must not exceed 1.5% m/m, or alternatively, ships can fit an exhaust gas cleaning system, or use other methods to limit SOx emissions in a SECA. The Government supports the SECA concept.

7.9 The North Sea ECA which covers most of the east coast of Britain as well as the English Channel, came into force in November 2007. (In fact, all EU Member States that border the North Sea ECA commenced monitoring and enforcement in August 2007.) The North Sea ECA will have a significant effect on reducing shipping's impact on air quality within the UK.

September 2008

Witnesses: **Joan Ruddock MP**, Parliamentary Under-Secretary of State, and **Mr Phillip Andrews**, Head of Transport Emissions Team, Department of Energy and Climate Change, **Jim Fitzpatrick MP**, Parliamentary Under-Secretary of State, **Mr Godfrey Souter**, Head of Branch, Shipping and the Marine Environment, and **Mr Simon Cockburn**, Head of the UK's delegation to the IMO, Department for Transport gave evidence.

Q251 Chairman: Good morning and welcome, thank you for making the time to come in and talk to us. As your official party has expanded a bit since we were originally planning this I wonder if you could just introduce your officials and advisers so that we know who they are and what their functions are.
Jim Fitzpatrick: I am Jim Fitzpatrick, Parliamentary Under-Secretary at the Department for Transport. On my left is Godfrey Souter, who is Head of Branch for Shipping and Environment, and to his left is Mr Simon Cockburn, who is the Permanent Representative at the International Maritime Organization for us.
Joan Ruddock: I am Joan Ruddock and this is Philip Andrews, who is Head of the Transport Emissions Team at DECC.

Q252 Chairman: Thank you very much. In the Government's memorandum to this inquiry it says, and I quote: "The Government is clear that shipping emissions must be tackled and that the shipping sector must operate under carbon limits." Does that mean that you expect global shipping to cut its absolute level of greenhouse gas emissions or simply that you expect to curb the projected growth of greenhouse gas emissions from the industry?
Joan Ruddock: I think that is entirely a matter for the international negotiations. What we know is that at the moment the emissions are considerable but not the biggest sector, that emissions undoubtedly would continue to rise, and therefore a curb is certainly necessary on those projections, and we as the UK Government are determined to see some way of including these emissions. Clearly we have included domestic emissions already in our own Climate Change Bill. We are working to encourage the EU in this matter. Our ultimate aim has to be and is to get a global deal which will indeed curb emissions for shipping, but as to the extent of that curb and the progress along a trajectory it is clearly much too soon to say.

Q253 Chairman: So you are not clear about the extent of your ambitions in this matter, whether what you are prepared to do is trim a bit off the "business as usual" scenario or whether you can get a cut which would at least stabilise the present level of emissions? You are not yet clear what is achievable?
Joan Ruddock: It is not clear what is achievable. We have made far less progress, as I think you will be aware, on shipping than we have on aviation. Indeed, being out there with the IMO constantly saying that we need to have a global deal is our ambition. That is what we know is absolutely vital and that is what we strive to achieve all the time. To prejudge as to the level of curbing or reduction probably is not sensible at this time. I will ask Philip if he has anything to add to that but that is certainly my view.
Mr Andrews: It depends largely on what the nature of the global deal is, which of course, as you know, is a very three-dimensional negotiation. What role shipping should have in meeting overall targets is the question. What they have left to do in reaching a target within other sectors if there becomes a global deal is really the question. At the moment it is too early to call for an absolute target or absolute reduction in emissions.

Q254 Chairman: Let me put the question in a slightly different way in that case. Business as usual says that shipping emissions are likely to double by 2050. What level of emissions globally from shipping do you think is consistent with achieving Britain's goal of limiting the rise in temperatures to not more than 2°C?
Jim Fitzpatrick: As Joan alluded to, we have set targets within the EU ETS for aviation saying 97% of the 2004–06 average by 2012 and then 95% afterwards, so I think we have got a clear ambition as far as aviation is concerned. I cannot imagine that we would be any less ambitious in respect of shipping given that both sectors are expected to increase in growth and therefore emissions. As Joan says, in terms of being able to predict and project what might be the conclusion of the negotiations at international level, either in the Framework Convention or the IMO would be speculating, although naturally the Government has set out its targets in terms of what we would want to see happening in UK terms, and we have included shipping and aviation within the Climate Change Bill because although we know that we are limited until such time as international agreement take place exactly what we can input, we wanted to demonstrate a commitment to say that we certainly do expect to be able to make progress in both sectors.
Joan Ruddock: The other thing I would say, Chairman, is that clearly we seek a global agreement and we favour some trading scheme, and within any trading scheme it is possible to set overall limits and each sector may contribute differently within the overall limits that are set, so we do not have to say to ourselves at this stage we have this particular numeric goal for shipping. What we have is an understanding of how we need to reduce overall and that is of course why we have taken responsibility for 80% of our emissions in the UK by 2050 because that is what we consider to be our contribution to a stabilisation goal of a 2°C temperature rise.

Q255 Chairman: I am not asking you to predict the outcome of the negotiations obviously but if you have got no goal internally for shipping, it implies that an unlimited contribution and indefinite contribution may be needed from some other sectors. We have now got an EU goal for aviation, at least in the short term. If we do not know what the level of global shipping emissions is that is consistent with a 2°C rise in temperature, what you are saying

is that we might find that the motor industry has to have a 95% cut in emissions. That is the implication, is it not?

Joan Ruddock: I think the point, surely, is that there has to be an overall cap that is consistent and that will cover a multiplicity of sectors and there has to be a means of achieving the end goal, so there is no need actually in theory to prejudge what any particular sector will contribute. I do not think anybody would expect that we would not want to see at least a halt in growth, but it is not for us as one individual nation to say that we have a vision of what shipping should contribute internationally. The real goal is to get an international agreement that will set a cap. We believe, as I said, that emissions trading is the way to do it, but if we can set a cap globally, wherever that is going to be, that is of great value, but the goal and the prize is getting an international agreement.

Q256 Chairman: Is there a dimension to the Government's policy on the growth of British ports that takes account of the possibility of peak oil or indeed of limits being placed upon global shipping emissions? Is there a consistency between the ports strategy and these environmental concerns?

Jim Fitzpatrick: I think that there is and I think that it is a parallel consistency with the Government's policy in the Aviation White Paper to say that aviation is expanding because that does not mean to say that it is in conflict with the Government's objectives to reduce emissions. What we have to do is introduce procedures and schemes to be able to make sure that, notwithstanding that some sectors will be expanding and will be contributing more to climate change, they have to compensate that in aviation through the Emissions Trading Scheme and hopefully a further international agreement, as Joan has been outlining, on shipping to make sure that it makes its contribution notwithstanding that global trade's expected expansion in the years ahead means that there will be additional emissions from shipping that will have to be dealt with.

Q257 Collin Challen: The Kyoto Protocol gave the IMO responsibility for tackling emissions from shipping but they have made very little progress, if any. What do you think the reasons are for that?

Jim Fitzpatrick: Secretary-General Mitropoulos has clearly made it his ambition to see progress and to get a deal by the IMO meeting next year in July at the Marine Environment Protection Committee to be able to report good progress to the UNFCCC in Copenhagen later in the year. The lack of progress is simply because there are some countries which are not signed up in the same way as the UK is to achieving targets. They break down into different camps but there are some who are very resistant, there are some who are mildly resistant, there are some who are supportive of different ways of doing it, and there are those like ourselves who want to see specific progress, so it is an international arena where the usual suspects in respect of their attitude towards climate change and emissions and agreements are pretty well laid out.

Q258 Collin Challen: The portents of Copenhagen next year do not sound too good really, do they, there will not be a scheme that Copenhagen can agree. Do you think any decisions will be taken about shipping next year at Copenhagen?

Jim Fitzpatrick: We are not completely pessimistic and negative. The Secretary-General has been investing a huge amount of personal capital in this. The IMO Secretariat has been working extremely hard. We have been working with allies both at UN level in the Framework Convention and also at the IMO and within the EU to try and drive this forward. If we do not get an IMO agreement then the European position is reserved similar to our stance on aviation, which is if we cannot get a world agreement then we might have to look at devising a European scheme to at least start the ball rolling, much as we have done with aviation coming into the EU ETS in due course. We have not given up hope of being able to arrive at an agreement in July or take progress forward to Copenhagen, but I am not being unrealistic to say that it is going to be a real challenge.

Joan Ruddock: There is a Kyoto Protocol ad hoc working group and an ad hoc working group on long-term co-operation and action and we are working within both those groups constantly to try to persuade people that there is a need to bring forward an international agreement on shipping, as we are on aviation as well. There have been talks including in Accra in the margins of the UNFCCC meeting between developing countries and developed countries on how to include shipping and we hope that there will be a meeting again of those groupings—Annex 1 and non-Annex 1 countries—at the meeting in Poznan this December. It is not as though there is no work going on and we are very positively encouraging other EU Member States in particular to support this process and we are in constant dialogue with developing countries as well. Our commitment is there, we want to see this brought about, and we will continue to lobby strongly. I think, as you rightly say, we do not have huge expectations. As Jim has said, there are countries which are opposed to having an agreement. Even if it were possible in theory to get an agreement at Copenhagen, they are absolutely opposed to having it until Copenhagen has secured all the other expected agreements.

Q259 Collin Challen: Certainly from my recollection of evidence given to this Committee from shipping interests in this inquiry they seem very unhappy with the suggestion which I think came from the EU that the EU perhaps could just do its own thing. Does that not suggest that responsibility for this does need to be taken away from the IMO and perhaps at Copenhagen next year there should be a fresh approach which does not include the IMO?

Joan Ruddock: I do not think so because I think we place our hopes for the ultimate agreement that is required in the IMO and, as Jim Fitzpatrick has said, the current leadership of the IMO is very positive on this and we are supporting them. What we have really had to say, and I think this is important, is if we cannot make the progress we want through the IMO towards a global agreement then we will of course look to an EU agreement and use that as a means of demonstrating to the rest of the world that this can be done and should be done.

Q260 Collin Challen: In what sort of timescale might that happen? Obviously we have Copenhagen as the big crunch next year and if the progress report that has been mentioned is not quite adequate, despite the best efforts of the new President of the IMO, what kind of timescale might then kick in after Copenhagen if it is felt that this other option has to be pursued? Are there any quicker ways of doing like perhaps amending the existing MARPOL convention on ship pollution?
Jim Fitzpatrick: Simon might want to say something about IMO procedures and timeframes. My understanding is that if we are able to use an existing convention and create a new annex then that can be done in 24 months or thereabouts. If it needs a new convention then that could be 36 months instead and then getting ratified will take some time longer. It very much depends on where agreement can be reached and what type of agreement would be appropriate as a vehicle to take this forward.
Mr Cockburn: Yes, I would agree with that entirely.
Joan Ruddock: I think Philip has just indicated that he would like to say something.
Mr Andrews: Assuming that the EU option is taken forward if there is no progress in 2009, I think, as you saw from your visit to Brussels, the Commissioner is working quite hard and quite enthusiastically on a number of options, so I suspect the timeline we are talking about for getting a Directive in place if they wish to move to forward is two to three years, based on previous experience. In terms of Copenhagen, one thing that may come out of Copenhagen as part of the dynamics is countries agree we should be reducing our shipping emissions by X (and they may agree on X, they may not agree on X) and then pass it back to the IMO to actually do the technical work on work out how that would work, which would be a significant step because some of the issue in the IMO is they have been asked: what is the problem, what is the target, and what is the solution, which is a very long chain of thought to have inside the IMO. If we can take out that first bit you may have a slightly faster timeframe, but that is only a potential outcome from Copenhagen.

Q261 Collin Challen: It has been suggested to us that national delegations to the IMO often take a different view of carbon negotiations than do our national delegations to the UNFCCC. Is there a disconnect between the two and, if there is, how do you think it should be remedied?
Joan Ruddock: I have referred to the two working groups earlier and it is through those working groups that we are trying to get coherence and cohesion between the developments at the IMO and the UNFCCC. We accept what you say, we recognise the need, and we have been tackling that as the UK.

Q262 Joan Walley: I think in the evidence that we have received there has been a disjointedness really between different government departments and officials at the IMO. What I am really interested in is how the Government has played a leading role within the IMO because that has been something that has been flagged up by our earlier reports from this Committee, particularly the Reducing Carbon Emissions from Transport Environmental Audit Select Committee Report, and yet the Government response does not seem to be there in any detail about what the Government is doing in taking that leadership role within the IMO. Could you set out for me what the key contributions are that the UK delegation has made to taking forward the whole discussions on greenhouse gases inside the IMO since Kyoto?
Jim Fitzpatrick: I think we would refute any suggestions that we are not active. We are very active within the IMO. We are pushing, as we have outlined, for agreement on technical and operational measures in the short term. We have submitted a paper on negotiating a new IMO convention looking at the economic instruments such as emissions trading which would be for after 2009. We have outlined that we have been supporting the Secretary-General and the Secretariat. It is our view that we have been the most vocal country in calling for detailed discussions on the merits of, for example, the ETS, and we have submitted several documents to the IMO over the last few years on these topics which, if the Committee has not, got we can certainly provide either the documents themselves or a list of UK submissions to the IMO on reducing emissions from ships over recent years.[1] As Joan said, we have a working group of officials from DECC, the Treasury, the Department for Transport and the Maritime Coastguard Agency devoted to greenhouse gas emissions from shipping. They meet regularly every four to six weeks to discuss and develop policy. That working party reports through the chains of senior officials in the cross-Whitehall Climate Change and Energy Strategy Board and that goes directly to Cabinet, so there is very strong linkage at the most senior level right the way through to Cabinet in respect of policy and what we are doing at the IMO. We can certainly supply information on what we have been doing at the IMO and the documents that we have submitted if that would be helpful to the Committee.

[1] See Ev 84

Q263 Joan Walley: It seems as though that is just treading water. It does not seem as though it is actually getting anywhere with the progress that we need to be making. For example, when we went out to Europe there was an increasing frustration about the lack of progress within IMO. How are you making sure that all this effort that you are talking about is being translated into getting the key milestones passed, or whatever the nautical equivalent is?
Jim Fitzpatrick: I think straightforwardly in a parallel way with our efforts at ICAO over aviation, where we invest a lot of effort and a lot of time in trying to reach international agreement on aviation, dealing with its contribution to climate change and, sadly, not being successful at Montreal and having to devise the European dimension to the Emissions Trading Scheme for aviation, we clearly have identified, as we have been saying for the past few moments, that the IMO is the appropriate vehicle. We are investing heavily, we are supporting the Secretary-General and the Secretariat. We are working very hard to try and secure agreement at IMO but our fall-back position, as we have described, is that if we are unsuccessful at the IMO next July or come Copenhagen, then we may have to have a European dimension to say that if Europe was prepared to introduce a scheme which brings shipping into the 21st century in respect of its responsibilities in tackling climate change then at least that would be a start. We have not given up on the IMO because there are a lot of countries which believe, similar to ourselves, that shipping needs to be addressing this issue and needs to be making progress. So although it may look very frustrating from the outside it is not because we the UK or even many EU partners with us are not doing our best to reach agreement; it is because we are being unsuccessful in persuading the whole international community that they should be supporting the policies that we are putting forward in this regard.

Q264 Joan Walley: Can I just check whether one of the examples that you quoted in the first part of your reply to my question in those schemes of evidence that you were doing was the Voluntary Ship CO_2 Emission Indexing because I would be very interested to know about that particular scheme because that was one that was cited in relation to the 2006 Climate Change Programme Review. I would be very interested to know how many UK registered ships took part in this trial and when the index will come into effect and what assessment you have made of the effects and impact that is having on emissions because that is the technical side that actually produces the action. Mr Souter?
Mr Souter: Yes certainly, one of the areas where we are working where we are in fact very optimistic about there being a short to medium-term outcome of the work of the IMO was called the CO2 Index but it was recently decided to call it Energy Efficiency Indexing as being less offensive to the non-Annex 1 countries. I simply do not know how many UK ships have been involved in that so far.

Q265 Joan Walley: Who would know?
Mr Souter: I dare say colleagues at the Maritime and Coastguard Agency and I dare that we can provide you the answer in writing.[2]

Q266 Joan Walley: Is that because that is being done by the Coastguard Agency?
Mr Souter: It is not because they are separate from us. We have an extremely close working relationship with colleagues in the Maritime and Coastguard Agency. It is almost a symbiotic relationship, it is very close indeed. It is simply that this is detailed statistical information which I have not got.

Q267 Joan Walley: Can you not see that it is by way of detailed information that we will make progress on these issues, and if that detailed information is not there ministerial level within one department, never mind across government, how can there be this understanding of how there is progress on the ground taking forward the various negotiations or the Climate Change Programme Reviews. It makes them meaningless if that information is not there.
Mr Souter: I think the point is not so much knowing how many UK ships have been involved in it so far as knowing what the outcome is going to be in terms of getting a mandatory system because we would like it to be a mandatory global system in place through the IMO. Obviously we must have the information about the individual ships which are involved in the UK but the important thing is getting the deal in the IMO so that this index can be made mandatory for new ships with all the benefits that that would bring.

Q268 Joan Walley: Finally on that, have you got any idea of what impact you think that can make on reducing emissions even if you have not got the detailed information.
Mr Souter: Yes, my perception of it is that at the moment the ship owner or charterer does not necessarily take into account the carbon footprint of the ship that he is going to purchase or which he is going to charter for a particular voyage whereas if there were an index of this sort then for new ships (obviously we would like it to be voluntary for existing ships because we know that we cannot realistically make it mandatory for them) then there has got to be the scope for the ship owner or charterer to say, "I am not going to use that ship because it has an adverse carbon impact and instead I am going to charter or purchase this other ship which will have a better carbon footprint, a better efficiency ratio."

Q269 Joan Walley: You still have no way of knowing what contribution you think those voluntary emissions might be making to reducing overall emissions?
Mr Souter: It is going to be part of a deal which is finally agreed in the IMO, although our aspiration is to drive efficiency by 10% by 2020 and 30% by 2050. But that is an aspiration.

[2] See Ev 84

Q270 Mr Caton: Minister, you paint a very positive picture of the UK role on climate change at the IMO. I have to say that is in stark contrast to some of the evidence that we have received from other organisations and individuals who, whilst recognising the UK has been active within the IMO on pushing for agreement on tackling air pollution, claim that it is not as proactive as some others on cutting greenhouse gases. To illustrate this, one witness pointed out that the UK's head of delegation, Mr Cockburn, was not present during discussions on greenhouse gas emissions because he was chairing the working group on ballast water. On the face of it, that does not seem to suggest that climate change is getting the priority that one would expect. One of the submissions that we have received has suggested that that is because the delegation is led by the Maritime and Coastguard Agency. What is your response to that?
Jim Fitzpatrick: I think my response would be that it shows pretty bad scheduling on behalf of the IMO if one of our officials is chairing a meeting that prevents him from attending a very important committee. Certainly the position that we are strongly representing as the UK at the IMO is as I outlined in my earlier answer.
Joan Ruddock: May I just add on that very point in terms of the meeting being cited that both DECC officials and our experts from DECC and indeed DfT were there present and participating.

Q271 Joan Walley: Mr Cockburn can answer for himself!
Mr Cockburn: This is an interesting report; it is news to me. I would never leave my role within the Plenary of the IMO to chair any working group or other group, so I do not know where that information came from. We did have a member of the UK delegation who was chairing the ballast water group and so he would have been aware and I would have been in plenary, which is where my role is. While our experts are out in working groups or drafting groups the head of delegation remains in plenary while other business is done and while we wait for the reports of the working groups. So I am not sure what the foundation of that story is.
Mr Caton: That is helpful clarification.
Chairman: It came in evidence the Committee had last week—oral evidence.

Q272 Dr Turner: Could you tell us how effective the working relationship is between the UK delegation to the IMO and the international climate change negotiation team within DECC; are they working closely?
Joan Ruddock: I will let the officials who are the people working together answer, if I may.
Mr Andrews: The team is here to a certain extent—except one of my colleagues who is currently preparing for Poznan so cannot be here or he would be sitting behind me otherwise—and we have a very close working group. As mentioned before we meet every four to six weeks as a formal policy development working group with Treasury and DfT colleagues, myself and DECC. I am working on the domestic emissions side and also colleagues from DECC, who do the international negotiations, who deal with all these bunker fuel groups and all the Kyoto groups. I often go to UNFCCC bunker fuel groups as well as or instead of people who normally do so. We work closely with IMO. The point made about various work groups going on in GHG type working groups in IMO is often that both DECC and DfT or an agency are there and we come together every four to six weeks to steer this work and get clearance and so forth in terms of preparation for reports. It is a very close relationship; there are no silo issues.

Q273 Dr Turner: It is good to hear that the work is integrated like that. Another thing which we have heard is that one of the IMO's problems is that non-Annex-I countries have been opposed to signing up to an agreement that applies equally to all shipping. What is the UK's strategy to break this particular deadlock, if indeed you find it a problem?
Jim Fitzpatrick: I think it is very much a matter not just for the UK but obviously for all those countries who agree with us that climate change is the challenge that it is, and that we try to persuade by rational argument and by deployment of the science that this is an issue; that the rest of the countries who do not accept our position are wrong because the evidence quite clearly suggests that there is the problem that we have identified that we have to take solutions. So our relations both bilaterally and otherwise with individual countries and collectively is a matter for the officials who are at the IMO and elsewhere to be constantly lobbying, meeting, persuading, cajoling, encouraging, whatever tools are in the box that can be deployed to win people to the UK's position and are those which you would expect us to employ, Dr Turner.

Q274 Dr Turner: Does the FCO take part in these efforts in formulating a diplomatic strategy towards non-Annex-I countries that will not play ball within the IMO? How does this relate to similar work within the United Nations' Climate Change Committee?
Jim Fitzpatrick: Governance is as joined-up as we all admire it to be and the FCO naturally have a role in the appointment of Mr Cockburn. We liaise directly with the Foreign Office on all these matters, as we have been describing this morning in terms of the working groups for those who are getting down to the nitty-gritty of the detail of the systems. So the Foreign Office would clearly be sighted when there was an international forum and, as with any meeting, they would have a list of priority items to discuss with appropriate countries and ministers and officials would be meeting in the margins and targeting key countries and key players that we would want to have regard to to try to persuade them to our position. So the Foreign Office obviously would be most important, given their role, but I think that this would extend to all government departments where there was an international

meeting; certainly my limited experience is one always gets a briefing of what the key issues are and who the international players are and who we should be addressing and whatever the priorities are. Obviously Copenhagen is on everybody's mind at the moment and I would be very surprised if it is not featuring on each international briefing for ministers wherever they go to international gatherings.

Q275 Dr Turner: One of the ideas that has been floated is should we succeed in achieving a global emissions reduction, reduction scheme for use in developing countries, that revenues could be hypothecated for purposes such as avoiding deforestation, and the suggestion has been made by Tuvalu, for instance. What is your reaction to those suggestions?

Joan Ruddock: Our greatest concern is that there should be a cap and a lot of the suggestions that have been made, which were effectively for a levy, do not meet that requirement and so where it is often said, I think, that "we"—usually in the form of the Treasury—have opposed this sort of scheme it is because we do not think that hypothecation or earmarking, as it tends to be called in the international environment, is an appropriate and the most effective way of actually tackling climate change and reducing emissions. The proposals that have been made, as I say, are not based on there being a cap and therefore actual reductions, and so it is more than possible to envisage that there is a levy, so that you can theoretically raise lots of money but you might not reduce emissions at all. So clearly it is not in our view appropriate. We will not support hypothecation and we do believe that the best way is to find some form of emissions trading where that is accompanied by a very specific cap. That is the only guaranteed way to get reductions. The other possibility I think is that if there is no cap and there could be a scheme whereby levies were made and, for example, companies or nations or whoever could buy CDMs, that that could actually flood the CDM market and produce a demand that could not be met sustainably; and all the time, as this Committee will know very well, we are all very much concerned to improve CDM projects and not flood the market with money where that sustainability test that we want to see much tougher literally gets dispensed with because of the amount of finance available. We think there are a lot of reasons why levying with hypothecation is not the way forward, and that is why it is clear that we have actually opposed such schemes.

Q276 Mr Chaytor: Just pursuing the question of cap-and-trade, you are saying that the government's only negotiating position is over a cap-and-trade system, but which organisation would be responsible for managing that? Assuming that progress was made that that could be achieved within the IMO, who would you see as having responsibility for managing the emissions trading system for shipping?

Joan Ruddock: I can seek advice on that. I do not have a view as to what the particular mechanism would be. We are obviously prepared to engage in any discussions about any form of scheme and we are very clear that there are particular needs of certain types of countries, particularly small island states, for example, where they have to bring most of their goods by ship. So differentiated responsibilities clearly have to be taken account of; but how it should be administered I am not in a position to suggest at this stage. We are much more concerned with the principles, with being able to demonstrate, as we believe we have, the view that emissions trading is something that can be done and the only way that we feel that it is possible to approach this would be on a sectoral level; so that, for example, there would need to be an agreement that shipping globally is dealt with as though it were a country in the parallel with the global emissions trading schemes that we would want to see covered for the whole of climate change reductions. So who will do it, how it will be done I am not in a position to say, but I think the principles are the ones that we believe are very sound and the ones that need to be pursued, and we know that although there is some enthusiasm from some of the Scandinavian countries and they put forward levy systems, but because they did not get a great deal of support and because obvious flaws like not having a cap have been pointed out we think that it is appropriate for us to be pursuing this particular route and to try to persuade others that this is going to be the best way of having cap-and-trade in this sector.

Q277 Mr Chaytor: Can you just tell us a bit more about the Treasury's position on hypothecation because the Treasury has over many years been opposed to hypothecation.

Joan Ruddock: And remains so.

Q278 Mr Chaytor: But then from time to time has conceded and introduced certain forms of hypothecation, but I am not absolutely clear why this question of hypothecation is so important. Can you elaborate what the government's objections are?

Joan Ruddock: I think because it sat within proposals for levying; so you take a levy, then you use it. One suggestion was for adaptation to climate change. But because it is not accompanied by any limit then it simply takes money but says, "Go on growing", and as the Chairman began by saying, where the potential growth in this sector is so considerable, that although this might be a means of raising lots of money there might be much more that countries would need to adapt to if climate change reached what we hope might be the 2° limit. So that is why we think that this is not a sensible way forward. I think one could not entirely close off the possibility that within some of the schemes that might develop there might be some hypothecation, but as a principle the Treasury does believe that this is not for international bodies to decide, but

hypothecation is something that we do not accept for ourselves and we do not believe it should be imposed in an international agreement.

Q279 Dr Turner: You have already made comments about levies as opposed to cap; would you like to set out your position on the different market-based schemes that have been discussed by the IMO—fuel bunker levies, emissions trading schemes or even hybrid with cap-and-trade schemes?

Jim Fitzpatrick: As you say, Dr Turner, there have been a number of schemes which have been suggested, which Joan Ruddock has outlined. We are very much into a cap-and-trade scheme. There was a proposal from Dr Stochniol called IMERS which was about a levy. This was similar to one proposed by Denmark and Norway previously but it was abandoned by Norway and they came down to supporting emissions trading and Joan has outlined the position of the UK in respect of international tax. We felt that that scheme would be easily administered because working out an emissions charge for a particular ship based on its cargo would be very complicated, given that many ships have different cargos with various origins and destinations at the same time, so we did not think that that would be a runner. The ETS scheme is one which, as you know, we support. The scheme proposed by the Swede, Dr Per K—geson of Nature Associates, has underpinned the joint proposal from France, Germany and Norway and something similar was also proposed by the industry NGO Interferry and that is where we would be interested in placing support. Maybe Joan has covered the questions in respect of the weakness of just having a levy—it does not offer any restrictions in terms of the expansion of the sector or them recognising that they have to address that. So in terms of our position we have been in our negotiations that the emissions trading option has a potential to both put a price on carbon and incentivise more carbon friendly designs and operations, whilst raising funds for climate change adaptation. So it is very much where we have been and where we will continue to sit.

Q280 Dr Turner: Given that the UK has such a very clear preference for doing this on the basis of the emission trading scheme why has the UK not tabled a proposal within the IMO to do just that because the IMO would seem to be the organisation best placed to actually make it work, given the complications to which you have already referred, Jim.

Jim Fitzpatrick: As I said earlier on, we have made a submission to the IMO on an ETS as well as the other documents which I have said we have submitted in recent years, and as I also said we would be very happy to supply you with that.

Mr Andrews: There is a tactical point to, to our interventions, which is we try not to lead talks about it: if others are bringing forward ideas we agree with we should agree with them. We are seen as in the UK we have very strong views on climate change; we are setting very strong targets; we are demonstrating the way. Frankly, we waving our flag can scare some of the more nervous countries on what we are actually proposing. If people are doing the work and delivering effective ideas we feel it best to come in behind them as part of consensus rather than be the ones looking to again push the UK kind of approach. So there is a slight tactical issue with it as well and, as described, some of the ideas that have come forward have been very useful.

Mr Cockburn: I confirm with my colleague on what he was saying.

Q281 Dr Turner: Quoting from your memo you state that the UK and the EU are exploring the possibility of a trans-national sectoral approach in the UNFCCC. Could you tell us more about this?

Joan Ruddock: We found at Bali that parties agreed to consider cooperative sectoral approaches and sector-specific action and we do think that that is highly relevant to this field because some of the obvious models that have been put forward, such as linking emissions to the cargo or linking emissions to where the ship has been flagged or the ports in which the ship might sail, all of these have really, really great problems associated with them in terms of giving any sort of fair deal in international negotiations. So to take a sectoral approach does seem to be appropriate and what we have been doing is trying to explore what sectoral approach means. So, for example, there needs to be an examination of what type of approach could be put forward. In our case, as you have heard already, we favour very much the carbon market instrument, but there can be technology policies as well. The nature of the sectoral approach, as to whether it is voluntary or whether it is mandatory, and the scope—so whether it should be national, regional or international. So we are looking at all of that and we do believe that whatever sectoral approach might be adopted it would need to be part of a comprehensive global deal and that this would be important because there is the possibility obviously of carbon leakage, which is very significant. So what we have concluded from all of this work is that in fact perhaps the most obvious model is the one that is already being pursued in terms of aviation, which is that you group the whole sector together—in this case the shipping sector, as I mentioned earlier, would be analogous to a whole country. So you would put it altogether, you would set an international cap for the sector and then work out how to do some sort of trade scheme within that which would enable us to get appropriate limits on the emissions from the shipping sector. That is the work in progress.

Q282 Dr Turner: How would you attribute to different individual countries what the contributions from any savings in shipping emissions were to their national targets?

Joan Ruddock: If we look at the model in the UK we have adopted an 80% reduction by 2050, as you are well aware, and that only includes our domestic aviation and shipping, and what we have said is that we need to take account of that at the moment

because there is no methodology and nothing agreed and you cannot possibly allocate to any individual nation, and so if there is a movement to make this whole sector analogous to a whole country then of course that would make a different way of dealing with the matter, rather than reallocating to every national inventory.

Q283 Dr Turner: So you have basically given up on trying to attribute emissions to individual countries?
Joan Ruddock: We think that there are huge problems. This Committee will be very much aware, I am sure, of issues regarding flagging, issues regarding different types of cargos, issues of commercial confidentiality. The difficulty of doing this is not that people are not willing to look at it—people have been looking at it but there is no obvious way of doing it. So rather than the huge complications and huge expense that would come and potential lack of fairness it may be better—we suspect at this stage of our thinking that it would be better—to take the sector as a whole and treat it as a whole country and deal with it in that way, and that will be, we think, workable because at the end of the day what matters is not how you allocate to individual nation states but how you get the world community to agree on a process by which it reduces its emissions. That is the goal. So it is possible to do this in different ways and this is the way that we work on at the moment. But I would stress that it is in no sense because we seek to avoid responsibility; on the contrary, we are trying to help the world to come to an appropriate agreement.

Q284 Chairman: Just on the point about the revenues, if you have an Emissions Trading Scheme where the allowances are optional, that produces revenues, the difficulties of allocating those revenues and who controls them internationally are just the same as if you had a tax on emissions. The revenue problem remains the same and that is it?
Joan Ruddock: Yes.

Q285 Martin Horwood: Picking up on what you were saying about the Climate Change Bill and the taking into account. The government has accepted the principle of including a calculation of international shipping in the domestic CO_2 targets, has it not, because it has to be incorporated by 2012 or you have to explain why not? So you have accepted that principle, just to be clear, is that right?
Joan Ruddock: Yes.

Q286 Martin Horwood: In the meantime you have to "take into account". What does "take into account" actually mean?
Joan Ruddock: In the legal terms taking into account is the same as "have regard to". So, for example, we are obviously going to receive the first formal advice of the Committee on Climate Change when it is established on the morning of December 1—I suspect some time later that day we will get the formal advice of that fully fledged Committee and we will see what they tell us, because of course it is they who will advise us how we might take account of or have regard to international aviation and shipping. As you may know, they have said in their interim advice that came to us in the shadow forum that we could not at the present time "take account" of in a meaningful way because nothing had been agreed. I am sorry, they said that we should "take account of" but we could not include in our targeting because there was no international agreement. So we will have to see what they tell us. Clearly they could tell us that if we were to take account of, if we had to include in the target then this would make everything else significantly different, but I cannot anticipate what the Committee is going to advise us upon.

Q287 Martin Horwood: So DECC itself has no concept of what taking into account would actually mean at this stage?
Joan Ruddock: I think we certainly would have ideas and I think that you would probably also have ideas. But if we had to take account of in terms of our target then clearly it would make our target more difficult to reach—there is no question about that. But we cannot put it within the target because there is no international agreement; so all we can do is look at it and say to ourselves and ask ourselves what would it mean if we had to take account of it?

Q288 Martin Horwood: That seems like a reasonable scenario. When you say "look at it", presumably that implies that you must have some kind of measurement methodology in mind? Do you?
Joan Ruddock: I think what we have said at the moment—and what the Climate Change Committee also acknowledges—is that there is no agreed methodology beyond the reporting as memo items the emissions from bunker fuels. What we know about that is that there is nothing else that we can do that fits any international framework or any international reporting system other than measuring bunker fuels. We know that that is not a good measure; we know it undoubtedly underestimates the emissions from shipping, and presumably probably from aviation. But there is nothing else that we can currently do. We are looking at how we could make up other measurements; so, for example, movement of shipping within UK waters is one of the things that is being looked at. But there is no methodology that we can put on the table at the moment other than the bunker fuels.

Q289 Martin Horwood: Accepting that nothing is going to be formally incorporated into the carbon budgets at the moment, surely in order to perform this role of taking international shipping into account or looking at it, as you say, you have to start to form a view on these different methodologies fairly soon and look at the difference that perhaps two or three different methodologies would make to the carbon budget.

Joan Ruddock: Sure.

Q290 Martin Horwood: Otherwise how can you possibly take it into account?
Joan Ruddock: Sure. I agree and I do not know if Philip has anything that he can add to what I am saying? I am aware of work going on, as I said, and I am also very clear that we have no other means of doing reporting at the moment other than bunker fuels. Philip, do you want to add anything?
Mr Andrews: Not really. Our intention is to follow the international standards for reporting under the Bill, and as I said we are doing more work on things such as what is plausible in terms of just activity in the UK waters. That is what we are working on at the moment.

Q291 Martin Horwood: That is your only alternative methodology, activity of ships in UK waters, is that right?
Mr Andrews: That is one of the options we are looking at at the moment.

Q292 Martin Horwood: But you are looking at different options actively?
Mr Andrews: Yes.

Q293 Martin Horwood: Good. That is kind of reassuring.
Joan Ruddock: Perhaps Mr Horwood has a suggestion to make.

Q294 Martin Horwood: There are other methodologies being suggested that fuel be used in reaching UK ports and things like that and a similar basis to similar methodologies being looked at for aviation.
Joan Ruddock: I think, if I might say so, that they all have this problem that clearly if any system of capping were to be reached then clearly unless it is a verbal agreement then people operating ships are simply going to either flag out elsewhere if it is a nationality thing, or if it is where do you take your fuel from they are going to take it from somewhere else.

Q295 Martin Horwood: Would you see this as an opportunity for Britain to take a lead in developing a better methodology than the bunker fuels one?
Mr Andrews: In the context of UN working groups we have been active. The starting list was eight methodologies and one of the challenges in that area of course is that some countries actually walk out of these groups as soon as they look at different methodologies. So the UK has put a lot of work into this area. The comparison to aviation, the example you gave, that is very good but unfortunately we do not have air traffic control for ships and that is one of the issues we are working on, in terms of monitoring traffic that is quite hard work. So why my response is rather cautious is we are working on these calculations but, as you know, there have been seven or eight years of work in UN working groups on this area of trying to work out allocating emissions with very little success—due partly to political issues but largely technical issues.
Joan Ruddock: Perhaps if there is something that we can add that satisfies this point we could send this to you in writing, over what we said.[3]

Q296 Martin Horwood: Obviously the time limit theoretically on the Climate Change Bill is 2012, unless you provide a good reason why not. But when do you actually expect to incorporate UK emissions for international shipping into carbon budgets for the UK?
Joan Ruddock: I think we have made it absolutely clear that we can only work on these matters. We have given the date by which we will say what we can do or whether we can do it and I have to repeat our goal remains always to get an international agreement—that is what we aiming for.

Q297 Martin Horwood: Absolutely but I am not asking you about the international actually, I am asking you about the UK domestic carbon project. So you are saying—and I do not want to put words into your mouth—that it is not going to happen before 2012?
Joan Ruddock: I think it is somewhat unlikely but if I stand to be corrected I shall provide a note to the Committee.

Q298 Joan Walley: I realise that all of this is conditional and the methods of measurements are still not there yet either, but can I raise the issue about the evidence that we have received from the Tyndall Centre, which suggests that at the stage when shipping and aviation are included, and can I ask what the view of both departments is in respect of including those emissions as part of the baseline calculation because the Tyndall Centre really emphasised to us that they should be added to the baseline total from which all carbon budgets and targets are being calculated.
Joan Ruddock: I think we obviously agree with that view because when Kyoto was being negotiated obviously international aviation and shipping were not included in the 1990 baseline and clearly there was no reason that there should be because there was going to be no deal on that. So if indeed there is to be an international agreement then obviously the baseline will have to be adjusted accordingly.

Q299 Joan Walley: Thank you for that. Can I ask as well in terms of the evidence that we have received from the Tyndall Centre, whether or not you would agree with their assessment that actual UK CO_2 emissions have gone up since 1990 and taking the current methods of measuring the UK's share of international aviation and shipping?
Joan Ruddock: Taking the UK share of international aviation and shipping, but on what basis?

[3] See Ev 84

Q300 Joan Walley: The point that the Tyndall Centre made to us was that taking the current methods of measuring the UK's share of international aviation and shipping into account UK CO_2 emissions have gone up since 1990.

Joan Ruddock: I have not had notice of that question and I cannot check the facts.[4] My instinct is to say that they are probably right but I am not in the position and I do not have the figures before me and so I cannot say definitively, but I think just on a commonsense basis if there had been, as we know there has been, an increase in emissions from those sectors then obviously that means that there has been an increase. I just think for the record, however, it would be very important to stress that first of all we had no obligation to include these and no obligation at all in terms of meeting our Kyoto commitments and the Kyoto commitments on the basis of the greenhouse gases basket has been exceeded by this country and we will nearly have doubled our agreed Kyoto commitment reduction in greenhouse gases. I think that is very important to say because we are dealing here with something that has no international agreement behind it, nor indeed does it have any domestic agreement; so in a sense it is a debating point.

Q301 Chairman: It is a bit more than a debating point. Of course we accept that there was no obligation on Britain to achieve reductions which included aviation and shipping—of course that is factually correct. But it is not a debating point because the science does not recognise what is covered by Kyoto and what is not, but the fact is that there are emissions from aviation and shipping which are contributing to the increased concentration of greenhouse gases in the atmosphere, which is what is going to cause the risk that we will have a temperature rise of more than 2° C. So it is not a debating point. I think the important thing here is to accept—and it would be very helpful if you could write and confirm the position because obviously you did not know we were going to ask this question—that actually although it is perfectly true in terms of the Kyoto targets that Britain has achieved—and there has been a reduction, excellent, that is good, better than most countries have done—but in terms of the future problem, since we now accept that there is going to have to be a global reduction of about 50% in 2050 that even Britain, one of the leaders in making progress, if you include aviation and shipping, which in due course we will do, it has not actually achieved a reduction. It is quite an important. It helps people to understand the urgency of the challenge that is in the future. This is not a point against the government at all, it is simply recognising the science and trying to educate the public that although it is good we are ahead of most countries that even here actually, if you take all the emission sources into account, we have probably had a rise. If you could just write and confirm that that would be quite helpful.

[4] See Ev 84

Joan Ruddock: Because I clearly do not have the figures before me what I am not in a position to know for certain is whether overall the CO_2 emissions have gone up. It may be that they have not gone down by as much if you include those figures, but whether overall they will have gone up is a moot point and that is why, in a sense, I say that it is a debating point because neither of us are in a position, as I understand it, to know what the figures are and clearly we can get figures to the Committee but they would only be based, of course, on taking emissions from bunker fuels and we know that that is an inadequate measure, so even then I would reiterate that I think it might still be a debating point. Let me just say this. We are only responsible for 2% of the world's emissions—only 2% and of that 2% even at the present time, notwithstanding that they are growing fast, aviation and shipping account for a small percentage of that 2% and that is why I think we need to focus always on how to reach a global agreement. What we can do ourselves, although it is incredibly important in terms of setting an example at the end of the day it is not going to solve the world's problems and not going to allow us to keep within 2°.

Q302 Chairman: I think it would be helpful if you could address specifically the Tyndall Centre evidence that we have received because they are making a very clear statement.

Joan Ruddock: I have indicated that I will.

Chairman: I just think on the last part of your answer, of course we are only responsible for a very small fraction but nevertheless some of us on this Committee—I certainly—feel very strongly that it is not just the moral obligation to try and take a lead because we have a better understanding of this issue than most people, but I also think that there is a huge economic and commercial advantage if Britain is one of the first countries to de-carbonise its infrastructure and that includes its transport infrastructure.

Q303 Mr Caton: Continuing on the Climate Change Act the government is already incorporating emissions from UK domestic shipping in the carbon budget set up under the Climate Change Act. From the reply, Minister, you gave to Mr Horwood, presumably those are going to be measured on fuel sales from UK bunkers. You acknowledged very frankly that that is flawed certainly as far as international shipping is concerned. Are the problems also with domestic shipping?

Joan Ruddock: Yes, we think there is some evidence that there is a period—and I do not have the dates in my head but I know there was a period in which measuring from bunker fuels we seemed to be on a plateau but actually we know that trade was growing. So there is an issue about the accuracy of measuring solely from bunker fuels because obviously ships can take their fuel elsewhere. But that is much less so of course when you are dealing with domestic, so in terms of the domestic accounting I imagine that is fairly accurate and that

the issue is much more serious and that is why we do not favour this method if we try to go beyond our own coastline effectively.[5]

Q304 Dr Turner: Joan, you have already alluded to an almost freestanding international sectoral answer to emissions trading within the shipping sector, but of course the EU is working on incorporating shipping into the ETS. Do you see any compatibility there?
Joan Ruddock: Yes.

Q305 Dr Turner: And how is government addressing that?
Joan Ruddock: Our goal, which I have to keep stressing, is the global agreement and we are constantly working towards that. So effectively we are only saying that we would incorporate shipping into the EU ETS as a second order measure. It would be much preferable if we could—

Q306 Dr Turner: You mean taking it into account?
Joan Ruddock: No. If we cannot get a global agreement—but only if we cannot get a global agreement—should we actually adopt shipping as part of the EU ETS, but if we do have to go down that road we want to go down that road, we have a political will to go down that road because we then see that we could use that as a building block to get a global agreement and so that is the route that we would take. But it is very obviously preferable to get a global agreement—there cannot be any question about that because whatever methodology we would use for the EU it is still limited to the EU.

Q307 Dr Turner: What is the Commission's approach to this and how is the government interacting with the Commission in trying to get a common approach?
Mr Andrews: This is probably one for the officials. As you heard from your visit to Brussels they are looking at a range of options, obviously for the sake of completeness. We suspect from our conversation with them that they will end up in a similar place to us, that it is hard to see how alternatives to cap-and-trade really do deliver real reductions. It also makes the sector have compatibility with other sectors, so you can have abatement at lowest cost across the economy by the fact that the two sectors can trade with each other. We are closely in contact with the Commission all the time and in due course there will be a consultation on this and will engage with that process again.

Q308 Dr Turner: A concern has been raised that if we succeed in getting shipping into the ETS that it could just have perverse consequences in terms of shippers unloading cargos in distant ports and then trucking them, which would clearly be entirely counterproductive in terms of emissions. What could be done to prevent any such unfortunate consequences?

Jim Fitzpatrick: We do have our eye on that, however it is not our expectation that the scheme would be so expensive as to either create the perverse response as to allow more trucks to be rolling into Europe or alternatively to create feeder ports in North Africa to replace European ports. There is concern and it is one which has been raised and it is one of which everyone is aware, but given that which we have been discussing, the lack of detail in respect of how the EU ETS would work in respect of shipping, there is an expectation notwithstanding the lack of that detail that the scheme would not be so expensive as to create that perversity.

Q309 Mr Chaytor: I want to ask about the low Carbon Transport Innovation Strategy. First of all, when is it likely to be published?
Jim Fitzpatrick: Certainly we completed the study in March 2007. The document—I was looking for confirmation, which I have just had—has already been published but I did not want to say that without being a position of greater confidence than I was. The research produced an overview report into the future technological options for low carbon commercial shipping and its long-term economic viability. Following the publication of Towards a Sustainable Transport System last year and the inclusion of domestic shipping emissions into the UK's carbon budgets and targets we are using that study and others to examine potential policy options for carbon emissions and abatement in domestic shipping, and we will supply the Committee with a copy of the report if you have not already had one, Chairman.

Q310 Mr Chaytor: So what priority is your department given to this, and accepting Joan's point about the UK has a responsibility for 2% of emissions, aviation and shipping are a miniscule proportion of that at the moment. But what priority are you going to attach to intervening directly to attempt to influence the reduction of emissions in UK shipping?
Jim Fitzpatrick: It is an ongoing priority; we have regular meetings with shipping companies, owners, manufacturers to discuss the technology and the initiatives and the different elements which are available. So in terms of how I could categorise its prioritisation within departmental arrangements would be difficult in that it is a continuous dialogue which is ongoing.

Q311 Mr Chaytor: Could you identify a particular budget line that is attached to the objective of reducing emissions in UK shipping?
Mr Souter: It is not so much being taken forward domestically, although there is what the Minister has said in terms of discussions with ship owners. But it is also the impact on the international negotiations because one of the areas where we are expecting short to medium term progress in the IMO is in technical and operational measures. There is far less

[5] See Ev 84

opposition from the non-Annex-I countries to technical and operational measures because they do not have the climate change label attached to them. So there is a very real likelihood that by autumn of 2009 we will have agreement in the IMO on a whole range of technical and operational measures, including management measures like slow steaming, but also including measures like design of ships for better hydrodynamic or better aerodynamic capabilities and design of engines to be more efficient. So that is the area where the study is helping us.

Q312 Mr Chaytor: Does the department see any opportunity for the United Kingdom as a whole in developing the new technologies in the design of ships or the design of engines? Is this an opportunity for British engineering, for example? Is the department in discussion with DIUS about how our innovation and science projects could be allocated to promote these new technologies?
Jim Fitzpatrick: Certainly it is standard government policy to outline and to promote the opportunities that climate change and climate change industries have for the UK to encourage manufacturing, to encourage design engineering and scientific advance. I could not tell you exactly how much the scientific research budget is dedicated to marine engineering and technology but I am sure that we could get those figures for you if you wanted.[6]

Q313 Mr Chaytor: I think it would be interesting to see again is there a budget line specifically for low carbon marine technology, if not in your department then in DIUS. Some witnesses have talked about the potential for improving the efficiency of the operations in individual ports. Is this again something that your Low Carbon Transport Innovation Strategy encompasses and is this again something to which government would give priority, given that the overwhelming majority of British ports are privately owned? Do you have the levers at your disposal to put this into practice at individual ports?
Jim Fitzpatrick: I think the levers are not there in that we could not force ports into a situation, but the generic term used, as I understand it, curiously called "cold ironing", which had to be explained to me because it does not suggest anything. Sometimes terms that you come across you think "I know what that might mean" but cold ironing did not make any sense to me at all. The provision of electricity from land-side off on to ships is being looked at. However, the assessment suggests that there is perhaps not really a huge saving to be made. Secondly, one of the major obstacles is the different electrical standards that different countries manufacturer to, so to have compatibility with the electricity which is provided from land-side to ships is not as straightforward as it is for other sectors. There is nothing to prevent ports at the moment offering electricity and providing that and, as I understand it, a few do; but it is not regarded, even in the large cargo terminals where ferries would spend longer than the smaller ports, as an area where there is likely to be large savings to be made in respect of omissions.

Q314 Mr Chaytor: Did you discover why it is called cold ironing?
Jim Fitzpatrick: No!

Q315 Mr Chaytor: Maybe you could send a note to the Committee explaining that as well! [7]Leaving aside the cold ironing, on the question of variable port dues, for example, there is some discussion in aviation about differential landing charges according to the emissions rating of the aircraft; is this something that is worth exploring or has there been some discussion about this? Again, what would the legislative requirements be for government to impose a scheme of variable port dues on individual ports?
Jim Fitzpatrick: Mr Chaytor, the port dues is an area that we are examining. We are not at a conclusion yet but as you have suggested there are many parallels between aviation and shipping in terms of this whole area, and given that there are varying differentials in terms of airport charges then port charge variations is something which is also being examined.
Mr Andrews: Can I just add that there of course we have very good data on Nox production from aircraft engines from two or three manufacturers; we have lots of science work. Every ship is different, there is not an index yet which is one of the issues about developing a standard index in the IMO and then you can apply measures to those. That is why it is again a very different situation to aviation.

Q316 Chairman: Can I just refer to the Department for Transport's Ports Policy Review Interim Report in the light of the answer a couple of answers ago, which says: "In particular, we would like to see ports work harder to reduce emissions from ships while alongside by the provision, where feasible, of shore-side fixed electrical power supplies to replace ships' generators while in port (a practice known as 'cold ironing'). This can substantially reduce emissions. We are actively supporting the development of an international standard for shore connection . . . " In the light of what you have just said have you studied your own Ports Policy Review Interim Report?
Jim Fitzpatrick: We have, but as I said to a certain extent, maybe based on the examination, this is saying that the jury is still out on the quantification of savings that can be made through cold ironing, and the latest information we have suggests that it would not be substantial but obviously that does contradict the Ports Policy Review document that we published some little time ago.

[6] See Ev 84

[7] See Ev 84

Q317 Mr Caton: The other thing that cold ironing presumably would help with is air quality at docks and when we have just received a report saying that 60,000 people die as a result of pollution from the maritime industry I would suggest that the government's policy should be such that we should be encouraging shifting to cold ironing. What you actually say is that the government's policy to expect major ports to formulate plans for the provision of cold ironing facilities once an international for shore connection has been agreed. When do you think that agreement is going to be reached and how is the government seeking to speed progress towards it?
Jim Fitzpatrick: As I said, Mr Caton, we are examining the main question as it stands at the moment, whether it is a cost effective measure against local pollution even at the ports where there are significant berthing times for some of the larger ships. We do think that more work is needed on the engineering stands as to the economic and environmental effects before definitive conclusions can be reached. I am not quite clear about the timeframe for that work but I can write to the Committee and let them know how far we have progressed that research.[8]

Q318 Mr Caton: From the sound of it we are a long way away from mandating ports to introduce cold ironing?
Jim Fitzpatrick: We are certainly not in the position at the moment to mandate ports, no.

Q319 Joan Walley: Can I finally turn to air quality and non-CO_2 contributions to global warming and ask about the MARPOL VI convention that was agreed. Really just to ask how effective do you think it will be in improving air quality in UK ports and really what your assessment is of the shipping industry's ability to meet these new targets and these new standards?
Jim Fitzpatrick: We are very pleased with the outcome of the negotiations at the IMO to amend the MARPOL Annex VI and the UK did play an important role there. The amendments have the potential to significantly improve air quality at sea and on land with knock-on benefits naturally for human health. This will be done naturally over time with a reduction to the permitted maximum sulphur content in marine fuel and with even stricter limits in the emission control areas of which there are currently two—the North Sea and the Baltic. Road transport fuel is already subject to strict contents and it is important from our point of view that ships are also subject to stringent regulations to reduce their environmental impact also. So as well as amendments to MARPOL Annex VI changes to the NO_x technical code have also been agreed, which will improve the engine standards for ships so that fewer nitrogen oxides will be produced also.

[8] See Ev 84

Q320 Joan Walley: Can I ask how you intend to actually measure what kind of an impact that is having? And how have you calculated the improvements will come about?
Jim Fitzpatrick: We have a measure for heavy goods vehicles to reduce the sulphur content in its fuel from 0.005% to 0.001% and we expect that there will be similar reductions in due course in shipping. Godfrey will say some more about the measurements.
Mr Souter: On the subject of SO_x, sulphur oxides, the compliance can be measured in two ways: firstly, when ships come into a UK port or in fact any other EU Member State port because obviously this is something which is going to apply to all the EU Member States. When they come into any of these ports it will be possible to check what fuel they actually have to make sure that they have actually been using a low sulphur fuel if they have been going through a sulphur emissions control area. Or, alternatively, because one of the things that the United Kingdom was very keen to achieve was a goal-based approach—a goal-based solution, I should say—in the revised Annex VI they may have scrubbers. If they have scrubber technology so that they can be using a higher sulphur fuel but their emissions will still be low sulphur emissions, then that is accepted as well. The only problem with this is if there are ships which are transiting through the North Sea and the Baltic and not actually calling at an EU Member State's port, in which case it is rather harder.

Q321 Joan Walley: What about the ability of the shipping companies to actually meet these new targets?
Mr Souter: We do not believe this should be at all difficult. Back in 1996 the protocol was agreed in the IMO to create—to add—an Annex VI to MARPOL. I think everybody realised at the time that the SO_x standards there were really rather easy to meet; but the fact of the matter is that everybody was very pleased actually to get an Annex VI about air pollution into MARPOL. But the idea that certainly we and a number of other countries had was that as soon as MARPOL Annex VI had actually entered force we would look to tightening up the standards, and that is what we did—we and a number of other European countries put a paper into the IMO just as soon as Annex VI was internationally in force, looking to get the Annex reviewed and to get tighter standards both for SO_x and $NO_{x.pa}$

Q322 Joan Walley: One other thing is that the Chamber of Shipping has suggested to us that what this will do is, if you like, put into effect a reverse modal shift and it will cause more freight to be taken by road rather than by shipping as a result of the extra costs. How would you actually prevent that from happening in respect of shipping freight?
Jim Fitzpatrick: We spent some time negotiating the agreement at international level as a result of very difficult negotiations where we played a prominent

part. There was some final adjustment to the amendments which were included in the international agreement and as a result of that we have had ferry companies lobby DfT in terms of the impact that they say it is going to have on their business.

Q323 Joan Walley: Do you think it will have that effect on their business?
Jim Fitzpatrick: What we have said to them by way of some reassurance, given that the standards are due to come in in 2015, is that the Maritime and Coastguard Agency will be carrying out a research project in the new year to quantify the cost and benefits of the compromised text for the Annex. They have said what they think the impact is going to be on them and we treated that seriously enough to say that we will go and do our own research and check it against their figures, and we will be having discussions with them again in due course. But that research project will be done by the MCA next year.

Q324 Joan Walley: Does the Maritime and Coastguard Agency have the extra resources to do that?
Jim Fitzpatrick: Yes.

Q325 Joan Walley: Finally, when we had the IMO here they talked about the contribution that non-CO_2 contributions made by shipping, such as black carbon and nitrous oxide, would be successfully tackled through these improved air pollution reduction measures and we understand that there was a former UK representative at IMO—I think his name was Mike Hunter—who did some detailed research work on that. Could you tell us what assessment is made of the contribution that this could make towards reducing global warming?
Mr Souter: Mike Hunter did not do it personally; Mike Hunter was the chairman of the special group which was set up by Mr Mitropoulos, the Secretary-General of the IMO, to look into this. It was an expert group and it pulled together experts from a number of countries around the world. They produced an amazingly comprehensive report and I am sure that we can provide you with a copy of it.[9] I do not recollect the detail of the actual findings about nitrogen oxides.

Q326 Joan Walley: Even though you might not have the detail of it, again can I ask whether or not the government shares the IMO's confidence that there will be improvements as a result of this?
Mr Souter: Yes, definitely.
Jim Fitzpatrick: No question.
Mr Andrews: The black carbon factor there of course is very uncertain.
Chairman: Thank you very much indeed for coming in.

[9] See Ev

Supplementary memorandum submitted by DECC and DfT

Q262: *Provide proposals submitted by UK to IMO on GHGs and ETS*[4]

Q265: *How many "UK" ships took part in the trial of the operational CO2 indexing of ships?*

— Although the Maritime and Coastguard Agency provided guidance for UK flagged ships, in case they wished to take part, none ended up being involved in the trials of the CO2 index.

Q295: *Which allocation methodologies under consideration for "taking account" of international shipping emissions?*

— We currently report estimated emissions from international shipping based on deliveries of refined product to marine bunkers for international and domestic shipping as memo items in the national greenhouse gas inventory which the UK is required to submit to the UN every year. These emissions will continue to be reported based on this measure of supply.

— Our intention under the Bill is to follow international reporting practice. We will also have regard to forecasts of the shipping industry's demand for marine fuels. When taking account of international shipping emissions, we will make clear what methodologies are being used.

— Please see paragraph 3.4 of the Government's oral evidence to the Committee for details of the allocation methodologies that have been considered in climate change negotiations, and the difficulties associated with each.

[4] Not printed.

Q300: *Do you agree that UK emissions have increased since 1990 if international aviation and shipping emissions attributable to the UK are included, as set out in evidence by the Tyndall Centre?*

No we would not agree. As shown in table below, both on a CO2 only basis, all for all GHGs, and based on bunker fuel methodology, UK emissions have reduced: for GHGs by 12.7%.

UK emissions with and without international aviation and shipping, calculated by bunker fuel sales

Year	CO2 only (MtCO2)				All Kyoto GHGs (MtCO2e)			
	Kyoto total	International aviation	International shipping	Kyoto total + Int. A&S	Kyoto total	International aviation	International shipping	Kyoto total + Int. A&S
1990	593.5	15.7	6.7	615.9	774.9	15.9	6.7	797.5
2006	555.9	35.6	6.8	598.3	653.8	36.0	6.9	696.6
1990-2006 (absolute)	-37.7	19.9	0.1	-17.7	-121.1	20.1	0.1	-100.9
1990-2006	-6.3%	126.2%	1.9%	-2.9%	-15.6%	126.2%	1.9%	-12.7%

Q303: *Any problems/anomalies with using fuel sales as measure of carbon emissions from domestic shipping?*

— Measuring carbon emissions using this method is reliant upon data on UK refiners' declared fuel sales to shipping. UK refiners' declared fuel sales are based merely upon those refiners' best estimate of final use. The majority of refiners' marine fuel oil output is traded through third parties, with refiners therefore having only a partial knowledge of the end use—domestic use through UK waters or international trade—to which traded fuel is put.

— Given that shipping is a highly mobile asset, vessels on domestic movements in UK waters may be operating on fuel sourced from UK refineries. Carbon emissions from such domestic vessel movements, where fuel has been sourced from outside of the UK, would therefore not be included in estimates based upon UK refiners' declared fuel sales. This problem is exacerbated where vessels are involved in both domestic and international movements.

Q309: *Copy of Low Carbon Shipping report / Low Carbon Innovation Strategy and when published*[5]

Q311 and 312: *Budget allocated to low carbon marine technology? (DfT)*

— The Department for Transport does not assign quotas for the research and development of specific technologies. There is therefore no specific budget allocated to low carbon marine technology within the Department.

— When a particular need is indentified, the Department can help by providing direct funding or identifying funding streams: for instance, the Engineering and Physical Sciences Research Council, which is funded by the Department for Innovation, Universities and Skills, has awarded grants for the development of such technology, such as the Advanced Marine Electric Propulsion Systems (AMEPS) developed at Strathclyde University. The EU's Waterborne Technology Platform Strategic Research Agenda (WSRA) is another source of funding.

Q317: *When will there be an international agreement on "cold ironing"?*

— We anticipate that "cold ironing" will be included in the International Maritime Organization's Guidance on Best Practices, which will form part of a wider package of measures on reducing greenhouse gas emissions on ships to be agreed at the IMO's Marine Environment Protection Committee in July 2009.

Q325: *Provide air pollution report from IMO (group chaired by Mike Hunter)*[6]

December 2008

[5] Published 23 May 2007, not printed.
[6] Not printed.

Written evidence

Memorandum submitted by Simon Brown, Director of Business Development, Martek Marine Ltd

Simon Brown is responsible for the development of "MariNOx", the World's first Type Approved marine diesel engine emissions monitor and heads up the companies R & D into innovative environmental monitoring systems.

Acknowledged as an industry expert in on-board emissions measurement, he recent led a groundbreaking development in automated GPS web based marine emissions reporting software package to demonstrate the enormous benefits of "real-time" monitoring on commercial shipping available over the internet.

Having recently seen through the revisions of the NOx Technical Code in the capacity as Chairman of the "NOx Code Working Group" at the IMO, this challenging task was made easier with the formation of a "group of technical experts" who represented all aspects of the marine industry. The group were keen to improve and clarify those sections of the NOx Code which have caused issues since its introduction, and develop workable regulations in those areas which will provide the greatest challenges over the coming years.

Bullet Point Summary

- Pro-active emissions reduction initiatives must be based upon accurate measurements and recording of totalized emissions inventories.
- The marine industry's decision for a phased programme for diesel engine emissions reduction combined with geographically based Emission Control Areas has not provided incentives for investment in emissions reduction technology. CO_2 emissions from shipping have not been addressed in the recent review of MARPOL Annex VI and the NOx Technical Code.
- Boilers and gas turbines fall outside the realms of MARPOL Annex VI but will contribute to the overall emissions inventory.
- IMO CO_2 indexing scheme is based on empirical calculations from fuel usage, not accurate measurement technology.
- Guaranteed compliance cannot be achieved by the current method of "rare" and "random" port state inspections. Real-time, live data, available on the internet can provide evidence of vessel emissions compliance at all times.
- Environmental initiatives such as emissions trading will require accurate emissions measurement. The further benefits to realise the full benefits of investment in emission reduction technology.

Submission Specifically Aimed at the Following Questions Raised

1. *How can the UK's share of emissions from ships be measured and included in the UK's carbon budget?*
2. *How quickly can any proposed scheme be implemented?*
3. *What are the benefits of direct measurement in wider emissions trading schemes?*

The worldwide shipping community has a serious number of challenges to face over the coming years. The revisions to MARPOL Annex VI and the NOx Technical Code have far reaching ramifications for ship owners, regulators, engine builders and technology providers alike.

This submission challenges the traditional marine industry "resistance" to continuous emissions measurement, by demonstrating the significant benefits of "what gets measured, gets done".

The ability to measure each emission source installed on-board, including boilers and other fuel consuming units, is essential to provide a fully accurate emission footprint, however these emission sources have not been included within MARPOL Annex VI.

Martek Marine Ltd, a UK based marine solutions supplier pioneered the first Type Approved on-board emissions monitoring and recording system in April 2005. Since this date, Martek have proven the following capabilities on-board:

I. Measurement of NOx, SOx and CO_2 on board vessels from diesel engines and boilers in line with the specific requirements of IMO MARPOL Annex VI regulations 13 and 14.

II. Capability to record totalised inventory in kgs and tons for each pollutant.

III. Capability to determine if the vessel is in compliance within a geographical region.

IV. Automated collection and recording of data from all installed sources on-board.

V. Capability to upload emissions data to a web portal via a GPS/satellite transmitter.

VI. Capability to measure CO_2 in line with the IMO CO_2 indexing scheme (MEPC Circ 471).

VII. Capability to accurately record totalised CO_2 for use in carbon offsetting or emissions trading schemes.

VIII. Capability to encrypt the data to prevent tampering by third parties.

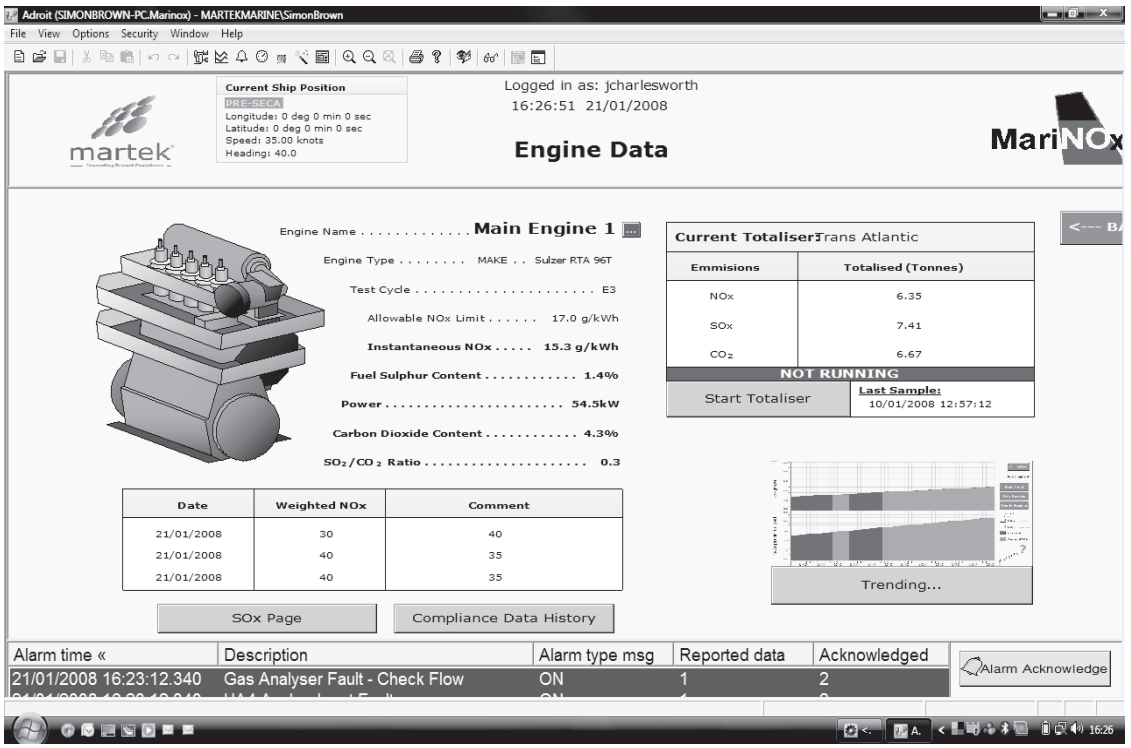
The current emissions inventory schemes, as implemented within ISO14001 and IMO, are all based on empirical calculations of CO_2 emissions based on fuel used. The factors used are different depending on fuel composition.

This method of calculation does not account for the efficiency of the emissions sources, thus the actual emissions reported are currently "estimates".

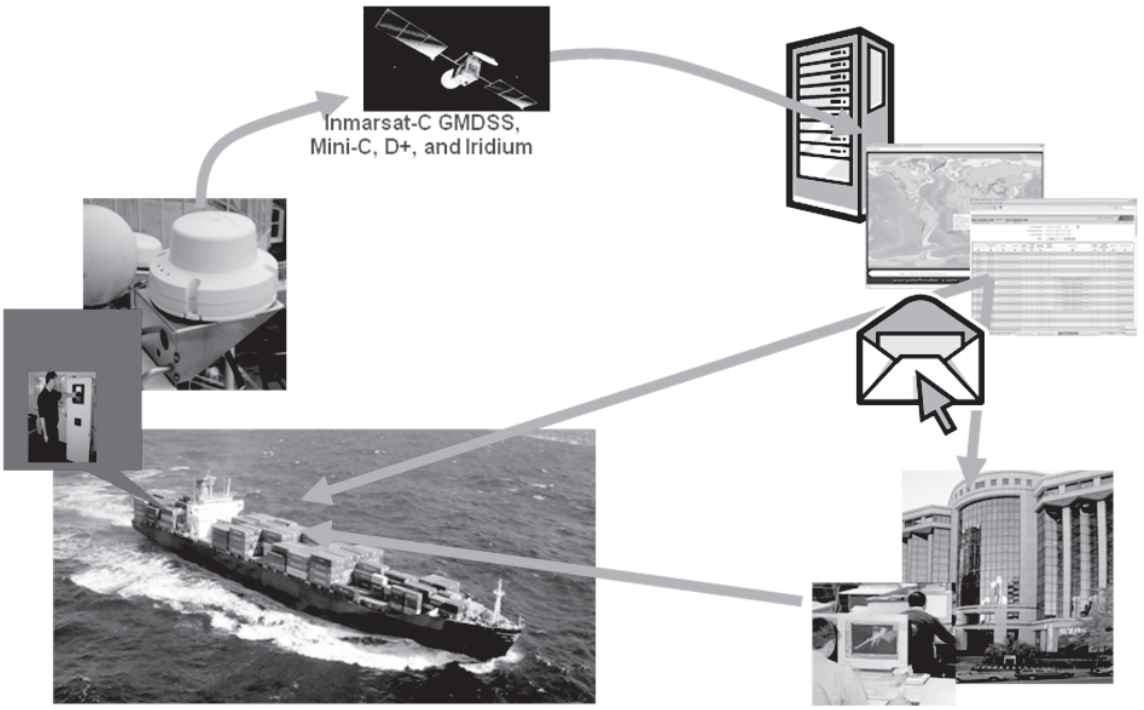
Subject to shipping being included within any "UK carbon budget", monitoring systems can be installed on specific vessels to automatically report emissions and provide accurate totals.

Systems are usually available within 12 weeks from manufacturers and the UK fleet could be equipped over a period of 24–36 months.

TYPICAL EMISSIONS REPORT



TYPICAL SYSTEM CONFIGURATION



Benefits of Emissions Measurement within a wider emissions trading scheme

- Environmental innovators will derive a financial payback from investment in emissions reduction technology, whilst achieving the wider environmental objectives.
- CO_2 being linked directly to efficiency and fuel consumption, measurement provides the ability to "optimise" performance to given conditions and operating profile would reduce operating costs and the environmental impact.
- Transparent reporting ensuring accurate industry inventory.

Considerations of measurement within a wider trading scheme

- Land based operators such as power stations are required to use monitoring technology and are audited regularly for performance, currently no such scheme is required for shipping.
- Systems are now widely available in the market and environmental innovators are installing across their fleets worldwide.

Summary

Emissions monitoring technology must be included within wider environmental initiatives to provide the metrics which will allow accurate measurement of fleet performance.

Environmental innovators will only invest in emissions reduction technology, if it provides a realistic payback or competitive advantage, on-board measurement is a key instrument in validating the efficacy of any project.

Using automated measurement technology combined with GPS location, allows the fleet to be monitored and audited for continual compliance with regulations.

Direct on-board Measurement will provide the mechanism to allow operators to derive financial payback from investment in emissions reduction technology and emissions trading schemes.

15 September 2008

Memorandum submitted by SEAaT

1.0 Introduction

SEAaT is a cross-industry, pro-active and self-funding group, whose mission is to encourage and facilitate efficient reduction of harmful emissions to air from shipping.

SEAaT believes the shipping industry, should be given the maximum freedom to achieve defined outcomes, using whatever environmentally acceptable solutions it finds appropriate and cost effective. There is potential for the reduction of emissions of shipping by innovation, in improving the energy efficiency of ships by the use of abatement technologies and performance improvements, both at an operational level and in the supply chain. However these potentials will only be realised if there is financial benefit for making the changes and a regulatory framework enables "goal based" solutions to flourish. To this end, SEAaT encourages the use of the market based instrument of emissions trading to facilitate performance improvement.

1.1 Summary

- Shipping CO_2 emissions estimated:
  - at between 0.8 and 1.2 billion tonnes of CO_2 annually;
  - to contribute to a mean figure of 2.7% of global anthropogenic emissions;
  - estimated growth factor of 2.3 to 3.5 times compared to the 2007 emissions inventory; and
  - growth may be restricted by current global economic slowdown.
- Allocation of UK shipping emissions to UK emissions budget not considered to be appropriate.
- Negative environmental and economic consequences may result from policies that do not properly consider the differences in shipping sectors.
- Prospects of international agreement on shipping emissions reductions are unclear.
- Measures and controls being considered are:
  - New build design index.
  - Recommended best practices.
  - Market based instruments:
    - Bunker levy.
    - Emissions trading (cap and trade).
- SEAaT considers emissions trading (cap and trade) to be the most effective market based instrument.
- Established technologies and operational measures exist to reduce emissions from ships by up to 30 to 40%, including:
  - Waste heat recovery.
  - Propeller design.
  - Hull forms.
  - Weather and tide routing.
  - Paint systems such as silicon coatings.
  - Trim optimisation tools.
- In addition, innovative technologies are being developed which may reduce emissions:
  - Sky sails.
  - Air cavity systems (air lubrication).
  - Twin propellers.
- UK Government support for a global emissions trading (cap and trade) will facilitate its adoption.

2.0 Responses to Strategic Issues as Identified by the Committee

2.1 *How significant is global shipping's contribution to climate change? How is this projected to change in the future?*

The most significant gas emissions from ships contributing to climate change are from combustion processes and VOCs (volatile organic compounds) from tank venting on tankers. The emission under the greatest consideration at the United Nations' body the International Maritime Organisation (IMO), with respect to reducing the contribution to climate change by shipping, is CO_2.

Verified release data from across the world's shipping fleet is not collated and is thus not analysed. However data from a fleet of tankers suggests that the proportion of emissions is 97% from combustion and 3% from tank venting.

The quantity of CO_2 produced by a ship's power plant is in direct proportion to the quantity of fuel burnt. For every tonne of fuel consumed approximately three tonnes of CO_2 are produced.

The estimate of shipping's contribution to the total CO_2 emissions from shipping submitted to the IMO, as part of the expert group study report on the revision of MARPOL Annex VI, established a figure of 1.2 billion tonnes per annum. A more recent study by Norwegian think-tank Marintec, for the IMO, whose preliminary report was presented to the IMO Green House Gas Working Group in June 2008, estimated the emissions from shipping as approx 0.8 billion tonnes per annum. Both these estimates were established using a top down approach and are based on ship size, engine size and an assumption of days steaming. A bottom up estimation using actual fuel consumption data is currently not possible,as there is no external reporting of fuel consumption data.

The Marintec report estimates the contribution of shipping to to be 2.7% of the global total emissions.

Estimations of change in contribution are directly proportional to changes in trading activity. The Marintec report estimated a growth factor of 2.3 to 3.5 compared to the 2007 emissions inventory. The recent reductions in economic growth may result in these estimates being reduced.

2.2 *How should the UK's share of international maritime emissions be measured and included in UK carbon budgets? How fast could this be done?*

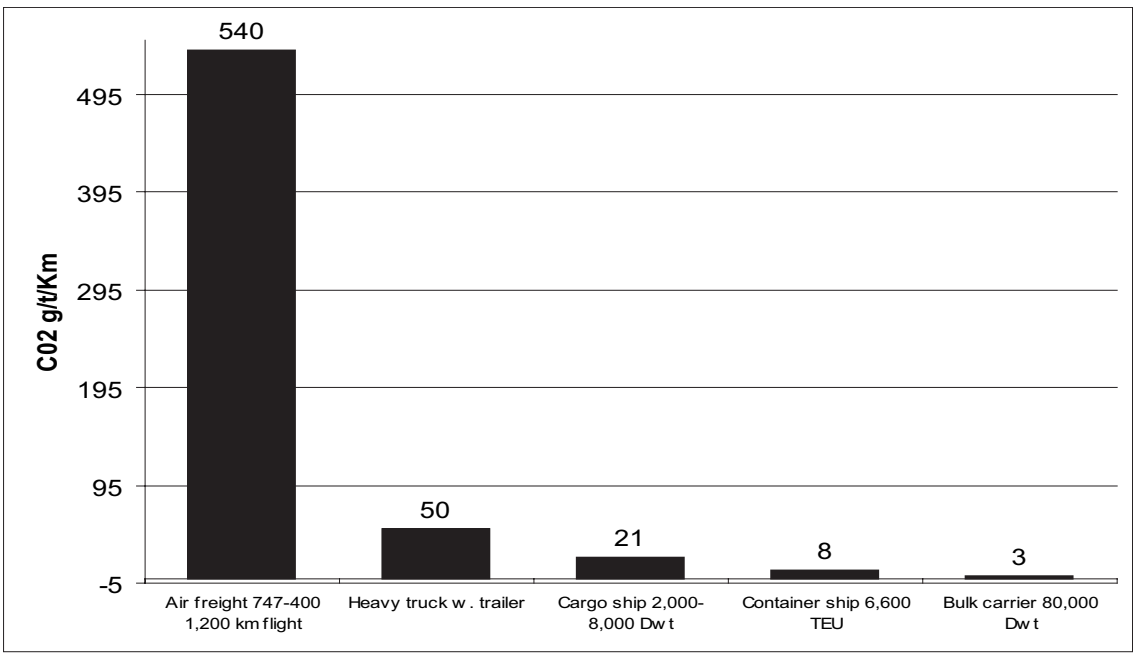
2.2.1 Deep Sea Shipping

The international nature of shipping makes it inappropriate to allocate "shares" of international shipping emissions to any particular nation. The trade in raw materials and finished goods often means that material is imported, value is added, and the resultant goods then exported. If the allocation was targeted at goods arriving at UK ports then use of UK ports as European "entry ports" may be jeopardised. It is more appropriate for the international shipping industry to be considered as a contributing entity in its own right, in much the same way as nation states are considered. Nevertheless, the European Union has made it clear they will act autonomously if the IMO do not provide acceptable measures for the reduction of CO_2 for shipping.

2.2.2 Short Sea Shipping

If it was decided to try to allocate shipping emissions to the UK, one of the unintended negative consequences of any emissions controls may be to drive modal shift from short sea shipping (another less CO_2 efficient transport mode). The table below gives a comparison of the various modes of transport.

CO_2—EFFICIENCY OF TRANSPORT MODES



Source: Swedish Network for Transport and the Environment and Danish Shipowners' Association.

A further negative consequence might be the development of ports outside the UK at which the journey is broken. The purpose of this would be to reduce the mileage between the "last port" and the UK. Although this might reduce the amount of CO_2, the UK accounting for it would not contribute to the reduction of global CO_2 emissions and may, depending on the vessels used to bring goods to the UK, actually cause an increase.

2.3 *What are the prospects of international agreements to control and reduce carbon emissions from global shipping, or to bring it within wider emissions trading schemes? How well is the UK Government playing a role in developing such agreements?*

It is necessary to consider agreements concerning measures to reduce carbon emissions separately from agreements to control carbon emissions.

2.3.1 Measures to reduce carbon emissions

Currently the IMO is considering two main measures to bring about a reduction in carbon emissions from global shipping. The first measure is a design index for new buildings. The index is generated from a formula, taking into account a vessels size, installed engine power, and a number of other factors establishing a theoretical emissions index. All new ships from an implementation date would be required to conform to or better this index. The second measure is a list of best practices which when implemented will reduce the emissions from ships. These best practices, include both technical and operations aspects of vessel operation. SEAaT supports these two IMO initiatives.

2.3.2 Measures to Control Carbon Emissions

The IMO is considering market based instruments to achieve control of emissions reduction. Two basic types of instrument are currently being looked at. One is a bunker levy, acting in effect as a Pigovian tax, to drive operational behaviour to reduce emissions. The other is an emissions cap and trade system. A preference for either system amongst the parties to the IMO is not presently clear.

The prospect of agreement to the adoption of any mandatory measure to reduce and control carbon emissions from shipping on a global basis appears, on the evidence of the outcome of the IMO Green House Gas Working Group held in Oslo in June 2008, to be unclear. The discussion to a large extent was dominated by the issue of the Kyoto Protocol's common but differentiated responsibilities. Some non Kyoto Annex 1 countries feel strongly that any measures to reduce and control emissions from ships should not apply to them. This is at variance with the views of the IMO Secretary General, who feels that in order to maintain a level playing field with international shipping all reduction measures and controls should apply to all shipping regardless of flag.

The UK government is ably represented at the IMO by staff from the Maritime Coastguard Agency and the Department of Transport.

2.4 *What are the prospects for developing new engine technologies and fuels, as well as more fuel-efficient operations? What more could the Government do to assist these developments?*

In terms of thermal efficiency the most commonly used engine type in international shipping, the slow speed marine two stroke engine, is approaching its theoretical maximum. These engines have a thermal efficiency of approximately 53%. No other current propulsive power plant configurations can match this. Of the developing technologies there appears to be none that can match the slow speed marine two stroke engine for its particular application. Fuel cell technology producing power on the scale required for marine propulsion appears to be a considerable distance away. Nuclear power, although proven to work in the 1960s, would not be commercially viable or socially acceptable. If nuclear power was to be considered it may be more acceptable and efficient to use this power to synthesise marine fuels on shore.

The best technological prospect for increasing the overall fuel efficiency of ships is to focus on waste heat recovery systems; hull forms and coatings; and propeller designs. However, take up of these units by the world shipping fleets is limited by costs of purchase and installation. These technologies are well known in the industry. Take up tends to be limited by cost of purchase and installation, and, up until present fuel cost rises, the poor return on investment these technologies represent.

The table below from *IMO Bulk Liquid Gases Report*, p 16, December 2007.According to research commissioned by the IMO, technologies could reduce fuel consumption and oil usage by up to "30–40%".

Measure no	*Description*	*Existing ships gain %*	*Newbuildings gain %*
1	Main Engine efficiency rating	2	
2	Main Enginer optimisation		2
3	Waste Heat Recovery		5–10
4	Optimize hull shape, inc reduced Cb*		3–10
5	Optimized propeller	2	3–6
6	Maintenace of wetted hull surface	2–5	2–5
7	Improved anti fouling paints	2–8	1–2
8	Twin skeg + twin propeller		5–8
9a	Trim optimisation—large Cb ships	1–2	1–2
9B	Trim optimastion—small Cb ships	Max 10	Max 10
10	Misc Fuel saving devices	2–6	2–6

However, some of these measures have been adopted by industry and results have reportedly not been meeting expectations.

There are non-conventional technologies currently being appraised for applicability, such as the sky sail concept, twin propeller and the under hull air cushion.

The developer of a kite system asserts their system may reduce a ship's fuel consumption by 10–35% on annual average, depending on wind conditions. Although recent tests have the mark at the lower end of the spread. Under optimal wind conditions, fuel consumption can temporarily be reduced by up to 50%. Developers of innovative propeller technology estimate a reduction in fuel consumption of up to 17% on some vessel types—considerably more than the IMO advisory group's estimation of 5–8%. A system to blow air bubbles under the ships hull to reduce fuel is said to cut fuel consumption by between 8 and 15%. The patented "Air Cavity System" improves the fuel efficiency of ships by reducing the frictional resistance of the hull surface.

With respect to alternative fuels, only liquefied natural gas is a serious contender for supplanting traditional fuels. The complexity of on vessel storage and containment systems and the shore-side infrastructure required for resupply severely limits the adoption of this fuel. The operational range of vessels using LNG is limited by the fuel tank size and boil off rates. LNG is considered by industry to be more suitable for short sea traffic than the deep sea trade. Indeed, some ferry routes with dedicated supply and shore-side infrastructure in Scandinavia currently use LNG for main propulsion fuel.

The shipping industry is a diverse one, and provides many different services to society. This spread of services militates against the adoption of proscriptive solutions targeted at the industry as a whole. Such a policy may have unintended negative consequences. There is a real possibility that requiring reductions of emissions from short sea shipping, causing increases in operating costs, will result in modal shift to land transport. This would increase rather than reduce emissions of transport related CO_2.

A recent fire in the Channel Tunnel, demonstrates the need for a strategic mix of transport modes. Should environmental policies create modal shift away from short sea shipping, bring about a loss of capacity, then any restriction of use of the tunnel would not be as easy to mitigate as is currently the case. The result on the UK economy would be negative.

It is for this reason SEAaT considers it vital the issue of emissions from shipping, and their reduction, is considered in terms of social utility, the various sectors provide and their position in the supply chain. Failure to do this may result in damage to a vital industry and an overall negative environmental outcome.

2.5 *SEAaT Proposal*

The members of SEAaT believe market based instruments in the form of a "cap and trade scheme"; applied where appropriate; will provide additional financial incentives to shipping companies to adopt the emission reduction measures most suitable to their sector of the business.

The design of such a trading system is vital to its success. SEAaT advocates a global, open trading system, with an emissions reduction trajectory linked to global emissions reductions aspirations. The initial emissions cap being set by historical emissions levels. The allocation method is recommended to be initially a free allocation based on historical data with a gradual transition to an auction allocation system over a number of years.

In supporting a global emissions trading scheme for the appropriate sectors of the shipping industry, the UK government would aid the effort to establish an emissions reduction facilitation tool that encourages change and rewards improved environmental improvement.

3.0 SOx, NOx and Particulates Emissions from Shipping

SOx, NOx and Particulates Emissions from shipping sources differ from CO_2; in that it creates localised environmental impacts where as CO_2 is a uniformly mixed emission and acts globally.

3.1 *Sulphur Oxides*

Sulphur oxides (SOx) are major air pollutants and precursors for secondary particle formation in coastal areas. The emissions quantity is directly proportional to the sulphur content in marine fuel.

Reductions in SOx emissions can be achieved by either reducing the sulphur content of the fuel used, or by removing SOx from the exhaust stream by using scrubbing technologies. Both approaches are permitted by MARPOL Annex VI. Switching to a lower sulphur content fuel, although the simplest option incurs cost penalties related to the differential between high sulphur and low sulphur marine fuels. Abatement by scrubbing allows cheaper high sulphur fuel to be used but incurs installation and operational costs.

A UK scrubber manufacturer estimates that 50% of the current tanker fleet could find scrubbing more economical than a diesel switch, which equates to a potential tanker market opportunity of 5,893 ships by 2015 for scrubber manufacturers. For vessel owners looking to future-proof their vessels against future regulation at new build stage, the economics of fitting a scrubber could be attractive.

According to the manufacturer, as many as 23,905 vessels from a global fleet target total of 71,758 could find scrubbing to be a more viable option than switching to diesel fuel by 2015—equating to a potential market of over $7 billion based on average scrubber size and costs.

Other developing scrubbing systems include the use of chemicals such as caustic soda in their cleansing process.

A benefit of the use of scrubbing technologies is that they also abate the emission of particulates.

3.2 *Particulate Emissions*

The combustion of all fuels leads to the emissions of particulate matter to a greater or lesser extent. Particulates associated with shipping emissions are soot and ash, polycyclic aromatic hydrocarbons, and SOx aerosols. These emissions have an adverse effect on the health of exposed populations, with residents in port areas being the most exposed. Reduction of particulate emissions can be achieved by burning lower sulphur fuel and/or using exhaust gas scrubbing technologies.

3.3 *NOx Emissions*

These emissions are subject to the controls imposed by the NOx regulations contained in MARPOL Annex VI. A phased reduction of NOx emissions is required by these regulations. Early phase reductions may be achieved by using in engine technologies where as the later phase reductions will require the use of exhaust gas or combustion air technologies such as scrubbing using catalysts in exhaust gas or adding water vapour to the combustion air.

22 September 2008

Memorandum submitted by Cascade Technologies Ltd

"To Measure Is To Know"

- Technology and products are now available for the real time measurement of Green House Gases (GHG) from ship stacks.
- Emissions data can be stamped with GPS position and time and viewed on the WWW.
- Real time data can be used to demonstrate current GHG emissions and therefore be used to show real improvements over time.
- The technology and products are available now and could be rolled out rapidly in volume if required.
- There is the possibility to save fuel (2 to 4%) from implementing real time emissions monitoring and providing this feed back to the engine management system or by manually managing the engines operating parameters. This is in preference to slowing the ships speed.
- The successful implementation of additional exhaust cleaning devices (scrubbers) to reduce emissions,can be monitored by this technology, thus proving its efficiency—99% reduction of SOx has been shown as well as similar reductions of NOx.

— Ambient air monitoring around ports or coastal areas could by implemented to correlate the effect of ships exhausts on the mainland.

1. Green house gases including CO_2, NOx and SOx are emitted from many energy generating processes including ships engines.

2. The ability to measure these gases rather than using theoretical calculations is important if reductions in emissions are to be demonstrated.

3. Current regulations do not allow engine adjustments to take place unless continuous emissions monitoring equipment is deployed.

4. Real time management/adjustment of engine operating parameters could be utilised to improve fuel efficiency which directly relates to GHG emissions. Many engines have electronic control that could be used with real time emissions data to improve combustion efficiency and therefore emissions.

5. There are significant technical challenges to providing data on emissions from ships funnels. These relate to size and weight of conventional equipment. Ensuring measurements are representative. Heat, vibration and dirty gases.

6. A new laser based technology specifically directed at the rapid and sensitive measurement of gases using a new type of laser has been developed by Cascade Technologies Ltd. A company which spun out of Strathclyde University, in Glasgow, in 2003.

7. This technology can be deployed in many fields for the measurement of green house gases GHG, including power stations and shipping.

8. The technology has been developed to the point of achieving type approval for the fitment to ships for the measurement of key GHG such as CO_2, NOx and SOx. The products that have been developed are designed to be easily upgradeable to future proof them, as additional gases are identified.

9. Cascade is one of the few companies in the world that has developed a measurement method for the real time analysis of GHG from ships. This is a significant challenge for most gas measurement technologies.

10. This capability is now a reliable method for measurement of ships emissions and could be deployed on a pilot basis on ships immediately. Volume could be installed within a six month timeframe. (The sensors are easy to install and require limited modifications to ship infrastructure prior to installation).

11. Ships can save fuel or reduce emissions by knowing their emissions and managing fuel consumption and speed to optimise GHG output. Slowing ships down is one option to save fuel but by measuring emissions, speeds could be maintained and fuel savings of 2 to 4% could be made, although sometimes the NOx output can increase.

12. A proposal to fit emissions monitoring equipment to all ships in certain areas could be implemented and then all ships in these waters could have the emissions data annotated with date and ship position. This data could be available for viewing on the WWW, similar to the National Air Quality Archive run by Defra.

13. The capability is now available for government to insist on shipping companies to install emissions monitoring equipment, thus giving the ability to understand the location of ships with their related emissions and relate this to land based air quality or the general reduction in GHG emissions from the shipping industry.

14. This ability to measure could then be utilised to understand the current position and to demonstrate future improvements.

15. Answering a few of the specific questions from the EAC New Enquiry document dated 17 July 2008:

— *How should UK share of maritime emissions be measured and how fast could this be done?*
  — Cascade has developed the technology and been trialling it on the P&O cross channel ferry Pride of Kent. It is now proven and available for roll out into the industry—volume capacity for production will be available when required on a short lead time.

— *What are the prospects for new engine technology and more fuel efficient operations and what could government do to assist?*
  — Engine technology—The engine manufacturers continue to improve the engines and real time measurement technology can help in the field.
  — In addition to engine technology, reduced emissions can come from using different, but expensive, fuels or by scrubbing (cleaning) the exhausts post burn. If this is done then the ship owner will want to measure the emissions to confirm efficiency of the scrubber.
  — By measuring in real time it is possible to see the effect on fuel consumption from winds and tides etc. This has not been possible with traditional technologies which typically have five to 15 minute response times. Our new technology can respond in sub second if necessary.
  — The government could fund pilot installations and then support the implementation of real time monitoring by offering some form of incentive for ships that have the monitoring installed and can therefore demonstrate their emissions.

— *What are the effects of shipping on air quality and public health what more could government do?*

— Ambient air monitoring is carried out in many areas of the UK, mainly in city centres and large conurbations. This monitoring could be extended to ports and then correlated to ships emissions. In addition, ships could be pushed towards using distillate (lower emission) fuels.

11 November 2008

Memorandum submitted by Greenwave

1. Introduction

2. Greenwave International Limited is a UK registered charity no 1123414.

3. The charity exists both to remind the global shipping industry of its environmental obligations and to develop meaningful, sustainable and affordable ways to meet those obligations.

4. Our research and development team is focused primarily on the reduction of greenhouse gas emissions from shipping and CO_2 in particular.

5. Greenwave believes that action by the global shipping industry to reduce CO_2 emissions has to be accelerated if global and EU targets are to be achieved and to this end we have developed both practical technologies and policies to assist a speedier reduction of emissions.

6. The charity protects the intellectual copyright of its solutions but licenses them back to the industry on a not for profit basis. This is to (a) avoid commercialisation of our work by third parties and (b) to bring solutions to the global market at the lowest possible cost thus reducing barriers to adoption.

7. We work closely with Southampton Solent University and Lloyds Register in the UK and with Auckland University in New Zealand.

8. The charity's work is funded by donations from the shipping industry and our R&D programme is supported by the Royal Institution of Naval Architects.

9. Greenwave's Relevance to the Inquiry

10. Greenwave has developed sustainable technologies for reducing CO_2 and other emissions from shipping using renewable power—wind engine technology. The use of wind power to deliver a significant amount of thrust to propel the ship enables power from the main engines to be reduced saving fuel and thus CO_2 while still maintaining speed.

11. Four full size wind engines can deliver the same thrust as a Boeing 737 at take off from the free and renewable power of the wind.

12. Average annual savings of 13% can be achieved representing around 900 tonnes of fuel per ship (for say a 60,000 tonne bulk carrier) equivalent to almost 3,000 tonnes of CO_2.

13. Thus Greenwave technologies help conserve a diminishing resource (oil) as well as reducing emissions and saving the ship operator a substantial amount of money in the process.

14. Greenwave has also developed a modular drag reduction kit capable of reducing CO_2 by over 150 tonnes per ship per year by saving 50 tonnes of fuel as a result of improved above-deck aerodynamics.

15. The capital cost of equipment and fitting of all Greenwave technologies will have a maximum three year payback from fuel saved. Thus they are commercially viable as well as practical and effective.

16. *No additional crew is required to operate these technologies and they are suitable for retro fitting to approximately 40,000 ships within the existing global fleet.*

17. The UK's Opportunity for Global Environmental Leadership and Sustainable Regional Regeneration

18. Once type approvals are completed by Lloyds Register (currently underway) and independently verified sea trials have taken place (first half of 2009—fund raising permitting) manufacturing and fitting these sustainable technologies provides opportunities for new jobs and urban regeneration.

19. A small number of locations will be required worldwide for installation and production in order to service a global industry. Key locations are Asia, Europe and The Americas.

20. The UK can make a good case for being the European hub.

21. The technologies themselves are not particularly challenging from a fabrication perspective. Most of the components (except for the rotor) can be purchased "off the shelf" and rotor production, using proven manufacturing methods and modern (renewable) materials can be developed without the need for massive investment in tooling.

22. Ship yards are required for installation which is a relatively quick and simple process. Dry docking is not anticipated.

23. Given the UK's heritage in ship building and related services, both the industrial infrastructure for manufacture and installation as well as a sufficiently skilled work force is readily available.

24. Both wind engines and drag kits can be manufactured in the same location.

25. New environmental technology represents an opportunity to create sustainable jobs and the regeneration of industrial areas in the UK.

26. Distribution of these technologies to a wider global market is a requirement but again the UK has plenty of working ports that can act as distribution points for installation elsewhere.

27. Greenwave has already commenced exploratory discussions with a Social Enterprise Advisor at Business Link in North Yorkshire and the Hartlepool Enterprise Team in order to explore these opportunities for job creation and urban regeneration. The response has been extremely encouraging.

28. However, we have, to date, been unable to identify any assistance from the government to support either our research or the marketing of the developed solutions.

29. Policies to "Get There Quicker"

30. In the 10 years since the responsibility for Greenhouse gas emissions was given to the IMO under the Kyoto protocol, no action has yet been agreed (at the time of writing) for the reduction of CO_2.

31. While Greenwave understands the difficulties the IMO has in reaching unanimity it is simply unacceptable that the current levels of emissions continue unabated while discussions drag on. When it comes to action on climate change we face a very real timing problem.

32. We do not have another 10 years. We have to start taking actions now.

33. *A simple and verifiable method of CO_2 calculation*

34. In addition to the technology solutions outlined earlier Greenwave wishes to inspire the UK government into taking a stronger leadership role in promoting policies that reward the quick adopters of emission reduction technologies and incentivise the laggards.

35. In order to achieve that it must first be possible to identify those ships that are more environmentally friendly in respect of emissions reduction.

36. Since the IMO has accepted a formula for calculating CO_2 produced by each tonne of fuel burned (multiply by between 3.1 and 3.2 to convert whichever grade of fossil fuel is used) it is possible to baseline current fuel consumption using ships logs and then have a simple measurement device for fuel. Two sealed flow meters linked to a sealed printer (sealed = tamper-proof) that self certifies the effect of whatever fuel saving technologies have been fitted.

37. Many technicians in the industry are struggling with the challenge of how to measure ALL the exhaust gases including particulate matter which changes as it goes through the exhaust process.

38. While the scientists and technicians try to resolve that complex issue we should identify CO_2 as the prime target and focus on doing something about that now. We cannot wait until we can solve all the emission measurement issues during which time ships continue to contribute substantially to global warming.

39. Once the "good guys" and the "bad guys" can be identified we can look at simple incentives.

40. *Green Lanes for Shipping at Ports*

41. There has been much debate about the concept of differentiated port dues as a way of rewarding and penalising. It has proved controversial.

42. Let us take an example from the road transport industry where the reward for car sharing is to have an exclusive "fast lane" to and from work.

43. The government could introduce a *Green Lane* for shipping that enables independently verified "greener" ships to go to the front of the queue on arrival in port.

44. Turnaround time in port is a serious commercial incentive.

45. Operationally it has virtually no cost for the port authority and it could be implemented rapidly.

46. *Leadership—a coalition of the willing*

47. Returning to the urgency and the IMO's predicament, they cannot go anywhere on CO_2 until the last person is "on the bus". The consequence is that the bus hasn't moved. Yet many people on that bus want to get going.

48. More leadership is needed to create a "coalition of the willing" of all those countries, institutions and shipping industry players who recognise the problem exists now and needs action now.

49. If the solutions to reduce emissions, that are already in development or already developed, were added together (in a variety of different combinations) the industry would actually be able to make significant reductions. But the industry has left the problem to the IMO which has been rendered ineffective by its own membership.

50. What is needed is leadership.

51. *The Sustainable Shipping Initiative* being drafted currently by Forum for the Future offers precisely the kind of independent leadership role that the industry needs if it is to make an urgent step change in its progress on emission reduction. www.forumforthefuture.org

52. Forum for the Future is a UK charity for sustainable development whose founding directors include Jonathon Porritt from the Government's advisor, the Sustainable Development Commission.

53. Summary

54. The shipping industry must rapidly accelerate action to mitigate its greenhouse gas emissions, particularly in respect of CO_2.

55. Sustainable solutions such as wind power, can play a significant part in reducing global emissions if given the support to develop.

56. The industry is fragmented and requires co-ordinated leadership in a coalition of the many parties ready and willing to act on ways to mitigate shipping's contribution to GHG emissions. Government support for the Sustainable Shipping Initiative being drafted by Forum for the Future would assist this.

57. There is a real opportunity for the UK government to be seen to be initiating, simple practical steps now to actively encourage adoption of green technologies through simplified CO_2 emission measurement and the adoption of Green Lanes in ports.

58. In the current economic downturn two beacons of opportunity shine out.

59. First, saving fuel is the only way to reduce CO_2 from ships and in so doing it conserves a diminishing resource and actually delivers a substantial commercial return for shipping. Savings approaching US$ 250,000 per ship per year are achievable with wind power alone, even at current lower fuel prices.

60. Second is the opportunity to create economic revival in depressed regions of the UK's industrial heartlands from which sustainable jobs would flow.

61. It is difficult to envisage a new industry more deserving of support in these uncertain times than one which offers sustainable improvements on climate change, sustainable jobs and regional economic revival while contributing to the well being of both the UK and the global community.

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