Energy transition and Decarbonisation of the fishing fleet : the Low Impact Fishers of Europe (LIFE)'s Perspective

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1. Introduction. Why is the Energy Transition important?

The critical importance of the ocean for sustaining life on Earth and human survival is widely understood[1]. Global warming and associated climate change are impacting biodiversity and marine ecosystem resilience, changing the way the ocean behaves and undermining its capacity to support life on earth.

Described as the defining crisis of our time, climate change is affecting human society as a whole and having a major impact on our seas, fisheries and our fishing sector. At the same time, increasing energy demands with a high dependence on fossil fuels are amongst the key drivers of many of the current geopolitical conflicts.

In December 2019, the European Commission (EC) unveiled the EU Green Deal, a set of policies and laws designed to reduce Europe's Greenhouse Gas (GHG) emissions to at least 55% of 1990 levels by 2030, and to net zero by 2050, in accordance with the parameters established by the Paris Agreement (adopted by the COP21 at the UN Climate Conference in Paris in December 2015). The Green Deal also includes a Biodiversity Strategy and a Nature Protection Package, with proposals for a transition to a sustainable food system. At the same time, in February 2023 the European Commission announced a "Pact for Fisheries and Oceans", a package of EC proposals for the fisheries sector which includes a Communication on the Energy Transition of the EU Fisheries and Aquaculture sector[2].

Fisheries, Food systems and carbon emissions

Food production is responsible for over a quarter of anthropogenic greenhouse gas (GHG) emissions globally (26%)[3], and about 26% of humanity's Ecological Footprint[4]. However, the fisheries sector is not a major contributor to GHG emissions. By using energy only to extract what nature has already produced, **fishing is able to put animal protein on our plates with a relatively lower carbon footprint compared to livestock rearing or aquaculture production.** Globally, fisheries account for 0.1 - 0.5% of total GHG emissions[5] (compared to aquaculture at 0.78 and much less than agricultural production), with EU fisheries contributing 3% of global fisheries GHG emissions.

However, that is only one side of the coin. **Large-scale fishing (LSF) is an energy intensive extractive industry, and LSF activities aggravate the climate crisis** by contributing to overfishing[6], impacting

[1] Brierley, A. S., and Kingsford, M. J. (2009). Impacts of climate change on marine organisms and ecosystems. Curr. Biol. 19, R602–R614. doi: 10.1016/j.cub.2009. 05.046

[2] https://oceans-and-fisheries.ec.europa.eu/publications/communication-commission-energy-transition-eu-fisheries-and-aquaculture-sector_en

[3] Poore, J., & Nemecek, T. (2018). Reducing food's environmental impacts through producers and consumers. Science, 360 (6392), 987-992.

[4] Mailhes and Galli, Global Sustainability Transition Hinges on Food (2017). Published by Global Footprint Network

[5] Impact of Climate Change on Fisheries and Aquaculture, FAO 2018 https://www.fao.org/3/CA0356EN/ca0356en.pdf

[6] Sumaila U.R. and Tai, T. (2020), End overfishing and increase the resilience of the ocean to climate change. Front. Mar. Sci., 15 July 2020, Sec. Marine Fisheries, Aquaculture and Living Resources. https://doi.org/10.3389/fmars.2020.00523

marine biodiversity and marine food webs, degrading and reducing the resilience of marine ecosystems, and disrupting carbon sequestration and storage. Furthermore, current assessments of carbon emissions based on "sea to port" only provide a partial picture of fishing's carbon footprint. The post-harvest value chain, "from port to plate", produces significant GHGs in transporting (often long distance for processing in Asian countries and back again to markets in Europe), processing, storage, packaging (with high use of plastics), and waste treatment - incurring significant waste along its length.

The carbon footprint of the fisheries sector may therefore be underestimated and needs to be assessed in a more holistic way. **The interconnectedness of the climate crisis with the biodiversity crisis is also an issue that the fisheries sector must address**. Scientific literature draws attention to the synergies between reducing overfishing and improvements in fish stock and marine ecosystem health and increased resilience of marine ecosystems to the effects of climate change.

Energy transition in fisheries must therefore be carried out in a strategic, coordinated and coherent way, in line with the Biodiversity Strategy as outlined in the EU Action Plan to Protect and Restore Marine Ecosystems, and with fisheries management policies geared towards stock recovery and ending overfishing.

LIFE insists that there must be a just transition towards carbon-neutral fisheries in Europe that effectively safeguard and restore marine biodiversity, while strengthening coastal communities and with SSF key actors in it.

The fisheries sector has an important contribution to make towards achieving climate targets, including a reduced carbon footprint. Maintaining the *status quo* is not an option and an energy transition must start without delay. However, the fisheries sector, especially the small-scale fleet segment, is living through a crisis, with highly uncertain future prospects due to ever diminishing stocks of fish at sea, lack of secure access to resources, lack of access to markets, increasing costs, and a lack of generational renewal. **SSF needs to be valued, brought back into the mainstream, and given the recognition it deserves as a key player in European fisheries of the future**.

2. Energy Transition and SSF - Key Statements

2.1. A 2050 Vision Needed for alternative models of production and consumption.

In the longer term, fishing faces numerous challenges, including evolving from a 20th century extractive activity, into a fit for purpose 21st century sustainable seafood producing sector as part of the rapidly developing Blue Economy. However, **as yet there is no common understanding or vision of what a sustainable and zero carbon seafood production sector should look like in 2050 or what role fishing will play in the Blue Economy**. What is clear, seafood production and fishing must change in line with sustainability necessities and blue economy development, and as such will be markedly different in 2050 compared to today.

Without a clear alternative vision, the direction of travel - or rather drift - would seem to be towards algae, aquaculture, synthetic protein, surimi and analogue fish all playing a larger role, and fishing a much smaller role. Also with climate change, biodiversity loss and other environmental impacts changing the availability of traditional stocks. This drift must be halted, but it needs courage and imagination to envision and plan for an alternative future, with a profitable, low impact fishing sector and thriving food secure coastal communities at the centre.

LIFE's vision is one where small-scale and low impact fisheries play a much more central role in food security, anchoring socio-economic activity in coastal communities, and as key agents of change towards better managed, more productive, sustainable fisheries. Small-scale low impact fisheries are part of the solution, not part of the problem.

2.2. Ending overfishing and reducing energy use as key strategies to conserve Blue Carbon and tackle climate change

The social and economic benefits of ending overfishing are generally well-known and well-understood; there are direct positive consequences for the fisheries sector and coastal communities in doing so. However, the link between ending overfishing and reversing the climate crisis is less well understood. There are at least 5 ways in which ending overfishing can increase the resilience of fish stocks and the marine ecosystem in the face of climate change. They include: increasing resilience by leaving more fish in the ocean, by maintaining the structure of marine food webs and by ensuring rich and diverse marine habitats and ecosystems. Maintaining the structure of the marine food web and conserving healthy marine habitats and ecosystems will in turn ensure that carbon sequestration and storage in the marine environment is optimised.

The fishing sector itself can contribute to reducing the amount of CO2 in the atmosphere through emitting less CO2 directly by switching to low carbon technologies. The sequestration of higher levels of CO2 can be achieved by having more fish in the ocean and healthy coastal ecosystems (especially seagrass beds and coastal wetlands). Plankton and small pelagic fish play a vital role in priming the ocean's carbon pump, boosting the ocean's role as a major sink for CO2 - estimated to hold 90% of the planet's stored CO2. Healthy coastal ecosystems can remove carbon at 10 times the rate of tropical forests, healthy seagrass beds store 11% of the ocean's buried carbon, and ocean sediments store vast amounts of carbon - the world's largest pool of non-fossil carbon. The carbon in these sediments can remain stored for thousands to millions of years, unless disturbed and resuspended in the water column. Fishing has the power to conserve or destroy these vital processes.

This highlights the importance of including a wider array of objectives for **energy transition, rather than just focusing on carbon emission reduction. Account must also be taken of how the marine environment sequesters and stores carbon (Blue Carbon), and measures applied that improve carbon storage mechanisms and boost carbon storage in the ocean**.

In a more generalised way, larger fish stocks would contribute to decarbonisation by reducing the requirement for so much fishing effort, and by increasing carbon sequestration. Fish stocks play an important role in carbon sequestration and storage through marine food webs. Fishing, especially

overfishing and destructive fishing, has the potential to significantly undermine carbon storage and sequestration by fishing down the food chain, depleting biodiversity, weakening trophic structures, and weakening the gene pool. This is increasingly scientifically recognised, as stated for example by ICES in a recent report[7].

Therefore, in order to decrease emissions and increase carbon sequestration, energy transition also needs to be aligned with and complement the Marine Action Plan and CFP implementation to achieve **ending overfishing, rebuilding fish stocks, and reducing the impact of carbon intensive, high impact fishing practices, especially those directly impacting the seabed**.

Of equal importance for reducing emissions is to reduce the total amount of energy used, rather than just changing the energy source from high to low carbon. To achieve this, **LIFE believes there is a need to rethink the current EU fisheries model and to promote a general reduction in the use of energy across the fisheries sector, in absolute terms**.

This is why LIFE also calls for a **strategic approach**, **shifting us away from carbon intensive, high volume, mono-specific high impact fishing to low carbon, selective, polyvalent low impact fishing**, phasing out of some kinds of fishing operations whilst giving priority to those fishery activities that have the least environmental impact and greatest socio-economic benefits through the application of Article 17.

2.3. Small Scale Low Impact Fisheries: Key Part of the Solution

The fisheries sector is not uniform and not all fisheries segments have the same impact. The STECF AER Report for 2023 (STECF 23-07) notes that the total average fuel consumption per landed tonne was 587 litre in 2021 for the SSF fleet [8]. According to data in the report, the SSF fleet segment uses 8.3% of the total of 1.8 billion litres consumed by the EU fleet over all, a relatively minor share. At the same time, the number of jobs and added value generated per litre of fuel is higher than for larger scale fleets. The strategic significance of the SSF sector is therefore in terms of the jobs and other socioeconomic benefits it generates, and the diversity of species rather than the quantities of fish landed. It therefore has a key role to play in securing a just transition to a zero carbon low environmental impact future for European fisheries, especially when measured against socio-economic criteria and environmental. If given favourable policies, SSF could increase its role as a source of food security, but successive CFP's have served to marginalise this vital sector.

Small-scale fishers are already taking measures to decrease their carbon footprint, and there are several examples of their good practices achieving results (including through reduced time at sea, minimising distance to the fishing grounds and through establishing more direct marketing arrangements), collaborating with scientists, and undertaking pilot projects to use alternative sources

[7] ICES. 2024. Workshop on Assessing the Impact of Fishing on Oceanic Carbon (WKFISHCARBON; outputs from 2023 meeting). ICES Scientific Reports. 6:12. 63 pp. https://doi.org/10.17895/ices.pub.24949122

[8] Scientific, Technical and Economic Committee for Fisheries (STECF) - The 2023 Annual Economic Report on the EU Fishing Fleet (STECF 23-07), Prellezo, R., Sabatella, E., Virtanen, J., Tardy Martorell, M. and Guillen, J. editor(s), Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/423534, JRC135182.

of energy. Examples include a prototype electric boat using "withy" fish traps constructed from willow in the UK, an engineering project to develop a small-scale fishing electric boat prototype in Catalunya, and repurposing sailing catamarans in Brittany as an alternative to current motor fishing boats.

By promoting, protecting and incentivising small-scale low impact fisheries and reducing large scale high impact fishing, overfishing would be reduced, carbon sequestration and storage could be increased, emissions decreased, and biodiversity better conserved. **By using Article 17, those extraction and production systems that impact the least on the marine environment, have a higher socio-economic value, and contribute most to mitigating the effects of climate change could be rewarded with preferential access to resources**.

2.4. Need for a differentiated approach and a level/playing field

In the same way that it is needed for fisheries management, **a differentiated approach is needed for just the transition to net zero fisheries by 2050** - one approach for SSF based on an appreciation of the socio-economic benefits generated, and one for larger scale fisheries based on the carbon footprint, measured by the fuel use intensity per tonne of fish produced. **A standardised, one size fits all approach to energy transition** would be too blunt an instrument to apply given the very different characteristics of large scale and small-scale fleet segments. It **would also create distortions and an unlevel playing field with disastrous consequences for SSF and the communities SSF activities support**.

Issues such as the cost and availability of alternative energy (bio-fuels, hydrogen, ammonia, etc.) and technological alternatives and support services (electric engines, batteries, recharging points, fuel delivery points, after sales services) may make the energy transition more economically and technologically difficult for the small/scale fishing fleet, particularly if infrastructure and supply chains are restricted to delivering services to a relatively few designated centralised ports. The specific location and characteristics of some small-scale vessels may make it less viable for them to transition to alternative technologies with low carbon emissions. It is important that the transition is adapted, fair, and that there is a level playing field across the different fleet segments and that good practice is rewarded.

2.5. Europe's Food System: not secure, not fit for purpose

Europe's food systems have been shown to be highly sensitive to external shocks, with carbon intensive long distance supply chains and just in time delivery systems vulnerable to disruption. Europe's citizens depend heavily on imports of seafood to meet their demands. In 2022, the total EU market supply of seafood (production and imports) amounted to 12,092 thousand tonnes. 8.856 thousand tonnes were imported from third countries, 3.326 thousand tonnes produced from EU sources, and 2.241 thousand tonnes exported to third countries[9] and with 15% of EU production

[9] AIPCE-CEP Fish Fish Study 2023 https://www.aipce-cep.org/wp-content/uploads/2023/10/Final-draft-Finfish-Study-2023.pdf;

destined for reduction to fishmeal and oil. This makes EU consumers reliant on imports for 75-80% of their consumption demands, and on products that don't have to meet the same social and environmental standards as EU produced seafood. This gives imported seafood an unfair competitive advantage over EU produced seafood, undermining the economic viability of the EU fisheries sector, and tantamount to social dumping.

Although there is considerable variation in the role seafood plays in European diets across the EU 27 Member States, EU consumers are amongst the highest per capita seafood consumers in the world, averaging 24 kgs per capita live weight equivalent. European consumers also tend to prefer to consume seafood either as a luxury item (shrimps and prawns) or in a convenient form - e.g. canned tuna and white fillets (Alaska pollack, cod and farmed salmon). These products (from 5 main species) account for up to 40% of seafood consumption, and are sourced from socially and environmentally questionable production methods.

Europe's food security is being undermined because our food system is not fit for purpose. Rather than arguing that we need to catch more fish in EU waters to replace imports, we need to consider whether it is responsible for EU citizens to consume such large quantities of seafood of questionable origin from so few species, and to ensure that production standards of imported seafood comply with the same production standards as EU produced seafood.

LIFE advocates for an alternative production and consumption model, based on consuming less animal protein and less seafood, but of greater diversity, for improving production and supply chain standards to reduce carbon footprint and to improve the viability and sustainability of EU seafood production systems (fishing and aquaculture).

Steps urgently need to be taken to improve the whole food system from the production (differentiating large scale fisheries and small-scale fisheries) to consumption, including the processing sector and supply chains, which incur a significant carbon footprint.

2.6. Give priority to fishing for human consumption

Fishing for direct human consumption should be given priority over fishing for fishmeal and oil, given the high energy requirements and inefficient energy use of the latter. The use of fishmeal as a feed ingredient in agriculture and aquaculture is also extremely wasteful of the energy and carbon stored in fish biomass, with significant conversion losses. In particular, the conversion of whole fish into dried fishmeal and oil, and the subsequent conversion of fishmeal and oil into animal protein is energy inefficient and incurs a huge carbon footprint. For example, the targeting of krill and small pelagic fish for reduction to fishmeal and oil can seriously harm the ocean's carbon pump and disrupt complex trophic relationships in marine food webs.

In some areas fish destined for industrial reduction represent an overwhelming majority of the fish landings, such is the case of Sweden, for example, which approximately 90% of the landed fish biomass

EUMOFA data https://eumofa.eu/the-eu-market

is destined for industrial reduction[10]. Besides, **such fisheries have a highly perverse impact on fish stocks and the wider marine food web, notably in the Baltic Sea**. Here, reduction fisheries have greatly contributed to the bad state of cod and herring stocks , but also to the wider ecosystem impacts.

In this regard, **comparing the carbon footprint of extracted wild food to domestically reared or farmed food is problematic**, given the very different nature of the production systems and the different impacts of each on the environment. For example, encouraging increased consumption of fish like cod or herring over beef or poultry could lead to increased pressures on already overfished stocks, offsetting any benefits of reduced GHG emissions from intensive livestock production.

2.7. The energy transition must involve the entire food system and should strengthen local short chain food systems

Energy transition must also involve a reduction in the use of energy all along the fisheries value chain, and within the entire food system, from fuel extraction through fishing to the final consumer - from well to wake, and from boat to plate. This would include reducing fossil fuel use for cold chain, processing, and transportation, as well as the use of non-biodegradable materials (plastics) in both fishing equipment and in post-harvest packaging. The post-harvest intercontinental and transcontinental transport of fish for processing and marketing must also be carefully scrutinised and reformed where needed.

Part of the solution lies in developing, protecting and strengthening local food systems, through transparent, short value chain and direct marketing arrangements, including through "community supported fisheries" such as those developed under the Foodnected[11] project.

This will also require promoting a new culture of seafood production and consumption, catching less to earn more, eating less animal-based protein, and of a higher quality and added value. It will also require a greater engagement by consumers in this transition, taking informed decisions about their local producers and the products available on the market.

2.8. Fit for Purpose Accounting System

In order to make the energy transition effective, **a monitoring scheme with established baselines along with a fit-for-purpose emissions accounting system and appropriate indicators**, need to be established so that a start can be made to record the state of play and how energy transition/ emissions reduction evolve over time. All these should be incorporated into the European Data Collection Framework.

Greenhouse gas and carbon footprint need to be measured from (oil) well to (vessel) wake, and for biofuels, from forest/ plantation to wake and from field to wake.

[10] https://balticwaters.org/en/baltic-sea-brief-58-let-the-baltic-sea-fish-recover-and-the-fish-caught-become-food-for-humans/

[11] https://foodnected.org

An appropriate choice needs to be made for the indicators used to measure how the transition is progressing and for measuring the direct and indirect impacts caused. High volume extractive activities may show greater efficiency in terms of fuel use intensity (volume of emissions produced compared to volume of fish extracted). However, this indicator, if used alone, masks the impact of overfishing on carbon storage and sequestration and other above-mentioned factors that drive and aggravate the climate crisis.

LIFE calls for an **emissions accounting system that covers the entire food system**, from sea to plate. In particular, as highlighted in a recent ICES report[12], it is important to **consider the absolute amount of greenhouse gas emissions produced. Measuring carbon footprint must be done in an holistic way, including using socio-economic indicators such as employment created per unit of carbon emissions generated.**

In addition, we need to develop global databases of seabed carbon stocks to enable an assessment of carbon storage in the seabed with an accounting system that can measure the impact of different fishing activities and other anthropogenic impacts on the capacity of the ocean to store and sequester carbon.

2.9. Beware of Unintended Consequences of the European Energy Transition

Green fuels are not a panacea, and there are valid concerns about potential harmful "side-effects" that energy transition in Europe may cause to the fisheries sector, especially SSF. The Green Deal framework and targets prioritise accelerated renewable energy generation, notably through offshore renewables. It sets targets for an installed capacity of at least 60 GW of offshore wind and 1 GW of ocean energy by 2030, and 300 GW and 40 GW, respectively, by 2050. However, the impact of achieving these targets on fisheries has not been adequately assessed, particularly as regards the spatial squeezing and potential displacement of small-scale fisheries, and the unquantified impacts of these installations on fish stocks and the wider marine environment, and the impacts that the related industrialisation of the coasts will incur. Account must be taken of the carbon footprint of green energy generating systems throughout their life cycle, including the environmental impact of decommissioning them.

It is vital that **independent environmental and socio-economic (ex-ante) impact assessments are carried out before concessions are granted for off-shore renewables** and before further installations of wind parks are carried out.

Last but not least, **LIFE calls for an inclusive process of Marine Spatial Planning across the EU, ensuring that SSF are properly included as relevant stakeholders,** with a dedicated voice, and their societal contribution and essential role as key actors in the blue economy is taken into account and properly valorised.

[12] ICES. 2024. Workshop on Assessing the Impact of Fishing on Oceanic Carbon (WKFISHCARBON; outputs from 2023 meeting). ICES Scientific Reports. 6:12. 63 pp. https://doi.org/10.17895/ices.pub.24949122

3. Challenges and opportunities of the Energy transition

3.1. Motivation and onboarding SSF in the Energy Transition

It is a fact that energy is one of the major cost items in the EU fisheries sector and fishing is currently highly dependent on fossil fuels, which represent between 10% and 35% of vessel operating costs, with much higher costs for some fleet segments[13]. Following a series of global crises, fuel costs have become highly volatile and seem likely to remain so. This is having a huge impact on the economic viability and resilience of fishing, making a switch to alternative fuels an increasingly urgent requirement for the fishing fleet, especially for those segments whose fuel costs are very high. In general, small-scale fishers are receptive to the idea that in the future, where possible, propulsion systems need to move away from purely fossil fuel options. That said, the cost of "green fuels" can often be prohibitive, and without supply chains and infrastructure in place to secure supplies at the right time and in the right place they do not yet offer a viable alternative.

There is therefore a strong economic logic for the fishing sector to lessen its dependence on fossil fuels, and to develop low carbon alternatives.

The "Pact for Fisheries and Oceans" comes at a time of great uncertainty in the fisheries sector, and for the small-scale fleet segment in particular. A general lack of availability of fish on the inshore fishing grounds, lack of access to resources and markets, marginal profitability, with the prospects of spatial squeezing from competing blue economy sectors mean that the majority of the fishers are cautious about making this transition. They are sceptical about solutions on offer, which they fear could worsen matters if not accompanied by a comprehensive strategy.

Trust in the EU and Member States authorities has also been eroded. "*Nobody will think about this transition because of the inaction of EU and Member States to save small-scale fisheries businesses up to now*", mentioned one LIFE member. SSF wants to see real changes in the policies to restore fish stocks, to provide them with improved access to resources, fishing grounds and markets, and for the adoption of a differentiated approach to the management of small-scale and large-scale fisheries. They need to be confident that they will have better prospects in the future, otherwise there will not be significant buy-in to make the energy transition and the investments it entails. In many areas the SSF are experiencing the decline of several key fish stocks, and the lack of alternatives makes investment in a new boat at this stage a risky venture, to say the least.

Therefore, the energy transition needs to be implemented in conjunction with marine environmental restoration and fish stock recovery plans and with sustainable fisheries management strategies, and be compatible with economic viability, decent working conditions and generational renewal to achieve its objectives.

[13] Scientific, Technical and Economic Committee for Fisheries, The 2022 Annual Economic Report on the EU Fishing Fleet (STECF 22-06), Publications Office of the European Union, Luxembourg, doi:10.2760/120462

3.2. Technology and Innovation

In LIFE's view, energy transition is inextricably linked to ending overfishing, which in turn requires a shift from high impact to low impact fishing. Functional ecosystems and healthy stocks would require less fishing effort to produce the same returns as degraded ones, and would improve carbon sequestration and storage.

In terms of technology, there are two key prerequisites to meeting 2050 decarbonisation targets:

- Reducing emissions through increased energy efficiency.
- Decarbonising energy sources and adapting vessels and fishing operations to use equipment producing zero carbon emissions.

At the moment **there are no off the shelf solutions available** that respond to these necessities. Neither can **there be a one size fits all solution for energy transition**. The fisheries sector is highly diverse, operating in a wide variety of different environments across distinct sea-basins, and **would rather require a plethora of solutions**.

Solutions need to encompass new fishing strategies, new vessel designs and onboard equipment, different sources of fuel and energy, new or different forms of propulsion and mechanical hauling of gear, changes in gear type or design with a circular economy approach to recycling and reusing materials used in the construction of fishing gears. Gear modifications should also entail reductions in seafloor contact to reduce impacts on seafloor habitats and reduce the release of carbon from the seabed.

Decarbonisation should start now using the tools already at hand, while technological innovation proceeds. Incentives should be provided, notably by allocating fishing opportunities to those who use more selective and less destructive fishing methods, with the objectives of reducing overfishing and increasing selectivity, whilst increasing energy efficiency on board.

Prerequisite for developing a decarbonisation and energy efficiency strategy for a fishing vessel is to document its activity and energy use patterns. This can be best achieved by **installing energy monitoring devices and conducting energy audits** to provide accurate information on how energy is consumed onboard, by which equipment, and their relative share of overall consumption during navigation and fishing phases. Examples of successful projects have been documented in a few locations, such as in the Basque Country[14].

The development of technologies and prototypes adapted to specific regional (sea basin) and their fisheries requirements is also key.

[14] Basurko, O C, et al., 2023, Research for PECH Committee – Workshop on the European Green Deal - Challenges and opportunities for EU fisheries and aquaculture – Part I: Decarbonisation & circular economy aspects for fisheries, European Parliament, Policy Department for Structural and Cohesion Policies, Brussels. http://www.europarl.europa.eu/thinktank/en/document.html?reference=IPOL_STU(2023)747294

Studies show that there is **significant potential for the development of electrical and hybrid propulsion systems for inshore static gear vessels** (potters, divers, liners and netters)[15]. These same studies show that:

- Electric propulsion alone, running off batteries, is currently only feasible for some of the smallest boats which have the lowest power and endurance requirements. This is primarily due to the weight and volume of the batteries needed for higher power and/or longer periods, although the cost of such batteries and lack of charging points may also be a barrier.
- Hybrid technology shows promise for static gear fishing, due to the variation in engine power that is used during a day at sea. For some vessels with particular usage patterns, at least a 20-30% saving in fuel and emissions is achievable. However, there are no "off the shelf" systems available at the moment designed for the rugged and exacting requirements of commercial fishing, but all of the basic elements of battery powered engine technology exists today.

Therefore, further research into the further development of low carbon propulsion systems that are suitable for small scale fisheries and workboat applications is needed. In the short term this means **implementing hybrid systems for small craft, to move from "innovation"/ R&D prototypes to "off the shelf" technologies**. In the longer term there is a need for improved battery technologies or alternative sustainable fuels if small fishing boats are to be enabled to make their contribution to the EU's net zero target of 2050.

- Rethinking the SSF fishing boat and its work space.

Alternative fuels and propulsion systems take up greater space on board a fishing vessel than fuels and engine technology currently in use, with implications for vessel stability, sea safety and working arrangements. In addition, several alternative fuels (hydrogen, methane, ammonia etc) need special handling and storage, reinforced against risk of explosion, and batteries may be at risk to overheating.

It is argued that such requirements in turn require that capacity ceilings for fishing vessels be increased. This contention needs to be treated with caution. There is a fine line between increasing vessel size to accommodate new low carbon technologies, and increasing fishing capacity leading to overfishing. Also, recent studies and reports indicate that most member states have ineffective capacity verification systems or no verification systems at all[16]. **LIFE therefore calls on the EC not to increase capacity ceilings due the risk of increasing overfishing**, and especially when there is such a lack of certainty as to what current levels actually are, and with evidence of widespread fraud.

Electrification of engines and machinery on SSF vessels has implications for weight/ displacement and working space. This in turn has implications for vessel stability (metacentric height), hold capacity, and handling of fishing gear and catches. Therefore, for SSF, **decarbonisation and the transition to alternative energy sources is therefore likely to require a rethink on the whole design and configuration of many small-scale vessels. It is not just a case of modernising and retrofitting existing vessels** and replacing engines, but building new boats that address the challenges of vessel stability,

[15] Magnus Johnson et al. (2022) "Electrifying the fleet, more sustainable propulsion options for the small-scale fishing fleet".

[16] EC DG Mare Study on engine power verification by Member States – Final report, Publications Office, 2019, https://data.europa.eu/doi/10.2771/945320

crew safety, secure operation of equipment, onboard fish handling and storage. **This has implications not only for the funding needed (see below), but also for the way fishing is done, and may require the development of new skills**. In this process, it is also important to consider how fishing vessels might need to be adapted for multifunctional use, not solely for fishing but also for activities such as tourism, research, etc. SSF are increasingly obliged to diversify their activities and income due to the seasonality of their occupation and the poor state and changing nature of the stocks.

This implies that vessels of the past may no longer be suited to current needs, and special care needs to be taken that **traditional vessels are not lost, with the associated loss of cultural traditions.**

In addition, and linked to the technological problems associated with decarbonisation, **problems of a legal nature arise**. Vessel seaworthiness certification will need to be updated, and the qualifications of captains and crews upgraded.

Meanwhile, ashore, new infrastructure and supply chains are needed to provide recharging points for batteries, supply and storage of alternative fuels, after sales service back up with mechanics and technicians skilled in the new technologies and workshops established to maintain, service and repair new equipment.

LIFE calls on Member States to invest in port infrastructure development, develop appropriate seaworthiness certification, and provide skills training for fishers to support the transition.

3.3. Financial needs, current tools its limitations, its potential and harmful effects

A just transition to a zero carbon emission future requires a level playing field and equitable access to funds to transform fossil fuel dependent fishing fleets. This will require both public and private finance, and differentiated mechanisms for delivering funds to large scale and small scale fleets whose needs are very different. For larger scale vessels, there may be potential to benefit from decarbonisation innovations taking place in the shipping sector, and to apply technological solutions arising. The question is whether similar benefits can be reaped by SSF from innovations taking place in the leisure craft sector.

Renewing and/or adapting the EU fleet (over 50.000 active vessels in 2021[17] in line with decarbonisation targets will cost billions of Euros, whereas the public funding available at EU level amounts to 10s of millions of Euros. There are, for example, around Euros 19 million available in the EMFAF (up to 2027) for engine replacements and improving energy efficiency, which when divided amongst 22 coastal member states, will clearly not go very far.

Such a situation implies that much of the financial burden for decarbonising the fishing fleet will fall on the fleet itself. This in turn implies that in the main, decarbonisation will need to be done “on the cheap”, with existing vessels retrofitted with alternative power generating and vessel propulsion systems. Given that the average age of the fleet is over 35 years, the reality is that many in the sector will consider such a step unwise, prompting a massive exit from fishing.

[17] STECF 27-03 AER 2023

A just transition to a zero carbon emission future requires a level playing field and equitable access to funds to transform fossil fuel dependent fishing fleets. This will require both public and private finance, and differentiated mechanisms for delivering funds to large scale and small scale fleets whose needs are very different. For larger scale vessels, there may be potential to benefit from decarbonisation innovations taking place in the shipping sector, and to apply technological solutions arising. The question is whether similar benefits can be reaped by SSF from innovations taking place in the leisure craft sector.

LIFE calls for Member States to ensure that future operational programmes prioritise energy transition of the European SSF fleets with appropriate access to funding and for the European Commission to provide support through directly funded projects to allow testing of new technologies and prototypes, and to evaluate the potential to replicate and up-scale these at a wider level. **Young fishers should be given preference so as to incentivise and otherwise enable a new generation to take up small-scale low impact fishing**.

Given the limited access that SSF have to sectoral support through the EMFF/EMFAF, fuel tax exemption has historically provided an important source of support. This has benefited both SSF and LSF equitably, and which has gone a long way to enabling SSF to stay afloat, especially in difficult times. **LIFE agrees on the need to eliminate harmful incentives such as fossil fuel subsidies, including fossil fuel tax exemptions**, to incentivize decarbonisation. **However, if fuel taxes are to be imposed, subsidies of equivalent value that directly benefit SSF must be immediately put in place to ensure their economic viability and to enable a fair transition to take place for this fleet segment**.

3.4. Energy Transition: Changing Mindsets, Developing Skills

Decarbonisation and a shift to zero emissions, along with developing fishing systems that are more selective and less impactful on the marine environment imply a change of approach, a change in mindset, and the development of new skills and knowledge. These changes need to be supported by capacity building and other kinds of support.

New skills will be needed for:

- developing new business skills for a zero carbon economy based on low impact fishing
- operating new kinds of selective low impact fishing gears
- the operation, maintenance and repair of new propulsion systems, new technology required for deployment and retrieval of gear, and digitisation linked to it
- the safe handling, navigation and use of vessels fitted with alternative fuel and energy systems, which may affect vessel stability, working space, handling characteristics of the vessel;
- diversification of activities and operation of multipurpose vessels (as for example for combining fishing with fishing tourism, scientific studies/ collaboration with scientists

New skills will also need to be developed by those service industries providing after sales backup and technical support. In this vein, there will be a need for support organisations to play a greater role in supporting the fishers and building their capacity to adapt to new processes and procedures, vessel licensing and certification arrangements and to the new regulations coming up.

4. Final thoughts and conclusions

Shifting from fossil fuel dependency to a zero carbon economy is as imperative for fisheries as it is for other production sectors. Decarbonisation must also be coherent with the other processes affecting the fisheries sector, and in line with fishery management objectives. Decarbonisation must not be pursued at the expense of biodiversity conservation, nature restoration, and the transition towards a fair and sustainable food system. On the other hand, if the vision of the fisheries of the future is well framed and the energy transition is well aligned with the CFP objectives to end overfishing, conserve and restore the marine environment, and is consistent with the objectives of achieving economic, social and employment benefits, it could provide a great opportunity to revitalise the small-scale low impact fishing sector, and give them prospects of future.

For LIFE this means:

- rethinking the EU's approach to fisheries, from high to low environmental impact, whilst promoting a general reduction of the use of energy across the fisheries sector, in absolute terms.
- focusing on carbon emission reduction whilst applying measures that improve carbon sequestration and storage in the ocean. In that regard, measures to reduce overfishing and rebuilding fish stocks are essential.
- initiating a just transition towards carbon-neutral fishing that effectively contributes to safeguarding and restoring marine biodiversity while strengthening coastal communities, shifting from carbon intensive, high volume, high impact fishing to low carbon, high value, low impact fishing, phasing out the most environmentally harmful fishing operations whilst giving priority, promoting, protecting and incentivising those fishery activities that have the least environmental impact and greatest socio-economic benefits.
- establishing a differentiated approach to the management of small-scale and large scale fisheries, recognising and rewarding (for example using Article 17) small-scale fishers as key actors of change in providing a solution to achieving carbon neutrality by 2050.
- giving priority to fishing for direct human consumption over reduction fisheries for fishmeal and oil.
- reducing the use of energy all along the fisheries value chain throughout the entire food system, while developing, promoting and strengthening local food systems.
- establishing a monitoring scheme, with baselines along with a fit-for-purpose accounting system for carbon emissions that covers the entire food system, considering the absolute amount of GHG emissions produced instead of relative measurements based on carbon footprint per kilogram of fish.
- designing and establishing an accounting system for blue carbon, to monitor seabed carbon stocks and carbon storage in the seabed, and able to measure the impact of different fishing activities and other anthropogenic impacts on the capacity of the ocean to store and sequester carbon.
- carrying out a formal (and independent) ex-ante assessment of the environmental and social impact of off-shore renewable energy generating (wind farm, tidal power, wave power etc.) structures before more concessions are given and microparks are installed widely in the EU.

- implementing an inclusive process of Marine Spatial Planning across the EU, ensuring that SSF are properly included as relevant stakeholders, with a dedicated voice, and their societal contribution and essential role as key actors in the blue economy is taken into account and properly valorised.
- applying tools already at hand, while technology innovation is being developed. These would prioritise allocation of fishing opportunities to more selective and less destructive fishing methods, reducing overfishing, increasing selectivity, and at a technical level, by increasing energy efficiency on board.
- investing public and private resources to investigate and to start co-developing and testing technologies with small-scale fishers. A specific group within the Energy Transition Partnership should be dedicated to establishing regional prototypes for the small-scale fishing vessel and gear combinations for the future.
- maintaining the established fishing capacity ceilings to avoid aggravating overfishing and the climate crisis
- encouraging investment by Member States in the development of port infrastructure, in the development of green energy infrastructure and towards simplifying fishing vessel seaworthiness certification to support the transition
- To make sure financing mechanisms are a fair and coherent use of public money alongside private financing opportunities, with important targeted financial support to the SSF fleet. In this regard, amend current limitations of the EMFAF which makes it impossible to assure a successful full transition. LIFE regrets that the Commission proposal for an Action Plan for Small-scale Coastal Fishing (former Article 15) was dropped by the Trilogue negotiations in 2021, with its visionary provisions for "promoting low-impact, climate resilient and low-carbon fishing practices that minimise damage to the marine environment" (former Article 15.1b)). This would have been an invaluable tool for supporting small-scale fishers to make the transition. Today, more than ever, there is an urgent need for new funding to be made available to SSF for the energy transition, to allow developing and testing of new technologies and prototypes.
- Member States to align their operational programmes to ensure that the energy transition of the European SSF fleets is supported by appropriate access to funding.
- Eliminate harmful incentives such as fossil fuel subsidies, including fossil fuel exemptions. However, if fuel taxes are to be imposed, subsidies of equivalent value that directly benefit SSF must be put in place to recognise SSFs key role, avoid deepening in its vulnerability and ensure a fair transition of this particular sector.

LIFE will keep engaged in the Energy Transition Partnership and other related initiatives, offer all support possible within our capabilities, and stand ready to further work on the topic with European and Member States institutions and stakeholders to reach the best possible outcomes.