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Analytical annex to the UK Emissions Trading Scheme (ETS) scope expansion: Maritime – interim response

Annex to an interim joint response of the UK Government, the Scottish Government, the Welsh Government and the Department of Agriculture, Environment and Rural Affairs for Northern Ireland



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Analytical Annex

This analytical annex provides background to the UK Emissions Trading Scheme (UK ETS) and the maritime sector following the 2024 consultation on the expansion of the UK ETS to the maritime sector. This annex accompanies the interim UK ETS Authority response to the consultation. In this, the UK ETS Authority, hereafter 'the Authority', made up of the UK Government, Scottish Government, Welsh Government and the Department of Agriculture, Environment and Rural Affairs in Northern Ireland, details various policy decisions, most notably Monitoring, Reporting, and Verification (MRV) requirements for the UK ETS and details of regulatory requirements. This annex provides a summary of the evidence base underpinning the Authority's initial policy decisions on the expansion of the UK ETS to the maritime sector; further detailed analysis will be undertaken to support full implementation. It is not an impact assessment and does not provide cost-benefit analysis of the policy decisions laid out.

The Authority will produce a full response to the 2024 consultation prior to expansion of the UK ETS to the maritime sector currently scheduled for 1st July 2026. In this, the Authority, will set out impacts of combined proposals, considering the interaction of proposed options and overall scheme impacts, including for regulatory proposals detailed in the interim Authority response. Where specific risks of options are identified, the Authority will set out the actions it will take to appropriately mitigate any such impacts where it is necessary to do so.

As confirmed in the UK-EU Summit - Common Understanding¹, the UK and EU should work toward establishing a link between carbon markets. The Common Understanding set out that, subject to negotiations, we intend to expand the UK ETS to include emissions from international voyages. We will set out further proposals in due course about how we intend to expand to international emissions, including the date for this expansion, via a notice to ETS stakeholders.

¹ <u>https://www.gov.uk/government/publications/ukeu-summit-key-documentation/uk-eu-summit-common-understanding-html</u>

Section 1: UK ETS Overview

Characteristics of the UK ETS

To consider the context of scope expansion, this section sets out characteristics of the existing UK ETS.

Scope/size of market

The UK ETS represents approximately 25% of UK territorial emissions based on the latest 2023 data². The scheme covers the UK's power sector, energy-intensive industry, and emissions from domestic flights, flights from the UK to the European Economic Area (EEA), flights from GB to Switzerland, and flights between the UK and Gibraltar.

The UK ETS covers carbon dioxide emissions for all activities with the addition of perfluorocarbons for aluminium production and nitrous oxide produced in the production of nitric, adipic, glyoxal and glyoxylic acid.

The Authority proposed as part of the "Developing the UK Emissions Trading Scheme" in 2022³ to include domestic maritime within the UK ETS by the mid-2020s. The July 2023 consultation response⁴ confirmed that the scope of the UK ETS would be expanded to domestic maritime from 2026, with the aim to consult on key aspects of the scheme including implementation and MRV requirements.

Emissions

In 2023, emissions within the scope of the UK ETS amounted to 97 million tonnes of CO₂ equivalent (MtCO₂e) – of which stationary installations accounted for 88 MtCO₂e and aircraft operators 9 MtCO₂e. This was a decrease from 111 MtCO₂e coverage in 2022, largely driven by a substantial decrease in power sector emissions from 48 MtCO₂e in 2022 to 37 MtCO₂e in 2023. This compares to total UK territorial emissions of 384 MtCO₂e in 2023.⁵

² DESNZ analysis based on Provisional UK greenhouse gas emissions <u>https://www.gov.uk/government/statistics/provisional-uk-greenhouse-gas-emissions-national-statistics-2023</u>

³ Developing the UK Emissions Trading Scheme (UK ETS) - GOV.UK

⁴ Developing the UK Emissions Trading Scheme (UK ETS) - GOV.UK

⁵ Provisional UK greenhouse gas emissions national statistics 2023 <u>https://www.gov.uk/government/statistics/provisional-uk-greenhouse-gas-emissions-national-statistics-2023</u>

Section 2: Maritime

Overview

As noted in the interim Authority response, in 2024 the Authority consulted on technical implementation details for the UK ETS scope expansion to include emissions from the maritime sector.

The interim Authority response is being issued to confirm key policy decisions to allow operators time to prepare to comply with the requirements of the UK ETS and to allow regulators to conduct onboarding of new operators.

This document is not, therefore, intended to be a cost-benefit analysis of the implementation of the maritime scope expansion, but instead aims to lay out the available evidence for each of the policy decisions laid out in the interim Authority response. A full impact assessment will accompany the main Authority response ahead of scope expansion scheduled for 1st July 2026, including impacts associated with the decisions detailed in this document.

Policy Decisions

Definition of a domestic voyage

The UK ETS will be expanded to cover UK domestic maritime emissions. The definition of a domestic voyage for the purpose of the UK ETS will include voyages travelling from one UK port to another UK port, as well as voyages which start and end at the same port in the UK. The definition will include all emissions within a voyage between ports of call, including while at anchor and while moored.

We also stated that we propose to include all in port emissions, comprised of emissions at berth in UK ports and emissions from movements within UK ports. This will include in port emissions from ships travelling domestically, internationally or both.

This definition aligns with the definition of domestic maritime used in the UK's National Atmospheric Emissions Inventory (NAEI)⁶.

As shown in Figure 1, UK domestic maritime emissions, as per this definition, were 5.8MtCO₂e in 2019⁷, from around 8,100 vessels (this figure excludes emissions from inland waterway vessels and leisure craft and is on a tank-to-wake basis⁸). Of this, 3.1Mt CO₂e (54%) were

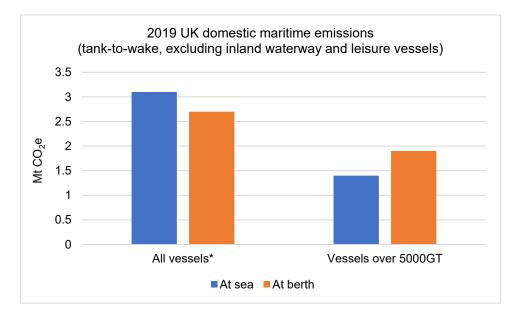
⁶ <u>Maritime emissions model framework</u>, Page 12.

⁷ These estimates have been produced by the Department for Transport's (DfT) maritime emissions model. The model uses 2019 as a base year for emissions forecasts out to 2050. 2019 was chosen as the base year to exclude any impacts that resulted from the coronavirus pandemic, particularly the impact that travel restrictions had on passenger services during 2020 and 2021. For further information on the maritime emissions model, prefer refer to Maritime emissions modelling framework - GOV.UK

⁸Tank-to-wake (TtW) emissions are any emissions produced through operating a maritime vessel, otherwise known as operational emissions.

produced at sea, and 2.7 MtCO2e (46%) at berth in UK ports. For vessels 5000GT⁹ or above only, the total 2019 domestic emissions figure was 3.3MtCO₂e, from around 4,900 vessels, of which 1.9MtCO2e (58%) was produced at berth in UK ports. It is estimated that around 0.3 MtCO₂e of the at-berth emissions produced by vessels 5000GT or above were from vessels which only conducted international voyages in 2019¹⁰.

Figure 1. 2019 tank-to-wake UK domestic maritime emissions at sea vs. at berth, by size threshold. *Excludes inland waterway and leisure vessels.



The definition of a domestic voyage and inclusion of emissions at berth within the UK ETS do not represent the finalised scope of the UK ETS expansion to the maritime sector, and as such the scope of the UK ETS expansion cannot be analysed in isolation. The impacts associated with the definition of a domestic voyage under the UK ETS and the inclusion of emissions at berth will be quantified as part of the comprehensive cost-benefit analysis that will accompany the full Authority response.

Inclusion of methane and nitrous oxide emissions

The ETS maritime expansion will include additional greenhouse gases (GHGs) in scope of operator's obligations, specifically methane and nitrous oxide.

The Authority proposes that an operator's greenhouse gas emissions are calculated on a carbon dioxide equivalent (CO_2e) basis. In accordance with international reporting protocols, the Authority propose that the emissions of each gas are weighted by its GWP¹¹ and that the GWPs used in this calculation are as follows: a GWP of 1 per tonne of CO_2 , a GWP of 28 per tonne of methane and a GWP of 265 per tonne of nitrous oxide¹².

¹¹ Global Warming Potential (GWP) is a measure developed by the Intergovernmental Panel on Climate Change (IPCC) to compare the warming impacts of different greenhouse gases relative to carbon dioxide (CO₂), over a specific time horizon (typically 100 years).

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<sup>12</sup>AR5 Climate Change 2013: The Physical Science Basis — IPCC
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⁹ 5000GT refers to a ship with a gross tonnage (internal volume) of over 5000.

¹⁰ All figures taken from DfT's Maritime Emissions Model (MEM) Maritime emissions modelling framework - GOV.UK

Greenhouse Gas	GWP
Carbon Dioxide (CO ₂)	1
Methane (CH ₄)	28
Nitrous Oxide (N ₂ O)	265

Table 1. Global Warming Potential (GWP) for greenhouse gas emissions in scope

For example, if an operator had 10 tonnes of nitrous oxide emissions, this would add 2,650 tonnes to the operators CO₂e emissions (i.e. 10 times 265).

Analysis of 2019 emissions data using the Department for Transport's (DfT) maritime emissions model¹³ suggests that 99% of GHG emissions from seagoing vessels within the UK domestic maritime sector were carbon dioxide (CO₂), with just 0.01 MtCO₂e of methane (CH₄) and 0.05MtCO₂e of nitrous oxide (N₂O).

The impacts associated with the inclusion of additional GHGs under the UK ETS will be quantified as part of the comprehensive cost-benefit analysis that will accompany the full Authority response.

Excluded maritime activity

The interim Authority response confirms that government non-commercial maritime activity will be exempt from the UK ETS. The indicative estimate of emissions from the proposed list of excluded activities¹⁴ from vessels 5000GT or above is roughly 0.002Mt CO₂e¹⁵, representing less than 0.01% of domestic maritime emissions for vessels 5000GT or above. This figure does not include military vessels, which are not generally included in emissions data used to generate maritime decarbonisation trajectories.

The excluded maritime activities set out in the interim Authority response is not a complete list of excluded maritime activity, as further policy decisions are still to be confirmed. The impacts associated with exclusions or derogations will be analysed as part of the impact assessment accompanying the final Authority response once all decisions are finalised.

Regulatory regime

Regulatory provisions applied to the maritime sector, including the scheme year, reporting and surrender deadlines of 31st March and 30th April respectively have no quantified costs or

¹³ For further information on the maritime emissions model, please refer to <u>Maritime emissions modelling framework -</u> <u>GOV.UK</u>.

¹⁴ Please see interim Authority response for further details of excluded vessels, Page 10.

¹⁵ Emissions estimates are sourced from EU MRV data (2019).

benefits identified as part of this analysis. Ongoing monitoring and evaluation will assess the impact of surrender deadlines, to be reviewed in 2028.

Requirement for operators to apply for the approval of a greenhouse gas emissions monitoring plan ahead of participation in the scheme is assessed as part of the MRV requirements below, as with the need to verify annual emissions reporting.

Monitoring, Reporting and Verification of CO₂ emissions from ships (MRV) regime and the UK ETS MRV requirements

We intend to use the existing UK MRV regime as the basis for the MRV requirement for the UK ETS, with five key deviations from the existing regime:

1. Scope

The current UK MRV regime applies to ships of 5000 GT or more that carry cargo or passengers for commercial purposes. This includes voyages to and from UK ports, between UK ports, and within UK ports (including while at berth)¹⁶.

The interim Authority response indicates that the UK ETS MRV requirements will align with the final scope of the scheme, which is yet to be confirmed. This means the scope could expand beyond the existing UK MRV regime, depending on final decisions.

This analysis draws on two main data sources:

- DfT's maritime emissions model, which uses 2019 Automatic Information System (AIS) data¹⁷.
- The Consolidated European Reporting System (CERS).

While vessel counts may vary slightly between the two due to differences in coverage, the estimates used here are consistent across both.

In 2019, approximately 4,900 vessels of 5000 GT or more called at UK ports. Of these 96% were already in scope of the existing UK MRV regime (i.e. cargo or passenger vessels). 217 vessels were not within the current scope.

However, the majority of these 217 vessels also operated in the EU. 90% of them carried out activity in EU waters in 2019 and would fall within the scope of the EU MRV scheme, as per the 2025 scope¹⁸. This means they would not face additional data collection requirements if brought into scope of the UK ETS MRV due to similarities in the requirements.

The data suggests, therefore, that the vast majority of vessels calling at UK ports are already covered by either the UK or EU MRV schemes. Based on 2019 data, a maximum of 50

¹⁶ <u>MIN 669 (M+F) Amendment 1 - Reporting emissions data into the UK MRV regime - GOV.UK</u>

¹⁷ Note that the DfT Maritime Emissions Model already excludes naval vessels or yachts.

¹⁸Prior to 1st January 2025, the EU MRV scheme included any ships of 5000GT and above, regardless of flag, that carry passengers or cargo for commercial purposes to or from ports in the EEA. From 1st January 2025 this has been expanded to include offshore ships 5000GT and above, and offshore and general cargo ships over 400GT. The EU scheme excludes warships, naval auxiliaries, fish-catching/processing ships, ships not propelled by mechanical means, government ships used for non-commercial purposes. Source: FAQ - Monitoring, reporting and verification of maritime transport emissions - European Commission

vessels, approximately 1% of the total vessels of 5000GT or more that called at UK ports in 2019, could face entirely new data collection and monitoring requirements.¹⁹ Assuming each vessel is operated by a different company, this could affect up to 50 operators.

Operators brought into scope will be required to collect fuel consumption data using one of the following approved methods:

- Bunker Fuel Delivery Note (BDN) and periodic stocktakes of fuel tanks
- Onboard bunker fuel tank monitoring
- Flow meters
- Direct emissions measurement

Each method has trade-offs in terms of cost, complexity, and accuracy. Manual methods like BDN and tank monitoring are less capital-intensive but more time-consuming. Automated methods like flow meters and direct emissions measurement require more investment but offer greater precision.

All operators will also be subject to new data reporting requirements under the UK ETS MRV scheme, which are discussed in the following section.

2. Gases

The Authority propose to include methane and nitrous oxide emissions within the UK ETS MRV requirements, reflecting these gases being brought within scope of the UK ETS for maritime activity specifically.

The EU MRV system requires reporting of CO₂, CH₄ and N₂O emissions.²⁰ Therefore, there is no additional monitoring cost to any vessels that are already within scope of the EU scheme (97% of vessels of 5000GT or above that called at the UK in 2019). The existing UK MRV regulations do not explicitly require monitoring of CH₄ or N₂O emissions estimates, just CO₂. However, CH₄ or N₂O emissions estimates can be calculated using fuel consumption data already collected multiplied by an emissions factor²¹, therefore it is minimal additional effort to calculate and report CH₄ and N₂O estimates.

Therefore, it is only the small number of vessels that are not currently within scope of either the UK or EU MRV schemes but will be within scope of the UK scheme for whom this will be an additional data requirement as part of the data collection process.

3. Point of obligation

The Authority intend for the UK ETS MRV requirements to align with the planned point of obligation for the UK ETS. The obligation for compliance is to be applied to the Registered

¹⁹ This estimate is based on vessel activity data from CERS and the maritime emissions model, and includes vessels with unknown activity in 2019, and represents the upper-most limit of vessels that could face entirely new data collection and monitoring requirements.

²⁰ FAQ - Monitoring, reporting and verification of maritime transport emissions - European Commission

²¹ For example, <u>https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2024</u>

Owner (RO) by default, except where the ISM Company²² has been transferred by the RO to assume the responsibility for compliance instead. This transfer of responsibility is to be evidenced by provision to the Regulator of a legally binding document. This approach would align with the approach of the EU ETS, resulting in no additional administrative burden for the majority of operators who comply with both schemes.

Using CERS data from 2023, there are around 2,000 unique Registered Owners with ships in scope of the UK ETS²³, many of whom will not have significant involvement in the management or operation of the ship.

Compared with other UK ETS sectors, this approach will require additional Regulator resource due to the assessment of legal agreements, as well as any potential additional engagement with ROs. This will be explored ahead of the final Authority response.

4. Regulatory regime

The regulatory regime of the UK ETS MRV requirements will match the UK ETS. For example, requiring regulators to approve emissions monitoring plans as opposed to an accredited verifier. We also intend that a monitoring plan and annual emissions report is required per operator, as opposed to per ship. It is expected that these decisions will add no administrative burden relative to that faced for the existing UK MRV and EU MRV schemes.

5. Fuel accounting

We consulted on how best to account for the use of biofuels or other sustainable fuels used in the maritime sector within the UK ETS, and how we could consider lifecycle emissions²⁴ from all maritime fuels within the UK ETS. The interim response confirms that the scheme will use a Tank-to-Wake emissions accounting approach and will zero-rate sustainable fuels of both biological and non-biological origin from the start of the scheme.

It is anticipated that this decision will have no impact on the costs of compliance with the MRV scheme. The impact on the costs and benefits of the overall ETS expansion to maritime will be explored in the analysis accompanying the final Authority response.

²² International Safety Management - <u>The International Safety Management (ISM) Code</u>

²³ [DESNZ analysis of MCA CERS data]

²⁴ Lifecycle emissions are also known as Well-to-Wake emissions. They are defined as the sum of a) the GHG emissions that are generated by operating ships, which are also known as Tank-to-Wake emissions; and b) the GHG emissions from the production and distribution of the fuels and other energy sources (e.g. electricity) that are used by ships, which are also known as Well-to-Tank emissions.

Costs of the UK ETS MRV scheme

The UK ETS MRV scheme will have the following additional costs:

Table 2. Costs identified to each party under the UK ETS MRV requirements.

Party	Cost	Frequency	Number of parties facing cost
Regulated entity – Owners/operators	Scheme familiarisation costs	Year 1, and following any scheme reviews	All regulated entities – 2,000 operators
	Data collection costs	Annual	Where these are additional to existing EU and UK MRV schemes – a maximum of 50 operators
	Preparation of a monitoring plan and annual emissions report	Annual	All regulated entities – 2,000 operators
	Verification of monitoring plan and annual emissions report	Annual	All regulated entities – 2,000 operators
	Submission of monitoring plan and annual emissions report	Annual	All regulated entities – 2,000 operators
	Regulatory charges: - Application charge - Annual subsistence charge - Determination charge	Annual	All regulated entities – 2,000 operators
Regulator	IT system build	Year 1, and following any scheme reviews	-
	Scheme running costs, including IT system maintenance, staff costs and enforcement	Annual	-

Costs to regulated entities

Research carried out by KPMG for DfT in 2015 assessed the costs of the EU MRV regulation of CO₂ emissions from UK shipping.²⁵ They identified the following annual costs for operators (in 2015 prices), for 'manual' and 'automated'²⁶ data collection processes as discussed in the section above. These estimates have been converted to 2025 prices using the latest GDP deflators²⁷:

Table 3. Administrative tasks / costs per year for compliance with MRV regulations for operators using both manual and automated techniques. Source: KPMG (2015), costs updated to 2025 price year.

Administrative Tasks	'Manual' cost per year (£2025)	'Automated' Cost per year (£2025)
Familiarisation with obligation	786	786
Preparation of monitoring plan	196	196
Registration with relevant authorities	287	287
Retrieving relevant information from existing data	157	78
Adjusting existing data	786	393
Filling in forms and tables, incl. recordkeeping	393	393
Verification	4,494	4,101
Submitting the information	393	393
Total cost	7,491	6,627

This suggests that the cost of compliance with MRV systems may be up to £7,500 per operator per year, for all the steps included above. As a comparison, the Impact Assessment accompanying the EU ETS expansion to maritime²⁸ states that the costs of MRV compliance is around 6,700 EUR per ship per year (2016 prices), also equivalent to approximately £7,500 in 2025 prices.

These estimates are not expected to exactly reflect the costs of complying with the new UK ETS MRV scheme, given different scheme requirements, but are included as a summary of

²⁵KPMG (2015) "*Estimation of Costs and Benefits of the EU MRV Regulation of CO2 emissions from UK shipping*" (unpublished research carried out for the Department for Transport)

²⁶ See point 1 on "Scope" for examples of manual and automated systems.

²⁷ GDP deflators at market prices, and money GDP - GOV.UK

²⁸ EUR-Lex - 52021SC0601 - EN - EUR-Lex - Part 1, Section 6.2.2.2

existing evidence. These estimates will be revisited for the final Impact Assessment once the final details of the scheme are all confirmed.

Charges:

Similarly to the approach taken for aviation operators, maritime operators will be assigned to a regulator based on the location of its place of residence or registered address. For those operators registered in one of the four nations of the UK, regulatory responsibility will fall to the regulator for that jurisdiction. For operators which do not have a registered office or place of residence in the UK, regulatory responsibility will fall to the Environment Agency. The regulators responsible for each jurisdiction are:

- England Environment Agency
- Northern Ireland Northern Ireland Environment Agency
- Scotland Scottish Environment Protection Agency
- Wales Natural Resources Wales.

The regulator will apply charges to obligated parties, to fund the running of the scheme. The EA proposed charges are:²⁹

Charge activity	Proposed charge
Application charge for an emissions monitoring plan	£2,246
Annual subsistence charge	£2,725
Determination charge	£151 per hour

Proposed charges for the other regulators are pending publication³⁰³¹, however are expected to be similar.

Next steps

While this annex provides a summary of the evidence base underpinning the Authority's initial policy decisions on the expansion of the UK ETS to the maritime sector, further detailed analysis will be undertaken to support full implementation.

A comprehensive Impact Assessment will be developed to evaluate the full scope of the UK ETS expansion. This will include a robust assessment of the expected emissions abatement from the inclusion of maritime emissions, the cost-effectiveness of the policy, and its

 ²⁹ Environment Agency proposed charges: <u>Environment Agency charges proposal for greenhouse gas emissions - GOV.UK</u>
³⁰ SEPA charges are likely to mirror current charges for aviation operators.

³¹ See: <u>Natural Resources Wales / UK Emissions Trading Scheme charges</u>, <u>Emissions Trading Schemes fees</u>, <u>charges and</u> <u>civil penalties | Department of Agriculture, Environment and Rural Affairs</u>, <u>Charging schemes | Scottish Environment Protection</u> <u>Agency (SEPA)</u>

distributional impacts across different vessel types, operators, and routes. The IA will also consider the interaction of the UK ETS with other regulatory regimes, including international measures such as those under the International Maritime Organisation (IMO), and the EU ETS where relevant.

The Impact Assessment will build on the evidence summarised in this annex and incorporate new data where necessary, including updated emissions baselines, behavioural responses to carbon pricing, and administrative costs for operators and regulators.

This analytical work will inform the final Authority Response and underpin policy development. The Authority remains committed to ensuring that the UK ETS continues to deliver costeffective emissions reductions while supporting the decarbonisation of the maritime sector.

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