Department for Transport

Course to Zero consultation: UK domestic maritime decarbonisation response form

Introduction

Thank you for responding. Your views will assist in informing the government's approach to accelerating domestic maritime decarbonisation.

Please fill in all relevant sections of this form, providing evidence where possible, and email it to: MaritimeTDPConsultation@dft.gov.uk.

Alternatively send by post to:

Course to Zero consultation
Maritime Environment, Technology and International Division, Maritime Directorate,
Department for Transport, Zone 1-5, Floor 4,
Great Minster House,
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London, SW1P 4DR

Closing date is 06 October 2022.

1. What is your feedback on the overall ambition and feasibility of the Net Zero Strategy pathway for domestic maritime vessel emissions?

According to the most recent official UK emissions data, domestic shipping is responsible for 5% of the UK's domestic transport GHG emissions, or 5.2Mt of CO_2 emissions, while international shipping represents 6 Mt CO_2 (at 2020 levels and including 50% of all journeys to and from the UK). However, it is worth noting that this accounts for a decrease of 17.8% from the 2019 level due to the impact of the pandemic on international transport.[i] In 2019 the difference was even greater: 5.9 Mt of CO_2 for domestic shipping, and 7.3 Mt of CO_2 for international shipping.[ii] By only considering its domestic emissions, but not its international emissions, the Government's plan to decarbonise is not addressing the majority of its shipping emissions.

The present consultation by the Department for Transport states that "international maritime emissions are out of scope for this consultation, since they are regulated by the International Maritime Organization".[iii] This is misleading.

The UN Convention on the Law of the Sea (UNCLOS) imposes a positive obligation on States to protect and preserve the marine environment [iv] and to cooperate regionally, directly or through competent international organisations, in formulating and elaborating international rules, standards and recommend practices and procedures consistent with UNCLOS for the protection and preservation of the marine environment.[v] UNCLOS looks to generally accepted international rules and standards as the level of protection required. For climate, the Paris Agreement, ratified by all but four countries, is the internationally accepted standard and therefore UNCLOS imposes a duty on state parties to reduce emissions from international shipping in line with the temperature goals of the Paris Agreement.[vi] The Paris Agreement obliges countries to reduce emissions in line with the temperature goal of well below 2°C and to aim for only 1.5°C. This is an obligation to achieve the temperature goal, [vii] and includes the emissions from the maritime sector, placing an obligation on countries to act nationally or regionally to reduce these emissions.[viii]

While the International Maritime Organization (IMO) has the authority to regulate international shipping emissions, the cumulative effect of the presently adopted IMO measures are consistent with a 3°C pathway or worse, and thus not in line with the Paris Agreement temperature goals.[ix] While IMO Member States should continue to push for global ambitious action to be taken within the IMO, they cannot simply wait for the IMO to act if they are to meet their international obligations. As a party to both the Paris Agreement and UNCLOS, the UK must act to reduce emissions from international shipping in line with the Paris Agreement. In the absence of global regulation that meets this standard from the IMO (or other source), the obligation falls upon individual States such as the UK to regulate.[x]

Both Paris Agreement and UNCLOS place a positive obligation on the UK to reduce maritime emissions, in the absence of global regulation that meets this standard from the IMO (or other source). If the IMO enacts regulations that drive the required emissions reductions, then the UK would have no further obligation to act. But until then, it is the UK's responsibility to do so, for both its domestic and international emissions.

7. What are the most significant barriers to domestic maritime decarbonisation at scale (if appropriate, within your subsector)?

Existing government policy on green hydrogen, particularly with respect to the use of hydrogen for sectors that have alternative, more efficient options such as home heating, may inadvertently hinder the decarbonisation of hard-to-abate sectors such as shipping, which – unlike home heating - have no other viable options for their effective decarbonisation.

Hydrogen and its derivatives are produced in large quantities today, but as an energy carrier, its use is negligible.[xi] The latest hydrogen forecasts predict that the amount of hydrogen in the energy mix will be only 0.5% in 2030 and 5% in 2050. However, if we are to meet the targets of the Paris Agreement, hydrogen uptake would need to triple to meet 15% of energy demand by mid-century.[xii] While these numbers reflect the challenge at a global scale, this is also true at the national level.

As mentioned in the Department for Transport's research commissioned to inform the 2019 Clean Maritime Plan, which the Net Zero Strategy pathway is based on, "the vast majority of emissions reductions under the Net Zero Strategy pathway will be achieved by a switch to low or zero emission fuels (…) with two low carbon hydrogen-derived fuels (ammonia and methanol), meeting the vast majority of energy demand by 2050", but is a recognition that "the production of the fuels in sufficient quantity will be a significant challenge". [xiii] And while the UK's Hydrogen Strategy promises to turn the UK into a "global leader on hydrogen" by 2030 - despite the domestic low-carbon hydrogen sector being, presently, virtually non-existent - the Strategy also acknowledges that there won't be significant quantities of green hydrogen for some time.[xiv] But the challenge extends beyond the limited availability of green hydrogen for the scale of our decarbonisation needs.

Hydrogen tends to be more energy intensive to store and transport than other conventional fuels. The separation or extraction process for green hydrogen production requires significant amounts of renewable energy, and the energy content of the output hydrogen is always less than the energy content of the input fuel, plus the energy required for the hydrogen process. In other words, the very process for producing green hydrogen results in substantial energy losses and is an inherently inefficient process.[xv]

Given its characteristics and the associated challenges, the value of green hydrogen to its users must be sufficient to justify the energy losses in its production, distribution and thus should be prioritised for sectors where electrification is either not an option, or a very poor one, such as is the case for

shipping. [xvi] Elsewhere, it is inefficient and expensive compared with the direct use of electricity, and should not be used as a like-for-like replacement of gas.[xvii] This is in line with the UK's Committee on Climate Change (CCC) advice to Government for its net-zero pathway, emphasizing that low-carbon hydrogen use should be restricted to "areas less suited to electrification, particularly shipping and parts of industry".[xviii]

In its 2050 Hydrogen Forecast, DNV singles out shipping and aviation as the two sectors that will likely make the most significant use of low-carbon hydrogen derivatives: both sectors are disconnected from the grid and require large amounts of energy, meaning that electrification or pure hydrogen are not feasible alternatives to the fossil-based fuels they currently rely on.[xix] And the recently published, Breakthrough Agenda Report, which follows the UK's COP Presidency, is unequivocal in the critical role of green hydrogen in the transition of maritime, and urges governments and private sector to work together in significantly increasing the number and geographical distribution of hydrogen demonstration projects and to ensure that these appropriately cover the "high-value end-use sectors".[xx]

But the current UK government position on green hydrogen is not in line with scientific understanding of the most efficient way to decarbonise the economy, leading to a problematic prioritisation of other sectors which could potentially gain priority for green hydrogen use in the coming years. Both the UK's Hydrogen Strategy and Heat and Buildings Strategy consider the option of using hydrogen in sectors that are better served by electrification, particularly domestic heating, suggesting that up to 45TWh of low-carbon hydrogen could be put to this use by 2035. More specifically, the UK government commits to: [xxi] [xxii]

- Deliver hydrogen for heat trials (neighbourhood by 2023, village by 2025 and potential pilot town by 2030), with a view to inform the Government's 2026 strategic decision point on the future of hydrogen for heat;
- Consult on the case for enabling or requiring new natural gas boilers to be easily convertible to use hydrogen ('hydrogen-ready') by 2026; and,
- Conduct assessments of blending up to 20% hydrogen (by volume) into the existing gas network.

In fact, the UK Government is already investing millions of pounds in studies on hydrogen heating, with at least £25m having been allocated to the Hy4Heat programme - a pilot scheme in Scotland to heat 300 homes with 100% hydrogen via the existing gas grid, backed by up to £18m of grants from

the industry regulator Ofgem.[xxiii] This is despite the fact that existing technologies that are presently available and in use - namely retrofitting, electricity and heat pumps - are far more efficient, more affordable, and more well established than using hydrogen for domestic heating. The Government's own evidence review of options for heat decarbonisation, back in 2018, stated that there ought to be a "growth in no- or low-regrets low carbon heating" measures[xxiv], and reports from the Institute for Public Policy Research[xxv], the Carbon Trust[xxvi], and Friends of the Earth[xxvii] all defend the same solutions for the decarbonisation of domestic heating: better efficiency, retrofitting, electrification, and heat pumps.

There is a significant risk that the discussion on hydrogen for heating leads to a delay in deploying alternative clean heating technologies that are available today and reduce greenhouse gas emissions now, while also jeopardising the decarbonisation of vitally important and hard-to-abate sectors such as shipping, aviation, and heavy industry. Given the urgency of reducing GHG emissions, policies and regulations should focus on increasing deployment of technologies available today rather than anticipating widespread availability of green hydrogen later. [xxviii]

Prioritising green hydrogen for domestic heating also risks significantly increasing costs to end consumers – a central consideration to any policy-making exercise, heightened by the current cost of living crisis. A recent report has showed that switching to hydrogen-based heating would like result in a doubling of consumer bills. [xxix] And just this September, an evidence review of independent analyses on the use of hydrogen for space and hot water heating looked at 32 studies carried out by a wide range of different organisations across academia, research institutes, and intergovernmental organisations such as the IPCC, IEA, McKinsey, IRENA, UCL, Imperial College, PIK, Energy Transition Commission and others. The paper shows that the widespread use of hydrogen for heating is not supported by *any* of the 32 studies, with all independent research so far concluding that "compared to other alternatives such as heat pumps, solar thermal, and district heating, hydrogen use for domestic heating is less economic, less efficient, more resource intensive, and associated with larger environmental impacts".[xxx]

A nascent energy market such as green hydrogen will need a comprehensive regulatory framework, in line with latest science and careful consideration of efficient resource, infrastructure, and investment allocation. The UK punches above its weight in terms of innovation technology and policy, with other countries looking to the UK to learn what innovative policy can achieve. But the Government's current policies on green hydrogen, and its targets for decarbonising sectors such as

shipping, are simply not well-aligned nor follow the latest science. There is an urgent need for UK policy alignment across Government departments, to ensure that green hydrogen is prioritised for sectors such as shipping, that have no other viable and efficient decarbonisation options.

[i] Department for Business, Energy and Industrial Strategy (2022) *Final UK greenhouse gas emissions national statistics: 1990 to 2020*. [online] Available at: https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2020 [Accessed 5 Aug. 2022].
[ii] *Ibid.*
[iii] Department for Transport (2022) *UK Domestic Maritime Decarbonisation Consultation: Plotting the Course to Zero*. [online] Available at: https://www.gov.uk/government/consultations/domestic-maritime-decarbonisation-the-course-to-net-zero-emissions [Accessed 4 Oct. 2022].
[iv] UNCLOS, Article 192.
[v] UNCLOS Article 211(2).
[vi] For a full discussion of this point see: Boyle, A. (2020) "*Protecting the Marine Environment from Climate Change: The LOSC Part XII Regime*," in Johansen, E., Busch, S. V., and Jakobsen, I. U. (eds) The Law of the Sea and Climate Change: Solutions and Constraints. Cambridge: Cambridge University Press, pp. 81–103. doi: 10.1017/9781108907118.005.
[vii]As the UK Climate Change Committee has pointed out, it is impossible to reach this temperature goal without reducing emissions from international shipping (and also aviation).
[viii] Cornerstone Barristers (2021). *In the Matter of the UN Framework Convention on Climate Change and in the matter of the Paris Agreement Re: Inclusion of emissions from international aviation and shipping in Nationally Determined Contributions*. [online] Available at: https://www.transportenvironment.org/wp-content/uploads/2021/10/Re-Aviation-Shipping-NDC-UP-DATED-Legal-Advice-Final-3-5-21-corr-1.pdf [Accessed 7 Jan. 2022].
[ix] Wittles, J. and Shankleman, J. (2021). *Bloomberg - UN's Guterres Blasts Shipping, Aviation Climate Targets as Too Lax* [online] www.bloomberg.com. Available at: https://www.bloomberg.com/news/articles/2021-10-14/un-leader-blasts-shipping-aviation-climate-targets-as-too-lax [Accessed 10 Jan. 2022]. See also Carbon Tracker's analysis of the international shipping sector, available at: https://climateactiontracker.org/sectors/shipping/
[x] O'Leary, A. (2022), *Freedom to Regulate the High Seas*. [online]Transport and Environment. Available at: https://www.transportenvironment.org/discover/freedom-to-regulate-the-high-seas/ [Accessed: 4 October 2022]
[xi] DNV (2022) *Hydrogen Forecast to 2050 - Energy transition outlook 2022*.
[xii] *Ibid*.
[xiii] Department for Transport (2022) *UK Domestic Maritime Decarbonisation Consultation: Plotting the Course to Zero*. [online] Available at: https://www.gov.uk/government/consultations/domestic-maritime-decarbonisation-the-course-to-net-zero-emissions [Accessed 4 Oct. 2022].
[xiv] Department for Business, Energy & Industrial Strategy (2021) *UK hydrogen strategy*.
[xv] DNV (2022) *Hydrogen Forecast to 2050 - Energy transition outlook 2022*.
[xvi] *Ibid.*
[xvii] *Ibid.*
[xviii] Committee on Climate Change (2020) *The Sixth Carbon Budget - The UK's path to Net Zero*.
[xix] DNV (2022) *Hydrogen Forecast to 2050 - Energy transition outlook 2022*.
[xx] International Energy Agency & International Renewable Energy Agency (2022) The Breakthrough Agenda Report 2022.
[xxi] Department for Business, Energy & Industrial Strategy (2021) *UK hydrogen strategy*.
[xxii] Department for Business, Energy & Industrial Strategy (2021) *Heat and buildings strategy*.
[xxiii] Collins L (2021) *Heating homes with clean hydrogen will be 'pretty much impossible' says UK energy minister*. [online] Recharge News. Available at: https://www.rechargenews.com/energy-transition/heating-homes-with-clean-hydrogen-will-be-pretty-much-impossible-says-uk-energy-minister/2-1-1078297 [Accessed 30 Sep. 2022].
[xxiv] Department for Business, Energy & Industrial Strategy (2018) *Clean Growth. Transforming Heating: Overview of Current Evidence*.
[xxv] Institute for Public Policy Research (2020) *All hands to the pump: A home improvement plan for England*.
[xxvi] Carbon Trust (2020) *Heat pump retrofit in London*.
[xxvii] Friends of the Earth (2020) *The role of hydrogen in our future*.
[xxviii] Rosenow J (2022) *Is heating homes with hydrogen all but a pipe dream? An evidence review*.
[xxix] Global Witness (2022) *Burning the public: The hydrogen heating pipe dream*.
[xxx] Rosenow J (2022) *Is heating homes with hydrogen all but a pipe dream? An evidence review*.