

## Additional written evidence from the Tyndall Centre for Climate Change Research, University of Manchester

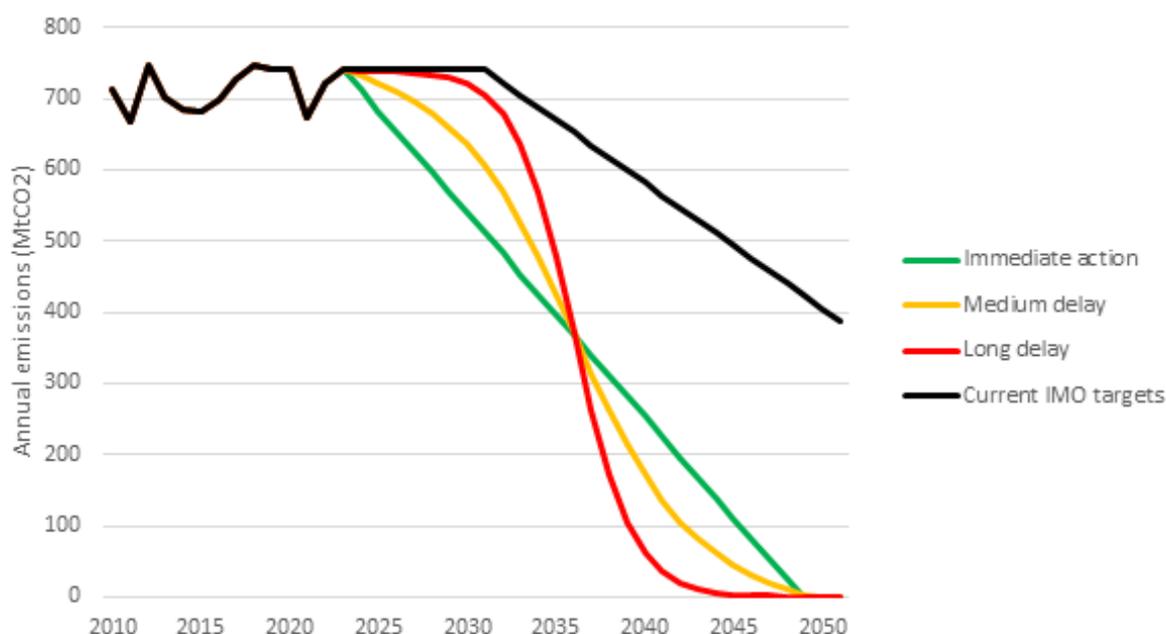
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### Shipping

This additional note on shipping provides further material on 4 issues raised in oral evidence:

#### i) Emission reduction pathways

Since the inquiry started the Tyndall Centre have published research<sup>i</sup> on pathways for international shipping decarbonisation compatible with the Paris 1.5°C goal. This research highlights that the existing IMO targets are associated with carbon dioxide emissions more than double those needed for the sector to play its fair part in meeting the Paris 1.5 degree goal. It sets out Paris compatible pathways – see graph below.



**The IMO's targets and Paris-compatible 1.5°C pathways**

If there is delay in cutting emissions, then subsequent pathways to zero emissions need to be much steeper - the orange and red lines – to stay within the same carbon budget. But steep trajectories are a particularly problem for the shipping sector. Ships have average lifetimes over 25 years. The turn-over of the fleet is slow. And the global investments required in new ships and land-side infrastructure for zero-carbon fuels are very large. Consequently, it would be highly imprudent to rely on any decarbonisation trajectories which took less than 25 years. The green “immediate action” pathway reduces the risk of having to rely on such untenably rapid transitions

As a result, the central conclusion of our research is that the IMO needs to set new targets and policies as soon as possible, with major emissions reductions this decade. Delay is not a prudent option, and the sector will need to deliver reductions of around 34% by 2030 on 2008 levels, on a pathway to zero emissions before 2050.

**ii) Carbon values**

The modelling underpinning the Clean Maritime Plan (CMP) sets out Marginal Abatement Cost Curves for measures to cut shipping emissions, using the standard values used by BEIS for carbon in policy appraisal. However, in September 2021 BEIS have introduced a major revision of this policy<sup>ii</sup>, to align carbon valuation with the new net zero targets under the Climate Change Act. These new values are broadly triple the old values. In the CMP modelling 38% of BAU emissions could be abated at less than £88/tCO<sub>2e</sub>, the BEIS price for 2031. The new values of £285/tCO<sub>2</sub> in 2031 imply that over 90% of BAU emissions abatement is justified<sup>iii</sup>. The CMP refresh should update modelling to reflect the new carbon price values.

**iii) Demand**

Issues of demand are often overlooked in discourses around cutting shipping and aviation carbon emissions, compared with efficiency and alternative fuel measures. However, demand issues are crucial, not just on future emissions, but on the level of investment required. For example, DNV's 2021 Maritime Forecast to 2050<sup>iv</sup> set out scenarios which show that future demand has a bigger impact on future alternative fuel investment than the level of climate targets. The solar capacity required in 2050 for shipping electrofuels for a 2040 decarbonisation date is >8000GW in a high growth scenario, and <4000GW in a low growth scenario. By contrast, under existing IMO targets, the 2050 solar capacity is just under 7000 GW (high growth) and 2500 GW (low growth).

**iv) Shore-power**

Shore-power can cut air pollution and carbon emissions, however there are significant policy barriers to its implementation, which are more significant than in other countries, particularly around lack of Government funding support and on high electricity taxes. These barriers and solutions to them are set out in Tyndall Research<sup>v</sup>.

**Aviation****v) Aviation emissions in the carbon budget**

Government plans for aviation will see it occupying a significant proportion of the total UK carbon budget if mitigation efforts are not enhanced accordingly. Demand management (i.e. reducing the number of flights taken) is the only mechanism we see in the near term that substantively affects aviation emissions in the short term and without it, other sectors will be required to reduce their emissions to an even greater extent to accommodate more aviation emissions in 2035 and beyond. This itself has economic implications for the wider economy requiring investment to accelerate the low carbon transition at an even faster rate. Aviation emissions should not be looked at in isolation within the carbon budget because, as the UK economy expands post-COVID-19, emissions increases from other sectors are also likely<sup>vi</sup>. This tightens the total 'allowance' for sectoral emissions given that the UK is already not on track to meet its fourth, fifth or sixth carbon budget.

This becomes clearer when considering the proportion of the carbon budget that aviation is likely to make up. Depending on the CCC scenario and their associated consumer demand and technology assumptions, aviation will make up between 11.9% and 18.5% of the UK's sixth carbon budget<sup>vii</sup>. The consequence of this is that reducing aviation emissions will play a greater role in the UK meeting its overall emissions targets by 2035 and, eventually, in 2050.

**vi) Market based mechanisms and Greenhouse Gas Removal (GGR)**

There are long standing concerns about the effectiveness of offsetting and emissions trading schemes<sup>viii</sup>. The effectiveness of schemes such as the EU's Emissions Trading Scheme (EU ETS) to drive the rate of emissions change commensurate with targets such as the Paris Agreement have been debated.

The effectiveness of MBMs depends on the 'getting the price right' i.e. the cost of carbon credits. There is an opportunity here to ensure that the price of carbon credits is at levels required to align with Paris Agreement goals. The intention of MBMs are to provide compliance entities the most cost-effective way to decarbonise. Hence, the cost of credits/offsets should converge with the cost of investment in low-carbon technologies, creating impetus for compliance entities to make a full transition needed to meet net zero emissions by 2050. The funds collected from MBMs can be setup as a direct revenue stream to increase investment low-carbon technologies. This can enable emerging technology options like GGR to become cost competitive.

According to the CCC, it possible that GGR by DAC and BECCS could fall to between £70/tonne CO<sub>2</sub> and £400/tonne CO<sub>2</sub> over the coming decades with a mean value of £100/tonne CO<sub>2</sub> assumed<sup>ix</sup>. The emergent nature for these technologies makes it difficult to assess the accuracy of these costs. Assuming the CCC is broadly correct in its projected costs, balancing residual aviation emissions from greater demand for flying could potentially cost billions of pounds annually. Furthermore, while GGR will hopefully be available in some form, it is by no means guaranteed it will be available at sufficient scale to balance out an increase in aviation emissions by 2035 and beyond.

#### **vii) Demand management**

The CCC in their analysis of what Net Zero means for the emissions of different sectors show demand change is or will be a significant contributor to aviation's pathway to reducing emissions. This is because technological improvements, operational efficiency and fuel switching are not expected by the industry to make a significant impact on emissions before the 2030s. Instead, a detailed plan for demand management is needed, including policies to ensure alternative modes of transport are used where available, a moratorium on airport expansion, measures to tackle frequent flying, and policies to drive virtual communications as a substitute to physical travel where appropriate. In the Balanced Net Zero scenario, in order to be on track for the UK's 2035 target and the sixth carbon budget, they find that there cannot be a growth in aviation demand above pre-pandemic levels. In other words, to stay on track for Net Zero budgets demand should not increase above 2019 levels.

Due to the cumulative nature of carbon on climate change interventions in emissions are essential in the near term to remain on track for limiting global warming to 1.5°C. Demand management measures can, and must, be applied as a matter of urgency while the much needed technical and operational innovation is accelerated.

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**References:**

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- <sup>ii</sup> BEIS, 2021. Valuing greenhouse gas emissions in policy appraisal <https://www.gov.uk/government/publications/valuing-greenhouse-gas-emissions-in-policy-appraisal>, 2<sup>nd</sup> September 2021
- <sup>iii</sup> Smith et al, 2019. REDUCING THE MARITIME SECTOR'S CONTRIBUTION TO CLIMATE CHANGE AND AIR POLLUTION Scenario Analysis: Take-up of Emissions Reduction Options and their Impacts on Emissions and Costs A Report for the Department for Transport. July. See Figure 5
- <sup>iv</sup> DNV, 2021. 2021 Maritime Forecast to 2050. Figure 7.3. <https://www.dnv.com/maritime/publications/maritime-forecast-to-2050-download.html>
- <sup>v</sup> Bullock, S. 2020. Barriers and solutions for UK shore-power. Tyndall Centre for Climate Change Research, University of Manchester. <https://mailchi.mp/britishports/tyndall-report> .
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- <sup>vii</sup> Climate Change Committee, 2020. The Sixth Carbon Budget Dataset <https://www.theccc.org.uk/publication/sixth-carbon-budget/>, 9 December 2020
- <sup>viii</sup> Larkin A. 2015. All adrift: aviation, shipping, and climate change policy, Climate Policy. <https://www.tandfonline.com/doi/full/10.1080/14693062.2014.965125>
- <sup>ix</sup> Climate Change Committee, 2020. The Sixth Carbon Budget: Greenhouse gas removals <https://www.theccc.org.uk/wp-content/uploads/2020/12/Sector-summary-GHG-removals.pdf>, 9 December 2020