# Opportunity Green: nitrogen inquiry additional submission

**Additional information on the UK's Maritime Decarbonisation Strategy, as requested by the Environment and Climate Change Committee nitrogen inquiry | April 2025**

### Opportunity Green

Opportunity Green is an NGO working to unlock the opportunities from tackling climate change using law, economics, and policy. We do this by amplifying diverse voices, forging ambitious collaborations and using legal innovation to motivate decision makers and achieve climate justice with particular emphasis on the aviation and shipping industries.

### The SASHA Coalition

The SASHA Coalition, facilitated by Opportunity Green, brings together companies across the green shipping and aviation value chains to advocate for policy supporting the use of green hydrogen to decarbonise these sectors in the UK and EU.

## Introduction

Opportunity Green's Scientific Officer, James Kershaw, gave evidence to the Environment and Climate Change Committee nitrogen inquiry at an oral hearing on 19 March 2025. The subject of the hearing was the use of ammonia as a shipping fuel. As in Opportunity Green's written submission[1], James highlighted that:

1. Ammonia has the potential to be used as a marine fuel and significantly reduce the shipping sector's greenhouse gas (GHG) emissions. However, it is only capable of minimising shipping's **climate impact** if:

    a. The ammonia used is green ammonia, produced with hydrogen sourced from electrolysis of water and all processes powered by renewable electricity.

    b. Effective measures must be implemented to limit nitrous oxide ($N_2O$) emissions from ship engines.

2. Beyond climate impacts, effective measures must also be adopted to minimise the potential **environmental and public health impacts** associated with nitrogen pollution from ammonia fuel use. These mainly result from $N_2O$ emissions, nitrogen oxide ($NO_x$) emissions, and ammonia ($NH_3$) spills, leaks and

[1] Opportunity Green, 2025. Opportunity Green response to the Environment and Climate Change Committee's call for evidence on nitrogen. NIT0008. Retrieved 31 March, 2025 from https://committees.parliament.uk/work/8898/nitrogen/publications/written-evidence/?page=2

emissions, across all stages of the ammonia fuel lifecycle, from production to use onboard ships, and can disrupt Earth's nitrogen cycle.

3. In general, nitrogen management must be incorporated into all climate policy across sectors to minimise ecological, socio-economic and public health issues, and ensure a just and equitable transition.

At the hearing, the Committee requested further information on what Opportunity Green would like to see from the proposed update to the UK's Clean Maritime Plan, which was published in 2019.[2] Since the hearing, the Department for Transport (DfT) has published this update in the form of the Maritime Decarbonisation Strategy (MDS).[3] In this additional submission, we therefore present:

1. Our original assessment of the Clean Maritime Plan.

2. Our assessment of the MDS, in relation to the Clean Maritime Plan and to the development of ammonia as a shipping fuel.

3. Key policy recommendations to build on the MDS's significant progress and manage nitrogen pollution.

This additional submission was written by Opportunity Green and the SASHA Coalition secretariat, to share their expertise on UK maritime decarbonisation policy.

## The 2019 Clean Maritime Plan

The shipping industry accounts for around 3% of both global GHG emissions[4] and UK GHG emissions (as of 2023)[5]. Without intervention, UK shipping emissions are projected to increase by ~10% by 2050.[6]

Given the scale of the problem, the Conservative government's failure to update its 2019 Clean Maritime Plan as promised in 2022 left the shipping sector's climate impact largely ignored. This shortcoming was exacerbated by the EU adopting it's FuelEU Maritime decarbonisation regulation in 2023, putting the UK behind its nearest neighbours in putting plans in place to decarbonise shipping. Furthermore, the plan itself fell short of an adequate decarbonisation roadmap by:

[2] Department for Transport and Maritime and Coastguard Agency, 2019. Clean maritime plan. Retrieved 26th March, 2025 from https://www.gov.uk/government/publications/clean-maritime-plan-maritime-2050-environment-route-map
[3] Department for Transport, 2025. Maritime decarbonisation strategy. Retrieved 26th March, 2025 from https://www.gov.uk/government/publications/maritime-decarbonisation-strategy
[4] International Maritime Organization, 2020. Fourth Greenhouse Gas Study 2020. Retrieved 26th March, 2025 from https://www.imo.org/en/OurWork/Environment/Pages/Fourth-IMO-Greenhouse-Gas-Study-2020.aspx
[5] UK Climate Change Committee (CCC), 2025. The Seventh Carbon Budget. Retrieved 31st March 2025, from https://www.theccc.org.uk/publication/the-seventh-carbon-budget.
[6] Transport & Environment, 2024. Long, loud and legal: the case for zero-emission UK shipping. Retrieved 31st March 2025, from https://www.transportenvironment.org/uploads/files/Long-loud-and-legal_-maritime-energy-policy-recommendations-for-the-UK-Jan-24-3.pdf

- Failing to set overall or interim targets to cut UK shipping emissions.
- Neglecting to include shipping in the UK Emissions Trading Scheme (ETS) that came into effect in 2021 to replace UK participation in the EU ETS. This was amended in 2023 when maritime was announced to be included in the ETS from 2026, but only partially due to key omissions of the ETS scope, discussed below.
- Relegating responsibility for accounting for the UK's share of emissions from international shipping to the IMO, through a failure to include those emissions from international voyages arriving in or departing from UK ports in subsequent plans to extend ETS regulations. States are legally obliged under the Paris Agreement to go beyond IMO regulations to reduce their share of international shipping emissions.[7;8]
- Failing to adopt a full lifecycle emissions accounting methodology.[9]

## The 2025 Maritime Decarbonisation Strategy (MDS)

The updated MDS, published on 25 March 2025, addresses many of the Clean Maritime Plan's shortcomings, and includes promising signs as to controlling nitrogen pollution from ammonia fuels. The positive signs in the strategy include:

- Setting targets aligned with those of the IMO to reach zero fuel lifecycle GHG emissions by 2050, and interim goals to reduce GHG emissions by 30 % by 2030 and 80 % by 2040.
- Outlining plans to introduce a domestic fuel regulation, which will be a crucial step to cutting emissions by driving the adoption of alternative fuels. It could also give the shipping industry the stability needed to develop low emission alternative fuels and spearhead green growth.
- Highlighting the importance of coordinating action across government, regulators, international organisations and partners, and the maritime industry.
- Reinforcing the commitment to expand the UK ETS to cover domestic shipping GHG emissions in 2026.
- Committing to using a full lifecycle "Well-to-Wake" (WtW) analysis to account for shipping emissions, and consulting on how best to calculate it.[10] This is crucial for fuels like ammonia, owing to the significant GHG emissions associated with some ammonia production methods.[11;12]

[7] Opportunity Green, 2022. UK Legal Obligations on International Shipping. Retrieved 31 March, 2025 from https://www.opportunitygreen.org/publication-uk-legal-obligations-on-international-shipping
[8] Opportunity Green, 2024. Who is responsible for international shipping and aviation pollution? Retrieved 31 March, 2025 from https://www.opportunitygreen.org/one-more-chance-including-shipping-aviation-emissions-paris-climate-plans
[9] Transport and Environment, 2023. A pricey omission: not charging ships for their pollution costs the UK £1.6bn/yr. Retrieved 31 March, 2025 from https://te-cdn.ams3.cdn.digitaloceanspaces.com/files/A-pricey-omission_-not-charging-ships-for-the-pollution-they-cause-costs-the-UK-1.6bn_yr-1-1.pdf
[10] Department for Energy Security and Net Zero, 2024. UK Emissions Trading Scheme scope expansion: maritime - analytical annex. Retrieved 31 March, 2025 from https://www.gov.uk/government/consultations/uk-ets-scope-expansion-maritime-sector/uk-emissions-trading-scheme-scope-expansion-maritime-analytical-annex-html#section-1-uk-ets-overview
[11] Chalaris, I., Jeong, B., Jang, H., 2022. Application of parametric trend life cycle assessment for investigating the carbon footprint of ammonia as marine fuel. Int J Life Cycle Assess 27, 1145–1163. https://doi.org/10.1007/s11367-022-02091-4
[12] Zamboni, G., Scamardella, F., Gualeni, P., Canepa, E., 2024. Comparative analysis among different alternative fuels for ship propulsion in a well-to-wake perspective. Heliyon 10, e26016. https://doi.org/10.1016/j.heliyon.2024.e26016

- Announcing the creation of a new UK Maritime Innovation Hub (MIH) to encourage innovation through investment into research and development of alternative fuels and technologies, and develop a robust regulatory framework with support for industry compliance. This promises to in turn spur green job creation and growth.
- On nitrogen pollution specifically, recognising the public health and environmental risks of using ammonia as a shipping fuel (e.g. MDS pages 19, 70-72, 83), and identifying potential measures to mitigate nitrogen pollution such as a North Atlantic Emissions Control Area (ECA).

## Policy recommendations moving forward

To build on the significant progress made in the MDS to decarbonise the shipping sector at the pace and scale that the climate crisis necessitates, the UK government should take the following further actions:

1. Implement a sustainable fuel mandate: The planned domestic fuel regulation outlined in the MDS will only be effective if it targets the right fuels. Green hydrogen and derived e-fuels can have the lowest emissions and environmental impacts,[13] yet lack the support needed to scale to meet projected demand. Meanwhile, overdependence on biofuels should be avoided due to their wider environmental impacts, and strong competition from other sectors, as the DfT recognises.[3]

   The planned domestic fuel regulation should therefore include a sustainable fuel mandate, similar to the sustainable aviation fuel (SAF) mandate introduced in 2025. In line with the best science this regulation should incentivise uptake of e-fuels over non-solutions like biofuels and fossil liquified natural gas (LNG). This will ensure that the UK shipping industry meets climate targets and captures the green growth opportunity that maritime decarbonisation presents.

2. Extend maritime ETS scope: When implemented in 2026 the UK maritime ETS should (1) be calculated using a robust WtW methodology, and (2) cover as many emissions as possible. The emissions that fall out of scope under current plans are namely those from:

   a. International shipping voyages arriving at or departing from UK ports, 50% of which should be covered in the UK ETS, in line with the EU ETS.

   b. Smaller vessels, 400GT – 5,000GT.

   These groups together account for ~85% of UK shipping emissions. Excluding them from the ETS weakens industry's incentive to transition to alternative fuels,

[13] SASHA Coalition, 2024. Fuelling nature: how e-fuels can mitigate biodiversity risk in EU aviation and maritime policy. Retrieved 27 March, from https://www.sashacoalition.org/biodiversity-risks-eu-aviation-maritime-policy

misses £1 billion a year in potential tax revenues[14] that could be invested in public services or maritime decarbonisation itself, and contravenes the polluter pays principle to which the government aspires to adhere.

3. Ensure the details of any domestic fuel regulations and ETS mechanisms are robust and incentivise genuine emissions reductions: Using the example of ammonia, any default $N_2O$ emission factors for ammonia (for instance, those to be used by shipping companies to calculate their emissions in the UK ETS) should be conservative, set to higher values to reflect uncertainty in $N_2O$ emissions from ammonia engines and incentivise industry to demonstrate superior GHG emissions performance.

4. Introduce stringent emissions monitoring: A robust, transparent and comprehensive monitoring, evaluation, verification and reporting system should be implemented to account for emissions throughout the fuel lifecycle. For ammonia it will be especially important to collect data from industry first-movers using ammonia fuel to monitor $N_2O$ emissions from ammonia engines. For alternative fuels like ammonia, the current uncertainty in GHG emissions means that robust monitoring should involve Continuous Emissions Monitoring, whereby $N_2O$ emissions from ship exhausts are continuously monitored and recorded.

   Monitoring should also not be limited to GHG emissions. In the case of ammonia, it will be necessary to monitor reactive nitrogen release throughout the $NH_3$ fuel lifecycle. There are currently no requirements for monitoring, for instance, $NH_3$ leaks, spills and emissions.

5. Strengthen nitrogen pollution management: The government should continue working with partners and at the IMO to extend the North Sea emissions control area (ECA) to all UK waters and into the North Atlantic. More broadly, nitrogen pollution management measures must be strengthened to mitigate climate, environmental and public health risks. This will be especially important if ammonia is widely adopted as a marine fuel.

Our key points and policy recommendations are summarised in the table below.

Opportunity Green and the SASHA Coalition welcome any response to this submission.

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| Area | Assessment of MDS with respect to the Clean Maritime Plan | Assessment of MDS with respect to ammonia as a shipping fuel | Policy recommendations |
|---|---|---|---|
| **Emissions reduction targets** | Ambitious IMO-aligned targets of "zero fuel lifecycle GHG emissions by 2050"[15], interim goals of 30% reduction by 2030 and 80% by 2040. | -- | The government must incentivise uptake of green hydrogen solutions, including e-fuels, with the lowest lifecycle emissions, e.g. through a fuels mandate (discussed below). |
| **Emissions accounting** | Strong commitment to full lifecycle WtW emissions analysis and consulting on how best to calculate it. | Commitment to WtW accounting is crucial since some ammonia production pathways have high associated GHG emissions.[11;12]<br><br>No consideration of wider nitrogen pollution assessment and reporting (e.g. $NH_3$ leaks, spills and emissions). | Introduce stringent emissions monitoring to comprehensively report emissions throughout the fuel lifecycle.<br><br>Set conservative default $N_2O$ emission factors for ammonia, reflecting uncertainty in ammonia engines' $N_2O$ emissions and incentivising industry to cut GHG emissions.<br><br>Monitor fuels with uncertain GHG emissions, such as ammonia, using Continuous Emissions Monitoring as standard procedure.<br><br>Monitor nitrogen pollution throughout ammonia fuel production lifecycle, as well as GHG emissions. |
| **Fuel regulation** | Planned domestic fuel regulations can give the industry regulatory stability needed to develop alternative fuels.<br><br>Strong recognition of biofuels' limitations, but no indication to incentivise green hydrogen solutions with lowest lifecycle emissions.<br><br>New UK Maritime Innovation Hub (MIH) would encourage development of alternative fuels and technology, and of a robust regulatory framework. | -- | Introduce a sustainable fuel mandate, similar to the sustainable aviation fuel (SAF) mandate introduced in 2025. In line with the best science this regulation should incentivise uptake of e-fuels over non-solutions like biofuels and fossil liquified natural gas (LNG). |
| **UK ETS** | Restated commitment to expand the UK ETS to cover domestic shipping GHG emissions in 2026 is key.<br><br>No confirmation yet on whether ETS scope will cover emissions from international voyages and smaller vessels under 5,000GT. | WtW accounting will be important to maximise UK ETS incentives for green ammonia and ensure all GHG emissions are accounted for. | Extend maritime ETS to cover as many GHG emissions as possible, using WtW accounting, including from:<br>1. Int'l shipping voyages (50%).<br>2. Smaller vessels, 400GT – 5,000GT.<br><br>Set conservative default $N_2O$ emissions factors for ammonia in ETS calculations to reduce risk of under-reporting emissions and incentivise industry to cut GHG emissions. |
| **Management of nitrogen pollution** | Stronger recognition of nitrogen pollution risks than Clean Maritime Plan. | Recognising the potential public health and environmental implications of using ammonia as a shipping fuel, and identifying Emissions Control Areas (ECAs) as a means of reducing nitrogen pollution, is a positive step. | Expand North Sea ECA and establish a North Atlantic ECA with int'l partners and at the IMO.<br><br>Strengthen nitrogen pollution management measures. Ammonia may be an important part of the future maritime fuel mix, but needs stringent measures to minimise nitrogen pollution's adverse climate, environmental and public health impacts. |