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Course to Zero Consultation
Maritime Environment, Technology and International Division, Maritime Directorate
Department for Transport
Zone 1-5, Floor 4
Great Minster House
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London
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06 October 2022

Dear Sir/Madam,

UK domestic maritime decarbonisation: plotting the course to zero

I write as Chief Executive of the Society of Maritime Industries (SMI) to share our views with regard to the Department for Transport's consultation on plotting the course to zero emissions in the domestic maritime sector.

The Society of Maritime Industries (SMI) is the trade association for the UK's maritime engineering, science and technology community – looking to enable maritime organisations of all sizes to thrive. This we do in various ways – including annual conferences, overseas events and trade missions. We support our members to raise their profile and enjoy meaningful collaborations. As a trusted advisor to the UK Government, we look to create new momentum and progress for the industry as a whole, and create new levels of maritime innovation, within our own member community and beyond.

Given its status as a major island nation, the maritime sector is a crucial part of the economy and is directly responsible for moving 95% of all UK imports and exports, worth in excess of £500 billion per year. At the same time, it still accounts for 3% of the UK's total greenhouse gas emissions due to the massive amount of traffic required to keep our nation fed, fuelled, and connected to the rest of the world.

Reducing the environmental impact of our vital maritime trade is essential to delivering on the objective of net zero carbon emissions by 2050. We are fully committed to working towards a more environmentally sustainable future and are deeply aware that the successful decarbonisation of the domestic maritime sector is an essential stepping stone towards decarbonising the whole economy before the middle of the century

To that end, SMI has enlisted the expertise of its members to answer the questions throughout this consultation with the level of detail necessary for government to make informed decisions going forward, particularly with the refresh of the Clean Maritime Plan in 2023. However, we have also taken the liberty to outline a number of general recommendations that, in our opinion, the Government should analyse and address prior to making a decision on the indicative industry targets and policy decisions with regard to the decarbonisation of the domestic maritime sector.

Chief Executive: Tom Chant

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Broadening the scope of engagement with industry

While the Department for Transport has proved to be a reliable interlocutor between government and industry, SMI believes that the scale of the challenge involving domestic maritime decarbonisation requires the Government to broaden the scope of its engagement with industry. This would entail a more proactive engagement between industry and government departments such as the Department for Business, Energy and Industrial Strategy (BEIS), the Department for Environment, Food and Rural Affairs (DEFRA), and the Department for Levelling Up, Housing and Communities (DLUHC), and the Ministry of Defence (MoD).

Focusing on our strengths

It is positive to see such an ambitious vision to the decarbonisation of the domestic maritime sector throughout the consultation, SMI thinks that government and industry would benefit from 'stratifying' their collective approach to decarbonisation, with a view to identifying and prioritising those sectors where clean technology is already available (workboats and short-sea shipping) against those where there are still fewer options (e.g. deep-sea shipping). The consultation would benefit from updating its evidence base and reframing the scope of decarbonisation with a focus on electrification, hydrogen, and methanol instead of concentrating predominantly on ammonia.

Leading by example

In his foreword to the consultation call, the Minister for Maritime stated that achieving decarbonisation requires a "team effort" in order to succeed, which involved collaboration from industry. While fully espousing this sentiment, SMI would urge the Government to adopt a more coherent approach to this issue. Many of our members expressed their disappointment at the fact that government vessels are not included in the scope of this consultation, giving the impression – rightly or wrongly – that the Government lacked coherence in its asks. We think that the Government should lead by example and include military vessels and its fleet within the scope of this consultation, as well as linking up these proposals with the key principles set out in the National Shipbuilding Strategy (NSbS) refresh.

The importance of investment and incentives

Bringing about maritime decarbonisation undoubtedly requires unprecedented levels of collaboration between industry and government. Industry has made great strides in cutting its emission levels by almost a third over the last thirty years but there is much more to be done, if we are to achieve net zero by 2050. There are a number of fundamental barriers to industry going further and faster, including shipping industry structures (split incentives) and uncertainty over technology selection. The Government has an important part in enabling industry to go further by investing in the research & development of clean maritime technologies and the deployment of green infrastructure supporting these technologies.

We hope that our submission will prove to be a constructive contribution to your work. If you require any further information, please do not hesitate to get in contact with SMI's Policy and Research Manager, Giorgio Buttironi, at Giorgio.Buttironi@maritimeindustries.org.

Yours faithfully,

A handwritten signature in black ink, appearing to read 'T. Chant'.

Tom Chant
Chief Executive, Society of Maritime Industries (SMI)

CONSULTATION ON UK DOMESTIC MARITIME DECARBONISATION: PLOTTING THE COURSE TO ZERO

A RESPONSE FROM THE SOCIETY OF MARITIME INDUSTRIES (SMI)

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

The decarbonisation of the domestic maritime sector is certainly an ambitious endeavour and the level of detail that this consultation has gone into shows that the Government understands the central role of our industry in making sure that the UK achieves its legislative target of net zero carbon emissions by 2050. Following the announcement of £206 million to establish the UK Shipping Office for Reducing Emissions (UK SHORE) in March 2022, it is reassuring to see that the Government is committed to this objective.

The technology necessary to drive decarbonisation in many areas of our domestic fleet is rapidly maturing and we believe that an accelerated take up is entirely possible. This will however require increased investment, commercialisation risk and collaboration between stakeholders throughout the maritime enterprise to achieve. In particular, joint working between Government and industry will be required to identify and implement incentivisation mechanisms to accelerate the transition.

One subsector of the maritime industry which appears to be largely absent from the 2019 body of evidence, but which could have a more ambitious timeline for decarbonisation, concerns offshore renewable energy. Operation Zero has set ambitious targets for the sub sector and the combination of operating cycles and the inherent electrical generation of the offshore developments lend themselves to vessel electrification in particular.

However, this example highlights issues with the body of evidence that the Government has employed throughout this consultation to map the pathways towards domestic maritime decarbonisation (including the Net Zero Strategy pathway). The research underpinning the Net Zero Strategy pathway, which is used as a baseline scenario in this consultation, was commissioned to inform the Clean Maritime Plan published in July 2019. Taking into account the economic challenges resulting from the COVID-19 pandemic, the UK's new position outside of the EU, and the current economic outlook facing the UK following the Russian invasion of Ukraine, in addition to the planned expansion of offshore renewables development, it is concerning that a landmark government consultation on such an important policy subject for the domestic maritime sector is informed by an outdated body of evidence.

SMI would encourage the Government to update its evidence base underpinning future pathways to decarbonisation in the domestic maritime sector, as this would provide a more up-to-date and realistic set of scenarios for industry going forward.

2. What role do you think the following alternative fuels and energies may play in decarbonising domestic maritime sector vessels (within your subsector, if appropriate)? What evidence do you have to support this opinion?

- a. Low carbon hydrogen
- b. Low carbon hydrogen-derived fuels like ammonia or synthetics e.g. methanol or methane etc. equipped with carbon capture systems
- c. Electricity and battery technologies
- d. Onboard renewables e.g. Wind or Solar

- e. **Nuclear power**
- f. **Biofuels (please include the generation and associated production process of biofuel(s) of interest)**
- g. **LNG**
- h. **Any other alternative fuels and energies which have not been presented or examined here, that may be important in the UK domestic maritime sector's decarbonisation.**

When considering whether certain specific types of fuels and/or propulsion technologies have the potential to play a more leading role in the decarbonisation of the domestic maritime sector, our members argued that we need to be honest about the trade-offs involved in this process, but they also talked about the importance of adopting a smarter approach to the strategy for maritime decarbonisation.

The consultation would benefit from a technical revision to diversify its current scope, which seems to give 'ammonia' a fairly predominant status as a future fuel in the pathways to maritime decarbonisation by 2050, towards electrification, hydrogen and methanol. This suggestion is supported by the considerable amounts of energy and significant costs associated with producing ammonia, factors that would have implications on other sectors beyond maritime.

At the same time, we need to adopt a smarter and more stratified approach to decarbonisation, one that involves identifying where clean technology is both currently available and potentially capable of making a difference today. While it is difficult to see an alternative to diesel for transoceanic voyages in the short- to medium-term, we should focus on advancing decarbonisation in areas where clean technologies allow for improvement. For instance, industry and government should work together on enabling the roll-out of clean propulsion technologies on short-sea routes and/or in the offshore wind maintenance and operation fleet, rather than trying to find solutions for every part of the maritime sector at the same time. Electricity generation by offshore renewable developments is another potential energy source that will be important in the UK domestic maritime sector's decarbonisation.

3. What value do you think different efficiency and energy saving measures could have in helping to achieve domestic maritime vessel decarbonisation (in your sub-sector, if appropriate)?

Efficiency and energy saving measures have an important role to play in helping to achieve domestic maritime vessel decarbonisation. They will be important even when adopting alternative fuels as an aid to improving performance and reducing costs. One particular efficiency and energy saving measure that has not been included in the body of evidence so far is ultrasonic or electromagnetic protection of hull and saltwater systems from marine growth.

Technology	Applicable Sectors										Savings	
	Bulk Carrier	Container	Cruise Passenger	Gas	General Cargo	Refrigerated Cargo	ROPAX	Tanker	RORO Cargo / Vehicle	Other Vessels	Approx. Fuel Savings %	ROI Period
Air Lubrication Systems	X	X	X	X	X	X	X	X	X		5%	5-7 Yrs
Waste Heat Recovery Systems	X	X	X	X	X	X	X	X	X	X	3-12%	20 Yrs
Sails / Wing Sails & Rotor Sails	X	X		X	X	X		X	X		6-12%	5-6 Yrs
Propeller; Contra-rotating propellers	X	X	X	X	X	X	X	X	X		6%	3 Yrs
Shore Power	X	X	X	X	X	X	X	X	X	X	2-5%	4 Yrs
Propeller; Control Pitch Propeller	X	X	X	X	X	X	X	X	X		2-3%	6-7 Yrs
Bulbous Bow (BB) - optimisation	X	X	X	X	X	X	X	X	X		2-3%	3-4 Yrs
Pre & Post Swirl Devices	X	X	X	X	X	X	X	X	X	X	2-5%	1-2 Yrs
Hull Cleaning	X	X	X	X	X	X	X	X	X	X	7-12%	<1 Yr
Just In Time / Route/Voyage Optimization / e-Navigation	X	X	X	X	X	X	X	X	X	X	1-7%	<1 Yr
Wake Equalising Ducts	X	X	X	X	X	X	X	X	X		2-3%	1-2 Yrs
Kites	X	X		X	X	X		X	X		-	20+ Yrs
Propeller Boss Cap Fin (PBCF)	X	X	X	X	X	X	X	X	X	X	2-3%	1-2 Yrs
Solar Panels	X		X	X	X	X	X	X	X		<1%	>25 Yrs
Fuel / Trim / Speed / Hull Optimization – Performance Monitoring	X	X	X	X	X	X	X	X	X	X	1-7%	<1 Yr
AziPod			X							X	2-3%	15 Yrs

Upcoming technologies include carbon capture onboard, fuel cell, and alternative fuels. The Return on Investment (RoI) period illustrated within the table has been obtained by taking the average cost of the technology to identify the capital expenditure, minus the savings obtained in both tonnes of fuel (at a price of 500 USD per tonne of fuel) and CO2 price levy (at the IMO published rate of 100 USD per tonne of CO2).

4. How should the technological transitions required to decarbonise the domestic maritime sector best be supported? What evidence do you have to help refine our understanding in this area?

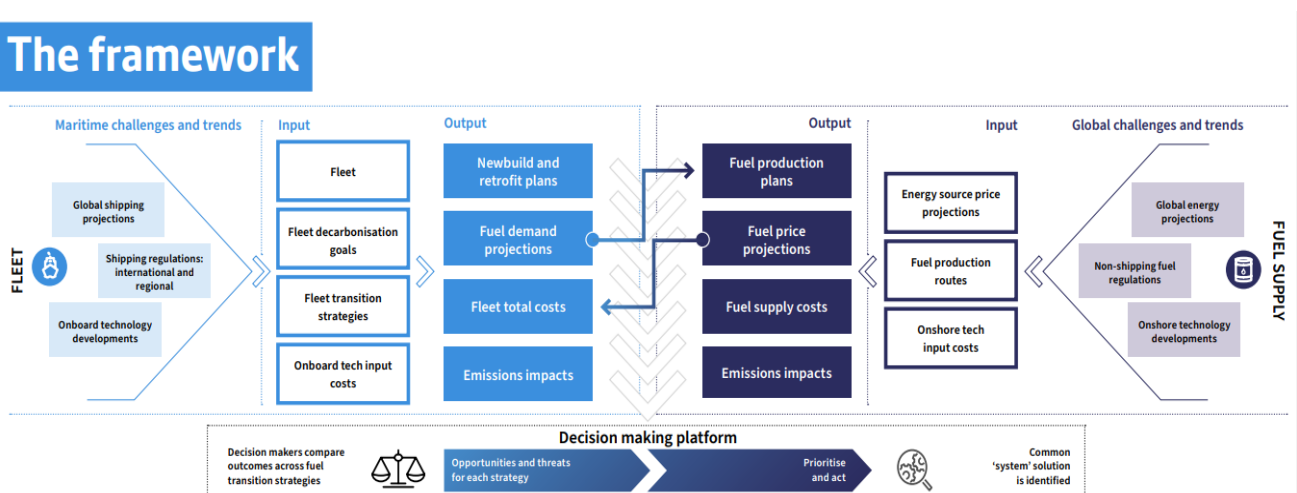
As highlighted earlier, the technology necessary to drive decarbonisation in many areas of our domestic fleet is rapidly maturing and we believe that an accelerated take up is entirely possible. This will require however, increased investment, commercialisation risk and collaboration between stakeholders throughout the maritime enterprise to achieve. In particular, joint working between Government and industry will be required to identify and implement incentivisation mechanisms to accelerate the transition. Ship refit and conversion will be important opportunities for ship owners and

operators to decarbonise and any incentive schemes should extend to include refit and conversion within their scope.

5. Are you able to provide any additional evidence on the costs and benefits associated with decarbonising UK domestic maritime vessels?

The cost of a hybrid propulsion chain is significantly higher than either a traditional diesel engine prime mover or a fully electric propulsor. It also adds significant weight to the vessel, which in turn requires greater power to move through the water. Estimates from SMI member HamiltonJet forecast a doubling in the cost for the propulsion train within hybrid vessels. With that in mind, HamiltonJet would recommend taking a leap of faith and moving straight to fully electric vessels for offshore CTVs, where they can charge both at the “home port” and in the field Wind Turbine power sources at wind turbines. Alternative fuels such as ammonia or hydrogen are other possible answers, but only if they can be sourced as green fuels.

A specific decarbonisation study would also be needed to establish costs and benefits associated with decarbonising the UK domestic maritime space, including the vessels (which are one element of the space). There are many technological solutions under development, but business cases remain unproven and investment levels are insufficient to drive zero carbon fuels to commercial viability and with a scale that can impact government’s targets. Lloyds Registers’ (LR) report provides a methodology for detailed comparison of different fuel transition pathways for a shipping fleet of a given vessel type and trade route. This generally applicable framework addresses the challenge holistically, considering both on-board ship and fuel supply chain perspectives. This detailed report will help stakeholders quantify the risks both inside and outside of their sphere of control. LR experts have applied the framework to a fleet of containership feeders operating between Singapore, Hong Kong, and other Asian countries nearby. This provides a concrete example of the use of the framework to support development of a green corridor – a zero-emission maritime route between two or more ports.



[The First movers in shipping's decarbonisation A framework for getting started](#) provides a solid template that could be considered to truly assess the costs and benefits for the UK maritime industry through the various fuel and technology transition pathways.

The associated operational expenditure savings from these reduced emissions are proportionally similar and extend through life to OPEX. In addition, the maintenance costs of aluminium vessels are

significantly less than those for steel with painting requirements either substantially different or removed entirely. These reduces other environmental impacts. SMI member OCEA Group is able to offer capital expenditure prices less than those for an equivalent steel vessel, despite the higher costs of aluminium over steel. This is because 40% less material is required in construction combined with competitive manufacturing processes. Aluminium, like steel, is an energy intensive material to produce from its original ore (bauxite), but it is the third most prevalent element on earth and it is recyclable up to 8 times (compared to 3-4 times for steel). Recycled aluminium requires 5% of the energy required compared to extraction for bauxite and we are constructing vessels made from 70% recycled aluminium to ensure a minimal environmental footprint in whole cycle ship manufacture and operation.

6. How should intermediary, indicative decarbonisation targets for UK domestic maritime sector vessel emissions be formulated?

SMI supports the Government's intention for the intermediary targets to be published in the refreshed Clean Maritime Plan in 2023 to be indicative, rather than statutory legal targets. We believe however, that given the different approaches and timelines for decarbonisation possible within the domestic maritime sector, that the targets should be stratified by sub sector. They should be specified both by percentages of overall fleet take up in 5-year intervals and by dates by which new build and/or existing vessels should be made zero emission. Consideration could even be given to specifying target levels of performance in terms of the IMO measures including the Energy Efficiency Design Index (EEDI), Ship Energy Efficiency Plan (SEEMP), Energy Efficiency Existing Ship Index (EEXI) and/or the Carbon Intensity Indicator (CII), or similar for smaller vessels.

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

Having a reliable supply chain that can provide the necessary novel fuels is a key part of the decarbonisation process. There is a currently a limited supply chain for much of the new fuels mentioned throughout the consultation, which makes it difficult for operators to achieve their net zero aims and leaves the sector stuck in a 'chicken and egg' scenario. For instance, our members told SMI that a number of their customers have encountered difficulties in procuring a reliable source of LNG for their maritime operations, arguing that this problem is especially acute in remote areas away from the 'LNG-receiving' regions of the UK (e.g. Grain LNG in Kent and Milford Haven in Pembrokeshire).

8. Which international policies, programmes, and initiatives do you expect will have the most impact on how the UK's domestic maritime sector decarbonises?

The increasing number of international policies, programmes and initiatives for driving decarbonisation are welcome and will all have either a direct or indirect effect in promoting zero emission technologies and fuels. The existing initiative most likely to have an effect on the UK's domestic maritime sector is likely to be Operation Zero, given the significant increase in vessels required to support offshore renewable development and the availability of the necessary technology and energy sources. There is the opportunity however, for new and more specific initiatives focused on the UK domestic sector, based on collaboration between port infrastructure, vessel owners and operators and the UK maritime engineering industry.

Additionally, our members have indicated that the setting of international standards on synthetic fuels will be essential in helping shipowners understand which propulsion technologies can be considered viable, something which would – in turn – enable further investment in one or more given solutions.

9. What do you think are the key lessons from international policies, programmes, and initiatives that we should consider in our approach to decarbonising the UK domestic maritime sector?

As touched on in the answers to Questions 1 and 6, our members believe that the UK could benefit from focussing on areas of the sector where quick wins are possible and devote our efforts to bringing about decarbonisation of the domestic fleet. Following the example of Norway on local ferries, the UK should focus on the decarbonisation of short-range vessels, where the technology is already available to make significant gains.

10. Are there any additional interventions targeting economic barriers that the government could explore introducing to complement and enhance our current approach, in the short, medium, and long term?

Given the challenging economic landscape in the aftermath of the COVID-19 pandemic, there is a level of uncertainty over how to transition towards net zero by 2050, particularly in light of increased demand for shipped goods and the globalisation of product manufacture.

The Government has a key role to play in bridging the competitiveness gap that exists in the maritime sector by helping to unlock further private investment in coastal communities through co-investment in the research and development of green propulsion technologies, as well as the deployment of green infrastructure at ports and on inland waterways. Another key aspect of this role for government also consists of enabling pro-green investment in technologies that have the potential to make a difference today, but remain economically unaffordable. In this context, the challenge lies in bridging the economic viability gap when investment decisions on potentially ground-breaking technologies are made.

Further government investment towards decarbonisation is essential for the UK to fulfil its ambition to be a world maritime leader and the Government would benefit from following the example set by other jurisdictions such as Norway and the Netherlands.

11. What are the potential benefits and impacts of mandating or incentivising the incorporation of energy efficiency and energy saving measures on board domestic maritime vessels, where possible?

As previously stated, energy efficiency and energy saving measures have an important role to play in reducing the emissions of the UK domestic maritime sector. Mandating their adoption is difficult due to the variety of measures available and their variable suitability for different use cases. It could also create financial difficulties in implementation. Incentivising adoption in different ways, including through financial measures could help to make the necessary business cases for investment.

12. What are the potential benefits and impacts of developing a zero-emission capability standard, either as a mandate or incentive for new ships? What do you think is a reasonable definition of zero-emission capability?

Mandating zero emission capability standards for new ships is a different matter. This would force the necessary investment, with compromises possible elsewhere to enable affordability. Incentivisation through additional financial measures would also help to accelerate adoption. The Carbon Intensity Indicator (CII), or similar for smaller vessels would provide a reasonable approach for defining zero-emission capability.

13. Are you aware of any domestic or international regulatory measures that you think currently discourage progress toward maritime decarbonisation, and should be reviewed by the government?

There are no specific measures that come to mind.

14. Which regulatory interventions do you think the government should support in the short, medium, and long term to help accelerate decarbonisation and complement existing plans and proposals?

In the short term, regulating the carbon intensity of fuels used in domestic maritime journeys would help to drive transition. It would also help to drive standardisation of the various alternative fuels which will also help to promote adoption and drive cost efficiencies.

Rather than focusing on the type of regulatory interventions, the Government should consider switching from a prescriptive to a more 'goal-based' approach to regulation, as it would be more likely to yield positive results in terms of innovation. There are examples in the defence industry (see the Naval Ship Code) that improving the regulatory environment in which innovators operate could increase the pace of change and reduce the risks associated with innovative projects.

15. What are the benefits and impacts of mandating the carbon intensity of fuels and energies used in the domestic maritime sector?

As highlighted above, the benefits of mandating the carbon intensity of fuels used in the domestic maritime sector including helping to drive and define standardisation of fuels which in turn will help to promote their adoption and drive cost efficiencies.

16. What more can the government do to help convene the maritime industry, connect, coordinate, and support its collaborative efforts to decarbonise the sector?

Given the importance of the endeavour beyond maritime and the multiple complex and significant barriers to decarbonisation across the sector, a proactive Government approach is crucial to enabling decarbonisation. The challenges are too great for the private sector alone to overcome and the Government alone can clearly not achieve the aim. Joint working between Government and industry will be required to help convene the maritime industry, connect, coordinate, and support its collaborative efforts to decarbonise the sector.

Training is an important part of any effort to decarbonise. Future mariners will have to quickly get to grips with the technologies on offer and there is likely to be a wide variety of different propulsion options in the future, with specialisms in each. Collaboration between OEMs, ship owners/operators and training providers, together with regulators, is necessary to ensure a seamless flow of information to make training efficient, effective, and best value for money. It is likely that the government will need to facilitate this to ensure maximum engagement from all stakeholders and to ensure that there are sufficient, qualified operators in future.

17. Does government have a role in providing advice or greater clarity on the technology and investment options for the domestic fleet?

The Government has a role to play in ensuring a smoother flow of information between stakeholders and providing a regulatory environment that supports the development of new technologies. Taking

the MoD's 'Defence Lines of Development' as a template, it would be good to see thinking across the transversal issues that will enable new technologies to be successfully implemented along with all the ancillary requirements of growing such an industry.

Sharing information and understanding is vital; a research sharing initiative could be a simple and powerful way to promote this.

We do not believe the Government's commitment to technology neutrality is a barrier at this stage given the uncertainties over the best way ahead across sub sectors.

18. Should the government explore options to disincentivise contractual behaviours which are creating a structural barrier to decarbonisation? How should government approach this?

Only where there is a clear and widespread held view that the behaviours are detrimental to reducing emissions.

19. How do you think the UK's MRV system could be improved to help support public and consumer engagement with maritime decarbonisation?

The UK's MRV system should be expanded beyond cargo and passenger vessels to include all elements of the domestic maritime sector and the GRT threshold lowered to include smaller vessels. Publishing the data is an effective way of incentivising better performance and exposing the barriers to decarbonisation. The MRV system should also be applicable to government fleets.

20. What role do you think the government should play in encouraging public and consumer investment in maritime decarbonisation efforts?

Education is a key part of the effort. The maritime sector is often seen as the 'hidden' industry, despite the fact that every part of the UK economy depends on it. Educating the public on the new technologies, and the opportunities to get involved from a STEM outreach perspective, could ensure that we have the skills to keep the industry growing and to catch up with other nations who are further ahead.

21. Do you have any other comments to share with us, about any aspect of domestic maritime decarbonisation?

SMI welcomes the Government's decision to consult on a path to bring about decarbonisation in the domestic maritime sector, particularly since achieving this objective is essential to attaining the wider ambition of net zero carbon emissions for the UK by the middle of century. Throughout the proposals, the Government has outlined the importance of industry engagement and collaboration as a crucial element to the success of this strategy. However, our members were disappointed that the government's own fleet does not seem to fall within the scope of this consultation, while also noting that the proposals in question are considered in relative isolation from the principles set out in the NSbS Refresh published in March 2022. As mentioned in the introductory letter to our response, the Government should include its fleet within the scope of this consultation and align these proposals with the key principles set out in the NSbS Refresh.

22. Do you have any other comments?

See our comments in our covering letter. Thank you for the opportunity to provide our thoughts.