Final stage impact assessment

Title:	UK Emissions Trading Scheme (ETS) Scope Expansion - Domestic maritime
Type of measure:	Regulation
Department or agency:	Department for Energy Security and Net Zero, Department for Transport
IA number:	n/a
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Contact for enquiries:	Tom Tierney – tom tierney@energysecurity gov uk
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1. Introduction

1.1. Purpose of the document

1.1.1. This Impact Assessment (IA) accompanies the UK ETS Authority's (henceforth 'the Authority') final response to the "UK Emissions Trading Scheme Scope Expansion: maritime sector" consultation (November 2024). It presents the analytical assessment underpinning the decision to expand the UK ETS to cover domestic maritime emissions, including cost-benefit analysis, business and trade impacts, and an assessment for small and micro businesses (SaMBA). The IA has been agreed by all four devolved governments of the UK.

1.2. Summary of the proposal

1.2.1. The UK Emissions Trading Scheme (ETS) is a cap-and-trade system that limits greenhouse gas (GHG) emissions from covered sectors and applies a carbon price to incentivise decarbonisation, supporting the UK's carbon budgets and net zero 2050 target. The scheme is jointly administered by the UK Government, Scottish Government, Welsh Government, and the Department of Agriculture, Environment and Rural Affairs for Northern Ireland.

1.2.2. Following a technical consultation in November 2024[1] and an interim Authority response in July 2025[2], the Authority has confirmed the inclusion of domestic maritime emissions in the UK ETS from July 2026. This IA covers only the expansion to domestic maritime, as set out in the Authority Response. Any future decisions to further expand scope to international maritime emissions will be subject to further analysis.

1.2.3. This impact assessment covers the proposals outlined in the Authority Response to this consultation, entitled "UK Emissions Trading Scheme Scope Expansion: Maritime – Main Response".

1.3. Summary of impacts

1.3.1. This Impact Assessment examines the effects of expanding the scope of the UK Emissions Trading Scheme (UK ETS) to the domestic maritime sector. The assessment covers two main areas:

- The direct impacts on the domestic maritime sector itself, such as GHG and air pollutant emissions reductions, cost to operators, and administrative requirements.

[1] UK ETS scope expansion: domestic maritime sector - GOV.UK
[2] UK ETS scope expansion: domestic maritime sector - GOV.UK

- The wider market effects[3], specifically how the inclusion of domestic maritime under different policy packages alters the distribution of abatement effort, compliance costs, and market dynamics across all sectors covered by the UK ETS.

1.3.2. For the domestic maritime sector, this assessment considers the period from 2026 to 2046. It evaluates the expected reduction in GHGs and air pollutant emissions, the cost to operators of achieving these reductions, and the administrative effort required to comply with the scheme. Both UK-based and foreign-owned operators are included, as data suggests that most vessels operating in UK waters are managed by international companies. This ensures the analysis captures the full extent of impacts, which predominantly fall on foreign operators but are likely to be passed through to UK consumers.

1.3.3. The assessment also considers the impact on the rest of the UK ETS market during Phase I of the scheme (2026–2030). This includes any changes in GHG emissions reductions required from other sectors, and how costs and incentives might shift as a result of bringing domestic maritime into the scheme.

1.3.4. Under the preferred policy package (Option A), scope expansion of the UK ETS to domestic maritime is estimated to lead to a net reduction of approximately 645,000 tonnes of carbon dioxide equivalent (CO_2e)[4][5] in total across the entire traded sector over the appraisal period (2026–2046). This figure reflects changes in GHG emissions from all sectors covered by the UK ETS, not just domestic maritime, and accounts for the broader impact of scope expansion during Phase I. These reductions are driven by operators responding to the carbon price signal through investment in cleaner technologies and behavioural changes. The social value[6] of

[3] Analysis of wider market effects as a result of scope expansion are limited to Phase I (2026-2030).

[4] All figures on tCO_2e presented in this analysis are rounded to the nearest 1,000.

[5] **CO_2e** (*carbon dioxide equivalent*): A metric measure used to compare the emissions of various greenhouse gases based on their global warming potential, expressed as the amount of CO_2 that would have the same warming effect over a given time period.

[6] The social value of emissions abatement reflects the estimated monetised benefits to society of avoided GHG (e.g. reduced climate damages), as distinct from standard financial or private benefits accruing to firms or individuals.

these GHG emission savings[7] is estimated at £155m[8] over the appraisal period (2026–2046) (discounted to 2026 base year, expressed in 2024 prices).

1.3.5. Alongside reduction of GHG emissions, abatement actions taken by domestic maritime operators in response to the UK ETS are also expected to drive reductions in air pollutants, namely nitrogen oxides (NO_X), sulphur oxides (SO_X) and particulate matter ($PM_{2.5}$). Using a damage costs approach[9], the value of these benefits is estimated at £179m over the appraisal period under Option A (discounted to 2026 base year, expressed in 2024 prices). Changes in emissions of air pollutants in the wider traded sector are not monetised.

1.3.6. The total additional cost to UK ETS operators of investing in emissions reductions is estimated at £22 million over the appraisal period (2026–2046) (discounted to 2026 base year, expressed in 2024 prices) for the preferred policy package. This cost reflects investment responses to the carbon price across the whole traded sector, consistent with the net GHG emissions reduction estimate above. Additional administrative costs are estimated at £179 million over the same period. The majority of these costs will be borne by non-UK maritime operators.

1.3.7. Social transfers[10] between UK ETS operators and the UK Government, in the form of allowance purchases, are projected to increase by £1,900 million over the appraisal period (2026–2046) (discounted to 2026 base year, expressed in 2024 prices). This figure captures the net impact of scope expansion across the traded sector, with the majority of revenue impacts generated from new maritime operators entering the scheme.

1.3.8. The central net present social value (NPSV) for Option A is estimated at £132 million. Sensitivity analysis confirms that the NPSV remains positive across a range of scenarios. When administrative costs are flexed (see Annex C, section

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[7] The value of greenhouse gas emission savings is estimated using the government's carbon values, which reflect the societal cost of emissions. This represents the monetised benefit of avoided greenhouse gas emissions over the appraisal period. Further detail on the methodology and assumptions is provided in Annex C.

[8] All monetised values presented in this analysis are rounded to the nearest £1,000,000 except where they exceed a billion, then they are rounded to the nearest £100,000,000 for ease of presentation.

[9] The damage cost approach applies pre-calculated average £/tonne values for different air pollutants to estimated emission changes, providing a proportionate way of monetising air quality impacts where detailed modelling is not feasible. See Defra guidance: Air quality appraisal: impact pathways approach - GOV.UK. For more detail on how this is applied in this analysis, see Annex C.

[10] Social transfer refers to the financial flow from UK ETS operators to the UK Government through the purchase of UK allowances (UKAs). This reflects the Department for Energy Security and Net Zero's (DESNZ) assessment of the change in social transfer value resulting from the expansion of the UK ETS to include domestic maritime. It is based on the projected value of UKAs purchased by UK ETS operators, using traded carbon values derived from DESNZ's Carbon Market Model (CMM). This approach differs from revenue estimates used for fiscal planning, which are separately quantified by the Office for Budget Responsibility (OBR) using its own assumptions on UKA pricing. See Annex C for more detail.

C3 for more detail), the NPSV ranges from £24 million to £208 million. When carbon appraisal values are varied, the NPSV ranges from £54 million to £209 million[11]. These results demonstrate that the policy delivers net societal value under both conservative and optimistic assumptions.

1.3.9. Additional sensitivity testing explores the impact of varying assumptions about the delivery of complementary decarbonisation policies (see Annex C, section C5.4 for more detail). In scenarios where these policies underperform, the UK ETS acts as a safeguard, guaranteeing emissions reductions through the cap. This drives greater abatement and higher carbon prices, resulting in increased monetised benefits and significantly larger social transfers. Under these stress tests, the NPSV rises to £442 million and £691 million respectively. This highlights the role of the UK ETS as a reliable decarbonisation policy safeguard, acting as a backstop that ensures emissions reductions in line with the cap, even future policy delivery is uncertain.

1.3.10. The preferred policy package is designed to maintain market stability by adjusting the cap to account for the new sector. This avoids placing unnecessary abatement pressure on other sectors and ensures emissions reductions are distributed proportionately. By contrast, not adjusting the cap, as in Option C, results in tighter market conditions and significantly higher costs to operators in the rest of the traded sector. Given that the current cap is already assessed as consistent with the UK's Net Zero Strategy, driving additional abatement in other sectors without adjusting the cap to reflect the inclusion of domestic maritime may result in unnecessary cost and effort that exceeds what is needed to stay on the net zero pathway.

1.3.11. Scope expansion to domestic maritime also facilitates future inclusion of international voyages within the UK ETS. Emissions from vessels at berth in UK ports are already captured, meaning future expansion would increase emissions coverage and abatement potential without introducing new operators. This sequencing means the current NPSV reflects early administrative costs but not future benefits.

1.3.12. Non-monetised impacts, including potential risks of competitive disadvantage, carbon leakage, mode shift and consumer price effects, have been assessed qualitatively. Evidence suggests these risks are low, particularly due to alignment with the EU ETS and the limited availability of alternatives to maritime transport.

1.3.13. In summary, the preferred policy package delivers proportionate emissions reductions at low cost to operators, maintains market stability and supports the UK's Net Zero Strategy. The positive NPSV reflects the combined value of GHG emissions reductions and air quality improvements. Sensitivity testing confirms

[11] See Annex C, section C5, for more detail on assumptions ranges utilised to produce ranges for sensitivity analysis.

the robustness of the policy across a range of assumptions, reinforcing the case for scope expansion.

1.3.14. The cost-benefit analysis is conducted over a 20-year period (2026–2046), in line with HM Treasury Green Book guidance for major infrastructure and decarbonisation policies. Further details on the modelling approach and assumptions are provided in Annex A.

2. Strategic case for proposed regulation

2.1. Expanding coverage of the UK ETS to include domestic maritime emissions strengthens the scheme's ability to deliver cost-effective decarbonisation. By bringing a major source of transport emissions into the cap, the scheme increases the diversity of abatement opportunities available. This means that emissions reductions can be achieved where they are cheapest across all covered sectors, rather than being concentrated in a narrower set of activities. Comprehensive coverage helps ensure that the carbon price drives the most efficient allocation of abatement effort, supporting the UK's statutory carbon budgets and Net Zero target.

2.2. Expanding the UK ETS to include domestic maritime emissions is critical for maintaining regulatory alignment with the EU ETS, which already covers both domestic and international maritime transport. Without coverage, UK operators could gain a competitive advantage over EU counterparts, creating market distortions and increasing the risk of carbon leakage. Such misalignment would also undermine the UK's ability to pursue future linking with the EU ETS. By extending coverage, the UK demonstrates policy coherence and compatibility, strengthening the strategic case for linking. A linked carbon market could deliver long-term benefits including more efficient, least-cost decarbonisation, greater market liquidity, price stability, and enhanced investment certainty.

2.3. The key market failure addressed by the UK ETS, including in expansion to the domestic maritime sector, is the existence of negative externalities[12]. At present, domestic maritime fuel prices do not reflect the social costs of their GHG and air pollutant emissions. As a result, shipowners and operators face insufficient economic incentives to invest in emissions reduction technologies or operational improvements.

2.4. Expansion of the UK ETS to include domestic maritime emissions address this market failure by placing a price on emissions through the requirement to surrender UK Allowances (UKAs). This carbon price encourages shipowners and operators to reduce their exposure by investing in cleaner technologies and practices where it is

[12] A negative externality is a cost imposed on third parties not directly involved in an economic transaction, such as pollution from production or consumption.

most cost-effective for them to do so given abatement options available across all sectors in the scheme.

2.5. In addition to pricing externalities, the inclusion of domestic maritime in the UK ETS may help to mitigate other market barriers to decarbonisation in the domestic maritime sector identified as part of research commissioned by the Department for Transport[13]. These secondary impacts include split incentives to invest, imperfect information, and coordination failures.

2.6. Split incentives arise when shipowners and operators have different financial interests. For example, owners may be responsible for investing in fuel-efficient technologies, while operators or charterers pay for the fuel. This misalignment can discourage investment in emissions reduction. Introducing a carbon price through the UK ETS may help to encourage action to better align incentives, such as putting in place appropriate contractual arrangements.

2.7. Many operators lack clear, accessible information about the costs and benefits of different decarbonisation options. This uncertainty can delay or prevent investment in emissions reduction measures. The UK ETS introduces a transparent and long-term carbon price signal, which can help clarify the financial case for action and encourage informed decision-making across the sector.

2.8. Decarbonisation in domestic maritime often requires coordinated action across multiple actors, such as ports, fuel suppliers, and vessel operators. In the absence of a shared incentive, these actors may delay action while waiting for others to move first. This coordination failure can stall progress. The UK ETS, through introduction of a carbon price, creates a common financial signal that applies across the sector. This helps align incentives and encourages actors to take action in parallel, reducing the risk of delay and unlocking system-wide change.

3. SMART objectives for intervention

3.1. The policy objectives are to:

a. Promote cost-effective decarbonisation across the UK ETS, including the domestic maritime sector, by incentivising emissions reduction through carbon pricing.
b. Support delivery of the UK's legally binding carbon budgets and net zero target by 2050.

[13] UMAS, E4Tech and Frontier Economics (2019), Reducing the domestic maritime sector's contribution to climate change and air pollution: Identification of market failures and other barriers to the commercial deployment of emission reduction options. A report for the Department for Transport. https://assets.publishing.service.gov.uk/media/5d24aaf7e5274a2f9d175695/identification-market-failures-other-barriers-of-commercial-deployment-of-emission-reduction-options.pdf

3.2. The inclusion of domestic maritime emissions in the UK ETS is expected to provide a long-term carbon price signal, encouraging investment in emission reduction and complementing existing UK domestic maritime decarbonisation measures (see the Maritime Decarbonisation Strategy[14] and Annex A for detail). Crucially, this also strengthens the UK ETS as a whole. By expanding the range of abatement opportunities within the cap, the scheme is better able to deliver emissions reductions where they are most cost-effective.

4. Description of proposed intervention options and explanation of the logical change process whereby this achieves SMART objectives

D4.1. The UK ETS is a cap-and-trade system that sets a declining limit on total GHG emissions from covered sectors. Operators must surrender a UKA for every tonne of CO_2e emitted. UKAs can be acquired via auction, secondary trading, or free allocation[15]. The cap declines over time, tightening the supply of allowances and increasing the marginal cost of emissions.

D4.2. The carbon price that emerges from this market reflects the scarcity of allowances and the marginal cost of abatement across the entire traded sector. By integrating domestic maritime emissions into the UK ETS, the scheme expands the pool of abatement opportunities, ensuring that emissions reductions occur where they are most cost effective.

D4.3. The proposed intervention expands the UK ETS to include emissions from domestic maritime vessels of 5,000 gross tonnage (GT)[16] and above from 1st July 2026. Maritime operators will be required to monitor, report, and verify (MRV) their emissions and surrender UKAs annually.

D4.4. This direct financial incentive will drive emissions reduction through several mechanisms available to ship owners/operators[17], including:

- Technical and operational energy efficiency measures (e.g., hull coatings, speed optimisation);
- Adopting of zero and near-zero GHG emissions fuels (e.g. hydrogen, ammonia, biofuels); and

[14] Department for Transport (2025) Maritime Decarbonisation Strategy https://www.gov.uk/government/publications/maritime-decarbonisation-strategy

[15] There will be no free allocation in the domestic maritime sector.

[16] Gross tonnage (GT) is a measure of the internal volume of a ship, used internationally to classify vessel size for regulatory purposes. It is not a measure of weight.

[17] See https://www.gov.uk/government/publications/maritime-decarbonisation-strategy for more detail.

- Shore power[18] (where available).

D4.5. Because the UK ETS establishes a single carbon price across all covered sectors, it reflects the marginal cost of abatement at the system level. This means that in the domestic maritime sector, GHG emissions will be reduced where the cost of abatement is lower than the prevailing UKA price. Where abatement is more expensive, operators will purchase allowances, ensuring GHG emissions reductions occur where they are most cost-effective across the traded sector.

D5. Summary of long-list and alternatives

5.1. Longlist of Policy Considerations

5.1.1. The UK ETS Authority considered a wide range of policy levers in developing UK ETS scope expansion to domestic maritime, including:

- **Gross Tonnage Threshold:** As confirmed in the UK Emissions Trading Scheme Scope Expansion consultation[19], the Authority will apply the UK ETS to ships of 5,000 GT and above. This threshold aligns with the existing UK MRV regime and other international regulation[20], avoiding disproportionate burdens on smaller vessels.
- **Activity scope:** Initial expansion covers UK domestic maritime only; international maritime is out of scope of this IA given planned consultation on further scope expansion to international maritime emissions.
- **GB-NI Equivalence:**
  - The expansion of the UK ETS to include domestic maritime emissions raises a specific challenge in relation to voyages between Great Britain (GB) and Northern Ireland (NI). Under the EU ETS, 50% of emissions from international voyages, such as those between the Republic of Ireland (RoI) and GB, are covered[21]. If the UK were to treat GB–NI voyages as standard domestic journeys, and therefore 100% in-scope, this would result in a higher effective carbon price on GB–NI routes compared to RoI–GB routes.
  - This asymmetry could create a distortion in carbon pricing across the Irish Sea, potentially undermining fair competition between operators and routes. It could also lead to perverse incentives in route planning and, in line with Article 2(1) of the

[18] Shore power (also known as “cold ironing” or on-shore power supply) refers to the provision of electricity from the local grid to a ship at berth, allowing it to switch off auxiliary engines and thereby reduce fuel use, emissions, and noise while in port.

[19] UK ETS scope expansion: domestic maritime sector – Page 12.

[20] For example, the EU ETS, Fuel EU maritime, and the planned IMO Net-Zero Framework.

[21] Scope of the EU ETS - European Commission

Northern Ireland Protocol and the European Union (Withdrawal Agreement) Act 2020[22], the UK Government is committed to ensuring that post Brexit- policy development does not result in a diminution of rights, safeguards, or equality of opportunity for Northern Ireland[23].
    - To address this, the options considered in the longlist were a 50% surrender deduction on GB-NI routes and expanding the UK ETS scope to include 50% of UK–EEA voyages. We also consulted on the future inclusion of expansion to UK-international voyages, which would also address this issue.
- **Exemptions:** The Authority explored a range of options, from no exemptions to permanent exclusions across a broad range of operators and vessel types.
- **Cap Adjustment:**
    - Cap adjustment refers to the process of modifying the total number of allowances issued under the UK ETS cap to reflect changes in the scope of emissions covered by the scheme. The cap sets the overall emissions limit in the UK ETS and is the primary mechanism for ensuring emissions reductions, ensuring alignment with the UK's statutory carbon budgets and net zero targets. When a new sector is added to the scheme, in this case domestic maritime, the Authority must decide whether to increase the cap to reflect the additional emissions, or to absorb those emissions within the existing cap.
    - The UK ETS cap for Phase I (2021–2030) was reset in 2023 following public consultation and was set at the top of the net zero consistent range[24]. This cap was based on the emissions profile of the traded sector at the time and did not include domestic maritime. The Authority considered either making no change to the cap and absorbing domestic maritime emissions within the existing allowance supply or increasing the cap in line with a net zero consistent trajectory for domestic maritime.
- **Gas Coverage:** As confirmed in the interim Authority response, gas coverage will include carbon dioxide, methane and nitrous oxide[25].
- **Emissions accounting:** The Authority considered two emissions accounting methodologies for domestic maritime. Tank-to-Wake, which accounts only for emissions produced during fuel combustion onboard the vessel, and Well-to-Wake, which includes upstream emissions from fuel production, processing, and transport.

[22] European Union (Withdrawal Agreement) Act 2020

[23] The UK's approach to the Northern Ireland Protocol - GOV.UK

[24] Developing the UK ETS: impact assessment

[25] UK ETS scope expansion: domestic maritime sector – Page 7.

5.2. Approach to Option Refinement

5.2.1. The refinement of longlist policy options into a shortlist for appraisal was not conducted through a formal scoring exercise against critical success factors (CSFs). Instead, the Authority adopted a case-by-case approach, assessing each option on its own merits considering the specific policy challenge it addressed.

5.2.2. Stakeholder feedback, including from industry, devolved governments, and environmental groups through the consultation, played a central role in shaping the refinement process. In addition, alignment with external frameworks such as the EU ETS, IMO developments, and advice from the Climate Change Committee helped ensure coherence and credibility.

5.2.3. This impact assessment does not provide a comprehensive account of all evidence used to refine the longlist. Instead, it sets out the preferred approach for each policy lever and explains the rationale for its selection, including, where relevant, how it compares to alternative options considered.

5.3. Final Policy Package

5.3.1. **Gross Tonnage threshold**: Vessels of 5,000 GT and above

5.3.2. **Activity scope:** UK domestic maritime only. Broader scope options are being explored separately through the international scope consultation, and any related analysis will accompany the Authority's response to that process.

5.3.3. **GB-NI equivalence:** To maintain carbon price parity across the Irish Sea, the UK ETS Authority has chosen to apply a 50% surrender deduction for voyages between GB and NI. This approach reflects stakeholder preferences and recognises the unique regulatory and operational context of NI–GB routes. It also aligns with the decision to limit initial scope expansion to domestic maritime only, which precludes inclusion of UK–EEA or wider international voyages at this stage.

5.3.4. **Exemptions:** The preferred approach includes targeted exemptions for Scottish island ferries, offshore ships, fishing ships, and government maritime activity. See Annex B for more detail.

5.3.5. **Cap Adjustment:** The Authority has opted to adjust the UK ETS cap in line with a net zero consistent pathway for domestic maritime. This decision reflects the core principle that scope expansion during a trading phase should be accompanied by a cap adjustment, provided the principles underpinning the original cap remain valid.

5.3.6. The cap for Phase I was set in 2023 at the top of the net zero consistent range, based on the traded sector's effort share and anticipated overperformance in the non-traded sector[26]. The inclusion of domestic maritime emissions represents a material expansion of scheme coverage, and the Authority judged that not adjusting

[26] The Greenhouse Gas Emissions Trading Scheme (Amendment) Order 2023 – Page 8.

the cap would be inconsistent with the scheme's design logic, which is already set on a Net Zero Strategy-consistent trajectory. Maintaining the existing cap without adjustment would effectively tighten the scheme beyond what was intended in the 2023 cap reset, rather than reflecting the planned balance of ambition and deliverability. Criteria used to assess the cap adjustment approaches included:

- Environmental alignment: consistency with net zero and carbon budget delivery.
- Market integrity: avoiding distortions or shocks to the UK Allowance (UKA) market.
- Policy coherence: alignment with the Authority's stated consultation position and long-term cap-setting principles.
- Administrative feasibility: deliverability within the Phase I timeline.
- Future linkage readiness: consider alignment to reduce administrative burdens on operators and maintain compatibility with any potential future EU ETS linkage.

5.3.7. Three options were considered: no adjustment, use of reserve allowances, and a net zero consistent cap increase. The preferred option, an explicit cap increase, was selected because it best upheld the principles above, provided long-term clarity to the market, and avoided the ambiguity and stakeholder uncertainty associated with using the reserve.

5.3.8. While the Climate Change Committee (CCC) advised against adjusting the cap[27], citing headroom in the existing Phase I cap, the Authority concluded that scope expansion is not the appropriate mechanism to absorb that headroom. Instead, the cap should reflect actual emissions coverage to preserve scheme credibility and ensure consistency with the Authority's stated policy intent.

5.3.9. **Gas Coverage:** As confirmed in the interim Authority response, coverage of CO_2, methane, and nitrous oxide

5.3.10. **Emissions Accounting:** The Authority has selected Tank-to-Wake accounting with zero-rating for sustainable fuels. This approach aligns with other existing policies and reporting systems, such as the EU ETS and EU MRV system, and is simpler to implement by 2026. While Well-to-Wake accounting would be preferable to ensure that the full lifecycle emissions of fuels are captured in the scheme, it has not been adopted for the start of the scheme due to data complexity and readiness concerns, namely the need to develop a Lifecycle Assessment (LCA) framework that will be compatible with other planned schemes, such as the IMO Net-Zero Framework[28].

5.3.11. The table below summarises the preferred policy package against the other shortlisted options. The shortlisted options are explained in further detail in Section 6.

[27] Letter: Advice on implementing the expansion of the UK ETS to include some domestic maritime emissions - Climate Change Committee

[28] IMO approves net-zero regulations for global shipping

Table 1. Shortlist appraisal options

Policy consideration	Do Nothing	Option A - Preferred option	Option B - Do maximum	Option C - No Cap Adjustment
Vessel scope	No expansion of the UK ETS to domestic maritime	Vessels of 5,000GT and above	Same as preferred option	Same as preferred option
Activity scope		UK domestic maritime	Same as preferred option	Same as preferred option
Exemptions		Exemptions for fishing-catching and fish processing ships, offshore ships[29], ferries serving Scotland's islands and peninsula communities, government maritime activity	No exemptions	Same as preferred option
GB-NI equivalence		50% surrender deduction for GB-NI journeys	Same as preferred option	Same as preferred option

[29] Exemption for offshore vessels ends in 2027.

Cap adjustment	Adjust cap according to NZ consistent pathway for the sector	Same as preferred option	No cap adjustment
Gas coverage	CO_2, methane, and nitrous oxide	Same as preferred option	Same as preferred option
Emissions accounting	Tank to Wake with zero-rating	Well to Wake	Same as preferred option

6. Description of shortlisted policy options carried forward

6.1. Three policy packages have been shortlisted for appraisal as part of the UK ETS domestic maritime scope expansion alongside a counterfactual 'Business-as-usual' scenario. These options reflect a range of ambition levels in terms of emissions coverage, while maintaining consistency in vessel size threshold, activity scope and gas coverage to ensure comparability and policy coherence. (See Annex B for more detail).

- **Business-as-usual (Do nothing)** – This counterfactual scenario assumes no expansion of the UK ETS to include the domestic maritime sector.
- **Option A (Preferred policy package)** – As described in Section 5.3 above, with targeted exemptions and cap adjustment (See Annex B for more detail).
- **Option B** – This high-ambition scenario maximises GHG emissions coverage in the domestic maritime sector, with no exemptions[30]. It applies a well-to-wake (WtW) accounting methodology and assumes full coverage of all eligible emissions sources. This option tests the upper bound of potential emissions coverage under scope expansion and associated impacts on the cap and market.
- **Option C** – This option mirrors the preferred policy package but retains the existing Phase I cap, rather than adjusting it to account for domestic maritime emissions. It is

[30] Whilst elements of this policy package are not considered deliverable (e.g., no exemption for Scottish island ferries) it is designed to test a hypothetical upper bound of emissions coverage and its associated impacts on the modelled impacts presented in this analysis.

included in the shortlist to test the implications of absorbing domestic maritime within the current cap trajectory, including potential impacts on carbon prices, market dynamics, and the distribution of abatement across sectors. While similar in structure to the preferred package, it provides a useful comparison to assess the role of cap design in delivering emissions reductions and the wider carbon market impacts associated with scope expansion. This option reflects the CCC advice, as discussed above.

7. Regulatory scorecard for preferred option

Part A: Overall and stakeholder impacts

(1) Overall impacts on total welfare		Directional rating
Description of overall expected impact	The proposed expansion of the UK ETS to include domestic maritime emissions is expected to deliver a positive overall impact, both economically and strategically. It supports cost-effective decarbonisation by extending the carbon price signal to a previously uncovered sector, while maintaining market stability through cap adjustment. The central net present social value (NPSV) for the preferred option is estimated at £132 million. Sensitivity analysis shows the NPSV remains positive under higher cost assumptions or lower carbon appraisal values. Strategically, the expansion aligns the UK ETS with the EU ETS, helping to prevent market distortions and laying the groundwork for future linking negotiations. A linked carbon market would offer long-term benefits including price stability, increased liquidity, and reduced compliance costs for UK operators. The sequencing of this expansion also means that the potential future inclusion of international maritime emissions would have minimal additional administrative burden, while significantly increasing the scheme's coverage and impact. Taken together, these factors demonstrate that the preferred policy package is proportionate, credible, and consistent with the UK's long-term climate goals.	**Positive** **Based on all impacts (incl. non-monetised)**
Monetised impacts	The central estimate for Net Present Social Value (NPSV) is £132 million (2024 prices, discounted to a 2026 base year). This figure is derived from the difference between total monetised benefits and total monetised costs over the appraisal period (2026–2046). On the benefits side, the policy is expected to deliver a net reduction of approximately 645,000 tonnes of	**Positive** **Based on likely £NPSV**

	CO_2e accounting impacts in the domestic maritime sector over the entire appraisal period, and the rest of the UK ETS market in Phase I. The monetised value of these GHG emissions reductions is estimated at £155 million. Furthermore, scope expansion of the UK ETS is expected to lead to air quality benefits by reducing the air pollutant emissions from UK domestic maritime. These monetised benefits are estimated at £179 million in the central scenario. The costs include two components. First, the additional cost to UK ETS operators of investing in emissions reductions is estimated at £22 million, reflecting responses to the carbon price signal across the traded sector. Second, administrative and enforcement costs are estimated at £179 million, the majority of which will be borne by non-UK maritime operators. The average annual administrative burden per operator per year is estimated to be approximately £5,700. This large total administrative cost is not, therefore, driven by excessive cost burden relative to other UK ETS sectors. While data across sectors is limited, previous administrative compliance costs have often been estimated at between £10,000-£20,000 per year[31]. The domestic maritime sector scope expansion instead has a modest administrative burden split across many operators (~2000 in the central case), with smaller average abatement per operator per year as a result of scope expansion.	
Non-monetised impacts	The expansion of the UK ETS to include domestic maritime is expected to generate a range of wider, non-monetised impacts beyond those captured in the headline NPSV. For example, potential innovation spillovers as the strengthened carbon price signal encourages investment in low-carbon technologies and fuels. The policy also aligns with the EU ETS, reducing the risk of competitive distortion and supporting potential future market linking. Other wider impacts include modest trade effects, limited risks of carbon leakage and modal shift, and small indirect consumer price increases through cost pass-through. Regional and equalities impacts are expected to be minimal, with specific mitigations in place for Scottish island communities. While these effects are not quantified in the NPSV, they contribute to the overall strategic and societal value of the policy.	**Positive**

[31] Assessment of costs to UK participants of compliance with Phase III of the EU-ETS

Any significant or adverse distributional impacts?	Significant distributional impacts arise mainly from the concentration of financial burden on operators purchasing allowances, most of whom are non-UK based. Within the UK, targeted exemptions (e.g. for Scottish island ferries, offshore, and fishing ships) are designed to prevent disproportionate impacts on specific groups or regions. A 50% surrender deduction for Northern Ireland - Great Britain routes, primarily designed to ensure parity of emissions covered on journeys from GB to the island of Ireland, across the Irish Sea, will also partially mitigate impacts on consumers and businesses in Northern Ireland. Small and micro businesses are largely out of scope due to the vessel size threshold, so only a small minority are affected, though these could face disproportionate administrative burdens. The UK ETS will not provide an exemption for the two Isle of Wight (IoW) ferry services in scope, unlike the exemption applied to Scotland's island and peninsula ferries. This reflects the Authority's assessment that the IoW has a larger population, greater access to essential services, and lower reliance on the mainland, resulting in less justification for exemption. While no distributional analysis has been undertaken for this decision, we acknowledge the potential for localised impacts.	**Uncertain**

(2) Expected impacts on businesses		
Description of overall business impact	Domestic maritime operators in scope of the UK ETS will face new compliance and abatement costs, through the purchase of UKAs, investments in emissions reduction and new administrative burdens associated with compliance. For UK-based operators, estimated to make up just 4% of total impacted operators, direct abatement costs are modest, estimated at only £1 million over the appraisal period from 2026 to 2046. The aggregate abatement cost across all domestic maritime operators, most of whom are non-UK owned, is estimated at £31 million over the same period. In addition, total allowance purchases by all operators are expected to increase by £1,900 million as a result of scope expansion. These cost of abatement figures differ from the summary presented earlier in the impact assessment, which reflects the	**Negative**

	net cost to business across the entire traded sector. That earlier estimate accounts for a £9 million reduction in abatement effort elsewhere in the traded sector post-scope expansion, which partially offsets the additional costs incurred by maritime operators. This gives a total net abatement cost of £22 million, consistent with the central NPSV calculation. This works out as only £550 per operator per year being spent on investing in abatement. For the wider UK ETS, the inclusion of domestic maritime does not significantly increase costs for existing operators, as the cap is adjusted to accommodate the new sector. The main business impact is therefore concentrated within the maritime sector, with the financial burden falling primarily on those required to purchase allowances. While direct costs for UK-based operators are minimal, the aggregate impact across the sector is significant due to the predominance of non-UK operators in scope.	
Monetised impacts	UK-based maritime operators are expected to incur £1 million in costs related to investing to reduce emissions as a result of carbon price exposure and £7 million in administrative costs over the appraisal period from 2026 to 2046. These costs are modest at the individual operator level but form part of a wider aggregate impact across the maritime sector. Total abatement costs for all maritime operators, most of whom are non-UK, are estimated at £31 million. Administrative costs across the entire sector are estimated at £179 million. The expansion also results in a financial transfer to government through allowance purchases. The total increase in allowance purchases across all UK ETS operators is estimated at £1,900 million over the appraisal period, accounting for any change in the rest of the traded sector in Phase I as a result of scope expansion. However, only around £77 million of this is expected to be borne by UK-based operators, with the remainder falling on non-UK entities. While the monetised impact of the UK ETS expansion is concentrated within the maritime sector, there are also changes in the rest of the traded sector captured in the modelling. Scope expansion leads to an increase in emissions across the traded sector of approximately 66,000 tonnes of CO_2e during Phase I. This is accompanied by a reduction in abatement effort by existing UK ETS operators, valued at £9 million.	**Negative**

Non-monetised impacts	In addition to monetised impacts, the expansion of the UK ETS to domestic maritime is expected to result in several non-monetised impacts on businesses. These include potential competitive effects, particularly where vessel size thresholds or policy divergences with the EU ETS may create uneven compliance obligations. While the overall risk of competitive disadvantage is assessed to be low, some operators may face higher relative costs depending on their fleet composition and market exposure. There is also a potential for carbon leakage and internal carbon displacement, though evidence suggests these risks are limited under current market and policy conditions. Mode shift away from domestic maritime to other transport modes is considered unlikely, given the limited availability of substitutes and the small share of waterborne freight in the UK. Smaller operators may face proportionately higher administrative burdens due to fixed compliance requirements, although the overall number of small and micro businesses in scope is expected to be low. In addition, the expansion is expected to generate positive non-monetised impacts that support long-term sectoral transformation. Chief among these are innovation spillovers, as the strengthened carbon price signal incentivises investment in low-carbon technologies and fuels. This may accelerate decarbonisation across the maritime supply chain, with benefits extending to UK-based engineering and manufacturing sectors. The policy's alignment with the EU ETS also reduces the risk of competitive distortion and lays the groundwork for future market linking, which could enhance price stability and reduce compliance costs over time.	**Uncertain**
Any significant or adverse distributional impacts?	No major disproportionate impacts are identified. Sectors that may face higher relative burdens or competitiveness impacts have had this impact mitigated by targeted exemptions. Small and micro businesses are largely excluded due to the 5,000 GT vessel threshold, though remaining small businesses may find it harder to absorb additional administrative costs. For the rest of the UK ETS, there are no significant distributional impacts, as the cap adjustment ensures that costs and compliance obligations do not shift onto existing UK ETS operators. No major disproportionate impacts identified. Fishing, offshore, and island ferry operators may be more affected; mitigated in part via targeted exemptions.	**Neutral**

(3) Expected impacts on households		
Description of overall household impact	The exact impact on households is uncertain; however, it is expected to be small based on emerging evidence from the EU ETS and related research. This research shows that even with full cost pass-through, the effect on final consumer prices is estimated to be minimal, typically less than 1% for most goods, and up to 2% for heavy, low-value commodities. The proportion of domestic maritime freight in the UK is low compared to other modes of freight, further limiting the risk of significant price increases for households. Please see Annex D for greater detail. A relatively higher exposure to these impacts may be faced by consumers in Northern Ireland, who rely more heavily on domestic maritime freight transport than other UK consumers, but impacts are still expected to be small, with the 50% surrender deduction for NI-GB routes to ensure parity of emissions covered on journeys from GB to the island of Ireland, across the Irish Sea, further reducing this risk. No significant behavioural changes or adverse impacts on vulnerable groups are expected.	**Uncertain**
Monetised impacts	No direct monetised impact on households has been quantified, as the expected pass-through of costs is uncertain. Supporting research indicates that any increase in consumer prices is likely to be marginal and not material at the aggregate level.	**Uncertain**
Non-monetised impacts	Non-monetised impacts on households are also expected to be minimal. There is no evidence of significant behavioural change or reduced access to goods and services as a result of the policy. The risk of indirect effects, such as inflationary pressure, is assessed as low based on international experience and early evidence from the EU ETS.	**Neutral**
Any significant or adverse distributional impacts?	No significant adverse distributional impacts on households have been identified. The policy is not expected to disproportionately affect any protected or vulnerable groups, and regional risks (e.g., for Scottish islands) are mitigated by targeted exemptions.	**Neutral**

Part B: Impacts on wider government priorities

Category	Description of impact	Directional rating
Business environment: **Does the measure impact on the ease of doing business in the UK?**	The expansion of the UK ETS to include domestic maritime introduces new compliance and administrative costs for operators within the traded sector. Total abatement costs are estimated at £22 million over the appraisal period from 2026 to 2046. This figure reflects the net impact across the traded sector, combining £31 million in abatement costs incurred by maritime operators with a £9 million reduction in abatement effort elsewhere in the traded sector as a result of scope expansion under the preferred policy package. Administrative costs are estimated at £179 million in total, falling entirely on maritime operators entering the scheme. There is no change in administrative burden for sectors already covered by the UK ETS. For maritime operators in scope, the average discounted annual administrative burden is approximately £5,700 per operator. The policy also results in a financial transfer to government through allowance purchases, totalling £1,900 million over the appraisal period. However, only around £77 million of this is expected to be borne by UK-based operators, with the remainder falling on non-UK entities. While these costs may affect the ease of doing business for affected operators, the policy supports long-term decarbonisation and market alignment by strengthening the carbon price signal and aligning the UK ETS with the EU ETS, helping to reduce market distortions and support future linking.	**May work against**
International Considerations: **Does the measure support international trade and investment?**	The policy aligns with EU ETS, supporting carbon pricing equivalence across the Irish Sea and reducing the risk of competitive disadvantage or carbon leakage. WTO compliance is not expected to be an issue, and the risk of trade distortion is low due to the international structure of the sector and targeted exemptions.	**Supports**

Natural capital and Decarbonisation: **Does the measure support commitments to improve the environment and decarbonise?**	The expansion strongly supports the UK's net zero strategy by incentivising emissions reductions in the domestic maritime sector. It delivers approximately 645,000 net tonnes of CO_2e abatement over 20 years and provides a robust carbon price signal to drive further decarbonisation	**Supports**

8. Monitoring and evaluation of preferred option

8.1. Monitoring, Reporting and Verification (MRV) requirements

8.1.1. The UK ETS MRV requirements will build on the existing UK MRV regime, with targeted modifications to reflect UK ETS scope expansion to domestic maritime, as set out in Interim Authority Response[32]. These changes include adjustments to emissions coverage, point of obligation and regulatory regime.

8.1.2. The revised MRV framework will enable the collection of detailed monitoring data on the fuel consumption and associated emissions from vessels carrying out activity within scope of the UK ETS scheme. This will enable future evaluation of the effectiveness of scope expansion to reducing emissions in the domestic maritime sector.

8.1.3. Based on 2019 data, up to 50 vessels, representing around 1% of the total, may be subject to new data collection obligations. The majority of vessels are already covered under the existing EU and UK MRV schemes. All obligated parties, estimated at around 2,000 operators, will incur administrative costs associated with scheme familiarisation, IT system onboarding, preparation and submission of Emissions Monitoring Plans and Annual Emissions Reports, allowance transactions and regulatory charges.

[32] UK ETS scope expansion: domestic maritime - interim response

8.2. Evaluation Framework

8.2.1. The UK ETS Authority has established a theory of change (ToC)[33] to guide the monitoring and evaluation of scheme benefits. Developed in collaboration with University College London and CAG Consultants, the ToC identifies three core outcomes:

- Improved UK comparative advantage in decarbonisation technology and low carbon products;
- Increased carbon efficiency among regulated firms;
- No adverse impact on overall economic activity and investment.

8.2.2. In early 2023, the Authority commissioned a two-phase evaluation programme, delivered by CAG Consultants in partnership with Winning Moves, University College London and Cambridge Econometrics. The programme is designed to assess the effectiveness of scheme implementation, early market outcomes, and longer-term impacts aligned with the ToC.

8.2.3. Phase 1 of the evaluation, completed in December 2023, examined the transition from EU ETS to UK ETS, delivery effectiveness, market performance, early emissions reduction activity and initial evidence of carbon leakage. These findings informed the first statutory review of the UK ETS, which concluded that the scheme is likely supporting participants to limit or reduce greenhouse gas emissions and is performing in line with expectations.

8.2.4. The second phase of the evaluation, running from 2024-2026, will focus on emissions and carbon leakage impacts. It will employ a theory-based approach supplemented by quasi-experimental methods to compare outcomes for UK ETS participants against a counterfactual group of industrial installations not covered by the scheme.

8.2.5. High-level evaluation questions include:

- Was the UK ETS efficiently and effectively delivered?
- What were the outcomes of the UK ETS, including carbon market liquidity?
- What have been the impacts of the UK ETS and on whom?
- How and why have these impacts occurred?

8.2.6. As the scheme evolves and changes, including notably to include additional sectors like domestic maritime, these changes will be monitored and evaluated through further phases of this ongoing evaluation programme.

[33] assets.publishing.service.gov.uk/media/657c4d9595bf65001071908c/evaluation-of-uk-ets-phase-1-report.pdf

9. Minimising administrative and compliance costs for preferred option

9.1. The preferred policy package has been designed to minimise administrative and compliance costs for domestic maritime operators where this is feasible and in accordance with the objectives of the policy, particularly through the structure of the MRV system and the use of existing regulatory infrastructure.

9.2. Administrative costs are defined as the real resource cost incurred by operators in complying with scheme obligations, including staff time, IT systems and verification processes. Compliance costs, through the purchase of UKAs, are treated as financial transfers between participants and government.

9.3. To reduce burdens, the scheme builds on the existing UK MRV regime, which already applies to most domestic maritime operators. As a result, only a small subset of operators will face entirely new data collection obligations as a result of scope expansion. However, all newly covered operators, including those already collecting similar data, will face new compliance requirements under the UK ETS. These include annual reporting, third-party verification, and payment of registry and emissions charges. These ongoing obligations represent the majority of administrative costs associated with the policy.

9.4. Key design features to minimise administrative and compliance costs include:

- Thresholds and exemptions: 5000GT threshold ensures smaller operators are unlikely to be subject to UK ETS obligations under scope expansion, and additional exemptions are in place where necessary. See Section 5 for more detail.
- Standardised protocols: Uniform MRV requirements streamline reporting and reduce complexity.
- Use of existing infrastructure: The scheme leverages existing UK ETS regulators and existing registries to avoid duplicating administrative structures.

9.5. The Authority will continue to monitor administrative and compliance costs through stakeholder engagement and evaluation activities. The evaluation programme will assess the effectiveness and impacts of the scheme, including cost burdens on participants.

Declaration

Department:

Energy Security and Net Zero

Contact details for enquiries:

Tom Tierney – tom.tierney@energysecurity.gov.uk

Minister responsible:

Minister McDonald

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed: 

Date: 24.11.2025

Summary: Analysis and evidence

For Final Stage Impact Assessment, please finalise these sections including the full evidence base.

Price base year: 2024

PV base year: 2026

This table may be reformatted provided the side-by-side comparison of options is retained	**1. Business as usual (baseline)**	**2. Option A (Preferred Policy Package)**	**3. Option B (Do Maximum)**	**4. Option C (No Cap Adjustment)**
Net present social value (with brief description, including ranges, of individual costs and benefits)	No change to current UK ETS or domestic maritime sector. No additional abatement, costs, or transfers.	NPSV: **£132m** (2024 prices, discounted to 2026).	NPSV: **£245m** (2024 prices, discounted to 2026).	NPSV: **£2,400m** (2024 prices, discounted to 2026).
Public sector financial costs (with brief description, including ranges)	No additional public sector costs.	Regulator costs included in admin costs, recovered via operator charges. No net increase in public sector spending.	Same as Option A	Same as Option A

Significant un-quantified benefits and costs (description, with scale where possible)	None.	Innovation incentives for maritime decarbonisation; improved market stability; alignment with EU ETS. Risks of competitive disadvantage, carbon leakage, and mode shift assessed as low.	Greater innovation incentive and market signal, but higher risk of competitive impacts due to no exemptions.	Large emissions reduction, but risk of market distortion, higher allowance prices, and disproportionate costs for non-maritime sectors.
Key risks (and risk costs, and optimism bias, where relevant)	…	Risks of cost pass-through to consumers and regional impacts (e.g. NI), partially mitigated by exemptions or reduction in surrender obligation.	Higher risk of disproportionate impacts on specific sub-sectors and Scottish island ferries due to lack of exemptions.	High risk of market disruption, increased costs for all UK ETS sectors, and potential for unintended economic impacts.
Results of sensitivity analysis	Not applicable—no new policy, so no sensitivity to input assumptions.	NPSV remains positive across all tested scenarios. Varies from **£24m to £208m** under different administrative cost assumptions, and from **£54m to £209m** based on carbon value. Complementary policy delivery affects NPSV, rising to **£442m–£691m** in stress test scenarios.	Sensitivities mirror Option A but with higher abatement and cost base. Central NPSV is **£245m**, with wider variation depending on admin costs and carbon value. Fuel mix and carbon value assumptions significantly influence outputs.	Delivers large positive NPSV (**£2,400m**) due to forced abatement across UK ETS. Admin cost and carbon value assumptions affect scale but NPSV remains positive. Fuel mix and BAU scenarios reinforce robustness, though risks of market

		Fuel mix assumptions also impact air quality benefits, with NPSV reaching up to **£370m**.		disruption are elevated.

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Annex A: Overview and Counterfactual

A1. Overview of the UK ETS

A1.1. The UK ETS is a cap-and-trade system that sets a limit on GHG emissions from sectors in scope of the scheme and ensures a carbon price is applied. It is a central pillar of the UK Government's strategy to achieve net zero emissions by 2050.

A1.2. The UK ETS was established in 2021 following the UK's departure from the EU ETS. In 2024, the UK ETS covered approximately 25% of UK territorial emissions. Aviation coverage includes domestic flights, flights from the UK to the European Economic Area (EEA), flights from Great Britain to Switzerland, and flights between the UK and Gibraltar.

A1.3. As of August 2025, there are 680 stationary installations and 365 aircraft operators in the scheme. In addition, 228 installations are regulated under the Hospital and Small Emitter (HSE) opt-out, and 99 under the Ultra-Small Emitter (USE) opt-out[34]. HSE emissions in 2023 were 2.1 $MtCO_2e$.

A1.4. Total emissions covered by the UK ETS in 2024 were 85.6 $MtCO_2e$, down from 97 $MtCO_2e$ in 2023 and 111 $MtCO_2e$ in 2022. Emissions by sector in 2024 were as follows:

- Industry: 35.1 $MtCO_2e$
- Power: 29.5 $MtCO_2e$
- Fuel supply: 11.3 $MtCO_2e$
- Aviation: 9 $MtCO_2e$
- Other: 0.8 $MtCO_2e$

A1.5. The cap on emissions is set to decline annually. The cap was 156 $MtCO_2e$ in 2021 and is set to fall to 49 $MtCO_2e$ by 2030. This trajectory was tightened following the 2023 Review to align with the UK's Sixth Carbon Budget.

[34] HSE (Hospital and Small Emitter) and USE (Ultra Small Emitter) are UK ETS opt-out schemes that allow eligible small emitters and hospitals to operate under simplified monitoring and compliance arrangements with emissions targets instead of trading allowances.

A1.6. The UK and EU have now formally agreed to pursue linking their emissions trading systems, as set out in the Common Understanding published at the May 2025 UK-EU Summit[35].

A2. Overview of the domestic maritime sector

A2.1. The domestic maritime sector is central to the UK economy. In 2024, approximately 85% of the UK's cargo imports and exports by weight were moved by sea, with a total value of over £500 billion[36]. The sector covers a diverse range of activities, including freight, passenger services, and offshore energy and port operations.

A2.2. Domestic maritime is also a significant source of GHG emissions. In 2019, domestic maritime GHG emissions were around 8 $MtCO_2e$ on a Well-to-Wake (WtW) basis[37]. On a Tank-to-Wake (TtW) basis, domestic maritime GHG emissions were 6.8 $MtCO_2e$ in 2019[38], representing around 5.5% of total UK domestic transport GHG emissions, more than the combined emissions from buses, rail and domestic aviation[39].

A2.3. Decarbonising domestic maritime is challenging due to long asset lifespans and capital intensity. The UK Government's Domestic Maritime Decarbonisation Strategy (MDS)[40] sets a pathway to zero emissions from domestic maritime by 2050, with interim targets of a 30% reduction by 2030 and 80% by 2040, relative

[35] UK-EU Summit - Common Understanding (HTML) - GOV.UK

[36] DfT analysis of HMRC bulk customs data. DfT use the port of entry for the good to define the mode, as the HMRC mode of transport field is incomplete and not validated. This method results in 10% of total trade in weight and around 11% of total trade by value having an unknown mode of transport which are not included in this analysis. For more information regarding the data, please see https://www.uktradeinfo.com/trade-data/latest-bulk-datasets/

[37] Tank-to-Wake (TtW) emissions refer to those generated by the operation of domestic maritime vessels. Well-to-tank (WtT) emissions include those generated by the production and distribution of the fuels and other energy sources used by domestic maritime vessels, while Well-to-Wake (WtW) is the sum of both TtW and WtT emissions, and covers the whole fuel lifecycle.

[38] Source: DfT domestic maritime emissions model. For more information, see: https://assets.publishing.service.gov.uk/media/67e184a470323a45fe6a7030/dft-domestic maritime-emissions-model-framework.pdf

[39] Transport energy and environment: data tables (ENV) - GOV.UK

[40] https://www.gov.uk/government/publications/domestic maritime-decarbonisation-strategy

to 2008 levels. These targets are supported by a suite of policy measures, including regulatory standards, innovation funding, infrastructure investment, and market-based mechanisms. Integrating domestic maritime into the UK ETS is a key step in delivering this strategy, addressing the absence of a carbon price and helping to overcome market barriers like split incentives, imperfect information and coordination failures (see main IA, Section 2 for further discussion).

A3. UK domestic maritime emissions

A3.1. Analysis of GHG emissions from the UK domestic maritime sector is informed by the Department for Transport's Maritime Emissions Model (MEM)[41]. The model produces estimates of maritime emissions in a historical base year (2019)[42] and emissions projections out to 2050. The base year emissions estimates draw on detailed automatic identification system (AIS) ship tracking data[43], which are then combined with assumptions on policy levers, and the cost, effectiveness and availability of technologies such as engines, fuels and energy efficiency measures[44]. Individual ship operating decisions are modelled to comply with policy measures on a cost-minimisation basis.

A3.2. The UK ETS will be expanded to cover emissions from UK domestic maritime activity. The definition of a domestic voyage for the purposes of the UK ETS was confirmed in the interim Authority response to the maritime scope expansion consultation, published in July 2026[45]. Under this definition, domestic maritime emissions include those from voyages between two UK ports, as well as voyages that begin and end at the same UK port. Emissions from all parts of these voyages are included, whether at sea, at anchor, or while moored.

[41] https://www.gov.uk/government/publications/domestic maritime-emissions-modelling-framework

[42] 2019 was chosen as the base year because it was the most recent year unaffected by Covid-19 for which there was a full set of data, when the model was first developed.

[43] Automatic Identification System (AIS) ship tracking data are signals transmitted by vessels carrying transponders, providing information such as a ship's identity, position, speed, and course. AIS is used for safety, monitoring traffic, and analysing shipping activity patterns.

[44] These assumptions were informed by research conducted by a consortium of KMPG, Mott MacDonald, and Houlder for DfT on technology costs, availability and effectiveness, engagement with external stakeholders and the Government's existing evidence base. For further details, see the Maritime Emissions Modelling Framework.

[45] UK ETS scope expansion: domestic maritime - interim response

A3.3. The interim Authority response also confirmed the inclusion of all in-port emissions within UK ports of call, covering both emissions at berth and from vessel movements within port boundaries. This includes in-port emissions from ships undertaking domestic, international, or mixed voyages. This definition aligns with the approach used in the UK's National Atmospheric Emissions Inventory (NAEI)[46].

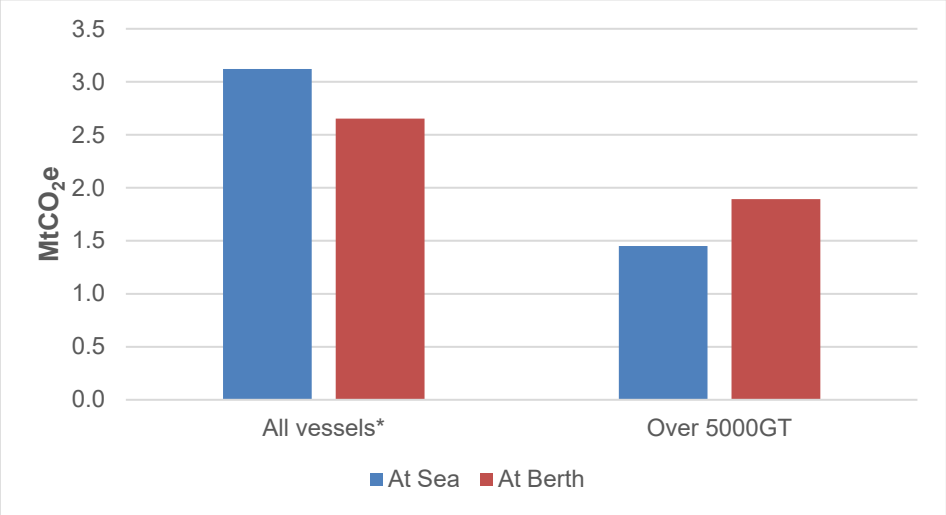
A3.4. Based on this definition, UK domestic maritime GHG emissions were estimated at 5.8 $MtCO_2e$ in 2019, from approximately 8,100 vessels. This estimate is on a tank-to-wake basis and excludes emissions from inland waterway vessels and leisure craft, which are estimated to contribute a further 1 $MtCO_2e$. Of the 5.8 $MtCO_2e$ total, 3.1 $MtCO_2e$ (54%) were produced at sea and 2.7 $MtCO_2e$ (46%) at berth in UK ports. For vessels 5,000 gross tonnage (GT)[47] or above, the 2019 domestic emissions total was 3.3 $MtCO_2e$ from around 4,900 vessels, with 1.9 $MtCO_2e$ (58%) produced at berth. It is estimated that approximately 0.3 $MtCO_2e$ of these at-berth emissions were from vessels that only conducted international voyages in 2019[48].

Figure 1A. 2019 tank-to-wake UK domestic maritime GHG emissions at sea vs. at berth, by size threshold. *Excludes inland waterway and leisure vessels. (Source: DfT's Maritime Emissions Model)

[46] Maritime emissions model framework, Page 12.

[47] 5000GT refers to a ship with a gross tonnage (internal volume) of over 5000.

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



A4. Counterfactual

A4.1. This section sets out the counterfactual, or business-as-usual (BAU)[49], scenario used to assess the impact of expanding the UK ETS to include domestic maritime emissions.

A4.2. The counterfactual assumes that the UK ETS remains unchanged and is not expanded to cover emissions from the UK domestic maritime sector. It provides a baseline against which the environmental and economic effects of scope expansion can be compared. The counterfactual scenario therefore has two parts: the domestic maritime emissions counterfactual and the UK ETS, or traded sector, counterfactual.

A4.3. The traded sector counterfactual scenario is modelled using the DESNZ Carbon Markets Model (CMM)[50], a partial equilibrium model that simulates supply and demand for emissions allowances across sectors covered by the UK ETS. The model uses assumptions about the cap trajectory and marginal abatement cost

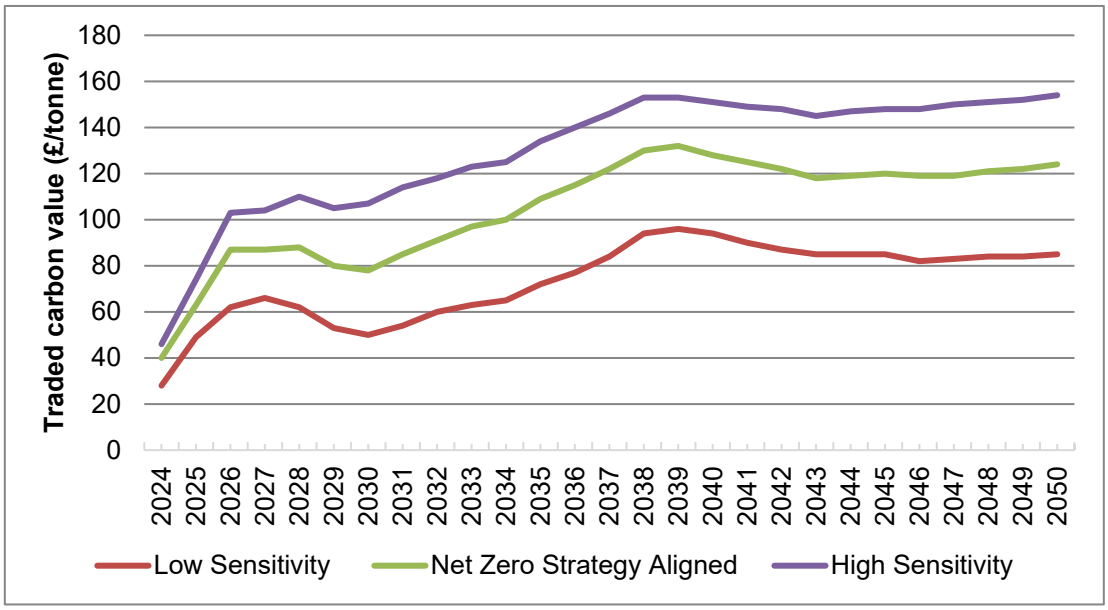
[49] Business as Usual; the baseline scenario in which no new policy changes are implemented, and current trends or regulations continue as they are.

[50] Traded carbon values used for modelling purposes, 2024 - GOV.UK – See the "Methodology" section for more detail on the carbon markets model.

curves[51] (MACCs) for scheme-covered sectors to determine a market-clearing carbon price for each year. These prices are published as traded carbon value scenarios and are intended to support long-term planning rather than to forecast market behaviour.

A4.4. Figure 2A below presents the traded carbon value scenarios from the 2024 DESNZ publication, including the "Net Zero Strategy Aligned", "Low Sensitivity", and "High Sensitivity" variants. These values reflect the carbon price trajectory in the counterfactual scenario, where domestic maritime emissions remain outside the scope of the UK ETS.

Figure 2A: Traded carbon value scenarios from the 2024 DESNZ publication. These figures reflect traded carbon value scenarios in the counterfactual, with no UK ETS scope expansion to domestic maritime. (Source: DESNZ 2024 Traded Carbon Values[52])

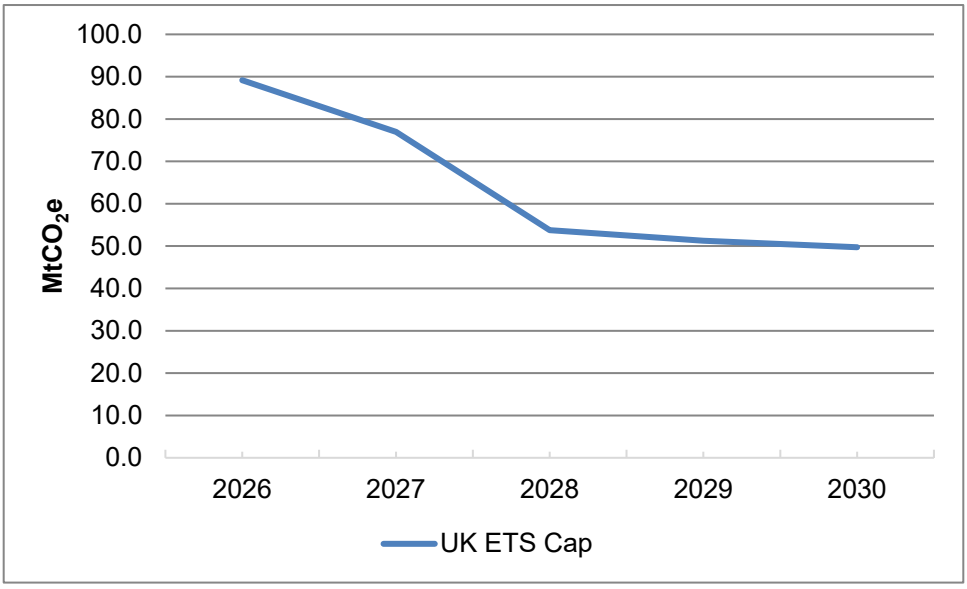


A4.5. In the counterfactual scenario, the UK ETS cap remains unchanged from its current Phase I trajectory (2021–2030), Figure 3A below shows the cap trajectory over Phase I.

[51] Marginal Abatement Cost Curves (MACCs) show the cost of reducing an additional unit of emissions (e.g. one tonne of CO_2e) across different abatement measures.

[52] Traded carbon values used for modelling purposes, 2024 - GOV.UK

Figure 3A: The UK ETS cap over Phase I (2026-2030) in the counterfactual scenario with no expansion to domestic maritime. (Source: DESNZ's Carbon Markets Model)



A4.6. The counterfactual for the domestic maritime sector reflects a 'business-as-usual' trajectory, in line with Green Book guidance. It includes policies that are either already in place or sufficiently confirmed to begin operation during the appraisal period. This includes EU maritime policies (the EU ETS and Fuel EU maritime[53]), and current and planned IMO GHG policies. These IMO policies are modelled in the same way as for the MDS in March 2025, which assumed a separate fuel standard and carbon pricing mechanism. However, in April 2025, the IMO approved the Net-Zero Framework, which comprises a combined fuel standard and emissions pricing measure[54]. In addition, adoption of the Net-Zero Framework was delayed at the meeting of the IMO's Marine Environment Protection Committee in October 2025. The current modelling approach therefore does not capture the complexities of the IMO Net-Zero Framework's design, such as flexibility mechanisms and trading elements, or the delay to its adoption, which is a limitation in the modelling.

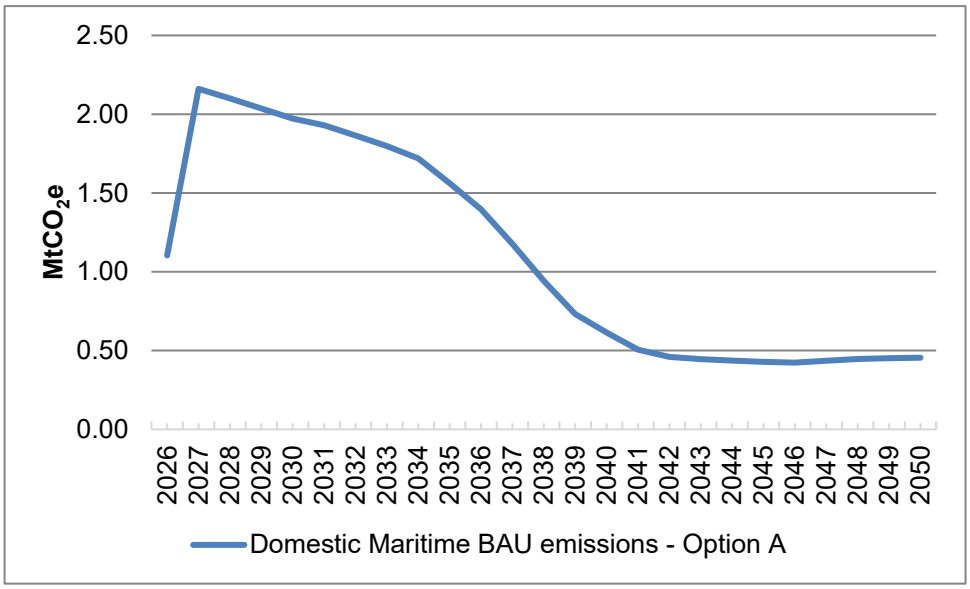
[53] An EU regulation, in force from January 2025, that sets limits on the greenhouse gas intensity of energy used on ships calling at EU ports. It is designed to stimulate the uptake of low- and zero-carbon fuels in shipping, alongside other EU measures such as the EU ETS extension to maritime.

[54] https://www.imo.org/en/mediacentre/pressbriefings/pages/imo-approves-netzero-regulations.aspx

A4.7. Other potential UK maritime policies, such as a domestic fuel standard, are excluded from the counterfactual. Whilst this policy is reflected in the domestic maritime emissions trajectory in the MDS, any further policies remain under development and have not yet undergone public consultation. Inclusion would risk overstating baseline emissions reductions and double-counting abatement, particularly given the sequencing of policy delivery. This approach ensures consistency with Better Regulation principles and provides a clearer view of the UK ETS's marginal impact.

A4.8. MACCs for the domestic maritime sector have been developed using the DfT MEM, incorporating assumptions aligned with the MDS. These MACCs estimate the cost and scale of GHG emissions abatement under different policy delivery scenarios. See Annex C for further detail.

Figure 4A. shows projected GHG emissions from domestic maritime vessels over 5,000GT in the counterfactual, with emissions in 2026 halved to reflect the partial UK ETS coverage in 2026.



A4.9. In accordance with HM Treasury's Green Book guidance, the appraisal period for this impact assessment is set at 20 years (2026-2046). This duration is standard for policies with long-term infrastructure, decarbonisation, or market transformation objectives, and is intended to capture both the immediate and enduring effects of the UK ETS expansion to the domestic maritime sector. A 20-year horizon allows for a robust assessment of investment cycles, behavioural change, and the evolution of costs and benefits, while ensuring comparability with other major government interventions. The chosen period reflects the expected asset life of vessels and the timescales over which emissions reductions and innovation are likely to materialise.

Annex B: Shortlisted Appraisal Options

B1. Option A and Scope Reductions

B1.1. Scope reductions

B1.1.1. The following policy decisions have been taken by the Authority as part of Option A, limiting emissions scope coverage[55]:

- **Exempting Government maritime activity (GMA)**, including operations by arms-length bodies and non-governmental organisations performing similar functions, as well as exemptions for activities performed for the exclusive purpose of search and rescue, firefighting, or providing humanitarian aid.
- **Ferries serving Scotland's islands and peninsula communities** will be subject to an exemption, with emissions from these services excluded from the scheme. This exemption will be reviewed in future. It is held constant for this analysis.
- **A 50% surrender deduction for routes between Northern Ireland and Great Britain**, aligned with the EU ETS treatment of Republic of Ireland–GB routes. This measure is subject to review if the EU ETS coverage changes or if the UK ETS expands to cover international voyages. It is held constant throughout this analysis.
- **A delayed implementation for offshore ships**, which will enter the scheme from January 2027, aligning with the EU ETS phased approach.
- **Fishing-catching and fish processing ships** will be exempt from the UK ETS at this stage. This exemption will be reviewed in future. This is held constant for this analysis.

B1.2. GHG Emissions Coverage Impact of Scope Reductions

B1.2.1. GHG Emissions data for all exemptions are sourced from the DfT MEM. For each exemption category, GHG emissions are held constant at their 2019 proportion of total UK domestic maritime GHG emissions. The only exception is ferries serving Scotland's islands and peninsula communities, for which GHG

[55] See Section 5 of the main IA document for more detail on longlist/shortlist appraisal options.

emissions are held constant at a level 27% above 2019, reflecting the impact of recent fleet renewal and the introduction of larger vessels into service[56].

B1.2.2. Emissions are projected forward by maintaining each category's share as a constant proportion of total forecast domestic maritime GHG emissions. For 2026, values are halved to reflect the scheme's mid-year implementation.

B1.2.3. This approach is subject to some limitations. Notably, it does not account for any structural changes in the fleet that might impact the relative share of domestic emissions from each category over time. However, in the absence of more detailed information on future emissions by category, this is considered a proportionate and pragmatic approach. It should also be noted that the primary requirement of this analysis is to forecast emissions out to 2030 for the purposes of the cap adjustment in Phase I. As such, significant structural change is unlikely.

B1.2.4. Table 1B presents the projected annual emissions associated with each exemption category over Phase I (2026–2030). These figures represent the emissions that will remain outside the scope of the UK ETS under the preferred policy package. Figure 1B visualises the impact of these exemptions on overall emissions coverage, comparing the emissions brought into scope under the preferred policy package with the emissions trajectory published in the MDS trajectory. The chart shows how the agreed policy decisions reduce the volume of emissions covered by the scheme over time.

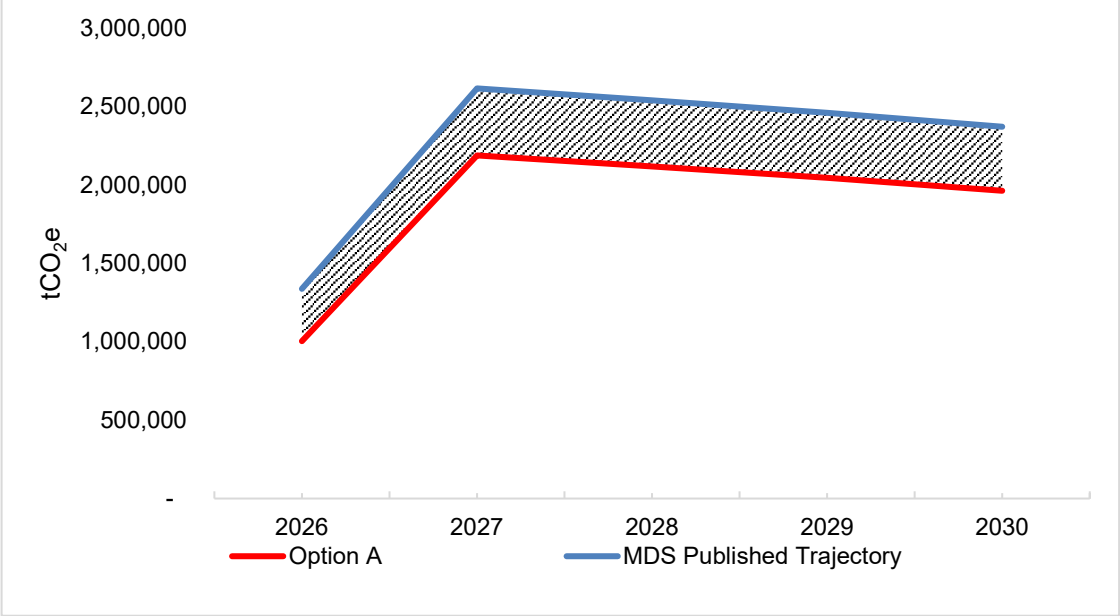
Table 1B: GHG emissions (tCO_2e) per annum associated with each policy decision reducing emissions coverage of the UK ETS scope expansion to domestic maritime. Figures rounded to the nearest 100. Rounding may mean totals do not match. (Source: DfT's Maritime Emissions Model)

tCO_2e	**2026**	**2027**	**2028**	**2029**	**2030**
GMA	800	1,600	1,500	1,500	1,400
Scottish ferries	108,000	215,900	215,900	215,900	215,900
GB-NI	107,000	209,300	203,300	196,900	189,700
Offshore ships	117,600	-	-	-	-
Fishing	200	400	400	400	400

[56] Confirmed with Scottish Government analysts.

Total	333,600	427,200	421,100	414,600	407,400

Figure 1B: UK ETS scope expansion domestic maritime GHG emissions coverage (>5000GT) over Phase I (2026-2030) as a result of agreed policy for Option A compared to MDS trajectory (>5000GT). Emissions coverage accounts for July 2026 implementation. (Source: DfT's Maritime Emissions Model)



B1.2.5. Option A strikes a balance between environmental ambition and practical implementation. It ensures that most GHG emissions from large domestic maritime vessels are brought into scope, while recognising the need for flexibility in specific operational contexts.

B2. Option B

B2.1. Option B was developed to test the potential impacts of a more expansive approach to including domestic maritime emissions in the UK ETS.

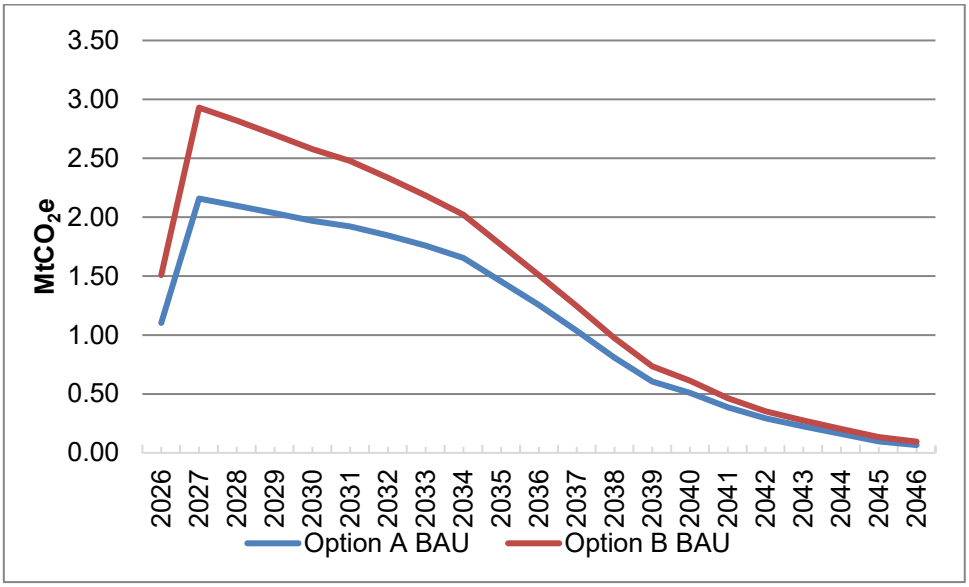
B2.2. This scenario is intended to be illustrative of the widest potential emissions coverage under a domestic maritime ETS. It removes all exemptions to demonstrate the upper bound of what could be achieved in terms of scope and ambition, with the exception of GB-NI 50% surrender deduction which is held constant.

B2.3. While this configuration is not considered operationally deliverable in the near term, due to factors such as the Scottish Government's legal responsibilities to safeguard island communities, it serves as a useful upper boundary for

comparison when assessing policy options. The scenario enables this analysis to explore the implications of maximum ambition and assess the sensitivity of outcomes to more expansive scheme design choices.

B2.4. In addition to removing all exemptions, the maximum ambition scenario also assumes the use of a well-to-wake (WtW) emissions accounting approach, rather than the tank-to-wake (TtW) methodology used in the preferred policy package. This change captures upstream emissions associated with fuel production and distribution, providing a more comprehensive view of the sector's greenhouse gas footprint and strengthening the carbon price signal for low-carbon fuel adoption.

Figure 2B: GHG emissions coverage trajectory for Options A & B to reflect the increased emissions coverage.



B2.5. While this scenario is not being proposed for implementation, it provides a valuable analytical benchmark for understanding the trade-offs between ambition, cost, and feasibility.

B3. Option C

B3.1. The UK ETS Authority has agreed to adjust the Phase I cap to account for the inclusion of domestic maritime emissions from July 2026. This decision is based on the principle that the cap should continue to reflect the same design logic and

ambition level that underpinned the 2023 cap reset and its alignment with the UK's Net Zero Strategy[57].

B3.2. In 2023, the Authority reset the UK ETS cap at the top of the net zero consistent range. 936 million allowances over Phase I, representing a 30% reduction in allowance supply over the phase[58]. That cap was underpinned by a set of principles that were reevaluated when making the decision to perform a cap adjustment for domestic maritime scope expansion.

B3.3. These included consistency with the UK's legislated carbon budgets, alignment with long-term decarbonisation pathways, and assumptions about the successful delivery of complementary policies across the traded sector. The cap was also assessed against expected market demand to ensure it would function as a binding constraint on emissions without creating structural oversupply. These indicators collectively formed the basis for determining that the cap was net zero consistent at the time of the reset, and they continue to guide the Authority's approach to cap integrity as the scheme expands.

B3.4. At the time of the reset, the Authority signalled its intention to expand the scheme to include domestic maritime emissions and subsequently consulted on this proposal in 2024. The inclusion of domestic maritime emissions from 2026 represents a material change in the scope of the scheme. To preserve cap integrity and consistency with original design principles, the Authority has deemed an adjustment necessary.

B3.5. The cap adjustment will be informed by the emissions trajectory associated with Option A, as set out in Section 1 of this annex. This trajectory reflects the expected emissions from domestic maritime vessels over 5,000GT, after accounting for all reductions in emissions coverage. The resulting emissions profile will be used to determine the volume of additional allowances to be added to the cap for the period 2026 to 2030.

B3.6. The shortlist also includes an appraisal option in which no cap adjustment is made, Option C. This option is structurally identical to the preferred policy package in terms of scope, exemptions, and implementation timeline, but assumes that the Phase I cap remains unchanged. This allows for a direct comparison of the carbon market impacts of cap adjustment versus no adjustment, including the effects on traded carbon values, allowance supply-

[57] Net Zero Strategy: Build Back Greener - GOV.UK

[58] Developing the UK Emissions Trading Scheme: main government response

demand balance, and abatement behaviour across both the domestic maritime sector and the wider traded sector.

B3.7. Option C is particularly important in light of advice from the Climate Change Committee (CCC)[59], which has previously argued that the existing cap already exceeds the net zero pathway by approximately 49 million allowances. While the Authority has not accepted this recommendation in full, it has acknowledged the need to test the implications of maintaining the current cap level while expanding the scheme's scope.

B3.8. Emissions coverage for domestic maritime scope expansion will remain identical to Option A. The results of this comparative analysis will be presented in full in Annex C.

Annex C: Modelled Impacts

C1. Modelled impacts in the domestic maritime sector

C1.1. Introduction

C1.1.1. This annex presents the modelled impacts of expanding the UK ETS to include domestic maritime emissions for all shortlisted appraisal options against the counterfactual, as described in Annex A.

C1.1.2. The modelled impacts reflect four key outcomes of introducing a carbon price in the domestic maritime sector:

[59] Letter: Advice on implementing the expansion of the UK ETS to include some domestic maritime emissions - Climate Change Committee

- **Abatement:** Net change in GHG emissions achieved by UK ETS operators in response to scope expansion to domestic maritime.
- **Air quality improvements:** Changes in emissions of primary air pollutants from the domestic maritime sector, as a result of wider abatement actions taken in response to UK ETS scope expansion.
- **Cost to operators:** The financial cost incurred by operators when investing in abatement measures to reduce emissions driven by scope expansion, alongside any new administrative cost burden.
- **Resource transfer:** Any change in the payment made by UK ETS operators to purchase allowances as a result of scope expansion, representing a transfer of value from the private sector to government.

C1.1.3. It is worth noting that whilst resource transfer is not a net cost to society and is excluded from net present social value (NPSV) calculations, it is significant in cost-benefit analysis as it reflects the distributional impact of the policy and the full financial responsibility placed on operators.

C1.1.4. All modelled impacts are presented against a counterfactual scenario in which the UK ETS is not expanded to include domestic maritime emissions (see Annex A for more detail). In this baseline, there is no carbon price signal, no additional abatement, no investment cost, and no resource transfer in the domestic maritime sector. The maritime counterfactual, as described previously, includes EU and IMO policies, but no further UK domestic maritime decarbonisation policies.

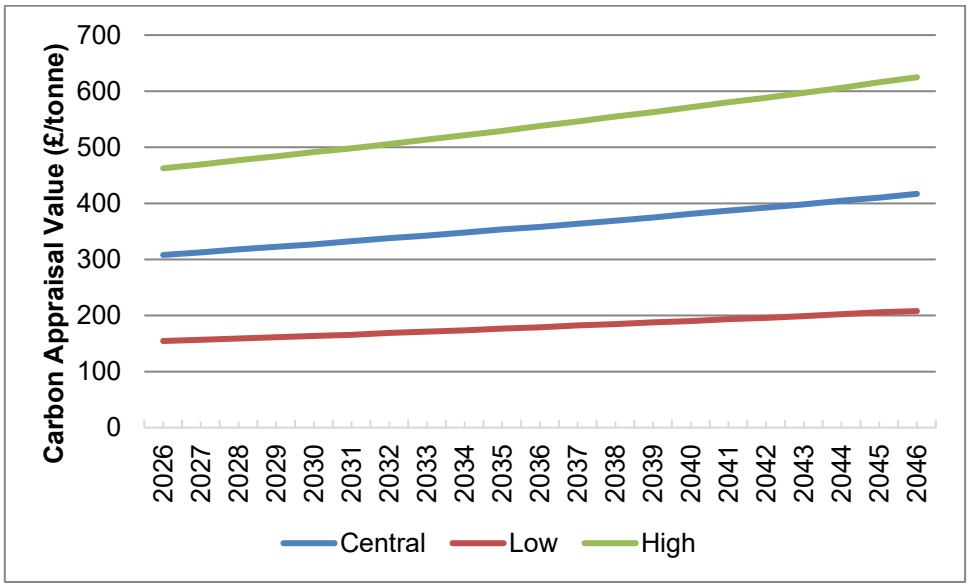
C1.1.5. The outputs in this annex are mostly derived from DESNZ's CMM, integrating domestic maritime specific MACCs produced with the DfT MEM. Air pollutant estimates come directly from the DfT MEM, and administrative cost burdens from internal modelling, as described in section C3.

C1.2. Abatement in the domestic maritime sector

C1.2.1. This section presents the modelled abatement impacts of expanding the UK ETS to include domestic maritime emissions. Abatement refers to the reduction in GHG emissions achieved by maritime operators only in response to the carbon price signal introduced through the scheme.

C1.2.2. The value of abatement is monetised using the social appraisal value of carbon, shown in Figure 1C, which reflects the estimated societal benefit of CO_2 abatement. This is different from the traded carbon value used in market modelling, which reflects the marginal cost of abatement in the scheme.

Figure 1C: Social carbon appraisal values (2026-2046)[60]



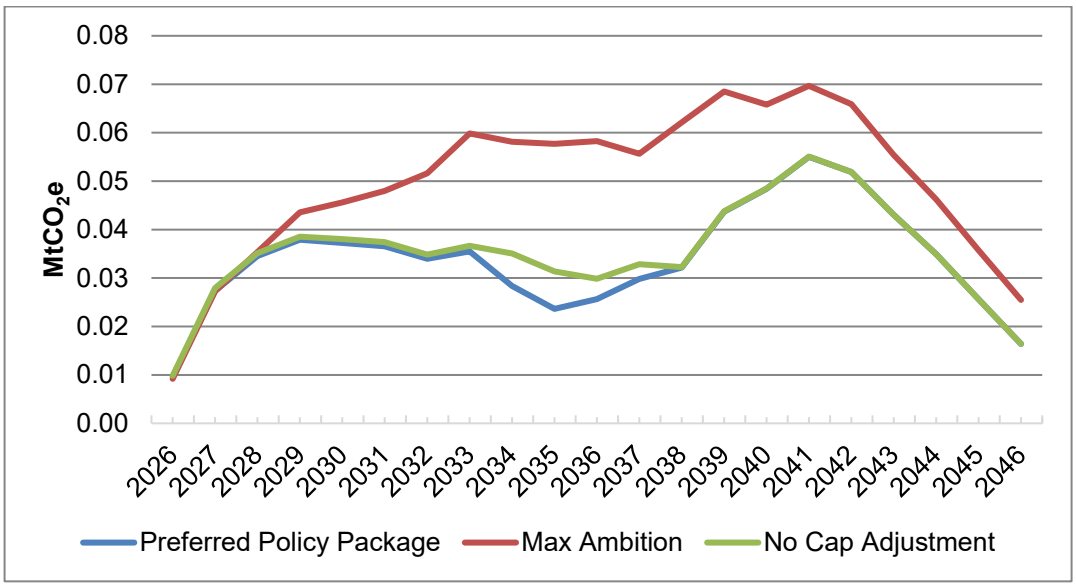
C1.2.3. Abatement is modelled by integrating the DfT's domestic maritime sector MACCs into the CMM. The MACCs represent the cost and volume of emissions reductions available to operators at different carbon price levels. The CMM simulates how operators respond to a carbon price, investing in abatement measures when it becomes cost-effective to do so.

C1.2.4. For central outputs of all three shortlisted appraisal options, the same underlying MACC assumptions regarding BAU emissions in the domestic maritime and traded sector are used.

C1.2.5. The graph below shows the trajectory of marginal emissions abatement in the domestic maritime sector for the three shortlisted appraisal options.

Figure 2C: Marginal abatement as a result of UK ETS scope expansion to the domestic maritime sector pa from 2026-2046 for each of the shortlist appraisal scenarios ($MtCO_2e$).

[60] https://www.gov.uk/government/publications/valuing-greenhouse-gas-emissions-in-policy-appraisal/valuation-of-greenhouse-gas-emissions-for-policy-appraisal-and-evaluation



C1.2.6. The role of the UK ETS in driving marginal abatement is directly linked to the complementary decarbonisation policies in the domestic maritime sector. In the earlier years of scheme implementation, the marginal abatement delivered by the UK ETS is larger, reducing post-2040 as other decarbonisation policies (e.g. EU and IMO measures) deliver more abatement and reduce the marginal abatement specifically driven by the UK ETS carbon price. This decline also reflects the diminishing space for further emissions reductions as the sector nears full decarbonisation towards the end of the appraisal period.

C1.2.7. While the UK ETS cap-setting methodology for Phase II of the scheme (post-2030) remains uncertain, this does not constrain the ability to model the impacts of scope expansion on the domestic maritime sector in isolation. The CMM applies a cap trajectory aligned with the assumptions used to generate the 2024 traded carbon values[61], providing a consistent basis for estimating how a carbon price influences abatement and cost outcomes for operators.

C1.2.8. For this sector-specific analysis, the robustness of results hinges more on the plausibility of the carbon price trajectory than on the precise cap level. Provided the assumed cap yields a credible price path, sensitivity testing around that price ensures analytical integrity. In contrast, modelling wider carbon market dynamics beyond 2030 is not attempted, given their high sensitivity to cap design, which remains undefined.

[61] Traded carbon values used for modelling purposes, 2024 - GOV.UK

C1.2.9. For this analysis it is assumed that from 2030, domestic maritime emissions are fully integrated into the UK ETS future cap setting methodology, rendering the scope expansion carbon market neutral in its impact. Future cap setting analysis will explore the impacts of cap options post-Phase I. Accordingly, this section focuses exclusively on operator responses to the carbon price, through abatement and investment, without modelling market-wide dynamics beyond 2030.

C1.2.10. Table 1C below presents the estimated monetised abatement benefits from the inclusion of domestic maritime emissions in the UK ETS under each of the three shortlisted appraisal options. These estimates are based on projected emissions reductions over the 2026 to 2046 period and are monetised using the central carbon value from the government's carbon valuation framework. All figures are expressed in 2024 prices and discounted terms. Figure 3C presents absolute GHG abatement generated under each option in the domestic maritime sector over the appraisal period.

Figure 3C: Total abatement in the domestic maritime sector from 2026-2046 for each of the shortlist appraisal scenarios (tCO_2e).

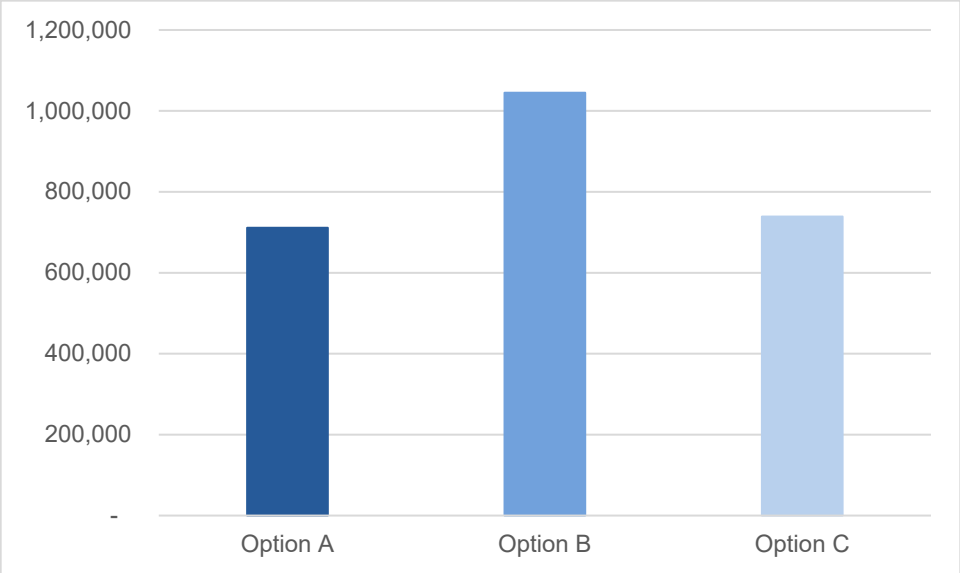


Table 1C: Monetised abatement from UK ETS scope expansion to domestic maritime across shortlisted appraisal options. (2024 prices, discounted). Figures rounded to the nearest £m.

Discounted to 2026 base year, expressed in 2024 prices (£)	**Option A**	**Option B**	**Option C**
Monetised Abatement - Maritime Sector	£258m	£380m	£268m

C1.2.11. Option A, the preferred policy package, is estimated to deliver roughly 711,000 tonnes of carbon dioxide equivalent abatement in the domestic maritime sector. Option C delivers a similar volume of roughly 739,000 tonnes, which is expected given that both options apply the same emissions coverage to the domestic maritime sector. Option B, which maximises emissions coverage, results in the highest abatement at roughly 1,045,000 tonnes. When monetised, these abatement volumes correspond to benefits ranging from £258 million to £380 million.

C1.2.12. These results indicate that while Option C yields outcomes broadly comparable to the preferred option, Option B delivers a substantially higher degree of abatement, and therefore monetised social benefit. However, the preferred option was not selected solely on the basis of quantitative performance. Rather, it reflects a broader assessment of implementation feasibility, stakeholder feedback, and the need to maintain scheme integrity. The consistency of abatement outcomes across the three options reinforces the robustness of the preferred approach under a range of plausible implementation scenarios.

C1.3. Air Quality Benefits

C1.3.1. The expansion of the UK ETS to include domestic maritime emissions is likely to have a significant impact on air pollutant emissions and air quality. This is because the UK ETS incentivise vessel owners and operators to improve their energy efficiency and to switch away from using fossil fuels to zero or near-zero GHG emission alternatives, which often have lower air pollutant emissions associated with their use.

C1.3.2. However, not all zero or near-zero GHG emission fuels are likely to have exclusively positive impacts on air pollution. For example, increased use of ammonia may lead to more emissions of nitrogen oxides (NO_X), whereas increased use of biofuels may lead to higher levels of sulphur oxides (SO_X). This is explored in detail in the Maritime Decarbonisation Strategy Analytical Annex[62].

C1.3.3. To better understand the impacts of scope expansion on air pollution, estimates for the potential impact on air quality of the UK ETS scope expansion have been estimated using the DfT's MEM. Given the highly localised impacts of

[62] Maritime decarbonisation strategy analytical annex

air pollution, Defra guidance recommends using the Impact Pathways Approach[63] to estimate any monetised air quality impacts over £50m. However, due to the level of granularity provided by the MEM, where changes in air pollutants are estimated at a cumulative level rather than by location and concentration, the Impact Pathways Approach is not possible. Instead, the air quality impact estimates have been estimated using the damage cost quantification method[64].

C1.3.4. Damage costs are a set of impact values, measured per tonne of emission by pollutant, which are derived using the more detailed Impact Pathways Approach. These values estimate the societal costs associated with small changes in air pollutant emissions but are based on UK averages rather than site-specific data. Ship-specific damage costs are used where available, for NO_X and $PM_{2.5}$. While the damage cost approach is better than failing to capture air quality benefits at all, the limitations of this approach should be noted. For more detail, please see the linked guidance.

C1.3.5. Using the damage costs approach, initial estimates indicate that in the central scenario, using the balanced fuel mix scenario from the Maritime Decarbonisation Strategy, scope expansion could yield air pollution benefits of £179m for Option A, with £203m for Option B and £184m for Option C. The impact of fuel mix assumptions on these outputs is explored in the sensitivity analysis presented in section C5.5. of this annex.

C1.3.6. These impacts are captured for the domestic maritime sector only; no impacts associated with changes in behaviour in the rest of the traded sector as a result of scope expansion in Phase I are included within this analysis.

C1.3.7. For more detail on the fuel mix scenarios and air pollutant modelling, refer to the Maritime Decarbonisation Strategy analytical annex and model framework[65] [66]. Importantly, the MEM only includes estimates of primary air pollutant emissions, so secondary emissions have not been considered in this analysis.

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[63] Air quality appraisal: impact pathways approach - GOV.UK - The impact pathway approach models how emission changes affect local pollutant concentrations and population exposure, allowing these location-specific health and environmental impacts to be quantified and monetised.

[64] Air quality appraisal: damage cost guidance - GOV.UK

[65] Maritime decarbonisation strategy analytical annex

[66] Maritime emissions model framework

Table 2C: Monetised air quality benefits as a result of reduced air pollutants from UK ETS scope expansion to domestic maritime across shortlisted appraisal options. (2024 prices, discounted). Figures rounded to the nearest £m.

Discounted to 2026 base year, expressed in 2024 prices (£)	**Option A**	**Option B**	**Option C**
Air Quality Benefits - Monetised	£179m	£203m	£184m

C1.4. Cost to operators in the domestic maritime sector

C1.4.1. As outlined in Section 2, the introduction of a carbon price in the domestic maritime sector incentivises emissions abatement by encouraging operators to adopt lower-emission technologies and practices. This occurs where the cost of abatement is lower than the prevailing carbon price.

C1.4.2. While this mechanism supports decarbonisation, it also imposes a direct financial cost on domestic maritime operators. These costs arise from investments in abatement technologies and operational changes. The scale of these costs depends on the type of measures adopted, the extent of emissions reduction required, and the carbon price trajectory over time.

C1.4.3. Cost estimates for domestic maritime operators are derived by simulating integration of the area under the MACC curve, multiplying abatement at each price point available rather than simply multiplying annual abatement volumes by the traded carbon value. This approach avoids overstating costs by accounting for the declining marginal cost of abatement across the curve. It reflects a more realistic distribution of abatement effort and cost over time, particularly in a sector where operators adopt a range of measures with varying cost profiles.

C1.4.4. Based on analysis of company address data for both International Safety Management (ISM)[67] companies and Registered Owners (ROs)[68], it is estimated that approximately 4% of operators under scope of the UK ETS scope expansion to domestic maritime are UK-based. This demonstrates that most vessels

[67] **International Safety Management (ISM)** companies are entities responsible under the ISM Code for ensuring that ships comply with safety and pollution prevention standards, often acting on behalf of shipowners or operators to manage operational safety and regulatory compliance.

[68] The **registered owner** is the legal owner of a ship as recorded in a national ship registry, holding formal title to the vessel regardless of who operates or manages it.

operating in UK waters are owned or managed by international entities, and as such only a proportion of total abatement costs will fall on UK businesses.

C1.4.5. However, the full cost of abatement for all operators is treated as within the scope of the net present social value (NPSV) calculation. This reflects the assumption that all abatement costs are passed through to UK consumers and therefore represent a cost to UK society. The rate and distribution of cost pass-through is subject to uncertainty and is assessed qualitatively in Annex D.

Table 3C: Cost to domestic maritime sector operators from UK ETS scope expansion to domestic maritime across modelled scenarios. (2024 prices, discounted). Figures rounded to the nearest £m.

Discounted to 2026 base year, expressed in 2024 prices (£)	**Option A**	**Option B**	**Option C**
Total Maritime Operator Cost of Abatement	£31m	£41m	£33m
Abatement cost to UK operators	£1m	£2m	£1m
Total domestic maritime sector abatement (tCO_2e)	711,000	1,045,000	739,000
Average £/t of abatement	£44	£39	£45

C1.4.6. The total cost to UK operators is low across all scenarios, ranging from £1 million to £2 million over the appraisal period. Option A delivers emissions reductions at an average cost of £44 per tonne, which is broadly comparable to Option C at £45 per tonne. Option B, which includes a broader emissions coverage, results in a lower average cost of £39 per tonne. These costs reflect that abatement within the domestic maritime sector occurs at lower price points where available but quickly becomes more expensive relative to the traded carbon value. As a result, the UK ETS increasingly drives abatement in other traded sectors where reductions are more cost-effective.

C1.4.7. The consistency in cost profiles across the three options reinforces the conclusion that the preferred policy package represents a proportionate and effective approach to integrating domestic maritime into the UK ETS. It delivers meaningful emissions reductions without imposing disproportionate costs on UK-based operators and maintains a favourable balance between environmental and economic outcomes.

C1.5. Social Transfer – Purchasing allowances

C1.5.1. In addition to emissions abatement and the associated investment costs, operators will incur ongoing compliance costs related to the purchase of allowances to cover residual emissions. These are emissions that are not abated in response to the UK ETS carbon price or through complementary decarbonisation policies.

C1.5.2. The CMM forecasts the level of emissions abatement under each appraisal scenario. Residual emissions are calculated as the difference between the business-as-usual emissions, and the marginal abatement achieved under scope expansion.

C1.5.3. These residual emissions must be accounted for by surrendering allowances. The cost of doing so is calculated by multiplying the volume of residual emissions by the traded carbon value generated by the CMM in each year.

C1.5.4. The resulting cost represents a financial transfer from private operators to government. This is not a net cost to society and does not reflect a loss of economic value. Accordingly, it is excluded from NPSV calculations. However, it remains significant as an indicator of the financial burden placed on the sector and the strength of the carbon price signal.

Table 4C: Social transfer from domestic maritime operators to government from UK ETS scope expansion to domestic maritime across modelled scenarios. (2024 prices, discounted). Figures rounded to the nearest £100m.

Discounted to 2026 base year, expressed in 2024 prices (£)	**Option A**	**Option B**	**Option C**
Social Transfer - Maritime Operators	£1,900m	£2,400m	£2,100m

C1.5.5. The scale of the social transfer reflects the fundamental design of the UK ETS as a market-based carbon pricing mechanism. These figures represent a redistribution of financial resources from operators to government, rather than a net economic loss. They are consistent with the long appraisal period and the cost of abatement in the domestic maritime sector.

C1.5.6. The magnitude of the transfer illustrates the strength of the financial signal intended to incentivise decarbonisation. It reinforces the role of the UK ETS in supporting emissions reduction through price-based mechanisms.

C1.5.7. Given the majority of operators affected by the scope expansion are foreign based, the purchase of allowances may result in a net inflow of capital to the UK Treasury. However, if these costs are passed through to UK consumers, the economic effect is essentially a financial transfer rather than a net benefit. Given

the uncertainty around pass-through behaviour and its distribution, we conservatively assume 100% cost pass-through from foreign firms. This approach avoids overstating the policy's economic impact and reflects the likelihood that any revenue inflow is offset by downstream costs borne by UK consumers.

C2. Carbon Market Impacts

C2.1. Phase I

C2.1.1. The preceding sections focused on the direct impacts of including domestic maritime emissions in the UK ETS. This section assesses the wider carbon market implications during Phase I (2026 - 2030), particularly how the inclusion of domestic maritime emissions affects the rest of the traded sector under different cap-setting approaches.

C2.1.2. Introducing a new sector into the UK ETS alters the overall structure of the carbon market. Even when the cap is adjusted to account for domestic maritime emissions, the addition of a new set of MACCs changes the distribution of abatement effort across the traded sector. This can influence the traded carbon value and the cost-effectiveness of emissions reductions across all sectors.

C2.1.3. These dynamics are modelled using the CMM, which compares two scenarios for all shortlisted appraisal scenarios:

- A counterfactual scenario in which the UK ETS operates without domestic maritime scope expansion
- A policy scenario in which domestic maritime is included, using the same business-as-usual (BAU) assumptions for the rest of the traded sector.

C2.1.4. To isolate the impact on the rest of the traded sector, domestic maritime emissions are subtracted from total traded sector emissions under the scope expansion scenario. The resulting figure is compared to the baseline to estimate the change in abatement required from the rest of the traded sector. This approach quantifies how the inclusion of domestic maritime shifts abatement effort across the economy.

C2.1.5. In Option A (the preferred policy package), the cap adjustment is informed by the Maritime Decarbonisation Strategy and the treatment of exemptions, as set out in Annex B. This adjustment aligns with the figures that will be legislated for and reflects the approach agreed across the Authority. The cap adjustment is slightly larger than the residual emissions in the maritime sector after scope expansion. This results in a slight loosening of the cap, leading to a small increase in emissions and a minor private benefit from reduced abatement effort in the rest of the traded sector.

C2.1.6. Option B, by contrast, is a hypothetical scenario in which the cap is adjusted precisely in line with residual emissions. This prevents any change in abatement effort across the rest of the traded sector and delivers a carbon market-neutral outcome, as intended under a cap adjustment approach. This small difference in cap adjustment approach between the options is reflected in the results shown in Table 4C below.

Δ Emissions (traded sector excluding domestic maritime) = Emissions (baseline, traded sector excluding domestic maritime) − [Emissions (scope expansion, traded sector including domestic maritime) − Emissions (scope expansion, domestic maritime)]

C2.1.7. The modelling assesses how the inclusion of domestic maritime emissions affects the wider UK ETS carbon market during Phase I (2026–2030), isolating the impact of domestic maritime scope expansion on the rest of the market. The impact varies depending on whether the cap is adjusted to accommodate the additional emissions.

C2.1.8. In Options A and B, the cap is increased to reflect expected emissions from the domestic maritime sector. This maintains the overall supply-demand balance in the market and avoids placing additional abatement pressure on other sectors. In contrast, Option C introduces domestic maritime emissions without adjusting the cap. This tightens the market by increasing allowance scarcity, which raises the carbon price and shifts additional abatement effort onto the rest of the traded sector.

Table 5C: Modelled carbon market impact of domestic maritime scope expansion under shortlisted appraisal options, isolating impact on the rest of the UK ETS market from impacts in the maritime sector.

Discounted to 2026 base year, expressed in 2024 prices (£)	**Option A**	**Option B**	**Option C**
Change in traded sector abatement effort (Phase I only) (tCO_2e)	- 66,000	0	10,677,000
Change in GHG emissions – monetised	£-25m	£0m	£3,200m
Change in cost of abatement to traded sector	£-9m	£0m	£921m
Change in social transfer value (allowance purchasing)	£-18m	£9m	£1,600m

C2.1.9. Table 5C shows the modelled change in emissions from the rest of the traded sector, the monetised societal benefit of those reductions, the private cost to

operators of achieving them, and the financial transfer to government through allowance purchases. The large difference in societal benefit and cost of abatement under Option C reflects the difference between the social value of carbon (used to appraise benefits) and the private cost of abatement (based on marginal abatement cost curves).

C2.1.10. However, it is important to recognise a limitation in the modelling approach for estimating cost impacts on the rest of the traded sector. In contrast to the MACC-based integration used for domestic maritime, the cost of additional abatement effort in the rest of the traded sector is calculated by multiplying the change in abatement volume by the traded carbon value. This method assumes all abatement occurs at the marginal cost, which may overstate the true cost, particularly in scenarios with significant abatement shifts such as Option C.

C2.1.11. This methodological difference is not material in Options A and B, where cap adjustment limits the redistribution of abatement effort. However, in Option C, the absence of cap adjustment forces substantial additional abatement onto the rest of the traded sector. This results in a large, estimated cost to operators (£921 million), which may be overstated due to the use of marginal cost pricing. While the societal benefit of accelerated abatement is high, it comes at a significant cost to the traded sector, costs that are likely to be passed on to UK consumers. Given that the current cap is already judged to be consistent with the Net Zero Strategy, this forced additional abatement may not be justified, and the positive figures associated with Option C should be interpreted with caution. The financial transfer from operators to government also increases significantly under Option C, reaching £1,600 million. This reflects the volume of allowances surrendered at elevated carbon prices. As with other transfers in the UK ETS, this is treated as a redistribution of financial resources rather than a net economic cost and is excluded from net present social value calculations.

C2.1.12. While Option C delivers a higher societal benefit due to accelerated abatement, this does not necessarily indicate a more cost-effective outcome. It reflects the volume of emissions reduced, not the efficiency with which those reductions are achieved. Forcing earlier and more expensive abatement than is necessary to meet long-term climate goals may undermine economic efficiency.

C2.1.13. The preferred policy package was selected based on a balanced assessment of feasibility, proportionality, and environmental integrity. It reflects the Authority's judgement that the current cap trajectory is consistent with the UK's net zero strategy. Introducing domestic maritime emissions without adjusting the cap would artificially constrain supply, potentially undermining cost-effectiveness and deliverability during Phase I.

C2.1.14. In summary, the modelling confirms that the carbon market impacts of domestic maritime scope expansion depend critically on cap design. The

preferred policy package delivers a stable and proportionate outcome, while the no cap adjustment scenario drives greater emissions reductions at significantly higher cost. These findings support the rationale for selecting the preferred package as the most coherent and credible approach to integrating domestic maritime emissions into the UK ETS.

C3. Administrative costs

C3.1. Introduction

C3.1.1. This section outlines the administrative cost burden associated with the inclusion of maritime emissions in the UK ETS. Unlike previous cost categories, administrative costs arise for both private and public actors. These include familiarisation, data collection and reporting costs for maritime operators, as well as administrative costs for regulators. While the responsibilities are shared, the financial burden is primarily borne by operators, as regulator costs are recovered through charges to obligated parties. The Impact Assessment quantifies these costs where evidence is available.

C3.1.2. There is significant uncertainty surrounding the estimates of the administrative costs, largely relating to the degree of additionality of these tasks relative to existing requirements under the existing UK Monitoring Reporting and Verification (MRV) regime, EU MRV and IMO Data Collection System. As such, a range has been produced. The results of the NPSV are highly sensitive to the additional administrative costs required by the ETS, given the relatively low levels of abatement in the maritime sector and the associated costs.

C3.1.3. Administrative costs are incurred by operators regardless of their emissions profile or abatement activity. This suggests that increasing the emissions scope of the UK ETS to include a share of UK-international emissions would not materially increase these costs, as no new operators would be brought into scope, given the inclusion of all emissions at berth within the current domestic maritime scope. A discussion of the impacts on small and micro businesses is included in Annex D.

C3.2. Operator Costs

C3.2.1. The inclusion of domestic maritime emissions in the UK ETS introduces new administrative requirements for operators. These costs are distinct from abatement costs, as they relate to the processes of complying with the UK ETS MRV scheme, as well as engaging with regulators.

C3.2.2. This Impact Assessment quantifies administrative costs using estimates of the expected time taken for each operator to comply with the MRV scheme, provided by the Environment Agency. In the central case this is around 80 hours a year on average for new operators, which is similar to the figure used in the EU MRV Impact Assessment[69].

C3.2.3. Compliance actions include scheme familiarisation, preparation and submission of monitoring plans and emissions reports, verification, and regulatory charges, as set out in table 5C. This includes both one-off and recurring actions. These estimates of time are then monetised using ONS wages data[70]. Other costs include the costs associated with verification of Annual Emissions Reports (AERs), and regulatory charges, which include an application fee for emissions monitoring plans (EMPs), an annual subsistence charge, and determination charges where applicable.

Table 6C. Administrative requirements on operators

Step	**Description**	**Frequency**	**Number of parties facing cost**
Scheme familiarisation	• Familiarise organisation with scheme guidance • Agree internal arrangements • Identify ships responsible for within scope (and complete legal agreements if needed) • Identify data requirements and collection methods	Year 1, and following any changes	All regulated entities – 2,000 operators
IT system onboarding	• Create METS and Registry accounts	Year 1	All regulated entities – 2,000 operators

[69] European Commission (2013) Impact Assessment accompanying the document 'Proposal for a Regulation of the European Parliament and of the Council on the monitoring, reporting and verification of carbon dioxide emissions from domestic maritime transport'. Annex XIII https://climate.ec.europa.eu/system/files/2016-11/swd_2013_237_2_en.pdf

[70] ONS, 2023, Annual Survey of Hours and Earnings (ASHE) https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/datasets/occupation4digitsoc2010ashetable14 Table 14.5a. The mean, 25th and 75th percentile wage for 'Managers in Logistics, Warehousing and Transport' is used. A 26.5% non-wage uplift is applied, in line with DfT Transport Appraisal Guidance.

Prepare Emissions Monitoring Plan (EMP)	• Apply for EMP in METS • Amend as required	Year 1, and following any changes	All regulated entities – 2,000 operators Only additional for those not in scope/ not complying with UK MRV
Data collection	• Monitor emissions • Collect and store emissions data throughout the year	Annual	All regulated entities – 2,000 operators Only additional for those not in scope of existing EU and UK MRV schemes, or the IMO DCS
Preparation of annual emissions report (AER)	• Complete information in METS to populate AER	Annual	All regulated entities – 2,000 operators Only additional for those not in scope/not complying with UK MRV
Verification and submission of AER	• Get AER verified by an accredited verifier • Upload into METS • Update based on improvement report as required	Annual	All regulated entities – 2,000 operators Verification only additional for those not in scope/not complying with UK MRV
Purchase and surrender allowances	• Make arrangements with sellers to buy allowances as needed • Surrender allowances to cover emissions surrender figure	Annual	All regulated entities – 2,000 operators
Regulatory charges	• Application charge • Annual subsistence charge • Determination charge	Annual	All regulated entities – 2,000 operators

C3.2.4. Some of these tasks/costs are specific to the new UK ETS MRV scheme and therefore can be assumed to be additional for all operators, given they are not required under the existing UK MRV, EU MRV or IMO DCS requirements. These costs are assumed to be the same for all operators, namely scheme familiarisation, IT system onboarding, purchasing and surrendering allowances, and regulatory charges.

C3.2.5. Other tasks (data collection, and preparation and verification of EMPs and AERs) may not be additional, or may take less time, if operators are already

complying with other monitoring schemes. It is expected that around 2,000 operators will be in scope of the UK ETS, over 90% of whom are assumed to already be in scope of either the existing UK MRV scheme, the EU MRV scheme and/or the IMO Data Collection System[71].

C3.2.6. The existing UK MRV scheme applies to ships of over 5000 GT that carry cargo or passengers for commercial purposes on UK journeys, using the same definition of domestic as under the UK ETS, and requires operators to monitor and verify their emissions data. All operators in scope of the existing scheme are therefore assumed to already have the capability to monitor their emissions data. However, the existing UK MRV scheme has not required operators to report their emissions, in the absence of a reporting system, meaning we do not have evidence on the levels of compliance. While anecdotal evidence suggests that some operators are complying with all UK MRV requirements, there is uncertainty over the extent to which all operators are fully complying with steps to prepare and verify reports.

C3.2.7. Therefore, as a conservative approach, in the central case we assume that preparation and verification of EMPs and AERs are additional tasks, but that the time burden associated is at the lower end of the range provided by the Environment Agency, to reflect that some operators may already be doing some of this for the UK MRV, and that there are likely to be efficiencies for those producing similar documents across several existing schemes. Verification is also assumed to be an additional cost, based on current costs for UK MRV verification available online[72]. This approach is considered to produce a conservative central estimate, which is appropriate given the lack of evidence on existing UK MRV compliance rates.

C3.2.8. In the lower case, we assume that all operators are fully complying with the requirements of the existing UK MRV scheme and that there are no additional costs associated with preparation and verification of EMPs and AERs for those in

[71] Based on data of ships calling at the UK over the past 5 years, from the Consolidated European Reporting System (CES). The average annual number of ROs that called at the UK is 3700, and of ISMs 1300. Calculations assume a higher proportion of ISM companies will take responsibility for the ETS obligation than ROs, based on experience from the EU ETS.

[72] Verification costs based on prices for UK and EU MRV verification available online (via DNV). The figure for 3 vessels is used to reflect the average fleet size. The figure for UK MRV verification for 3 vessels (£1146 per operator) is used in the central case, the figure for EU MRV verification for 3 vessels (£3212 per operator) is used in the high case.

the existing scope. In the higher case we assume the costs of preparation and verification of EMPs and AERs are fully additional and are the same for operators already in the scope of existing schemes as for new operators, alongside higher verification costs in line with current EU ETS verification prices.

C3.2.9. The only operators not currently in scope of the existing UK MRV scheme that will be brought into scope of the UK ETS MRV scheme are those that operate offshore vessels, from 2027. The costs associated with preparing and verifying EMPs and AERs are assumed to be fully additional for these operators. The EU MRV scheme brought offshore vessels into scope in 2025, so it is only those who only operate in the UK that will face entirely new data collection requirements. For these operators, additional costs are expected to arise from establishing new data collection systems. Emissions data can be collected from a range of methods including bunker delivery notes and fuel tank stocktakes, on-board fuel tank monitoring, flow meters, or emissions monitors. Generally, the more automated, accurate approaches have higher associated investment costs, but lower operational costs, and vice versa. Estimates of the cost of data collection methods are based on previous research by CE Delft[73], converted to 2024 prices.

C3.2.10. Considering all the components set out above, the average annual administrative cost per operator is assumed to be approximately £5,700 in the central case. The lower end of this range, reflecting a world in which many of the costs are not additional for operators already in scope of the existing UK MRV scheme, is £3,285 per operator per year. At the upper end of the range, where all costs are assumed to be additional and we assume no streamlining for operators that are already familiar with existing UK and EU MRV schemes, is £9,151 per operator per year on average. This range is comparable to the estimate used in the original EU MRV Impact Assessment, of EUR 6,700 per year (or approximately £7,500 in 2024 prices).

C3.2.11. Total discounted administrative costs to all operators are therefore estimated to be £179m in the central case, within a range of £103m to £287m, over the appraisal period. As UK businesses are expected to make up just 4% of the impacted operators, the central estimate of administrative costs to UK businesses

[73] CE Delft (2013) Monitoring of bunker fuel consumption https://cedelft.eu/wp-content/uploads/sites/2/2021/04/CE_Delft_7A40_Monitoring_Bunker_Fuel_Comsumption_FINAL.pdf This research states that the costs of a flow meter for a Panamax bulker can vary between $15,000 and $60,500. To reflect that new vessels being brought into scope of the UK ETS MRV are likely to be smaller than this, the lower bound of this range is used as a central estimate.

is around £7m. These costs are the same for Option C, as the administrative requirements are the same. For Option B, a small number of additional operators – those operating fishing vessels and Scottish island ferries - are brought into scope, which increases the total discounted admin costs slightly to £181m.

C3.3. Regulator Costs

C3.3.1. The expansion of the UK ETS to include domestic maritime emissions introduces new administrative responsibilities for regulators. These include onboarding new operators, reviewing and approving emissions monitoring plans, processing compliance documentation, and maintaining the digital infrastructure required to support scheme delivery.

C3.3.2. Regulator costs are expected to arise from both one-off and recurring activities. One-off costs include the development of IT systems to support data submission, verification, and compliance tracking. Recurring costs include system maintenance, staff time for regulatory oversight, and enforcement activities. Additional resource may also be required to assess legal agreements where operators transfer compliance obligations from the Registered Owner to the ISM Company, due to the complexity of domestic maritime ownership structures.

C3.3.3. These costs are recovered through charges applied to obligated parties. The Environment Agency has proposed an application charge of £2,246 for emissions monitoring plans, an annual subsistence charge of £2,725, and a determination charge of £151 per hour[74]. Equivalent charges from other regulators are expected to be broadly similar and will be confirmed in due course.

C3.3.4. As a result, while administrative responsibilities are shared, the financial burden of regulator costs is ultimately passed through to operators. The overall administrative cost burden of the scheme is therefore primarily held by the private sector.

[74] Environment Agency (2024) Environment Agency charges proposal for greenhouse gas emissions https://www.gov.uk/government/consultations/environment-agency-charges-proposal-for-greenhouse-gas-emissions

C4. Summary of Cost-Benefit Analysis

C4.1. Overview

C4.1.1. This section presents the combined outputs of the cost-benefit analysis for the proposed UK ETS scope expansion to domestic maritime. It draws together the modelled estimates of emissions reductions, monetised benefits, abatement costs, administrative burdens, and social transfers for each of the three shortlisted appraisal options. These estimates are compared against a baseline scenario of no scope expansion. Non-modelled and qualitative impacts are discussed in Annex D.

C4.1.2. The estimates are derived from separate modelling components:

- GHG emissions reductions are calculated for both the domestic maritime sector and the wider traded sector (Phase I only).
- Air pollutant emissions impacts are estimated for the domestic maritime sector only.
- Monetised benefits reflect the societal value of avoided emissions.
- Abatement costs are the direct financial cost to operators of investing in emissions reductions driven by scope expansion.
- Administrative costs capture the burden of complying with the UK ETS, including familiarisation, reporting, verification and regulator charges. These are treated as real resource costs and are assumed to be the same across all options.
- Social transfers represent the financial flows from operators to government through the purchase of allowances. These are calculated across both domestic maritime and traded sector (for Phase I only) through any change in residual GHG emissions or the traded carbon value. These are not treated as net economic costs but are included to illustrate the scale of redistribution.

Table 7C. Final outputs for shortlisted appraisal options.

Discounted to 2026 base year, expressed in 2024 prices (£)	**Option A**	**Option B**	**Option C**
Total Reduction in Emissions	645,000	1,045,000	11,416,000
Total Monetised Benefit of Change in Emissions	£155m	£263m	£3,400m
Total Monetised Benefit - Air Quality	£179m	£203m	£184m
Total Cost to operators of investing in abatement	£22m	£41m	£954m
Total Administrative & Enforcement Costs	£179m	£181m	£179m

NPSV	£132m	£245m	£2,400m
Total Social Transfer	£1,900m	£2,400m	£3,700m

C4.1.3. The outputs of the cost-benefit analysis show that all three shortlisted options deliver positive net present social values (NPSVs), with varying levels of emissions reductions and monetised benefits. Option A, the preferred policy package, delivers 645,000 tCO_2e in GHG emissions reductions, £155 million in monetised carbon benefits and £179 million in air quality improvements. Abatement costs are £22 million, while administrative and enforcement costs are £179 million. The resulting NPV is £132 million.

C4.1.4. Option B, which illustrates hypothetical maximum emissions coverage, delivers higher GHG emissions reductions of 1,045,000tCO_2e and greater monetised GHG benefits of £263 million. Air quality improvements are estimated at £203 million. Despite higher abatement costs of £41 million, the overall net present value is £245 million.

C4.1.5. Option C, which does not adjust the cap, delivers the highest GHG emissions reductions at 11,416,000 tCO_2e and the highest NPV at £2,500 million. This outcome is driven by accelerated abatement across the rest of the traded sector due to tighter market conditions. However, the associated abatement cost is substantial at £954 million. The cost impact on the traded sector is calculated by multiplying additional abatement effort by the traded carbon value, which assumes all abatement occurs at the marginal cost. This may overstate the true cost, especially in scenarios with significant abatement shifts. In contrast, the cost to domestic maritime operators is calculated using the marginal abatement cost curve, providing a more realistic estimate.

C4.1.6. Despite its high NPSV, Option C is not the preferred choice. The current cap trajectory is already judged to be consistent with the UK's Net Zero Strategy. Forcing additional abatement through a tighter cap may impose unnecessary costs on the traded sector, which are likely to be passed on to UK consumers. This raises concerns about cost-effectiveness, deliverability and proportionality.

C4.1.7. In Option A, the monetised benefit from GHG abatement alone does not exceed the administrative burden. This reflects the structure of the domestic maritime sector, which includes a large number of operators with relatively low individual GHG emissions. While the average annual administrative cost per operator is modest, the aggregate burden is significant. This dynamic explains why administrative costs exceed GHG abatement benefits in Option A, despite its positive NPSV when considering air quality improvements too.

C4.1.8. The potential future expansion to international maritime would be expected to deliver greater GHG emissions coverage and abatement potential, with limited

additional administrative burden. The onboarding and MRV systems established under domestic maritime scope expansion would support potential future implementation, meaning current analysis captures most future costs, but not benefits.

C4.1.9. The effectiveness of the UK ETS scope expansion will depend on its interaction with other decarbonisation policies. The availability of low-carbon fuels, port infrastructure and vessel retrofit support will influence the cost and feasibility of abatement. These factors are not fully captured in the central modelling but are considered in the qualitative assessment.

C4.1.10. Distributional impacts are also relevant. As outlined in Section 1.3, only around 4% of affected domestic maritime operators are UK-based. This means the majority of compliance costs fall on foreign firms, while UK-based operators in the traded sector may benefit from reduced abatement pressure. This redistribution supports the conclusion that the preferred policy package delivers emissions reductions in a proportionate and economically efficient manner.

C4.1.11. In summary, Option A represents a coherent and credible approach to integrating domestic maritime emissions into the UK ETS. It maintains market stability, avoids disproportionate costs to UK operators and supports the Net Zero Strategy. The positive NPSV reflects the inclusion of air quality benefits and reinforces the case for implementation. The policy's performance will be further explored through sensitivity testing and ongoing evaluation.

C5. Sensitivity Analysis

C5.1. Approach to sensitivity analysis

C5.1.1. The central estimates presented in this impact assessment are subject to uncertainty, reflecting variability in key modelling inputs and assumptions. Sensitivity analysis is used to test how changes in these inputs affect the core outputs of the appraisal, including emissions reductions, traded carbon values, monetised benefits, and net present social value (NPSV).

C5.1.2. This section presents four targeted sensitivity tests, each addressing a distinct source of uncertainty that could materially influence the assessment of the UK ETS scope expansion to domestic maritime:

1) Administrative cost burden

The first test explores the impact of varying assumptions about the administrative costs associated with integrating domestic maritime into the UK ETS. In the central scenario, for Options A and C, these costs are estimated at £179m, assuming that the majority of administrative costs are additional for all operators. However, the existing UK MRV

regime already requires in-scope operators to monitor their emissions and to prepare and verify emissions reports, therefore the central case may overstate the burden to operators who are already doing a lot of these steps (however, there is currently no data collection or enforcement to confirm the extent to which this is happening, which is why full compliance is not assumed in the central case).

Efficiencies may also be realised for operators with larger fleets and those who have experience of reporting their data into other monitoring schemes, through digitalisation, streamlined MRV processes, or alignment with existing reporting systems. This is explored in the lower bound of the administrative costs range. Conversely, costs could be higher if implementation proves more complex than anticipated, and there are no streamlining benefits. This sensitivity assesses how changes in administrative costs affect the overall NPSV.

2) Carbon Appraisal value: monetisation sensitivity

The second test assesses how changes in the appraisal carbon value, which is used to monetise the benefits of emissions reductions, influence the net present value and benefit-cost ratio of the policy. This reflects uncertainty in the valuation of long-term climate damages.

3) Complementary policy and business-as-usual emissions: system-wide sensitivity

The third test evaluates the impact of varying levels of decarbonisation effort across the wider economy and the domestic maritime sector. These changes affect the business-as-usual emissions trajectory and the shape of MACCs, which in turn influence the traded carbon value. This enables assessment of the sensitivity of cost-benefit outputs to changes in the traded carbon value.

4) Fuel mix assumptions for air quality benefits calculation

The fourth test examines the sensitivity of air quality benefit estimates to assumptions about fuel mix in the domestic maritime sector. In the central case, air quality benefits are derived from modelled reductions in air pollutants associated with a shift away from high-emitting fuels. These monetised benefits are critical to the positive NPSV observed under all options, particularly Option A where the monetised benefit from GHG abatement alone does not exceed the administrative burden. Given the importance of these benefits to the overall value proposition, this sensitivity tests the impact of alternative fuel mix scenarios on air quality outcomes. This includes assessing the extent to which operators may adopt lower-emission fuels and the resulting variation in air quality improvements. The test helps to demonstrate the robustness of the central NPSV to changes in fuel mix assumptions and supports the case for ongoing refinement of the air quality modelling approach.

C5.2. Administrative cost burden

C5.2.1. This sensitivity test explores the impact of varying assumptions about the administrative costs associated with integrating domestic maritime into the UK ETS. In the central scenario, these costs are estimated at £179m. However, these estimates are subject to uncertainty, particularly around the additionality of tasks that should already be being done for the UK MRV, and the potential for efficiencies where operators are also in scope of the EU MRV and IMO DCS schemes.

C5.2.2. The table below presents the results of the sensitivity analysis for Option A (the preferred policy package), under three scenarios: central, high, and low administrative cost assumptions. All other inputs are held constant.

Table 8C. Impacts of sensitivity testing on Option A (preferred policy package).

Discounted to 2026 base year, expressed in 2024 prices (£)	**Option A - Central Admin Costs**	**Option A - High Admin Costs**	**Option A - Low Admin Costs**
Total Reduction in Emissions	645,000	645,000	645,000
Total Monetised Benefit of Change in Emissions	£155m	£155m	£155m
Total Monetised Benefit - Air Quality	£179m	£179m	£179m
Total Cost to operators of investing in abatement	£22m	£22m	£22m
Total Administrative & Enforcement Costs	£179m	£287m	£103m
NPSV	£132m	£24m	£208m
Total Social Transfer	£1,900m	£1,900m	£1,900m

C5.2.3. The results of the sensitivity testing show that administrative costs are a key driver of the overall NPSV for Option A. In the central scenario, administrative costs are estimated at £179 million, resulting in an NPSV of £132 million. Under the high-cost scenario, where administrative costs increase to £287 million, the

NPSV falls to £24 million. In the low-cost scenario, where administrative costs are reduced to £103 million, the NPSV improves to £208 million. Importantly, the NPSV remains positive across all scenarios, demonstrating that the policy continues to deliver net societal value even under less favourable cost assumptions.

C5.2.4. The administrative burden is particularly impactful in a sector characterised by a large number of relatively small operators. While the average per-operator cost is modest, the aggregate burden is significant. This reflects the fixed nature of onboarding, MRV setup and compliance processes, which do not scale with emissions volume. As such, the cost-effectiveness of the policy improves over time and with broader system integration, including potential future expansion to international maritime, where greater emissions coverage and abatement potential can be achieved with limited additional administrative cost.

C5.2.5. It is also important to consider that the administrative cost burden is front-loaded and does not scale with emissions coverage or abatement volumes. This means that the same cost is incurred regardless of abatement delivered. As such, the cost-effectiveness of the policy improves over time and with broader system integration, including the potential future expansion to UK-international maritime emissions.

C5.2.6. In summary, the sensitivity testing confirms that administrative cost assumptions materially affect the NPSV, but the policy remains cost-effective across all tested scenarios.

C5.3. Carbon Appraisal value

C5.3.1. The carbon appraisal value represents the estimated monetary value of carbon emissions abatement, as published by the UK Government[75]. It is used in policy appraisal to monetise the benefits of emissions reductions. In this impact assessment, the carbon appraisal value is applied to modelled emissions savings from the UK ETS scope expansion to domestic maritime, forming the basis for the monetised benefit estimates.

C5.3.2. The central carbon appraisal value has been used throughout the assessment to generate primary estimates. However, the government's guidance also provides a range of values—labelled "low" and "high"—to reflect uncertainty

[75] Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal - GOV.UK

around the true societal value of carbon abatement. Sensitivity testing using this range is standard practice in decarbonisation policy appraisal.

C5.3.3. The table below presents the results of applying low, central, and high carbon appraisal values to the same underlying emissions reductions. All other inputs, including abatement costs, administrative costs, and social transfers, are held constant. This isolates the effect of carbon valuation on NPSV.

Table 9C: Results of sensitivity testing – carbon appraisal values

Discounted to 2026 base year, expressed in 2024 prices (£)	**Option A - Central Carbon Appraisal Value**	**Option A - High Carbon Appraisal Value**	**Option A - Low Appraisal Value**
Total Reduction in Emissions	645,000	645,000	645,000
Total Monetised Benefit of Change in Emissions	£155m	£232m	£77m
Total Monetised Benefit - Air Quality	£179m	£179m	£179m
Total Cost to operators of investing in abatement	£22m	£22m	£22m
Total Administrative & Enforcement Costs	£179m	£179m	£179m
NPSV	£132m	£209m	£54m
Total Social Transfer	£1,900m	£1,900m	£1,900m

C5.3.4. The results of the sensitivity testing show that the NPSV for Option A is sensitive to the assumed carbon appraisal value. For the same level of GHG emissions reductions, the monetised benefit from carbon abatement ranges from £77 million to £232 million, resulting in NPSVs from £54 million to £209 million. This variation is driven entirely by changes in the assumed societal value of carbon, not by differences in policy performance or cost.

C5.3.5. The NPSV remains positive across all scenarios, demonstrating that the policy delivers net societal value even under conservative assumptions about the value of carbon. This reinforces the robustness of the preferred policy package and supports its implementation, while highlighting the importance of maintaining up-to-date carbon valuation guidance in future appraisal work.

C5.4. Complementary Policy and BAU Emissions

C5.4.1. The cost-benefit results presented in this impact assessment are highly sensitive to assumptions about the delivery of complementary decarbonisation policies across the traded sector and the domestic maritime sector. These policies shape the business-as-usual (BAU) emissions trajectory, which in turn determines the marginal impact of the UK ETS.

C5.4.2. In the central modelling, a Low BAU scenario is assumed. This reflects full delivery of expected domestic decarbonisation policies across the traded sector, as well as the impact of international measures on the domestic maritime sector's GHG emissions. Under these conditions, most emissions reductions are achieved outside the ETS, leaving limited residual abatement for the scheme to deliver. This results in relatively lower monetised benefits and NPSVs across all shortlisted appraisal options. The modelling of IMO GHG policies does not reflect the complexities of the IMO Net-Zero Framework's design or the delay to its adoption, and therefore may overestimate the abatement delivered.

C5.4.3. Therefore, to test the robustness of these results, two alternative BAU scenarios were modelled:

- **Central BAU:** Assumes partial delivery of complementary policies across the traded sector, with the same delivery in the domestic maritime sector.
- **High BAU:** Assumes minimal delivery of complementary policies in both the traded and domestic maritime sectors.

Table 10C. Impact of flexing BAU assumptions compared to outputs for shortlisted appraisal options.

Discounted to 2026 base year, expressed in 2024 prices (£)	Option A	Central BAU	High BAU
Total Reduction in Emissions	645,000	2,824,000	7,926,000
Total Monetised Benefit of Change in Emissions	£155m	£691m	£1911m
Total Monetised Benefit - Air Quality	£179m	£236m	£310m
Total Cost to operators of investing in abatement	£22m	£306m	£1351m
Total Administrative & Enforcement Costs	£179m	£179m	£179m
NPSV	£132m	£442m	£691m
Total Social Transfer	£1,009m	£18,200m	£48,000m

C5.4.4. The results of this sensitivity test demonstrate that the UK ETS delivers significantly greater GHG emissions reductions and monetised benefits when complementary decarbonisation policies underperform. The central appraisal assumes successful delivery of these complementary policies, which is considered the most likely scenario. However, the Central BAU and High BAU scenarios represent more extreme stress tests, where GHG emissions reductions are not delivered as expected by other measures.

C5.4.5. In these stress test scenarios, the UK ETS takes on a larger share of the decarbonisation burden. This drives additional abatement and places upward pressure on the carbon price. As a result, the NPSV increases to £442 million under the Central BAU scenario and £691 million under the High BAU scenario. These outcomes highlight the ETS's role as a backstop, guaranteeing emissions reductions even when other policies fall short.

C5.4.6. The higher NPSVs in these scenarios are accompanied by significantly increased social transfers, rising to £18,200 million and £48,000 million respectively. These reflect the inflationary impact on allowance prices, which increase as scarcity intensifies. This leads to larger financial flows from operators to government, reinforcing the ETS's function as a market-based mechanism that dynamically adjusts to policy delivery gaps.

C5.4.7. These findings confirm that the lower NPSVs observed in the central appraisal options are not indicative of poor policy design. Rather, they reflect the assumption that complementary policies will deliver most of the required abatement. The ETS plays more of a background role in this scenario, acting as a failsafe to ensure GHG emissions targets are met if other measures underperform.

C5.4.8. In summary, the sensitivity analysis demonstrates that the UK ETS scope expansion to domestic maritime is highly responsive to the wider policy environment. The preferred policy package performs well across all scenarios, and its value increases substantially when complementary policies underdeliver. This underscores the importance of maintaining a strong and flexible ETS as part of the UK's broader decarbonisation strategy.

C5.5. Fuel mix assumptions

C5.5.1. The final sensitivity test explores the impact of varying fuel mix assumptions on the monetised air quality benefits associated with UK ETS scope expansion to domestic maritime. In the central appraisal, air quality improvements are estimated based on a shift away from higher-emitting fuels, such as marine gas oil, towards lower-emission alternatives. These benefits are monetised using established valuation methods and contribute significantly to the overall NPSV across all options.

C5.5.2. While the central case assumes a representative fuel transition, this sensitivity tests the robustness of those assumptions. It considers alternative fuel mix scenarios, those produced for the Maritime Decarbonisation Strategy, to assess how changes in fuel choices might influence air quality outcomes. This is particularly important given that air quality benefits are a major driver of the positive NPSV in Option A, where the monetised benefit from abatement alone does not exceed the administrative burden. For further detail on the MDS fuel mix scenarios, refer to section 4 of the MDS analytical annex[76].

Table 11C. Impact of flexing fuel mix assumptions on modelled outputs for Option A.

Discounted to 2026 base year, expressed in 2024 prices (£)	**Option A - Central fuel mix assumption**	**Option A - More ammonia**	**Option A - No ammonia**	**Option A - More bio**
Total Reduction in Emissions	645,000	645,000	645,000	645,000
Total Monetised Benefit of Change in Emissions	£155m	£155m	£155m	£155m
Total Monetised Benefit - Air Quality	£179m	£205m	£181m	£417m
Total Cost to operators of investing in abatement	£22m	£22m	£22m	£22m
Total Administrative & Enforcement Costs	£179m	£179m	£179m	£179m
NPSV	£132m	£158m	£134m	£370m
Total Social Transfer	£1,900m	£1,900m	£1,900m	£1,900m

C5.5.3. The results of this sensitivity test show that air quality benefits, and therefore overall NPSV, are sensitive to assumptions about fuel switching in the domestic maritime sector. In the central scenario, air quality improvements are estimated at

[76] DfT (2025) Maritime Decarbonisation Strategy: Analytical Annex
https://assets.publishing.service.gov.uk/media/67e1417170323a45fe6a6fdb/dft-mds-analytical-annex.pdf

£179 million, resulting in an NPSV of £132 million. Under alternative fuel mix scenarios, air quality benefits range from £181 million to £417 million, with corresponding NPVs rising to £370 million in the most favourable case.

C5.5.4. These scenarios reflect different fuel mix outcomes, including increased uptake of ammonia or biofuels, or limited adoption of ammonia. While the total emissions reductions and carbon monetised benefits remain constant across all scenarios, the variation in air quality benefits demonstrates the importance of fuel choice in determining the overall societal value of the policy.

C5.5.5. All sensitivity tests on air quality impacts use the central damage cost value provided in the Government's valuation guidance. When applying the low damage cost sensitivity, the monetised air quality benefits fall significantly, reflecting the lower assumed societal cost of air pollutant emissions. Under this scenario, and assuming the central fuel mix, there is a monetised air quality benefit of £74 million, with a NPSV of £28 million.

C5.5.6. The NPSV remains positive across all fuel mix scenarios, and when utilising a "Low" damage cost sensitivity, reinforcing the robustness of the preferred policy package. However, the scale of benefit is clearly influenced by the extent of fuel switching. This highlights the importance of monitoring fuel use during implementation and ensuring that supporting policies and infrastructure are in place to enable the transition to lower-emission fuels.

Annex D: Wider Impacts

D1. Introduction

D1.1. The expansion of the UK ETS to include domestic maritime journeys is expected to result in a range of wider impacts, in addition to the quantified effects presented in Annexes B and C. These may include:

- Impacts on the competitiveness of the UK domestic maritime sector
- Risk of carbon leakage and modal shift
- Trade impacts
- Impacts on consumers through cost pass-through
- Regional impacts
- Equality impacts

D1.2. This annex qualitatively assesses the wider impacts of the policy, drawing on the best available evidence, including government commissioned research and early outcomes from similar policies implemented in other regions.

D1.3. Research commissioned by the Department for Transport and the former Department for Business, Energy and Industrial Strategy, and undertaken by Frontier Economics, assessed the potential risks of competitive disadvantage, carbon

leakage[77] and internal carbon displacement (i.e. mode shift) that could arise from the expansion of the UK ETS to the domestic maritime sector[78].

D1.4. The research focused on three routes between Great Britain and Northern Ireland: Heysham to Warrenpoint, Belfast to Liverpool, and Belfast to Southampton. The following sections present the findings of this research, referred to as the Frontier Economics research, in relation to each identified risk. Additional evidence is drawn from the monitoring of the implementation of the EU ETS expansion to the domestic maritime sector.

D2. Competition impacts

D2.1. Introduction

D2.1.1. This section considers the extent to which the expansion of the UK ETS to domestic maritime may limit the ability of suppliers, in this case providers of shipping services, and businesses that rely on these services, to compete in their respective markets.

D2.1.2. The vessels in scope of the expansion of the UK ETS to domestic maritime are part of several different markets, including passenger ferries, cruises, roll-on, roll-off (ro-ro) freight services[79], lift-on, lift-off (lo-lo) container services[80], and dry and liquid bulk freight services. Similarly, businesses which rely on freight services for transporting final goods, or as part of their supply chains, also compete in several markets, both domestically and internationally.

[77] **Carbon leakage** refers to the shift of emissions to other countries with laxer climate policies, typically as a result of stringent mitigation efforts in one region increasing costs for emissions-intensive industries.

[78] Frontier Economics (2023), 'Economic research on the impacts of carbon pricing on the UK domestic maritime sector', https://www.frontier-economics.com/media/5hmhnehy/the-impacts-of-the-uk -domestic maritime-sector-joining-the-uk-ets.pdf

[79] Roll-on, roll-off (ro-ro) freight services refer to shipping operations where vehicles and trailers are driven on and off vessels using built-in ramps, enabling efficient transport of wheeled cargo without the need for loading cranes.

[80] Lift-on, lift-off (lo-lo) freight services refer to shipping operations where cargo is loaded and unloaded using cranes, typically involving containers that are lifted vertically onto and off vessels.

D2.1.3. Most customers attach no intrinsic value to freight being transported by a particular mode on a particular route. This means that domestic maritime services tend to be substitutable for other ways of reaching the same endpoint via different routes, if these alternatives exist.

D2.1.4. Domestic maritime services also compete with other modes of transport within the broader international travel market. Measures that increase costs for certain shipping services, but not for alternative modes, may affect the wider transport market. This is considered further in Section 3 of this annex.

D2.2. **Risk of competitive disadvantage**

D2.2.1. As the UK ETS is expanded to include domestic maritime, shipping operators will face increased costs in the form of UK ETS allowance requirements, unless they take action to reduce emissions. The extent to which this could result in competitive disadvantage, carbon leakage or modal shift will depend on several factors:

- **Carbon cost exposure**. Routes with ship types with high emission intensities and minimal short term abatement options are considered to have a high carbon cost exposure and would therefore be more impacted by the introduction of a carbon price based on their fossil fuel consumption (and therefore more likely to try and find alternative routes to minimise this cost)
- **Likelihood of cost pass-through**. Operators would be more likely to pass through carbon costs (i.e. to increase the price they charge their customers to cover their higher costs) when market conditions mean their ability to sustainably absorb any cost changes is minimal (e.g. a highly competitive environment)
- **Likelihood of a shift to substitute options**. Customers may respond to an increase in shipping transport costs (where carbon costs have been passed through) by substituting to other routes that are not subject to a similar carbon cost, or other transport modes where this is feasible.
- **Potential degree of customer response.** Different types of customers will have different levels of price sensitivity. This is likely to be dependent on the characteristics of the cargo or passengers being transported (e.g. time sensitivity and volume/type of cargo)

D2.2.2. Competitive disadvantage may arise if businesses in the UK domestic maritime sector experience a significant adverse impact on their competitiveness, such as increased costs, relative to competitors.

D2.2.3. Operators may choose to pass through some or all of their additional costs to customers. Customers may respond by accepting higher prices or by reducing demand. The degree of cost pass-through depends on the market conditions in

which operators operate, while consumer response is influenced by the elasticity of demand.

D2.2.4. Research by Frontier Economics found that, due to relatively high cost pass-through and low demand elasticity in the domestic maritime sector, a material reduction in UK domestic maritime demand would only be expected at carbon prices significantly higher than current UK ETS allowance prices. This suggests that a substantial change in traffic levels is unlikely following the expansion of the UK ETS.

D2.2.5. For the three NI-GB case studies considered, the risk of competitive disadvantage was assessed to be low. This is due to the parallel expansion of the EU ETS to international maritime, which reduces cost differentials between competing journeys.

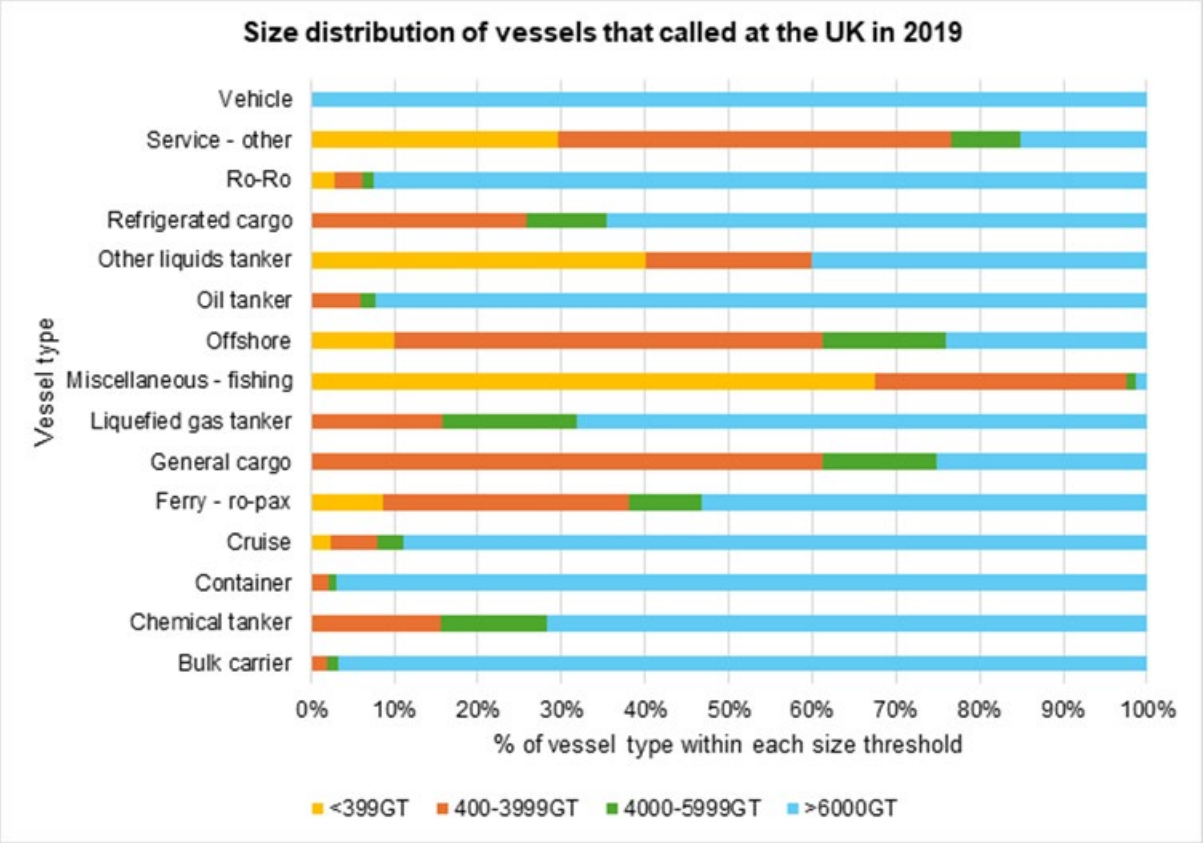
D2.2.6. More broadly, given the significant overlap between the UK domestic shipping market and the EU market, the expansion of the UK ETS to domestic maritime is not expected to disadvantage UK businesses relative to competitors. According to the DfT Domestic maritime Emissions Model, 97% of vessels engaged in UK domestic maritime activity in 2019 also carried out at least some domestic maritime activity in the EU.

D2.2.7. Competitive disadvantage might arise however where there are divergences from the EU policy. For example, if sectors exempted from the EU scheme were included within the UK scheme. This risk has been mitigated in the preferred policy option by aligning exemptions with the EU where possible. The ‘Do Maximum’ policy option, which does not include exemptions for offshore or fishing (unlike for the EU), could be seen to have greater competitiveness risks.

D2.2.8. Competitiveness impacts may also arise where operators within the same market are not uniformly subject to the UK ETS, due to vessel size thresholds. Figure 1D presents the size distribution of vessels that called at UK ports in 2019, based on the Department for Transport Domestic maritime Emissions Model.

D2.2.9. For 10 of the 15 vessel types analysed, over half of the vessels within each type exceeded 6,000 gross tonnage. For vessel types with a higher proportion of vessels below or near the 5,000 gross tonnage threshold, there may be greater potential for competitive distortion. The vessel types with the highest proportion of their fleet within the 4,000 to 6,000GT size threshold are liquefied gas tankers (16%), offshore (15%), general cargo (14%) and chemical tankers (13%).

Figure 1D. Size distribution of vessels that called at the UK in 2019. Source: DfT Domestic maritime Emissions Model



D2.2.10. Competitive disadvantage may also arise for businesses exporting to GB via ship, where they compete with GB-based businesses that can use other transport modes not subject to an equivalent carbon price. This is particularly relevant for NI exporters, as GB is NI's largest external market for trade[81]. The 50% surrender deduction between GB and NI will help to mitigate this impact.

D2.2.11. The evidence presented suggests that the expansion of the UK ETS to domestic maritime is unlikely to result in significant competitive disadvantage for UK operators. Market characteristics, such as low demand elasticity and high cost pass-through, indicate that substantial changes in demand are unlikely at current carbon price levels. The alignment of exemptions with the EU ETS, the high degree of overlap between UK and EU domestic maritime activity, and the 50% surrender reduction for Northern Ireland to Great Britain routes further mitigate competitiveness risks. While some risks remain,

[81] Great Britain remains NI's largest external market for Trade | Northern Ireland Statistics and Research Agency

particularly in relation to vessel size thresholds and policy divergence, these will be monitored following implementation.

D2.3. **Carbon leakage**

D2.3.1. In this context, carbon leakage refers to the displacement of greenhouse gas emissions from domestic maritime journeys included in the UK ETS, due to differences in carbon pricing across jurisdictions. Vessel operators may seek to avoid or reduce exposure to carbon pricing by altering routes to call at ports outside the scope of the scheme.

D2.3.2. For the three case studies examined in the Frontier Economics research, carbon leakage could involve operators switching to indirect routes via the Republic of Ireland. These would be classified as international voyages rather than UK domestic voyages, thereby avoiding the costs associated with the UK ETS.

D2.3.3. The research found the risk of carbon leakage in these case studies to be low. This is because the EU ETS already applies to 50% of international voyages to the EU, reducing the financial incentive to reroute. In addition, the decision to apply a 50% surrender deduction to journeys between Northern Ireland and Great Britain ensures carbon cost equivalence between the UK and the Republic of Ireland, effectively eliminating this risk.

D2.3.4. Within the EU ETS, transhipment ports located within 300 nautical miles of an EU member state are not considered port calls for the purposes of compliance[82]. This prevents ports such as Tanger Med in Morocco and Port Said in Egypt from being used to reduce EU ETS costs through transhipment. The only ports within 300 nautical miles of the UK that fall outside the scope of the EU ETS are those located in the Faroe Islands, approximately 215 nautical miles from the northern Scottish Isles, so the risk of transhipment for this purpose is considered low. Although the UK ETS expansion has not occurred concurrently with the EU ETS, the EU assessed the risk of carbon leakage to the UK and concluded that UK ports do not offer sufficient transhipment facilities compared to other EU ports[83].

[82] https://www.emsa.europa.eu/reducing-emissions/extension-ets/faq-extension-ets.html

[83] European Commission (2021) Study on EU ETS for domestic maritime transport and possible alternative operations of combinations to reduce greenhouse gas emissions Study on EU ETS for domestic maritime transport and possible alternative options of combinations to reduce greenhouse gas emissions - Publications Office of the EU (europa.eu) – Section 4.3.5. Box 4-4

D2.3.5. Further research into the EU ETS has reached similar conclusions. Transport & Environment[84] note that evasive port calls incur additional costs, including extra fuel, operational, port-call, and opportunity costs. For avoidance of the EU ETS to be financially viable, the compliance cost would need to be higher than the sum of all these extra costs. Their analysis suggests that the potential risk of policy evasion is very limited at the current carbon price levels. Research by CE Delft[85] found that, while avoidance of the EU ETS could not be ruled out, operational constraints of capacity limits in ports outside the scope of the scheme reduce the risk of transhipment.

D2.3.6. Early evidence following the expansion of the EU ETS to include domestic maritime has indicated limited evidence of transhipment or additional stops via the UK to avoid ETS charges, providing further support for the assessment of this risk as limited[86].

D2.3.7. There is a theoretical risk of carbon leakage from the UK ETS via Crown Dependencies, which are not within scope of the scheme. These include the Isle of Man, Jersey and Guernsey. However, the port facilities on these islands are not considered sufficient to support large-scale transhipment, and the financial incentives to do so are likely to be limited. This risk will be monitored following implementation of the scheme.

D2.3.8. The assessment of carbon leakage risks supports the case for expanding the UK ETS to domestic maritime. The evidence indicates that the potential for emissions displacement through route changes or transhipment is limited under current market and policy conditions. The alignment of exemptions with the EU ETS, particularly the 50% surrender deduction for Northern Ireland to Great Britain routes, further reduces the likelihood of carbon leakage. These findings suggest that the expansion is unlikely to undermine the environmental integrity or competitiveness of the UK domestic maritime sector.

D2.4. **Mode Shift**

D2.4.1. Internal carbon displacement in this context refers to a shift of emissions from domestic maritime journeys included in the UK ETS to other sectors of the UK economy, due to different levels of carbon pricing or climate regulation. This

[84] Transport & Environment (2020) All aboard: Too expensive for ships to evade EU carbon market ETS_shipping_study.pdf (transportenvironment.org)

[85] CE Delft (2022) Domestic maritime shipping and EU ETS: An assessment of the possibilities to evade ETS costs ce-delft-domestic maritime-shipping-eu-ets.pdf (portofrotterdam.com)

[86] Monitoring of the implementation of Directive 2003/87/EC in relation to domestic maritime

may take the form of mode shift, where travel or freight moves away from domestic maritime transport towards other modes outside the scope of the UK ETS, such as road or rail.

D2.4.2. The Frontier Economics research found the risk of mode shift to be low for the three case studies examined. This is primarily due to the limited availability of alternative transport modes between Great Britain and Northern Ireland, aside from aviation, which is already covered by the UK ETS.

D2.4.3. More broadly within mainland GB, there may be a risk that freight and passengers shift from domestic maritime transport to surface modes such as road or rail. However, domestic maritime passenger services around mainland UK that will be affected by the UK ETS are limited to those serving islands, where the only alternative is air travel[87]. Waterborne domestic freight is a relatively small mode within GB, though this could be at risk from mode shift. 216 billion tonne-kilometres of domestic freight were moved in the UK in 2022, with 12% moved by water[88].

D2.4.4. The evidence suggests that the risk of internal carbon displacement through mode shift is limited in the context of the UK ETS expansion to domestic maritime. The lack of viable alternative transport modes on key routes, the small share of waterborne freight in the UK, and the coverage of aviation under the UK ETS all contribute to a low likelihood of significant emissions displacement. These findings support the conclusion that the expansion is unlikely to result in substantial shifts to other transport modes.

D3. Trade impacts

D3.1. The expansion of the UK ETS to domestic maritime may have a marginal adverse effect on international trade and investment. However, the overall impact is expected to be low.

D3.2. The expansion will increase the cost of international trade with the UK via shipping, as emissions produced while at berth in UK ports during international journeys fall within the scope of the scheme. UK ETS allowances equivalent to these emissions will need to be surrendered.

[87] https://www.gov.uk/government/statistical-data-sets/sea-passenger-statistics-spas#uk-domestic-sea-passengers

[88] https://www.gov.uk/government/statistics/transport-statistics-great-britain-2023/transport-statistics-great-britain-2022-freight

D3.3. Emissions produced at berth in UK ports represent a small proportion of total emissions associated with international journeys. Data from the DfT Maritime Emissions Model suggests that, of the 165,000 port calls made by vessels over 5,000GT in 2019, the mean CO_2e produced while at berth in UK ports was just under 12 tonnes[89]. Using the DESNZ forecast ETS allowance price value for 2026 (£87/tCO2e[90]), this would add approximately £1,000 to the transport costs of each international journey to the UK.

D3.4. Data from Clarksons' Shipping Intelligence Network covering the dry bulk, tanker, container, and gas carrier sectors, suggest that average shipping operating costs (including crew costs) have ranged from $7,000-7,300 per day since 2023[91]. Average earnings for those sectors, as represented by the ClarkSea Index, have been approximately $23,600-25,000 per day in the same period. For spot voyages, earnings are net of brokerage commission, fuel, port, EU ETS and Fuel EU Maritime (where appropriate) costs. For time charter contracts, fuel and port costs are not borne by the ship owner.

D3.5. The additional cost associated with UK ETS compliance therefore is not expected to significantly affect the relative costs or earnings of international shipping operations. Transport costs represent a small proportion of the final costs of goods, as discussed in Section 5. Because transport is typically a derived demand, created by demand for traded goods, it tends to be price inelastic[92]. This implies a limited behavioural response to a small increase in price, and therefore any impact on trade volumes would be expected to be minimal. As mentioned in Section 2, the Frontier Economics research concluded that, overall, a significant change in UK domestic maritime traffic is not likely following expansion of the UK ETS.

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[89] Mean value: 11.96 tonnes CO_2. Median value: 2.3 tonnes CO_2. The mean value is inflated due to instances of vessels remaining at berth for particularly long periods of time (over 50 days). The mean value is used as a conservative upper value.

[90] Net Zero Strategy Aligned value for 2026, £2024 prices. https://www.gov.uk/government/publications/traded-carbon-values-used-for-modelling-purposes-2024/traded-carbon-values-used-for-modelling-purposes-2024

[91] Clarksons' Shipping Intelligence Network

[92] See, for example, the World Bank evidence review at https://documents1.worldbank.org/curated/en/573201468766481035/pdf/multi-page.pdf. Although this paper is from 1990, the fundamental economic theory has not changed. 0.5 central elasticity estimate for ocean shipping of general cargo (p27)

D3.6. Data suggests there has not been a major change in overall EU maritime activity following the phased expansion of the EU ETS to the maritime sector, including 50% of international journeys, from 1st January 2024. Total EU port calls from 1st January to 31st December 2024 were 0.25% higher than over the same period in 2023[93]. This supports the expectation that significant impacts are unlikely to result from the expansion of the UK ETS to domestic maritime.

D3.7. Overall, the analysis suggests that the expansion of the UK ETS to domestic maritime is unlikely to have a material impact on international trade. The cost implications for shipping are modest relative to overall operating costs and earnings, and transport costs remain a small component of final goods prices. Evidence from the EU ETS rollout and the Frontier Economics research further supports the conclusion that trade volumes are unlikely to be significantly affected.

D4. Indirect consumer impacts through cost pass-through

D4.1. Introduction

D4.1.1. Vessel owners and operators may respond to the costs associated with the policy by passing these costs on to consumers through price increases. A comprehensive assessment of the consumer impacts of UK ETS expansion is constrained by limited data on how operators are likely to respond.

D4.1.2. The following section presents existing evidence on cost pass-through and a discussion of the potential impact of the policy on consumers. These estimates do not inform the headline cost-benefit analysis and are intended to illustrate the possible scale of cost pass-through. They should be treated as highly uncertain.

D4.2. Existing evidence

[93] Clarksons' Shipping Intelligence Network

D4.1.3. The cost of owning/running ships comprises several components, including operating expenses (OpEx), voyage costs, maintenance costs and capital costs. Voyage costs comprise fuel costs, port costs, canal dues, and, recently, carbon emission allowances for vessels operating under active regulation like the EU ETS.

D4.1.4. Expansion of the UK ETS to the domestic maritime sector will result in increased costs to vessel operators, either in the form of paying for ETS allowances and/or from switching to a more expensive fuel or utilising energy saving measures/technologies to reduce their emissions.

D4.1.5. In response to the EU ETS, major shipping companies have announced their intention to pass on increased costs in the form of surcharges[94]. Hence, it is expected that any increases in voyage cost due to UK ETS will be passed on, at least in part, to charterers. This may occur directly when the vessel is leased out in a time-charter/bareboat contract or indirectly through Bunker Adjustment Factors in the spot market[95]. However, voyage costs are just part of the total costs, meaning that a 1% increase does not translate to a 1% increase in shipping transport costs. For example, for one vessel type, fuel costs are estimated to account for roughly half of the voyage costs and around one fifth of the total ship costs[96].

D4.1.6. According to UNCTAD, the ad valorem freight rate[97] for all commodities imported to the UK by sea in 2021 was 13%[98]. This tends to be higher for larger, low-value products such as furniture, and lower for smaller, high-value products. A higher ad valorem freight rate implies that increases in transport shipping costs will lead to greater changes to the commodity price. The extent of shipping companies' cost

[94] E.g. Container lines set out EU ETS surcharges (seatrade-domestic maritime.com); What the EU Emissions Trading System (EU ETS) means for shippers (wtagroup.com); OOCL and HMM the final top carriers to unveil EU ETS surcharge estimates - The Loadstar

[95] Bunker Adjustment Factors are surcharges applied to freight rates to account for fluctuations in marine fuel (bunker) prices, commonly used in both spot and long-term shipping markets.

[96] Based on indicative costs for a 10-year-old bulk carrier vessel, though this can vary depending on the vessel type and period. Source: Stopford, M., 2008. Domestic maritime Economics, 3rd edition, Taylor & Francis Group, Oxford.

[97] The percentage of a commodity's price attributed to the shipping transport cost.

[98] UNCTAD Trade and Transport Dataset
https://unctadstat.unctad.org/datacentre/dataviewer/US.TransportCosts

pass-through to their customers depends on the levels of market concentration, demand price elasticity, and substitutability of inputs[99].

D4.1.7. Freight rates for the charterers have historically fluctuated due to supply and demand shocks. The COVID-19 pandemic and wider supply chain disruptions led to record container freight rates in late 2021/early 2022, but evidence suggests that the impact on consumer prices and wider inflation was relatively low.

D4.1.8. According to UNCTAD[100], a 243% increase in container freight rates would lead to global import price levels increasing by 11%, with a one-year lag, and, in turn, to an increase in average consumer prices of just 1.5%.

D4.1.9. Similarly, the OECD found that a persistent increase in shipping transport costs of about 50% would lead to an increase in the Consumer Price Index of circa 0.2 percentage points one year after[101].

D4.1.10. The IMF[102] suggest that a 22% increase in global shipping transport costs raises domestic headline inflation by 0.15% over one year. However, it is worth noting that these shocks were unexpected and short-term, so the market may respond differently to a longer-term expected price increase, like the one from the UK ETS.

1. In April 2025, the IMO approved the IMO Net-Zero Framework which includes a pricing mechanism for GHG emissions. Although adoption of this measure was delayed at the meeting of the IMO's Maritime Environment Protection Committee in October 2025, several studies suggest that the potential impacts of such economic measures on consumers are expected to be relatively low overall:

- A meta-analysis of the relevant literature found that carbon prices applied to bunker fuels in the range of 10 to 50 USD/tCO_2 could increase shipping transport costs by

[99] European Commission (2021) Study on EU ETS for domestic maritime transport and possible alternative options of combinations to reduce greenhouse gas emissions - Publications Office of the EU (europa.eu)

[100] UNCTAD (2021) Review of Domestic maritime Transport 2021 - Chapter 3: Freight rates, domestic maritime transport costs and their impact on prices (unctad.org)

[101] OECD (202) OECD Economic Outlook, Volume 2021 Issue 1. Box 1.3 'Rising container shipping costs could push up near term inflation in OECD countries' OECD Economic Outlook, Volume 2021 Issue 1 | OECD Economic Outlook | OECD iLibrary (oecd-ilibrary.org)

[102] IMF (2022)

0.4 – 16%[103]. On average, this would increase the import prices of goods by less than 1%. Heavy, low-value commodities tended to exhibit relatively higher increases in compared to high-values ones.

- Analysis carried out for the International Chamber of Shipping (ICS suggested that a levy of below $100/t of CO_2 would not have a disproportionately negative impact on states, leading to a 0.6-4% increase in final goods' prices[104].
- Rojon et al. (2021) find that levies of under $50/t CO_2 equivalent result in less than 1% price increases[105].

D4.1.11. An assessment of the EU ETS expansion to domestic maritime concluded that, even under full cost pass-through, prices of commodities as iron ore and cereals would rise by less than 2% by 2050. Goods such as crude oil, organic chemicals, and perishable goods would largely be unaffected[106]. Similarly, Transport & Environment concluded that the likely impact of the EU ETS on seaborne transport costs would be negligible[107]. Specifically, it would increase shipping costs by 8 to 40 euros per twenty-foot Equivalent Unit (TEU)[108], representing a 1-5% increase in shipping transport costs, and less than a 0.8% increase in total transport costs. This would increase the price of a pair of shoes by a maximum of 0.80 cents, a banana by 0.08 cents, a TV by 10 cents, and a fridge by 80 cents.

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[103] Halim, R., Smith, T., & Englert, D. (2019). Understanding the Economic Impacts of Greenhouse Gas Mitigation Policies on Shipping: What Is the State of the Art of Current Modeling Approaches? (researchgate.net)

[104] ISWG-GHG-12-3-8-Initial-impact-assessment-on-States-of-a-carbon-levy-for-international-shipping-ICS.pdf (ics-shipping.org)

[105] Rojon, I. et al (2021) The impacts of carbon pricing on domestic maritime transport costs and their implications for developing economies - ScienceDirect

[106] Section 6.2.2.4 of COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT REPORT Accompanying the document DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union, Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and Regulation (EU) 2015/757 EUR-Lex - 52021SC0601 - EN - EUR-Lex (europa.eu)

[107] Transport & Environment (2022) Cost-of-clean-shipping-is-negligible-_-Case-study-for-6-green-e-fuels-and-stringent-ETS_Final_Corrected.pdf (transportenvironment.org)

[108] Twenty-foot Equivalent Unit (TEU) is a standardised measure used to describe the capacity of container ships and terminals, based on the volume of a 20-foot-long shipping container.

D4.1.12. The available evidence therefore suggests that the indirect consumer impacts of UK ETS expansion to domestic maritime, through cost pass-through, are likely to be modest. While operators are expected to pass on some costs, the overall effect on commodity prices and inflation is expected to be limited. This is consistent with findings from the EU ETS and international studies, which indicate that carbon pricing mechanisms in domestic maritime transport do not result in significant price increases for consumers.

D4.3. Further evidence from EU ETS

D4.3.1. On 1 January 2024, the EU expanded the EU ETS to include greenhouse gas emissions from vessels over 5,000 gross tonnage on intra-European voyages, and 50% of emissions from voyages that either begin or end at an EU port. The policy is being phased in, with operators required to surrender allowances for a gradually increasing share of their emissions until full coverage is reached on 1 January 2027.

D4.3.2. The earlier implementation date relative to the UK ETS expansion provides emerging evidence on how costs are being passed through to consumers. This evidence is summarised below.

D4.3.3. Analysis conducted as part of the EU's monitoring of the implementation indicates that the estimated additional costs to vessel operators are lower than the surcharge rates cited below Analysis of 2024 data, where 40% of emission allowances must be surrendered, estimates that the additional cost for a journey between Asia and Northern Europe is approximately 7 euros per TEU.

D4.3.4. Most major shipping lines have published their ETS surcharge estimates per TEU for different lengths of voyages, indicating full cost pass-through. For example:

D4.3.5. Asia – North Europe, the surcharge ranges from £14 per TEU to £23 per TEU.

D4.3.6. For a voyage from Asia – Mediterranean, the surcharge ranges from £9 per TEU to £20 per TEU.

D4.3.7. For a voyage from Europe – North America, the surcharge ranges from £20 per TEU to £40 per TEU[109].

D4.3.8. Analysis from the EU indicates that these responses by liner operators have been within the range of a 1-5% increase in container freight rates.

[109] What the EU Emissions Trading System (EU ETS) means for shippers

D4.3.9. The EU has also assessed the impact of the EU ETS expansion on short sea shipping routes and passenger ferry prices, indicating price increases of between 3% to 11% in 2024, however, this is dependent on the length of the route[110].

D4.3.10. Early evidence from the EU ETS expansion suggests that while shipping operators are passing through costs to customers, the resulting price increases remain modest. Surcharges have generally fallen within the range of 1% to 5% of container freight rates, and impacts on passenger ferry prices vary by route length. These findings support the expectation that the UK ETS expansion to domestic maritime is unlikely to result in significant consumer price increases.

D4.4. Estimated Impact on UK Consumers

D4.4.1. While the exact impact of the expansion of the UK ETS on consumers is uncertain, the overall impact is estimated to be small. This is based on the evidence of the shipping sector that indicates that the cost of transporting a good is only responsible for a small proportion of the final cost of a good.

D4.4.2. Furthermore, the low level of domestic maritime freight, relative to other modes of transport, reduces the risk of significant impacts to consumer prices in the UK.

D4.4.3. However, early evidence from the EU ETS indicates that operators have been able to pass-through over 100% of the estimated ETS costs in the form of environmental-related surcharges, which suggests that the introduction of the UK ETS could lead to increased transport costs for moving freight via domestic maritime in the UK. The extent to which these costs will be passed through to consumers via the final cost of the good remains uncertain.

D4.4.4. Consumers in Northern Ireland may be more exposed to any cost pass-through, due to their relatively higher reliance on goods moved via domestic maritime than GB consumers, though the overall impact is still expected to be minor. The exact impact is difficult to quantify, given the lack of data about the contents of containers travelling between Great Britain and Northern Ireland. However, drawing on the evidence outlined in Section 4.2, the proportion of transport costs within the final cost of a good are estimated to be small, therefore, the impact of the UK ETS on the total cost of producing and transporting a good that businesses face is likely to be minimal. Furthermore, a 50% surrender deduction has been applied to routes between Northern Ireland and Great Britain primarily to prevent re-routing via the

[110] Monitoring of the implementation of Directive 2003/87/EC in relation to domestic maritime

Republic of Ireland or other gaming behaviour, however, this measure will also ensure that businesses in Northern Ireland are not disproportionately impacted compared to competitors in the Republic of Ireland and the rest of Europe and partially mitigate the carbon price exposure faced by consumers in Northern Ireland.

D4.4.5. The extent of the additional costs and pass through to consumers will depend on the vessel and operator. However, initial analysis suggests that, on a selected route between Great Britain and Northern Ireland, the introduction of the UK ETS may lead to similar increases to transport costs as those seen in the EU ETS, outlined in Section 4.3.5.

D5. Small and micro business impact assessment (SaMBA)

D5.1. Small businesses are defined as those employing between 10 and 49 full-time equivalent (FTE) employees, while micro businesses are those employing between one and nine employees[111].

D5.2. The international shipping sector is not covered well by typical data sources such as DBT's business population estimates[112]. In the absence of data on the size of domestic maritime companies within the scope of the UK ETS, data from the Home Office on vessel crew sizes has been used as a proxy.

D5.3. Crew sizes vary by vessel type, operator and route, with passenger services typically requiring more crew than cargo vessels. To assess whether an operator might qualify as a small or micro business based on crew size, it is necessary to understand the typical ratio of seafarers to shore-based staff and off-vessel seafarers.

D5.4. The CEBR's Value of Shipping report[113] suggests that shore-based staff make up about one-third of UK-based employment in the shipping industry. Therefore, for this analysis, if a vessel has a crew of fewer than 30 and is operated by an organisation that does not operate any other vessels, it is assumed that the total number of

[111] https://assets.publishing.service.gov.uk/media/5d67a8c240f0b607c23ad897/RPC_Small_and_Micro_Business_Assessment__SaMBA___August_2019.pdf

[112] https://www.gov.uk/government/statistics/business-population-estimates-2024

[113] https://www.ukchamberofshipping.com/policy/prosperity/the-value-of-uk-shipping

employees is under 50, qualifying as a small or micro business[114]. This is a conservative approach, as businesses are likely to employ more crew than are on the vessel at any one time, and many companies may be subsidiaries of larger parent companies.

D5.5. There are limitations to this approach. For example, it assumes that crew are directly employed by the organisation liable for UK ETS costs, which may not be the case due to the complex organisational structures in the domestic maritime sector. Additionally, crew size data is only available for vessels that travel internationally and called at a UK port in the past 6 months. When crew size data was unavailable, it has been estimated based on other vessels with a similar gross tonnage and vessel type profile.

D5.6. UK ETS scope expansion only applies to vessels over 5,000GT calling at UK ports. Companies operating only small vessels are therefore not affected, which is assumed to exclude many smaller businesses. Vessel size is broadly correlated with business size, as a large vessel is a significant capital asset, typically owned by companies with the financial capacity to secure such assets.

D5.7. Approximately 4,900 vessels over 5,000GT called at UK ports in 2019[115], operated by around 2,000 operators[116]. Of these, 168 vessels over 5,000GT were operated by single-vessel companies. Approximately 145 of these vessels had a crew of less than 30 and can therefore be assumed to be operated by a small or micro business. This suggests around 7% of operators within scope are small businesses. The number of micro businesses is expected to be negligible, as this would require a crew of fewer than six, assuming that a third of employees are shore-based, which is unlikely for vessels over 5,000 GT.

D5.8. The UK ETS allowance price faced by businesses in scope of the scheme is based on the volume of GHG emissions. This means that, all else equal, the financial impact scales linearly with vessel activity. While vessel activity does not directly determine business size, it is likely to correlate with it, as companies operating more

[114] In some cases, a company owning two vessels could also theoretically fall below the 50-employee threshold (if both vessels had less than ~15 crew members each) but would be more likely to employ sufficient off-duty crew or shore-based staff to exceed 50.

[115] Analysis of DfT Domestic maritime Emissions Model data and MCA CERS data

[116] DESNZ analysis of MCA CERS data

or larger vessels are likely to be employing more people[117]. Therefore, the absolute impact of UK ETS expansion is expected to increase with business size, when expressed in terms of employee numbers.

D5.9. The administrative burden of complying with the UK ETS, such as familiarisation and reporting costs, as set out in Annex C, will not be dependent on any factors correlated with business size. These are fixed and create the same burden per business or per vessel. Larger businesses operating several vessels may experience proportionately lower administrative burdens, as they only need to produce one Emissions Monitoring Plan and one Annual Emissions Report for all vessels in their fleet. These businesses are also more likely to be within scope of the EU MRV scheme, which may result in operational efficiencies.

D5.10. This administrative burden will fall primarily on shore-side employees. Smaller businesses, which typically have fewer administrative staff may find these costs represent a larger share of their overall operating costs. Some small businesses that do lower levels of maritime activity may face higher administrative costs than UK ETS allowance obligations. However, policy options to exempt such businesses, for example through a de minimis threshold, were judged not to be practical, given they would still require the same level of data monitoring and reporting, and therefore administrative burden.

D6. Regional impacts

D6.1. Scope expansion of the UK ETS is not expected to result in significantly disproportionate impacts across the UK. However, in theory, if the scheme were applied uniformly on all routes, Northern Ireland may be more at risk of being affected than other regions given the reliance on domestic maritime for trade with GB.

D6.2. The tables below provide a breakdown of UK domestic maritime emissions by country, split into at-berth emissions and at sea emissions. At-sea emissions are attributed to the country of voyage origin, which may differ from destination. The data indicates that at-berth emissions are highest in English ports, while at sea emissions are highest from vessels where their journey began in Scotland when looking at all

[117] The more vessels a company owns, the more people it will be employing to crew them. A further effect is that vessels which are more active may require more individuals to be employed, as more active hours is likely to necessitate more changes of crew.

vessels, and equal between Scotland and England when looking at only vessels above 5,000GT.

D6.3. In practice, due to the 50% surrender deduction for routes between NI and GB, operators on these routes will face lower additional costs per journey compared to operators conducting voyages on routes that begin and end in GB. While this could result in relatively higher costs for businesses operating coastwise routes in England, Scotland and Wales, the impact is expected to be minimal.

Table 1D: UK domestic emissions by country and operational phase, million tonnes CO_2e, 2019.

UK Country	At berth ($MtCO_2e$)	At sea - origin country ($MtCO_2e$)
England	1.5	1.2
Scotland	0.7	1.6
Northern Ireland	0.1	0.3
Wales	0.3	0.1
Total	**2.7**	**3.2**

Note: Totals may differ due to rounding

Table 2D: UK domestic emissions by country and operational phase, vessels over 5,000GT, million tonnes CO_2e, 2019.

UK Country	At berth ($MtCO_2e$)	At sea - origin country ($MtCO_2e$)
England	1.1	0.6
Scotland	0.4	0.6
Northern Ireland	0.1	0.2
Wales	0.3	0.0
Total	**1.9**	**1.5**

D6.4. As outlined in Annex C, the majority of operators that will be responsible for purchasing allowances are not based in the UK. Based on operator data, approximately 4% of total operators impacted by the scheme are UK businesses. This suggests that regional disparities in terms of operators compliance obligations are likely to be minimal.

D6.5. As outlined in Section 2 of this annex, scope expansion may affect the competitiveness of businesses based in Northern Ireland that rely on domestic maritime to import and export their goods. This impact is difficult to avoid, but the 50% surrender deduction for NI-GB routes is intended to ensure equivalence with businesses in the Republic of Ireland and the rest of Europe.

D6.6. As outlined in Section 5 of this annex, the policy may have a minor impact the price of goods moved via domestic shipping. This impact may be felt more strongly by consumers in NI, given their reliance on trade with GB. While this impact is unavoidable, research indicates that the price effect is likely to be minimal, given the small proportion of transport costs in the final price of goods and early evidence from the EU ETS.

D6.7. Section 7 of the Islands (Scotland) Act 2018 requires that Relevant Authorities must have regard to island communities when implementing policy[118]. There are approximately 93 inhabited offshore islands in Scotland[119], the vast majority of which are not connected to mainland Great Britain by road. Around 10 ferries serving several of these islands, including Arran, Barra, and Orkney, are over 5,000 gross tonnage and would otherwise fall within the scope of the UK ETS expansion to the domestic maritime sector. As outlined in the Authority Response, a decision has been taken to exempt these services from the scheme. As a result, there are not expected to be any impacts on Scottish island communities. A full Islands Communities Impact Assessment has been carried out by Scottish Government.

D6.8. The UK ETS will not provide an exemption for the two Isle of Wight (IoW) ferry services in scope of the policy, unlike the exemption applied to Scotland's island and peninsula ferries. This reflects the Authority's assessment that the IoW has a larger population, greater access to essential services, and lower reliance on the mainland, resulting in less justification for exemption. While no distributional analysis has been undertaken for this decision, we acknowledge the potential for localised impacts.

D7. Innovation impacts

D7.1. The scope expansion of the UK ETS to cover domestic maritime is expected to promote innovation in decarbonisation technologies[120]. By reducing the price differential between fossil fuels and low-carbon alternatives, scope expansion may increase the demand for these technologies, particularly as ETS allowances prices increase over time.

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[118] Islands (Scotland) Act 2018 https://www.legislation.gov.uk/asp/2018/12

[119] As of 2011 census data, available at https://www.scotlandscensus.gov.uk/documents/inhabited-islands-analytical-report/

[120] UK Emissions Trading Scheme scope expansion: maritime (HTML) - GOV.UK

D7.2. Emerging research related to the EU ETS suggests that alternative fuels may become price-equivalent with fossil fuels if allowance prices reach sufficiently high levels[121]. While, based on current forecasts, this is unlikely to be realised in the short-term, lower ETS allowance prices are likely to drive innovation and investment in energy efficiency technologies that reduce fuel consumption and emissions.

D7.3. It is not possible to quantify the benefits associated with any potential innovation and investment in decarbonisation technologies as a result of the UK ETS expansion. Shipbuilding is a global industry, with most vessels constructed outside the UK. Therefore, any innovation driven by the UK ETS may not result in direct domestic benefit. However, the UK is supporting domestic shipbuilding and associated engineering sectors through the UK Shipping Office for Reducing Emissions (UK SHORE), which supports UK-based businesses to develop and scale decarbonisation technologies for the shipping sector[122].

D7.4. Examples of UK SHORE projects include the rollout of shore power facilities at the Port of Aberdeen, allowing vessels to reduce their emissions while at berth, and the launch of a new zero-emission electric ferry serving routes in Orkney.

D7.5. The expansion of the UK ETS should provide a greater incentive, beyond UK SHORE, to boost domestic investment and innovation into cleaner technologies. An early evaluation of the UK ETS showed that approximately 34% of respondents noted they were planning to 'invest in research, development, and innovation' in response to the UK ETS, with 28% of respondents planning to 'invest in R&D for deep decarbonisation technology', with similar impacts across the aviation and power generation sectors[123]. If these impacts are not sector-specific, a similar impact could be expected for the domestic maritime sector.

D8. Equalities impacts

D8.1. Equalities Impact Assessment

D8.1.1. The policy is not expected to have a negative impact on any groups with protected characteristics.

[121] Maritime emissions trading in the EU: Systematic literature review and policy assessment - ScienceDirect

[122] Evaluating UK Shipping Office for Reducing Emissions - GOV.UK

[123] Evaluation of the UK Emissions Trading Scheme: Phase 1 report

D8.1.2. The expansion of the UK ETS to the domestic maritime sector is not judged to be directly relevant to the Public Sector Equality Duty, as it only directly impacts businesses rather than specific groups or individuals. The scheme is expected to have some downstream impacts on people and households, as a result of the additional cost of the UK ETS being passed through to consumers through supply chains and on ticket prices. However, this is not expected to disproportionately impact any of the protected groups. Further detail is set out in a separate Equality Impact Assessment.

D8.2. Justice impacts

D8.2.1. The policy is not expected to have an impact on any element of the justice system, therefore a Justice Impact Test has not been carried out.