Our own path to Net Zero
What does decarbonisation mean for safe and prosperous Clyde fishing?

Fisher-led workshops to identify skills needs for net zero fishing vessels in the Clyde
Glasgow, Friday 17 March & Campbeltown, Saturday 18 March 2023

Net zero commitments by governments and seafood supply chains have led to a push to develop alternative methods of powering fishing vessels, but rapid changes in vessel propulsion could create skills deficits for fishers and associated businesses. Fisher knowledge must be central to discussions around safe and practical decarbonisation of fishing vessels, to meet the expectations of customers and regulators. FIS and the CFT hosted these workshops to better understand local need and capacity for Clyde communities to be part of a decarbonised seafood industry.

Scotland's Blue Economy Vision is that by 2045 "*Marine sectors and their supply chains are decarbonised using energy efficient fuels and processes… supported by a skilled workforce*". These workshops brought together fishers, vessel designers, engineers, regulators, ports representatives and training experts to consider what might be needed to develop this skilled workforce and support the Clyde region in a truly just transition to using novel fuels at sea.

A summary of needs identified by participants.

"Until someone bites the bullet and builds or retrofits a net zero fishing vessel, it's all just talk."

Need 1: Prototype, proof-of-concept fishing vessels reflecting types suitable for Clyde fisheries. These vessels could be Clyde-built as part of the regeneration of maritime industry in the area, which would become a knowledge centre of the costs, skills, capacities, consents, and infrastructure required to retrofit and rebuild a modern fishing fleet. Immediate steps should be analyses into prospective costs of constructing or converting vessels, current regulatory barriers, and port infrastructure requirements.

"Instead of being pioneers of technology that works for us, we'll be left with what doesn't work."

Need 2: A fuel transition roadmap specific to Clyde fisheries, developed and supported by fishers, port authorities, policy makers, regulators, vessel designers and builders, skills development experts and supply chains, to establish a viable, coordinated and timely route to change that is fit for purpose for Clyde fishing businesses and communities.

"For an individual, finding funding is mentally and physically crippling."

Need 3: A one-stop shop for technical, financial, and regulatory advice on adopting new technologies. This support hub would assist fishers in identifying and applying to relevant grants, and improve communication with authorities on consenting regimes and policy consultations to support adoption.

"It's natural and easy for a vibrant fishing fleet to look to the future, but here in the Clyde…"

Need 4: Actions to improve fishing literacy and therefore the perception of Clyde fisheries as a modern, carbon conscious industry. This improved social licence will contribute to attracting new entrants, funding, and collaboration with other sectors and industries.

A summary of discussions

Too early to know what to train for – but changes to training regimes must reflect our future.

"Gone will be the days when you can go down to the engine room and sort something yourself".

It is too soon in the net zero transition to define what skills gaps are likely for Clyde fisheries. However, conversations must begin now to understand the range of gaps that will need to be filled across the various technologies and fleets.

Even at this early stage, there would be benefits in close collaboration between the fishing industry, government, and training providers to mitigate against skills shortages, and prepare for the new training regulations currently under consultation, particularly in relation to the implications of novel fuel use on health and safety, vessel risk assessments, and drills and pollution.

Training for engineering opportunities arising from new technologies should be developed, and made available to all fishing sectors. Marine colleges, training providers and organisations such as Seafish could help ensure that courses and programs are tailored to all fishing sectors. For example, electrification training currently focused on high voltage for larger boats should be adapted to suit small vessels changing to battery power. A lack of funding for training and an uncertain regulatory environment must not leave any fishing sector behind.

Path forward: Training providers and organisations such as Seafish could ensure that the views and needs of Clyde fishers, and their supporting industries, are heard in consultations on new safety training requirements and provision, and regulators should develop proactive and supportive partnerships with fishers wishing to adopt new technologies.

Crewing issues affect this as all else

"How many fishermen will we have by the time we get to Net Zero?"

The fishing industry already faces challenges in attracting new talent, with perceptions of the job being 'dirty and difficult' and offering 'limited prospects' (1). Recent crew shortages on the west coast of Scotland have been exasperated by changes in immigration rules post-Brexit, disproportionately effecting vessels on the Clyde and resulting in many boats struggling to meet the minimum levels of qualified crew required to even go out to sea. These fundamental issues around crewing will need to be addressed alongside considering additional training needs related to novel fuels.

Novel fuels will require a greater reliance on supporting engineering skills from onshore, and less ability for mechanical maintenance/servicing direct from crew; because of the higher potential risks associated with the alternative fuels currently in consideration.

Transferability of skills between sectors can be a selling point for courses and training programs, enabling individuals to work in multiple industries. Net zero and technical challenges could interest the younger generation already committed to climate issues. Training that is transferable between sectors could attract new entrants and so help alleviate crew shortages – although this would depend on fisher wages being competitive with other industries.

Path forward: Attract a new generation of climate-savvy fishers though innovative short courses, and new courses focussed on the future of fuels, in collaboration with schools, colleges, training hubs and other sectors in the Clyde area. A framework of certifications around alternative fuels, transferable between maritime sectors, will attract and retain crew that are highly skilled and ready for future changes in the maritime sector.

Trust in real world, tested technical advice

"Failing to invest in new technology, training and infrastructure now could leave fleets unviable."

Currently, no alternative fuels are as affordable, accessible, safe, or space efficient as diesel. Each would require more complicated tank, piping and safety requirements taking up more space onboard fishing vessels. In most cases, net zero vessels would have to be larger to match the operation of an existing diesel vessel, which would significantly increase capital costs and crew requirements.

Regardless of these difficulties, Clyde skippers and vessel owners must prepare for net zero targets, supply chain requirements and a forecasted reduced availability of diesel. Failure to test and invest in new technologies that meet Clyde fishers' specific needs is simply too risky - other industries will push technology and infrastructure in a direction that is unsuitable for Clyde fisheries, resulting in the high risk of stranded assets, and unviable and uncompliant businesses. To navigate this transition period and remain commercially viable, Clyde fishers must be able to access specialist advice. This advice cannot be based on a theoretical or general understanding, but on a practical, real world understanding of the vessels and environment relevant to the Clyde.

Path forward: Building or retrofitting a prototype vessel of a type relevant to Clyde fisheries is the only way to develop a true and trusted understanding of the issues faced by fishers, trainers, regulators and funders in the Clyde's path to net zero. An accurate cost analysis of constructing or converting a fishing vessel over 10m in length to methanol will build a comprehensive understanding of the costs involved, and how grants, preferential loans, and similar financial instruments could facilitate this transition.

A parallel study should assess the timescales, strategies, and costs associated with modifying port infrastructure to accommodate the transition to alternative fuels. Once these analyses are complete, a proposal can be submitted to relevant funders and investors to garner support for Scotland's prototype net zero fishing vessels.

Financial support and business advice is critical

"The first net zero fishing vessels won't be as commercially competitive as existing diesel vessels."

All fuel alternatives are currently more expensive than diesel in terms of capital costs and, with the exception of electric options, operational costs. Transition must make business sense for all Clyde sectors, who must be supported to make informed financial decisions in order to remain competitive while making progress towards net zero. Fishers need free, expert advice on funding opportunities and finance tools such as preferential loans and public/private investment.

Path forward: Establish a support hub that provides guidance on net zero targets, fuel options, funding, and compliance, to help fishers make informed financial decisions as net zero targets approach. This one-stop shop would support fishers in developing a business case for transition, identify necessary changes in funding mechanisms to better support small fishing businesses, and explore finance tools and policies for adopting new technologies. Additionally, the hub would facilitate improved communication with relevant organisations, such as the MCA and Marine Scotland.

Planning for a truly 'just' transition

"Fishers are already at the bottom of the pecking order when it comes to access to resources."

Clyde fisheries need and deserve a long term plan for a positive, net zero future. The plan should be co-designed with fishers, and aim to retrofit and rebuild the fleet with fuel-conserving and carbon-reducing vessels that promote fishing efficiency, high welfare, and crew comfort. The CFT's 'Vision Document' A-Vision-The-Clyde-Fishery-Short-Version.pdf (clydefishermenstrust.com) would serve as a

foundation for this effort. A wholesale fleet retrofit or replacement can then be incentivised through credits for those who transition towards lower emissions.

Fishers should highlight the positive changes and existing practices they are engaged with to produce low carbon products. The seafood supply chain infrastructure relies on the balance of different catches, from various vessel and gear types, so no sector must be left behind and all must be recognised for taking practical steps towards net zero.

Training is just one piece of the alternative fuels jigsaw – other considerations are high cost and low availability, space and storage, port infrastructure, and permissions to convert vessels. The seafood industry needs cross-sector finance, planning and support to stay safe and competitive.

Path forward: Build on the CFT's 'Vision Document' with a tailored roadmap for the Clyde fishing industry, developed in partnership with fishers and coastal communities, that includes adaptation, effective communication, and improving fishing literacy amongst decision makers and the wider public. By establishing a social license to operate, public acceptance and support for Clyde fishers can be enhanced, paving the way for a sustainable and equitable transition.

Removing regulatory barriers

"Nothing is as efficient than diesel, so we'll need to fish differently and think differently."

Regulation must align with policy targets to ensure they are not counterproductive. For example, current fisheries management and vessel safety restrictions on a vessel's length, power, gross tonnage, or other factors, may force vessel owners to choose between adopting new technologies and maintaining fishing capacity.

An understanding of regulatory barriers to becoming a modern, climate conscious fleet adoption of alternative fuels is needed, as is the knowledge to advocate change to outdated regulations. Currently, our understanding is driven by those fishers who are early adopters of new technologies coming up against regulatory barriers and having to navigate their way through, at personal expense. A more supportive, less costly way forward for fishers would be for regulators to anticipate potential issues and proactively advise fishers as to suitable routes to adoption.

Path forward: An audit of existing regulation would reveal where regulation currently *disincentivises* the transition to net zero. This audit would also highlight counterproductive restrictions to testing and adopting alternative fuels and propulsion systems. Solutions may include seeking exemptions for experimentation or implementing alternative licensing systems. Active participation in discussions and consultations will ensure the fishing industry's voice is heard in shaping supportive regulations.

A summary of presentations

Fiona Matheson – author of the CFT report 'A Vision: The Clyde Fishery'

The Role of Net Zero in Developing the Clyde Fishing Industry

Fiona opened the workshops by referring to the vision document for the future of the Clyde fishery. This looks towards a bright, positive future of possibility for the Clyde fishery, and sets a baseline of the economic, regulatory, political and cultural environment in which it operates (A-Vision-The-Clyde-Fishery-Short-Version.pdf (clydefishermenstrust.com)

Fishing has been central to the Clyde economy for hundreds of years, and still holds great economic importance for many rural communities. Fiona warns that history is rife with immediate, unjust

transitions from traditional industries. Lessons have been learned that just transition depends on inclusive dialogue rather than a fixed set of rules.

Without a just *paced* transition, Clyde communities can suffer economic and social hardship. The Clyde fishery has its own challenges, with an aging fleet and lack of new, skilled entrants. A just transition to Net Zero should be incentivised as part of an integrated fishing development strategy for the Clyde, which provides for fleet replacement, food resilience and circular economy benefits, and a social safety net to scaffold communities during transition.

Duncan Boag – naval architect, Macduff Ship Design

Concept Designs for Net Zero Vessels

Duncan presented the work Macduff Ship Design has undertaken for FIS looking at concept designs for net zero fishing vessels (www.fisorg.uk/net-zero-fishing-vessels-report) This looks at how using alternative fuels, power systems and drivetrains could replicate the capabilities of three different existing diesel-powered fishing vessels.

He advised that the study has shown net zero fuels are currently no match for diesel-powered fishing vessels but failing to invest in this technology and the associated safety, training and infrastructure now could leave fleets unviable.

Duncan shared concept designs produced as part of the second phase of this project – due to publish soon and funded by the Marine Fund Scotland. These designs show that battery-electric appears to be the best option for a smaller static gear vessels, with methanol also plausible. For medium and large trawlers, the designs point to methanol options being the most plausible. These concepts help to show the technical, regulatory and financial barriers preventing the uptake of new technology by the UK fishing industry.

All alternative fuels present additional dangers, costs, and challenges in comparison to diesel. The designs shown had significant additional safety spaces and systems compared to diesel to mitigate the dangers. Until demonstrator vessels are built it is uncertain how regulators will view the approval of these. Successful and safe operation of these demonstrators will be needed to prove to regulators, fishers and the public that these vessels are safe.

With government net zero targets two decades away, it might seem an attractive option to stick with diesel vessels and worry about it when the deadline arrives. However, it would be catastrophic for the industry if, by these deadlines, many fishing vessels are not compliant with net zero legislation and are therefore prevented from operating.

Lachlan Paterson – Fish Industry Training Association

Training Considerations for Transitioning to Net Zero

Lachlan spoke about the challenges presented by the transition to Net Zero. Many fishers are concerned about more regulations being enforced on top to what is already difficult regulatory landscape. Because of this, some fishers are reluctant to engage in conversations around Net Zero, as they already have so much on their plate, with new training and safety regulations on the horizon.

Lachlan stressed the need for better communication to engage the industry in this discussion, and expressed concerns around crew shortages and the impact of this on fishing communities, especially in areas away from the fishing hubs of the North East and Shetland. He posed the question: “How many fishermen will we have by the time we get to Net Zero?”.

The resilience of the Clyde fishing communities was noted, having survived many challenges and bolstering the economy and culture of rural coastal communities. However, there are significant concerns about how many of the aging fleet would be able to adopt new technologies, in terms of cost, skills and technical feasibility

Lachlan stressed the importance of addressing the concerns of fishermen around this issue and being careful as to how the message of transition is conveyed. The seafood supply chain is reliant on a balance of different vessels, gear types and catches and as such, a one-sized-fits-all approach may not be suitable for every sector.

He concluded by urging the industry to learn from the experience of other sectors in terms of skills development and adopting fit for purpose technologies and practices. His insights on the potential challenges facing the fishing industry during the net zero transition emphasised the need for careful planning and communication to ensure the best possible outcomes for all stakeholders.

Dr Magnus Johnson - University of Hull

Research into Small Vessel Electrification

Recent research by Magnus' team at the University of Hull, in collaboration with the National Federation of Fishermen's Organisations, aimed to understand the potential for electrifying the fishing fleet, focusing on small-scale fishing. Interviews were conducted with skippers in three different areas in the UK, to get their perspective on electrification or alternative propulsion for their vessels. Magnus asked questions about fishing methods, fuel usage, and opinions on electrification. Most skippers were interested in electrification if it saved them money.

The study found that different fleets have varying needs and practices. It suggested that a hybrid system with a battery, generator, and electric motor might be a good solution for potting fleets. However, as yet there are no off-the-shelf systems available. Infrastructure for charging boats also needs to be improved, especially in rural areas. As more electric cars require charging points, harbours will likely have more charging points available for vessels too.

Efficiency is a key concern for electrifying fishing boats. Behavioural changes can also significantly reduce fuel consumption, such as reducing engine RPM and using the correct propeller. Magnus concluded that electrification of fishing fleets is a complex issue, with different solutions needed for different fleets and locations. Efficiency and infrastructure improvements are crucial, but policy and regulations must also adapt to support this transition.

Douglas Chirnside & Hans Unkles - Local Vessel Owners

First hand experience in implementing Net Zero Technologies.

"I had to step back to go forward but it's so liberating to be producer and not a consumer of fuel – I can work less, fish less and have the same money in my pocket"

Douglas shared his experience of transitioning from a large diesel-powered catamaran to a small, more efficient electric vessel. He noted that he used to burn 50 gallons of diesel per trip but now can sometimes return to shore having effectively the same amount of fuel as when he left thanks to an on-board solar panel charging the battery which drives his motor whilst he is out at sea.

The smaller boat allows him to catch less produce, as he has far fewer overheads to meet. He also noted the benefits of energy independence, the reduction in breakdowns, fewer servicing costs and not having to be exposed to diesel fumes. However, he noted some draw backs to converting vessels to electric. Current technologies are only suitable for a few sectors, and limitations on fuel density mean

that it is not feasible for larger boats or extended trips. There also high initial costs to meet. Despite these challenges, the overall cost of transitioning to electric is lower than purchasing a new diesel-powered boat, especially when funding is available to covering a portion of the costs.

"Compliance and funding is a pain in the arse but this has been the most refreshing and rewarding build of my life."

Hans expects that fishing 2-3 days per week on his newly refitted electric <8m vessel will be almost as cost efficient as fishing daily when he relied on diesel. Catching less and making the same money is a model that will work well for him and the restaurants he supplies.

Hans stressed that the components and hardware needed for this type of vessel conversion are readily accessible, and conversion is within the capabilities of any decent boatyard. However, establishing compliance with underdeveloped regulations has been hugely costly for Hans, and accessing funding has been incredibly time-consuming.

To make electric vessels more viable, the inshore industry needs to look at their businesses and fishing operations a bit differently and, but fishers do need guidance and financial support to adapt to new technologies. This guidance should create conditions for fishers to test new technologies over periods of time, to make sure these are fit for purpose for their specific environments and businesses.

A key issue for the future is whether inshore fishers can afford to build new electric vessels or even convert existing boats, such as second-hand Cygnus models. Both Hans and Douglas posed the question: how many fishers will risk this investment faced with the pressures and uncertainties of the introduction of policies such as Highly Protected Marine Reserves and new medical requirements?

Professor Chris Smith - Centre for Future Clean Mobility, University of Exeter

Safety and Training in Other Sectors

Chris discussed the decline in diesel usage and the impact this will have on the diesel supply chain, as well as the increasing importance of alternative propulsion systems in the maritime industry. As diesel demand falls rapidly, the maritime industry will need to shift towards electric vehicles, alternative fuels, and hybrid powertrains. This transition will require extensive training for maritime professionals and the development of regulatory frameworks to support the adoption of new propulsion technologies. Approximately 80,000 people will require training in alternative propulsion systems by 2030, with few current offerings available.

Chris highlighted the potential of energy storage options like lithium batteries, hydrogen gas, ammonia, and methanol. Lithium batteries can be a safe alternative to diesel but require proper thermal management and training for high-voltage systems. Hydrogen, ammonia, and methanol are alternative fuels that can be used in combustion engines or fuel cells, each with their own challenges in terms of storage, toxicity, and stability.

The transition to alternative fuels may involve complex hybrid systems, requiring new skills and higher costs. Despite these challenges, Chris emphasised the benefits of transition directly to electric and alternative fuel systems instead of relying on diesel engines, which have lower efficiency rates.

Regulatory frameworks are being developed to facilitate the adoption of alternative fuels in the maritime sector. The MCA is partnering on a project funded by the Regulators' Pioneer Fund to develop regulations for a new class of vessel, with a prototype vessel expected to pave the way for full classification approval in two years. The project is seeking fishers to be part of a user group to share their experiences and knowledge.

Participant List

Duncan Boag Naval Architect, Fishing Vessel Manager - Macduff Ship Design
Jonathan Brown Technical Director - Malin Group
Kara Brydson Executive Director - Fisheries Innovation & Sustainability
Shelagh Cameron Local Community Member
Douglas Chirnside Fisher, Electric Vessel Owner, Boat Builder
Chris Dunn Managing Director - Malin Marine Consultants
Tommy Finn Fisher, Vice Chair of Clyde Fishermen's Association
Dr Clive Fox Scottish Association for Marine Science
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Matt Horton Head of Partnerships & Operations - City of Glasgow International
Dr Magnus Johnson University of Hull
Simon Macdonald Chair of West Coast Regional Inshore Fisheries Group.
Kenneth MacNab Fisher, Chair of Clyde Fishermen's Trust, Chair of Clyde Fishermen's Association
James MacNab Fisher
Colin McArthur Fisher, Harbour Master, Clyde Fishermen's Association Branch Representative
Douglas McKie Marine Surveyor - Maritime & Coastguard Agency
Fiona Matheson Author of the 'Vision Document' - Clyde Fishermen's Association
Don Mitchell Head of Curriculum & Project Director - Marine Training Centre
Alistair Morris Senior Offshore Wind Associate - Carbon Trust
Lachlan Paterson Fisher, Fishing Industry Trainer - The Fish Industry Training Association
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Hans Unkles Fisher, Electric Vessel Owner, Boat Builder
Heather Unkles Local Community Member
Lorna Unkles Local Community Member
Jonathan Walker Project Manager (Arts, Education and Culture) - Clyde Fishermen's Trust
Elaine White CEO of Clyde Fishermen's Trust, Executive Secretary of Clyde Fishermen's Association
Ian F White King's Harbour Master Clyde - Port Operations Director - Royal Navy

The Clyde Fishermen's Trust is a local, community-led fishing charity dedicated to supporting and revitalising the wider Clyde and west of Scotland areas. **www.clydefishermenstrust.com**

FIS is a coalition of experts driving strategic innovation for a prosperous & sustainable UK seafood industry.

Our remit is to facilitate, coordinate & leverage investment for innovation in UK seafood.

Fisheries Innovation & Sustainability

www.fisorg.uk

The workshops were made possible thanks to support from the Lloyd's Register Foundation