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**COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN
PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL
COMMITTEE AND THE COMMITTEE OF THE REGIONS**

On the Energy Transition of the EU Fisheries and Aquaculture sector

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1. Introduction

The high energy prices in 2022 were exacerbated by the unjustified and unprovoked invasion of Ukraine by Russia. These high prices have affected citizens and businesses across the European Union, especially those that are highly dependent on energy. As part of its response, the EU adopted the REPowerEU¹ plan to: (i) reduce the EU's dependency on fossil fuels through energy savings; (ii) diversify supplies; and (iii) quickly substitute fossil fuels with renewable and low-carbon alternatives.

Energy is one of the major cost items in the EU fisheries and aquaculture sector. The hike in energy prices resulted in marine-diesel prices more than doubling in 2022 compared to average prices in 2021. This in turn led to surging operational costs for the fishing fleet, with energy costs increasing from 13% of revenues in 2020 to an estimated 35% in 2022², putting the economic viability of the EU fleet and aquaculture activities under tremendous pressure. It is estimated that the EU fishing fleet's net profits dropped from EUR +218 million in 2021 to EUR -430 million in 2022, a severe decrease as the result of the soaring fuel prices. In this context, about 40% of the small-scale fleet, 66% of the large-scale fleet and 87% of the distant-water fleet was not profitable at the energy price levels of 2022. Analysis also showed that a 10 eurocent increase in the price of fuel reduces annual gross profit of the entire EU fisheries sector by EUR 185 million.

As a result of this fuel dependency, a significant part of the EU fisheries fleet was not able to cover their operational costs³ in 2022, leading many vessels to stay in port. For aquaculture too, the increased energy prices are a threat to profitability and viability – both directly through increased energy costs and indirectly through higher feed prices and other input costs. As a result, much of the fisheries and aquaculture sector had to rely on the financial support provided by EU Member States and the financial tools made available at EU level⁴ to continue operations.

These exceptional circumstances exposed the structural vulnerability in the economic resilience and sustainability of the EU fisheries and aquaculture sector. This vulnerability is caused by the sector's high level of energy intensity and its dependence on fossil fuels. Given the current uncertain geopolitical context, energy prices are expected to remain both high and volatile. Again threatening the social, economic and environmental sustainability of the sector. It also

¹ COM(2022) 230 final.

² In a number of segments of the EU fleet, particularly those using energy-intensive fishing methods, fuel costs represented more than half of the value of landings in 2022.

³ 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.

⁴ Temporary Crisis Framework (C/2022/1890), Regulation (EU) 2022/1278 and Commission Implementing Decision (EU) 2022/500.

shows the need to reduce dependency on fossil fuels and move to renewable and low-carbon energy sources as quickly as possible, in line too with one of the ambitions of the European Green Deal⁵ to reach climate neutrality in the EU by 2050.

Fishers and aquaculture operators began reducing their energy intensity between 2009 and 2014, but the progress they made has stagnated in recent years⁶. There is therefore a need to accelerate the energy transition through a more coordinated EU approach, thereby also contributing to the wider objectives of the European Green Deal and its strategies, including the farm-to-fork strategy⁷ and the Sustainable Blue Economy Communication⁸.

Moreover, this energy transition is an integral part of the implementation of the common fisheries policy (CFP)⁹ and is fully aligned with the Commission strategic guidelines for more sustainable and competitive aquaculture (the Aquaculture guidelines)¹⁰. It will also reduce the overall impact of fishing and aquaculture activities on marine ecosystems, pollution and climate change by lowering greenhouse-gas (GHG) emission levels in the fisheries and aquaculture sector¹¹. Indeed, the Communication on the functioning of the CFP¹², which is published with this Communication¹³, points out that achieving resource and energy efficiency is one of the main drivers for the effective implementation of sustainable and profitable fishing and aquaculture activities.

The Commission, in partnership with all stakeholders, aims to step up collective efforts on the energy transition with a more comprehensive and coordinated approach. This approach also delivers on one of the proposals on climate change and the environment put forward by European citizens in the Conference on the Future of Europe¹⁴, as well as takes account of the views collected during the Call for Evidence (CfE)¹⁵.

This Communication, therefore, puts forward a coherent approach for actions that aims to:

⁵ COM(2019) 640 final.

⁶ Data collected under the EU Data Collection Framework indicates that EU fisheries reduced their fuel intensity (i.e. fuel consumption per tonne of landings) by more than 15% between 2009 and 2014, but this trend has stagnated since then.

⁷ COM(2020) 381 final.

⁸ COM(2021) 240 final.

⁹ Regulation (EU) 1380/2013 on the Common Fisheries Policy.

¹⁰ COM(2021) 236 final. The strategic guidelines for a more sustainable and competitive EU aquaculture for 2021-2030 include actions related to the energy transition of the sector, such as: (i) the identification of a reference method to determine the carbon footprint and impact on ecosystems of aquaculture production; or (ii) the mapping of good practices at governmental and industry level covering energy efficiency and the reduction of carbon footprints.

¹¹ Gephart, J.A., Henriksson, P.J.G., Parker, R.W.R. et al. 'Environmental performance of blue foods'. *Nature*, Vol. 597, 2021, pp. 360-365. <https://doi.org/10.1038/s41586-021-03889-2>.

¹² COM(2023) 103.

¹³ And together with the Report from the Commission to the European Parliament and the Council – 'The Implementation of the CMO Regulation' (COM(2023) 101) and the 'EU Action Plan: Protecting and restoring marine ecosystems for sustainable and resilient fisheries' (COM(2023) 102).

¹⁴ Annex to COM(2022) 404 final on the six proposals from the Conference on Climate Change and the Environment, where the Commission proposed the initiative for consideration as a new area of action.

¹⁵ The call for evidence was open for feedback between 7 November 2022 and 5 December 2022 https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13619-EU-fisheries-and-aquaculture-energy-transition_en.

- strengthen the socioeconomic performance and resilience of the EU fisheries and aquaculture sector;
- achieve the CFP objectives of ensuring that fishing in the EU is socially, economically and environmentally sustainable;
- achieve a sustainable, climate-neutral, and competitive aquaculture sector in line with the objectives set out in the Aquaculture guidelines adopted by the Commission in May 2021; and
- ensure that the sector contributes to the EU’s climate, biodiversity, health and pollution-reduction ambitions for 2030 and 2050¹⁶ and can seize the resulting market opportunities.

Achieving this requires a coherent and systemic EU strategy that centres around a partnership that brings together all relevant stakeholders and adapts to ongoing developments in technology, energy sources and infrastructure.

This Communication presents an enabling framework for the energy transition in the EU fisheries and aquaculture sector by identifying and addressing barriers and setting up the structures for long-term cooperation in this area.

2. Energy dependency in the fisheries and aquaculture sector

At present, most fishing vessels rely on marine diesel for their operations, although smaller vessels may use petrol. In total, the EU fleet consumed over 1.9 billion litres of marine diesel in 2020 to catch and land 4.05 million tonnes of fish valued at EUR 6.3 billion at the first sale. This fuel consumption led to direct emissions of approximately 5.2 million tonnes of CO₂. Before fuel prices reached record-high levels in the first 9 months of 2022, energy costs accounted for around 13% of revenues in EU fisheries on average, albeit with substantial differences between the different fleet segments^{17,18}. In some segments, such as trawlers, energy expenses accounted for over a quarter of revenues in 2019, making them especially vulnerable to fuel-price increases. Since 2009, the EU fishing fleet has reduced its fuel consumption per kg of landed fish by over 15%, but these reductions have stagnated in recent years and now stand at around 0.5 litres of fuel per kg of landings¹⁹.

Depending on the type of aquaculture, energy is needed for a variety of different purposes. In marine aquaculture, energy may be needed in the form of fuel to power service vessels. In freshwater aquaculture, energy is needed in the form of electricity for feeding systems, water

¹⁶ In line with the European Green Deal, REPowerEU, the Fit for 55 package of climate legislation and the biodiversity and farm-to-fork strategies.

¹⁷ Based on 2019 economic data collected under the EU Data Collection Framework (Regulation (EU) 2017/1004). Marine fuel prices rose by 48% from 2020 to 2021 and rose even further to record-high levels in 2022, with peaks well above EUR 1.00 per litre. In the first 9 months of 2022, the average marine fuel price was around EUR 1.00 per litre; more than double the average price in 2021.

¹⁸ Scientific evidence indicates that total CO₂ emissions across fisheries and aquaculture products range from as low as 1.09 kg CO₂e up to 20.31 kg CO₂e per kilogram of edible product (Gephart et al., 2021).

¹⁹ Scientific, Technical and Economic Committee for Fisheries, *The 2021 Annual Economic Report on the EU Fishing Fleet* (STECF 21-08), Publications Office of the European Union, Luxembourg, 2021, doi:10.2760/60996.

pumps, remote control tools, to monitor farming conditions, and to recirculate/clean the water²⁰. The share of costs for energy consumption differs widely depending on both the type of species farmed and the production technique used. For example, energy costs in EU mussel aquaculture range from 3% of total costs in operations using mussel rafts, to 14% of total costs in operations using mussel longlines. In EU rainbow-trout aquaculture, which represents over half of EU freshwater farming production, costs range from an almost negligible percentage in operations using trout cages, to 8% of total costs in race-ways and trout tanks²¹. For individual facilities, the share of costs for energy use can be significantly higher. However, energy demand and GHG emissions do not only result directly from production facilities or service vessels, they also stem indirectly from raw materials, such as feed or other input. Fed-aquaculture is thus also exposed to hikes in feeding costs due to a rise in energy prices.

3. A vision for climate-neutral fisheries and aquaculture

As stated by President von der Leyen in her 2022 State of the Union speech²², the way ahead for the energy transition of the EU's economy is 'not just a quick fix, but a change of paradigm, a leap into the future'. It is now time to accelerate the transformation towards climate neutrality in the fisheries and aquaculture sector through the energy transition.

By 2050 at the latest, the EU fisheries and aquaculture sector must be sustainable, economically profitable, and a global example of good governance with a neutral CO₂ footprint. In achieving this, it can also play a key role in a sustainable and healthy European food system and reduce pollution and other negative pressures on marine ecosystems and human health.

In accordance with the CFP, all harvested stocks should be fished at maximum sustainable yield (MSY)²³. This should in turn help prevent the excessive use of energy, improve the economic performance of the sector and reduce adverse impacts on the marine ecosystems. Fishing techniques and gears need to become modern, energy efficient, selective, and have no – or insignificant – negative impact on the health and biodiversity of the broader ecosystem. Modifications to vessel design, adopting energy-efficient on-board equipment and fishing patterns, assisted by supporting power sources, such as wind-assisted or solar-electric propulsion, will help to further increase energy efficiency. These changes will be further supported by new forms of digitalisation that give real-time information to operators and assist in decision-making in the fishing strategy within the scope of the CFP, such as route and speed optimisation. This will lead the sector to significantly reduce its energy use and optimise costs, thereby boosting its sustainability and resilience to external shocks.

Renewable and low-carbon fuels and energy sources will be alternatives for fishing vessels, depending on the fleet characteristics. These fuels and energy sources include electricity,

²⁰ The setting up of EU data collection on aquaculture under the EU Data Collection Framework (Regulation (EU) 2017/1004) is still under development. Current data coverage does not make it possible to discern EU-wide trends on energy consumption in aquaculture.

²¹ Scientific, Technical and Economic Committee for Fisheries, *The 2020 Annual Economic Report on the EU Fishing Fleet* (STECF 20-12), Publications Office of the European Union, Luxembourg, 2020, doi:10.2760/441510.

²² [State of the Union Address 2022 by President von der Leyen \(europa.eu\)](#).

²³ Following the objectives specified in Article 2 of the CFP Regulation (EU) 1380/2013.

ammonia, renewable hydrogen, sustainable biogas, synthetic fuels, and sustainable biofuels²⁴ (including drop-in fuels such as algae biofuels) and other innovative renewable and low-carbon energy sources. Small-scale fishing vessels and aquaculture-service vessels could be electrified and supported by solar panels or other renewable or zero to low-carbon main or auxiliary power sources²⁵. Where possible, existing engines can be modified, while in some segments the acquisition of new low-carbon-emission (hybrid) engines and vessels could be the solution. The sector will benefit from abundant recharging and refuelling infrastructure in ports. Driven by a comprehensive approach, there will be close cooperation within the EU fisheries and aquaculture sector to exploit, where possible, ‘synergies by design’²⁶, in particular on technology uptake, energy production, and energy use. This requires strong upfront cooperation among all stakeholders to ensure synergies between: (i) the fisheries and aquaculture sector; (ii) shipbuilders; (iii) infrastructure in ports; (iv) scientists; (v) ocean-based renewable-energy systems and producers; (vi) the waterborne transport sector; and (vii) other alternative energy systems. This cooperation will make it possible to harness the full potential of both the production and use of renewable and low-carbon energy and the deployment of innovative compatible technology.

EU aquaculture will mature into an even more competitive, innovative, and resilient sector, in line with the Aquaculture guidelines. It will also play a critical role in the supply of nutritious, sustainable and healthy food to EU citizens. It will fully embrace renewable and low-carbon energy sources to power its service vessels and facilities, and will also ensure the use of sustainable feed options to significantly reduce its carbon footprint. Sustainable aquaculture alternatives and novel practices (such as seaweed farming, integrated multi-trophic aquaculture, and marine permaculture) can further reduce the sector’s energy use, GHG emissions and broader environmental impact. The development of the sector, supported by the energy transition, will create economic opportunities and jobs, in particular in rural and coastal communities, and will lead the sector to become a global reference for sustainability.

EU fisheries are encouraged to continue the positive trend, as observed for the period 2009-2019, towards reducing fuel intensity by reducing the fossil-fuel consumption per kg of landed product for at least an additional 15% for the period 2019-2030. EU aquaculture is also encouraged to reduce fossil fuel consumption and non-renewable sources of energy. This objective will be further discussed based on the monitoring of data stemming from the STECF Annual Economic reports²⁷, from any new collected scientific evidence, and in consultation with stakeholders.

4. Innovative technologies and practices for the energy transition

²⁴ While preventing the adverse effects of pressure from biofuel demand on global food security due to indirect land-use change and competition between crops produced for food and biofuels, in line with the framework laid down under Directive (EU) 2018/2001.

²⁵ E.g. for hauling, navigation, fish-finding equipment, the galley, and cabin power.

²⁶ Designing systems, processes and operations upfront to identify interplays between the different Blue Economy sectors that are complementing and mutually reinforcing each other, ensuring a comprehensive energy transition path.

²⁷ Scientific, Technical and Economic Committee for Fisheries (STECF), <https://stecf.jrc.ec.europa.eu/reports/economic>

Changes in fishing practices and the adoption of new innovative technologies and ways of operating should form the backbone of the energy transition towards climate neutrality in the EU fisheries and aquaculture sector. There are two main directions of change: (1) an increase in energy efficiency, including a decrease in fuel-use intensity and in overall fuel consumption in the sector in the short to medium term; and (2) a switch from fossil fuels to renewable and low-carbon energy sources.

4.1 Improving energy efficiency

Improving energy efficiency is a first step towards alleviating energy dependency, especially in the short to medium term. This should result in overall lower energy demand in the sector.

Rebuilding and maintaining healthy fish stocks capable of producing MSY is a key objective of the CFP. It is also an essential driver in reducing energy consumption due to the reduction of fishing effort required per unit of catch at healthy biomass levels.

Fishers can furthermore significantly increase their energy efficiency through adaptations of the vessel, gears, and fishing patterns, including by: (i) switching to gears with lower drag force or modifying their hull, for example by retrofitting a bulbous bow; (ii) switching to more energy-efficient and environmentally sustainable fishing techniques; (iii) more efficient selection of fishing grounds and routing, as well as reducing the cruising speed to fishing grounds with the help of digital tools; and (iv) switching to more energy-efficient propulsion systems (e.g. fitting fuel-saving propellers or reducing the energy demands of onboard equipment).

Marine aquaculture facilities can similarly increase their energy efficiency through adaptations to their service vessels. In other segments, operators can adapt facilities by adopting energy-efficient equipment (such as pumps and heating/aeration/filtration systems) and switch to other more energy-efficient techniques or ways of operating. Aquaculture facilities can transition to more sustainable feed alternatives, for example by limiting the use of fish meal and oil taken from wild stocks as fish fodder (e.g. by using alternative protein ingredients such as algae or insects or by-products from other industries)²⁸. Sustainable aquaculture alternatives and novel practices, such as seaweed farming and marine permaculture, can further reduce the sector's energy use, carbon emissions and environmental impact²⁹.

Several fisheries and aquaculture facilities have already started to adapt their vessels, facilities, gears and operations to increase energy efficiency³⁰. As a result, they have lowered operational costs, energy intensity, and their dependency on fossil fuels. However, adopting energy-efficient technologies or fishing techniques is not always sufficient, and in some cases certain energy-efficient fishing gears and techniques can have undesirable effects on fish stocks or the marine ecosystems. Preventing these negative side-effects requires a comprehensive approach that is in

²⁸ COM(2021) 236 final.

²⁹ COM(2022) 592 final.

³⁰ Including the adoption of 'flying' or lighter trawl doors that reduce drag; the demonstration of wind-assisted propulsion technology; hull modifications; and lighter and thinner netting that significantly reduces fuel consumption.

line with the broader objectives of the CFP and the action plan for protecting and restoring marine ecosystems for sustainable and resilient fisheries³¹.

4.2. Moving to renewable and zero or low-carbon energy sources

Increasing energy efficiency alone will not make it possible to reach the final goal of a climate-neutral EU fisheries and aquaculture sector. Ultimately, the energy transition also requires a switch towards renewable and low-carbon power sources. Therefore, the sector must follow the two mutually reinforcing paths of reducing energy intensity, on the one hand, and switching to renewable and low-carbon energy sources, on the other.

There is potential to replace or refit the current marine-diesel combustion engines in fishing vessels and aquaculture-service vessels. For example, these engines could be replaced by electric propulsion techniques and by engines running on alternative fuels³², such as renewable hydrogen, ammonia³³, methanol or other sustainable synthetic fuels and biofuels^{34,35}. Some alternative energy sources and fuels can already be used on existing diesel engines after some engine modifications³⁶.

Although much progress has been made in developing alternative fuels and propulsion systems for other types of marine vessels, to date there has been limited uptake of these systems by fishing and aquaculture vessels. Fisheries have seen the sporadic introduction of amongst others: hydrogen-powered fishing vessels; hybrid propulsion systems that combine electric propulsion with efficient diesel engines; and wind-powered propulsion. In marine aquaculture, successful testing of electric barges and vessels for aquaculture indicates a strong potential for broader market adoption. In line with the sustainable and smart mobility strategy³⁷, the EU needs to create the right environment to further develop innovative technologies to bring zero-emission vessels to the market. For fisheries, such ‘vessels of the future’ must also be adapted to ensure they perform well in other essential areas, including improving safety and comfort onboard and minimising impacts on ecosystems.

Ports and other land infrastructure will also need to adapt, as they are key service providers for fisheries and marine aquaculture and will therefore play a critical role in enabling the energy transition for the sector. The EU’s ‘Fit for 55’ package³⁸ will boost the availability and uptake of renewable and low-carbon maritime fuels. This package includes: (i) the FuelEU Maritime³⁹

³¹ COM(2023) 102.

³² In line with AFIR: COM(2021) 559 final.

³³ European Maritime Safety Agency, *Potential of Ammonia as Fuel in Shipping 2022*, EMSA, Lisbon, 2022 <https://emsa.europa.eu/publications/reports/download/7322/4833/23.html>.

³⁴ Algae biofuels are unlikely to become commercially viable – or available – for another decade. The Commission has identified the future needs in this area in its recent EU algae initiative (COM(2022)592 final), and included two specific actions related to the development of industry standards and dedicating further research efforts through Horizon Europe.

³⁵ European Maritime Safety Agency, *Update on Potential of Biofuels for Shipping 2022*, EMSA, Lisbon 2022 <https://emsa.europa.eu/publications/reports/download/7321/4834/23.html>.

³⁶ For example, it is possible today to convert some diesel engines to operate also using hydrogen.

³⁷ COM(2020) 789 final.

³⁸ COM(2021) 550 final.

³⁹ COM(2021) 562 final.

proposal; (ii) proposals for revisions of the regulation on alternative fuels infrastructure (AFIR)⁴⁰; (iii) a proposal for a revision of the renewable energy directive⁴¹; (iv) a proposal for the revision of the energy taxation directive⁴²; and (v) the proposal to extend the emissions trading system to maritime transport⁴³. Together, these proposals will help to develop market-ready zero-emission technologies – including those suitable for or applicable to fishing and aquaculture vessels. In line with the EU strategy to harness the potential of offshore renewable energy⁴⁴, it is also key to ensure synergies between an energy-efficient fisheries and aquaculture sector and ocean-based renewable-energy systems.

Given the relatively small size of the EU's fisheries and aquaculture sector, the energy transition needs to be well-attuned to both: (i) broader initiatives such as in port infrastructure; and (ii) the further development of alternative renewable and low-carbon energy sources, fuels and technology for waterborne transport. Vessels that are being designed and constructed in the coming years should therefore not only aim to use existing energy-efficient and alternative propulsion technologies, but also ensure that they can accommodate retrofitting with future technologies during their lifetime.

5. The EU's fisheries and aquaculture regulatory framework and the energy transition

The CFP provides a guiding framework for European fisheries management that can support the energy transition. It makes it possible to build or renovate fishing vessels within the capacity ceilings and under the condition that any new fishing capacity entering the fleet be compensated by the same amount of capacity being withdrawn⁴⁵. This ensures that the national fleet capacity is in balance with available fishing opportunities and can contribute to the profitable and energy-efficient operation of the fleet. These capacity rules are sometimes considered a barrier for the uptake of clean, renewable, or low-carbon energy sources. This is because these technologies may require more space and vessel capacity than conventional diesel engines, as also highlighted by some stakeholders in the CfE for this initiative⁴⁶. However, in most Member States there is available inactive fishing capacity⁴⁷. Member States could allocate this inactive capacity to fishing vessels that need it for energy transition purposes. Through efficient management of entries into and exits from their fleet, Member States can use the available capacity to invest in and adopt new technologies for the energy transition of these vessels.

The European Maritime Fisheries and Aquaculture Fund (EMFAF)⁴⁸ can be used for the modernisation and innovation in the fisheries and aquaculture sector. The EMFAF can support investment in operations that can support the energy transition such as: (i) improvements in energy efficiency and reductions in carbon footprint (e.g. hydrodynamic optimisation, gear

⁴⁰ COM(2021) 559 final.

⁴¹ COM(2021) 557 final.

⁴² COM(2021) 563 final.

⁴³ COM(2021) 551 final

⁴⁴ COM(2020) 741 final.

⁴⁵ For example, through decommissioning an old vessel without public aid.

⁴⁶ https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13619-EU-fisheries-and-aquaculture-energy-transition_en

⁴⁷ i.e. the difference between the capacity ceilings and the actual active capacity of the fleet.

⁴⁸ https://oceans-and-fisheries.ec.europa.eu/funding/emfaf_en

efficiency, alternative fuels and bridge systems for engine control); (ii) replacement/modernisation of engines for vessels up to 24 metres under conditions⁴⁹; (iii) the modernisation of fishing vessels up to 24 meters for the subsequent installation of energy-efficient engines that require an increase in gross tonnage of the vessel^{50,51}; and (iv) skills development⁵².

The EMFAF includes safeguards through its eligibility conditions for the fleet subsidies mentioned above to prevent overcapacity and thus overfishing. These safeguards include: (i) non-eligibility for vessels belonging to a fleet segment where the fishing capacity of the segment is not in balance with the fishing opportunities available to that segment; and (ii) restrictions on increasing a vessel's engine power. The EMFAF provides targeted support for an increase in a vessel's gross tonnage for: (i) subsequent installation or renovation of an engine or propulsion system which increases energy efficiency or lowers CO₂ emissions; and (ii) the placement or renovation of a bulbous bow which can increase energy efficiency. However, neither of those options are permitted to lead to an increase in overall fleet capacity or overfishing.

Some stakeholders have called for more flexibility in the EMFAF to test and develop innovative solutions for the use of renewable and low-carbon energy sources. However, the EMFAF can already support the development of low-carbon and energy-efficient technologies. For example, it can do this by funding: (i) feasibility studies of new technology; (ii) tests and trials of new technology (e.g. demonstrators, prototypes); (iii) energy-efficiency audits; and (iv) the dissemination and transfer of technology and innovation, including for vessels above 24 metres. Also, the funding through the Community-Led Local Development (CLLD)⁵³ gives opportunities for enabling the energy transition and stakeholder collaboration on a local level, for example through building skills and the dissemination of knowledge.

Furthermore, state aid has been enabling the development of the sector. The Commission is concluding the process of revising the State Aid framework applicable to the fisheries and aquaculture sector⁵⁴, to ensure that it stays in line with the EU's priorities and objectives, including CFP objectives. For example, the recently endorsed new state aid guidelines will in particular permit aid under the same conditions as under the EMFAF. The new Fisheries Block Exemption Regulation (FIBER)⁵⁵ will allow aid for e.g. energy efficiency, reduction of CO₂, mitigation of climate change effects and transition to green energy, by alleviating the procedure to put in place measures for SMEs.

⁴⁹ As specified in Article 18 of EMFAF Regulation (EU) 2021/1139.

⁵⁰ Referred to in Article 22(2) of Regulation (EU) 1380/2013 establishing a common fisheries policy; under conditions to compensate the increase by the prior withdrawal of at least the same amount of fishing capacity without public aid from the same fleet segment or from a fleet segment for which the latest report on fishing capacity has shown that the fishing capacity is not in balance with the fishing opportunities available to that segment.

⁵¹ As specified in Article 19 of EMFAF Regulation (EU) 2021/1139.

⁵² Supporting advisory services, cooperation between scientists and fishers, professional training, lifelong learning, the promotion of social dialogue, knowledge sharing, and diversification of activities.

⁵³ https://oceans-and-fisheries.ec.europa.eu/funding/local-partnerships_en

⁵⁴ https://competition-policy.ec.europa.eu/sectors/agriculture/legislation_en

⁵⁵ Regulation (EU) No 2022/2473 (*OJ L 327, 21.12.2022, p. 82–139*)

In the specific case of the EU's outermost regions, given the specific challenges they face due to their remoteness, topography and climate, these regions can benefit from a higher EMFAF aid intensity for many types of investments in modernisation and innovation, with the exception of certain fleet subsidies⁵⁶. Moreover, the recently endorsed new state aid guidelines⁵⁷ will continue to allow state aid for fleet renewal in balanced fleet segments in the outermost regions, which in principle can also help to improve energy efficiency and accelerate the energy transition in the fleet there.

The Commission aims to ensure that the regulatory framework continues to be appropriate for achieving the objectives of the CFP while at the same time enabling the energy transition. To achieve this, the Commission will regularly assess the possibilities provided under the existing legal framework, as is also proposed in the Communication on the functioning of the CFP. Also, as announced in the farm-to-fork strategy, it is important to continue work on the Sustainable Food System initiative that the Commission plans to propose in 2023 for a harmonised EU approach to sustainable food production.

Taxation also plays an important role in promoting more environmentally friendly practices. This is why the Commission's proposal on the revision of the Energy Taxation Directive⁵⁸: (i) better aligns the taxation of energy products with EU's energy and climate policies; (ii) promotes clean-energy sources; and (iii) removes outdated tax exemptions across economic sectors, including fisheries and aquaculture. These proposals will help the fisheries and aquaculture sector to move away from the use of fossil fuels.

6. Challenges for the energy transition

Despite the existence of technological and operational innovations for energy efficiency and the potential for switching to zero- or low-carbon propulsion technologies, there is currently limited uptake of these innovations and technologies in the EU fisheries and aquaculture sector. Identifying the barriers that prevent stakeholders from taking these steps and subsequently jointly addressing these barriers, is the one of the most important immediate steps for furthering the energy transition in the sector.

6.1. Technological barriers

Technological barriers can make it difficult to adopt new technologies, especially considering that a significant share of the fishing fleet is relatively old or belongs to the small-scale coastal fleet. This concern was also expressed by stakeholders in their feedback to the CfE. These technological barriers can prevent the retrofitting of vessels with current renewable and low-carbon power sources. One of the main causes of these barriers is the weight or size of the installation, which can cause safety issues, especially on smaller vessels. For example, alternative propulsion systems may require more space onboard, cause issues with vessel stability, or reduce the vessel's range and therefore its level of autonomy. Moreover, the lack of appropriate service infrastructure for both vessels using alternative fuels (e.g. ammonia,

⁵⁶ Regulation (EU) 2017/1004 Articles 17, 18 and 19.

⁵⁷ Guidelines for State aid to the fishery and aquaculture sector C(2022) 8995.

⁵⁸ COM(2021) 563 final.

methanol) and for electric vessels using recharging infrastructure, makes it currently in many cases unfeasible to adopt such propulsion technologies.

Innovation can help to overcome these technological barriers, but the innovation process can face its own barriers, with stakeholders indicating: (i) the lack of knowledge transfer and cooperation between the sector and researchers; (ii) a lack of scientific validation of new technologies through scientific testing and pilots; and (iii) a lack of trust towards innovations by some stakeholders⁵⁹.

6.2. Knowledge and skills barriers

Knowledge barriers can hamper decision-making, for example, at the side of fishing/aquaculture operators, vessel owners and policymakers. These knowledge barriers include a lack of data or a lack of technological knowledge about, for example, fuel consumption, engine operations, and alternative technologies. Replying to the CfE, stakeholders confirmed that they lack energy-efficiency data, such as from onboard fuel-monitoring tools which limited the ability to measure and trace emissions. Stakeholders indicated that these knowledge barriers limit the understanding about the potential of energy efficient technologies and may prevent the adoption of more energy-efficient operations. The uptake of new technologies is also compromised by gaps in information and knowledge on the compatibility of existing solutions and environmentally friendly gears for: (i) vessels of different types, lengths, and ages; and (ii) different fishing techniques. Stakeholders replying to the CfE suggested there was a need for more research in both these technical areas, and in new business models. They also highlighted the need for further feasibility studies in this area.

Improved knowledge must also be used to develop practical skills to facilitate further uptake of innovations and fishing and aquaculture practices, such as the use of different gears, fishing methods, technologies, and propulsion systems. Developing relevant skills among a broad range of actors in the sector is therefore essential, notably those working at sea, in aquaculture facilities, in ports, and in supporting sectors. There is currently a limited number of placements, on-the-job training positions, and apprenticeships where people can acquire the necessary practical skills for working with novel and alternative propulsion technologies. Another barrier is the ageing of the workforce and the difficulty to attract new talent and young people to the sector. Moreover, barriers to skills acquisition are likely to appear throughout the different stages of the value chain. These barriers include a lack of suitable training facilities, and the absence of programmes to ‘train the trainers’ for a range of jobs needed to facilitate the energy transition in the sector.

6.3. Financial barriers

There are concerns that the relatively high investment costs for adopting certain energy-efficient technologies and low-carbon propulsion technologies, compared to the revenues of the majority

⁵⁹ European Commission, European Climate, Infrastructure and Environment Executive Agency, Bastardie, F., Feary, D., Kell, L., et al., *Climate change and the common fisheries policy: adaptation and building resilience to the effects of climate change on fisheries and reducing emissions of greenhouse gases from fishing: final report*, Publications Office of the European Union, 2022, <https://data.europa.eu/doi/10.2926/155626>.

of vessels in the fishing fleet, may slow down the implementation of new technologies and innovations. This has in turn led to concerns about the lack of market opportunities to develop energy-efficient solutions and clean-propulsion technologies, which may hamper private investments. Given that most aquaculture companies in the EU are micro-enterprises, the same barriers apply to the adoption of cost-efficient power-management systems in aquaculture facilities and aquaculture-service vessels. The limited availability of commercially viable alternative energy sources and fuels also holds back the adoption of alternative propulsion technologies. Further developing the investment landscape is essential to attract new private investments to the sector, which is in turn essential for the sector-wide uptake of technologies for the energy transition.

As explained in Chapter 5, public funding opportunities to support the uptake of energy-efficient measures are already available to finance the transition under the EMFAF. These measures can support a variety of activities, including education projects and the development, testing, auditing and dissemination of energy-efficient technologies. However, there is a need to further reflect on how to facilitate the accessibility of a broader range of EU funding opportunities at the various stages of research, innovation, deployment, and investment. In particular, investment solutions for a transition to reduce both GHG emissions and dependence on fossil fuels should be sought for fishing vessels above 24 metres that appear to be among the most fuel-consuming fleet segments. Several EU funding instruments in addition to the EMFAF can already help to finance the energy transition. However, the steps that applicants must take to access the funds can form a considerable bottleneck in the funding process. Besides, some available funding might not specifically target the sector, or may have conditions attached that prevent or limit investment in the fisheries and aquaculture sector's energy transition.

The CfE confirmed that funding and investment for innovation and research on new technologies and new vessels is one of the main concerns by stakeholders. Further identifying and addressing these barriers for the energy transition, in a gradual approach, is the first stepping-stone for the energy transition in the fisheries and aquaculture sector.

7. Enabling the energy transition of the EU fishery and aquaculture sector towards 2050

The challenges mentioned in Chapter 6 of this Communication hold back progress towards the twin aims of energy efficiency and the use of renewable and low-carbon energy sources in the sector. Because these twin aims form the backbone of the transition towards a climate-neutral fisheries and aquaculture sector in the EU, it is key to address them together with a wide range of stakeholders. To accelerate the energy transition, the Commission proposes 27 actions focusing on four main areas of action and the international context. These four main areas are:

- (a) to improve the governance framework and coordination/cooperation between stakeholders;
- (b) to close the gaps in both available technology and knowledge through research and innovation (R&I);
- (c) to develop skills and a workforce that is prepared and ready for the energy transition; and
- (d) to improve the business environment, including in financing opportunities and awareness.

7.1. Improve the governance framework and coordination and cooperation between stakeholders

Both work and discussions on the energy transition in the sector are fragmented across different stakeholder fora. As a result, the energy transition in the sector has not found a central hub for stakeholder cooperation and coordination in the EU. This limits the ability to: (i) make the most of the sector's strengths; (ii) develop a common strategy; (iii) exchange best practices; and (iv) work closely together on the topic with a broad range of stakeholders.

The Commission has been engaging with stakeholders, including through regional groups, advisory councils, social partner organisations, and local action groups under community-led local development. Coordination with Member States is also at the heart of the transition process and Member States need to take an active role in these dialogues. The Commission will continue to actively take part in facilitating the dialogue on the energy transition, but it calls on all stakeholders and national authorities to engage actively in this process.

To facilitate cooperation and coordination between stakeholders, the Commission will launch a new and broad multi-stakeholder partnership on the energy transition in EU fisheries and aquaculture: **the Energy Transition Partnership for EU Fisheries and Aquaculture (or 'ETP' for short)**.

The ETP will be the backbone for stakeholder cooperation and coordination on the energy transition in the sector. It will bring together all stakeholders – including small-scale businesses – who should take part in accelerating the transition, notably the fisheries and aquaculture sector; the ancillary activities sector; the processing sector; fishing port authorities; shipbuilders; gear manufacturers; NGOs; research organisations; financial institutes; the energy sector; and national and regional public authorities. Following up on the proposal from the Conference on the Future of Europe, the general public is also a key constituent. The ETP will give an opportunity for citizens to engage with, and learn more about: (i) the role of fisheries and aquaculture in the EU's food systems; and (ii) how to achieve a climate-neutral Europe by 2050.

The focus of the work of the ETP will be to further identify barriers for the energy transition and explore common ways to address them. The ETP will facilitate discussions and develop a knowledge base by sharing information and best practices in areas such as: (i) available financing tools for the transition; (ii) remaining knowledge and skills gaps; and (iii) common research priorities. This ETP will also be the coordinating hub for the energy transition in the sector for links with the EU's broader initiatives on the energy transition (e.g. in maritime transport and infrastructure, such as the European Sustainable Shipping Forum⁶⁰, or in the development of alternative fuels and energy sources). The Commission will call on the ETP and its stakeholders to make concrete, practical and sustainable proposals on solutions to accelerate the energy transition in the EU fisheries and aquaculture sector.

The ETP will be set up in 2023 and the Commission will encourage all stakeholders and national authorities to work on and endorse a declaration that they will join forces on the energy transition in the sector. The Blue Forum, announced in the 2021 Sustainable Blue Economy

⁶⁰ https://transport.ec.europa.eu/transport-themes/sustainable-transport/european-sustainable-shipping-forum_en

Communication⁶¹, will provide the initial technical support and secretariat services to the ETP. It will help coordinate the ETP's dialogue and cooperation among stakeholders and among different users of the sea. This will help to promote reflection and discussion on synergies by design in the energy transition in the sector.

The Commission will in 2023:

- organise a conference on the energy transition in the EU fisheries and aquaculture sector, bringing together all stakeholders, as the official 'kick-off' of a renewed effort and cooperation on the energy transition in the sector;
- launch a new multi-stakeholder energy-transition partnership (ETP) for the EU fisheries and aquaculture sector and encourage this partnership to kick-off its work by agreeing on a declaration to join forces in implementing the energy transition and becoming climate-neutral by 2050;
- start consulting the stakeholders engaged in the ETP to: (i) further collect stakeholder views and best practices; and (ii) further identify barriers to the transition and ways forward, which can feed into the preparation of the ETP's declaration and roadmap;
- call on the ETP and its stakeholders to start making concrete, practical, and sustainable proposals on solutions to accelerate the energy transition in the EU fisheries and aquaculture sector.

By 2024, the Commission will have:

- developed, in close cooperation with the ETP for the EU fisheries and aquaculture sector, a roadmap for the energy transition towards climate neutrality by 2050.

7.2. Closing the gaps in technology and knowledge through R&I

It is essential to increase knowledge and awareness about existing technologies and practices for the energy transition (such as those mentioned in Chapter 4). It is also essential to promote the testing and scientific validation of new and existing technologies for their application in fisheries and aquaculture. These activities will sustain the uptake of these technologies/practices and accelerate the transition.

Certain technologies are not yet market-ready – or are not technically/economically viable for application in the sector – and therefore need further development. This is particularly the case for technologies needed for the wider adoption of renewable and low-carbon energy sources. To facilitate the transition, innovations are essential in shipbuilding, gear design, propulsion methods, port infrastructure, and clean/renewable energy sources and fuels. To achieve this, innovation in the sector should be better connected to existing frameworks for R&I, for example in the maritime transport sector. In that context, the EU's sustainable and smart mobility strategy⁶² has already set a milestone that zero-emission ocean-going vessels should be market-ready by 2030. At the same time, there is a need to strengthen the process for developing new technologies, which starts with R&I and ends with the application of these technologies to new

⁶¹ COM(2021) 240 final.

⁶² COM(2020) 789 final.

and existing types of fishing vessels and aquaculture facilities that are fully compliant with safety requirements and fit-for-purpose. Cooperation at regional, national and sector level is an important tool to enable that process.

Innovation is already happening, although there is more scope for innovative projects focused on the fisheries and aquaculture sector. Energy-efficient gears, solar panels, sails wind turbines or retrofitting vessels are already in use in the sector. There have also been examples of vessel owners replacing diesel engines with hybrid solutions or with alternatives like batteries or engines powered by ammonia or hydrogen.

To inspire uptake across the EU, the Commission will **launch a virtual knowledge-sharing platform under the ETP, starting with the publication of a compendium of case studies and best practices on: (i) energy-transition innovations in the EU fisheries and aquaculture sector; and (ii) synergies by design across sectors.** In the future, the compendium will evolve into a ‘living’ publication, gathering the best case studies and best practices in the industry. The compendium will be selected by a team of experts representing several industries linked to the fisheries and aquaculture sector, and the team will be led by the ETP.

Furthermore, the knowledge base will be strengthened by an assessment of the estimated costs, benefits, and impacts of the energy transition in the sector. The Commission will **conduct an EU-wide study on the available technologies for the energy transition in the fisheries and aquaculture sector and their respective costs and benefits.** It will also evaluate relevant indicators (e.g. the payback period and return on investment) across the different fleet segments, as well as across aquaculture techniques. Furthermore, the Commission will launch, on the EU Blue Economy Observatory⁶³, a user-friendly web tool to assess the impacts of fuel prices on fleet and sector performance. To improve its monitoring capacity, the Commission will **assess the need for additional regular data collections on the energy consumption and emissions of the sector**, for example through pilot projects.

For aquaculture in particular, the Aquaculture guidelines already contain plans to develop a guidance document on environmental performance⁶⁴. This document will be partly aimed at helping the aquaculture sector to further reduce its environmental and carbon footprint. The guidance document will contain a list of good practices on energy efficiency and reduction of carbon footprint in aquaculture including, where relevant, data provided by the study on the available technologies for the energy transition in the sector and their respective costs and benefits. The newly established EU aquaculture assistance mechanism⁶⁵ will also ensure the wide dissemination of this and other guidance documents and provide technical support.

The EU has a broad range of innovation programmes that aim to accelerate the energy transition of the EU’s economy and that can be mobilised to support the energy transition in the fisheries

⁶³ https://blue-economy-observatory.ec.europa.eu/index_en.

⁶⁴ This guidance document will include: (i) the identification of a reference method to determine the carbon footprint of aquaculture production; and (ii) the gathering and listing of good practices at governmental and industry level covering energy efficiency and the reduction of carbon footprints (Annex of COM(2021) 236 final).

⁶⁵ https://cinea.ec.europa.eu/news-events/news/new-aquaculture-assistance-mechanism-support-eu-sustainable-aquaculture-2022-07-29_en.

and aquaculture sector. Investment in R&I under Horizon Europe⁶⁶ continues to support the transformation process towards a sustainable blue economy. In particular, the ETP will promote efforts to develop, deploy and test technologies, working in synergy with other research areas and industries, especially the development of sustainable technologies in waterborne transport through Horizon Europe. Creating the right environment for R&I, in particular by connecting with other partnerships, such as the European Partnership for Zero Emission Waterborne Transport (ZEWT)⁶⁷ and the Batteries4EU⁶⁸ Partnership or Clean Hydrogen JU⁶⁹, which are developing technology building blocks for use by the waterborne transport sector, can offer synergies with innovation needs in the energy transition for fisheries and aquaculture. Industrial alliances also exist in which public and private partners have joined forces to support the large-scale deployment of clean technologies⁷⁰. The Commission, together with stakeholders in the ETP, will explore ways to secure synergies and maximise benefits for the sector from these existing initiatives.

The EU's digital strategy 'A Europe Fit for the Digital Age'⁷¹ will furthermore promote digitalisation in the waterborne transport sector, and digitalisation will also have to be embraced as part of the energy transition in the EU fisheries and aquaculture sector.

Through the new ETP, the Commission will also promote the potential for specialisation on a national and regional level to foster the dissemination and acceptance of innovation to benefit the sector. The Commission is already facilitating and supporting maritime regional cooperation at sea-basin and macro-regional scale, including through the implementation of smart specialisation strategies (S3). Such S3s also cover the energy transition by identifying strategic areas for action with wide stakeholder involvement and regional/inter-territorial cooperation. The Commission has set up a new S3 thematic platform on the sustainable blue economy⁷², addressing five topics: fisheries, aquaculture, marine renewable energies, blue biotechnologies, and coastal maritime tourism. This thematic platform provides capacity-building activities (e.g. training) for blue-economy stakeholders and an opportunity for interregional cooperation in shared smart specialisation priority areas. It also provides know-how to set up interregional partnerships and other support services. The thematic platform will help to: (i) create synergies between the different funding instruments in innovation; and (ii) further mobilise public and private stakeholders in the blue economy at regional level.

The Commission helps EU Member States and regions to develop, implement and review their S3s and implement innovative projects through the European Regional Development Fund (ERDF⁷³), EMFAF, European Social Fund (ESF⁷⁴), and other EU funds. It will further explore

⁶⁶ https://ec.europa.eu/info/funding-tenders/find-funding/eu-funding-programmes/horizon-europe_en.

⁶⁷ <https://waterborne.eu/partnership/partnership>.

⁶⁸ <https://bepassociation.eu/>

⁶⁹ https://www.clean-hydrogen.europa.eu/index_en

⁷⁰ For example, the European Clean Hydrogen Alliance, the EU Battery Alliance, and the Renewable and Low-Carbon Fuels Value Chain Industrial Alliance.

⁷¹ https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age_en.

⁷² <https://s3platform.jrc.ec.europa.eu/sustainable-blue-economy>

⁷³ https://ec.europa.eu/info/funding-tenders/find-funding/eu-funding-programmes/european-regional-development-fund-erdf_en; <https://ec.europa.eu/environment/archives/life/funding/life.htm>.

⁷⁴ <https://ec.europa.eu/european-social-fund-plus/en>

the creation of an innovative cooperation group for stakeholders on the energy transition in the EU fisheries and aquaculture sector, under the S3 thematic platform on the sustainable blue economy.

The Commission will explore opportunities to create synergies with networks and programmes to develop EU-wide innovation ecosystems in real-life environments ('living labs')⁷⁵ including with the European Investment Bank. The Commission also calls on regions and stakeholders to set up regional living labs with the engagement of different stakeholders (including shipbuilders, ports, energy suppliers and investors) to co-create, develop prototypes, and scale-up innovative solutions for the energy transition of the sector.

The potential of the EU 'Restore our Ocean and Waters by 2030' Mission⁷⁶, notably via its 'lighthouses,' should be fully used. This EU Mission is an opportunity here to address the innovation barriers caused by a lack of collaboration between developers of innovation and end-users, as well as those barriers resulting from a lack of scientific endorsement. **The Commission calls on regions, Member States and other stakeholders to endorse the charter of the initiative 'Restore our Ocean and Waters by 2030' and explore the further creation of regional 'lighthouse' projects** under this mission. This will improve collaboration between public and private actors through R&I activities that aim at the broader societal uptake of innovations that: (i) accelerate the energy transition in the sector; and (ii) can be disseminated to the rest of the EU. Likewise, cooperation is also needed with the European Partnership for a Climate-neutral, Sustainable and Productive Blue Economy⁷⁷ set up in 2022 under Horizon Europe.

⁷⁵ According to the European Network of Living Labs, living labs are open-innovation ecosystems in real-life environments using iterative feedback processes throughout a lifecycle approach of an innovation to create sustainable impact: <https://enoll.org/about-us/what-are-living-labs/>.

⁷⁶ https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/restore-our-ocean-and-waters_en.

⁷⁷ <https://maritime-spatial-planning.ec.europa.eu/fundings/european-partnership-climate-neutral-sustainable-and-productive-blue-economy>.

The Commission will in 2023:

- launch an EU-wide study on the available technologies for the energy transition in the fisheries and aquaculture sector and their respective costs and benefits to gain better understanding of the costs, benefits, investment needs, and potential for synergies by design;
- set up an online platform for knowledge sharing, which will start with the delivery in 2023 of an online compendium of regularly updated best practices and case-studies on the energy transition and synergies by design across sectors;
- launch a user-friendly web tool to assess the impacts of fuel prices on fleet and sector performance, as part of the EU Blue Economy Observatory;
- explore opportunities to build synergies with networks and programmes to develop living labs (the EU-wide innovation ecosystem in real-life environments), including with the European Investment Bank;
- further explore: (i) the possibility of promoting interregional cooperation under the priorities identified during the S3 brokerage sessions on fisheries and aquaculture; and (ii) possibilities to introduce new cooperation among stakeholders on the energy transition in the sector, under the S3 Sustainable Blue Economy platform.

The Commission will by mid-2024:

- assess the need for additional regular data collection to monitor the energy consumption and emissions of the sector.

The Commission calls on regions and Member States:

- to explore the creation of regional ‘lighthouse’ projects under the Mission Oceans and Water and promote projects on energy transition starting in 2024.

7.3. Develop skills and a workforce trained and ready for the energy transition

The Commission recognises the importance of a considerable reskilling and upskilling effort in all economic sectors, in part to accelerate the path towards the 2030 EU targets on employment and skills⁷⁸. This was underlined by President von der Leyen’s announcement to make 2023 the European Year of Skills.

For the EU fisheries and aquaculture sector in particular, enabling the energy transition will require new knowledge, skills and qualifications so that workers will be able to adopt new technologies and practices. The fisheries and aquaculture sector needs dynamic and knowledgeable workers, especially younger people, who can help to propel the sector into a sustainable future. For fisheries, this is a particular challenge given its ageing workforce, which may lead to the loss of skilled workers in this sector.

⁷⁸ These are proposed under the 2020 European Skills Agenda for sustainable competitiveness, social fairness and resilience: https://ec.europa.eu/migrant-integration/library-document/european-skills-agenda-sustainable-competitiveness-social-fairness-and-resilience_en.

The Commission has already enabled the setup of skills partnerships (stakeholder engagement) under the pact for skills⁷⁹, one of the flagship actions under the European skills agenda. Mirroring what already exists in other EU economic sectors, the fisheries and aquaculture sector should consider setting up relevant large-scale skills partnerships among the stakeholders to work on promoting skills development.

Up-to-date education and vocational training systems to train and re-train workers for new and sustainable activities will be vital to attract new workers and improve the image of the sector, its employment opportunities and its attractiveness to newcomers, including younger generations and women. Skill shortages, in particular about transition to renewable and low-carbon alternative energy, are likely to appear throughout the sector as it steadily starts to make this transition. Many sub-sectors will need to invest in knowledge and training in the areas of renewable and low-carbon energy and attract well-skilled workers to help transform the fisheries and aquaculture sector. These sub-sectors include naval energy engineering, energy suppliers, ports, and others. In addition, as underlined in the Skills and Talent Package⁸⁰, legal migration can also contribute to address labour shortages as well as ensure equality and a fair environment for the sector's workforce. Finally, adapting the sector to the energy transition, may also create opportunities and jobs in rural and coastal communities.

To promote this change, the Commission launched a new edition of the 'blue careers' call for proposals, under the EMFAF, totalling EUR 7.5 million⁸¹, aiming to support innovative blue-economy skills projects. It has also launched in 2022, the "women in the blue economy" call⁸², to help increase the participation of women in the different sectors of the blue economy, including fisheries and aquaculture. As part of its strategic foresight approach, the Commission will also launch a 'Fishers of the Future' project to: (i) identify trends, skills requirements, employment opportunities, skills and training gaps, opportunities, and threats facing the sector; and (ii) illustrate profiles of how fishers might be working in 2050⁸³.

The Commission encourages Member States to further integrate knowledge and skills on the technologies and practices necessary for the energy transition into vocational training and education programmes for the fisheries and aquaculture sector and across its value and supply chain. This effort can be supported by the EMFAF or by other EU programmes, notably Erasmus+, the ESF+, and the Recovery and Resilience Facility. **The Commission will also explore setting up a virtual academy programme on the energy transition for the sector on an online EU platform**, while also continuing to build on existing 'blue skilling' programmes in EU agencies.

⁷⁹ <https://ec.europa.eu/social/main.jsp?catId=1517&langId=en>.

⁸⁰ [COM\(2022\) 657 final](#).

⁸¹ https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/emfaf/wp-call/2023/call-fiche_emfaf-2023-bluecareers_en.pdf.

⁸² https://cinea.ec.europa.eu/news-events/news/women-blue-economy-call-proposals-now-open-2022-05-17_en. In February 2023, EUR 2.5 million was awarded for two projects, https://cinea.ec.europa.eu/news-events/news/eur-25-million-awarded-two-emfaf-projects-women-blue-economy-2023-02-06_en

⁸³ As proposed in the Communication 'The common fisheries policy today and tomorrow' (COM (2023) 103).

Finally, knowledge and relevant data related to energy use in the sector play an important role in supporting well-informed decisions by stakeholders and policy makers. The **EU Blue Economy Observatory**⁸⁴, launched in May 2022, will be a pillar of knowledge and data gathering and dissemination. It will also analyse and report on progress in the transition to renewable and low-carbon energy sources for fisheries and aquaculture.

The Commission will in 2023:

- better promote grants under the EMFAF and the ‘blue careers’ call for the development of the next generation of blue skills. It will also provide opportunities for attractive, sustainable maritime careers in the blue economy that train workers for the jobs needed during the energy transition.
- further explore the issue of skills partnerships in the blue economy at large, following-up on the set-up of skills partnerships under the pacts for skills in the area of shipbuilding and offshore renewable energy, as announced in the Sustainable Blue Economy Communication.

As of 2024, the Commission will:

- explore the setup of a virtual academy programme on energy transition on an EU platform, while also building on existing ‘blue skilling’ programmes in EU agencies.

The Commission urges and calls on the Member States to:

- integrate knowledge and skills on the technologies and practices needed for the energy transition into vocational training and education programmes for fisheries and aquaculture.

7.4. Improve the business environment and raise awareness of financing opportunities

Appropriate investment frameworks, funding and financing possibilities are key for enabling the energy transition. Ensuring these are in place will require a significant financial effort, particularly in a sector that is highly diverse and characterised by mostly small-scale businesses. Investment must also be mobilised in: (i) R&I; (ii) the testing and scientific validation of technology; (iii) upscaling; and (iv) the eventual deployment of technology across the sector. Furthermore, investments must also be made beyond fisheries and aquaculture, in the wider value chain, which encompasses ports, shipbuilders, energy providers, the fish-processing industry, and fish auction halls.

EU and national public funds and financing instruments can leverage private investment and help overcome existing barriers to investment by bridging financing needs. But it is also necessary to address other barriers that impair widespread private investment, including in the areas of promoting market development and encouraging more widespread adoption of technologies by small businesses.

To support the energy transition in the sector, the EU has a wide range of funding tools made available through public funds, private investment backed by public financing, and EU financial instruments and grants. To mobilise these funds for the energy transition, Member States must

⁸⁴ https://blue-economy-observatory.ec.europa.eu/index_en.

make better use of the existing opportunities, in part by allocating funds to the benefit of the energy transition in their programming, while private parties could benefit from better awareness and assistance in accessing these funds.

The EMFAF can: (i) continue to support the pre-market stage of innovation and new technologies; and (ii) financially support the adoption and deployment of mature technology. It can support these stages while ensuring alignment with the objectives of the CFP, as explained in Chapter 5. Most Member States have included the energy transition measures in their EMFAF programmes and are ready to support the sector in the energy transition through tailored operations of the fund. **The Commission will help Member States to translate the commitments of their EMFAF programmes** into concrete investments to support the energy transition and energy efficiency for their national fisheries and aquaculture sector.

The Commission also calls on Member States to use the flexibility within their fishing capacity ceiling, in cooperation with the sector, to help reallocate capacity where it is needed and to enable the uptake of technologies for the energy transition on vessels⁸⁵. In this framework, any reallocation of capacity should require a reliable monitoring of capacity, including regarding engine power⁸⁶.

The EU's key R&I programme Horizon Europe offers tools to facilitate collaboration and strengthen the impact of R&I in developing, supporting, and implementing the shipping industry's transition to renewable energy. Some of this support for the shipping industry can also be accessed by some large fishing vessels. Both the Mission Restore our Ocean and Waters⁸⁷ initiative and its 'lighthouse' projects continue to provide financial support to achieve climate-neutral fisheries and aquaculture. In particular, this support is directed through the work on the specific 'lighthouse' project in the Baltic and North Sea, which is working on developing a sustainable and climate-neutral blue economy. Innovative projects for the energy transition can also be financed under the S3s⁸⁸ that regions need to further develop. The ERDF and the Innovation Fund⁸⁹ can support projects which include innovative low-carbon technologies with commercial demonstrations, while always complying with the CFP's objectives and principles. Finally, Member States can also provide state aid under specific conditions, as mentioned in Chapter 5. The new FIBER adopted by the Commission will continue to allow investment support linked to green energy and energy transition.

The EU launched several initiatives in response to the COVID-19 pandemic and Russia's unprovoked act of aggression against Ukraine. These initiatives include REPowerEU, the Recovery and Resilience Facility⁹⁰ and the recent announcement of a European Hydrogen

⁸⁵ This possibility is more elaborately explained in Chapter 5 of this Communication.

⁸⁶ European Commission, Directorate-General for Maritime Affairs and Fisheries, Study on engine power verification by Member States: final report, Publications Office, 2019, <https://data.europa.eu/doi/10.2771/945320>

⁸⁷ https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/restore-our-ocean-and-waters_en.

⁸⁸ https://ec.europa.eu/regional_policy/en/funding/erdf/.

⁸⁹ https://climate.ec.europa.eu/eu-action/funding-climate-action/innovation-fund_en.

⁹⁰ https://ec.europa.eu/info/funding-tenders/find-funding/eu-funding-programmes/recovery-and-resilience-facility_en.

Bank⁹¹. Together, these initiatives can accelerate financing of the transition to alternative energy. The EU fisheries and aquaculture sector can benefit directly from these initiatives. But it can also benefit from the spill-over effects of both demand for clean energy and development/deployment of clean-energy technology, in other industries such as shipping. Furthermore, following the new energy emergency regulation⁹², the Commission will: (i) carry out a needs assessment on investment to speed up the clean-energy transition; and (ii) make a proposal to enhance REPowerEU's financial firepower. Some Member States have already included marine and maritime-related investments in their REPowerEU plans. These investments include: (i) greening and innovation in fisheries and aquaculture; (ii) greening and digitalisation of ports and shipyards; and (iii) green shipping. For this purpose, **the Commission calls on Member States to include, in their national recovery and resilience plans, reforms and investments related to the energy transition and clean energies in the sector.**

To promote simplified access to information on funding, and better identify which funds can be used to support the energy transition and in which way, **the Commission will develop a specific guide and database on EU funding and financing instruments for the energy transition in the fisheries and aquaculture sector.** The Commission also aims to facilitate the accessibility and use by public and private parties of existing funds that can support the energy transition. **It will therefore promote specific assistance at regional and cross-border level to match specific projects with the most relevant funds for the energy transition of EU fisheries and aquaculture.** It will achieve this through the already available assistance mechanisms of the different sea-basin strategies⁹³. To facilitate the use of existing funds that can support the energy transition by public and private parties in EU aquaculture, cooperation will also be needed with the recently established aquaculture assistance mechanism⁹⁴ which aims to: (i) become a 'one stop shop' for disseminating knowledge, technical expertise and information on sustainable aquaculture (including a guide on EU funding and a database of EU-funded projects in the sector); and (ii) share good practices on sustainable aquaculture in the EU.

The energy transition also needs to be driven and supported by private investment, in particular projects for which access to public funding is restricted or insufficient. In recent years, the Commission has been developing funding programmes and tools to attract private investors and reduce risks, while facilitating the take-up of innovative investments, such as the InvestEU programme⁹⁵ and the BlueInvest Fund launched in partnership with the European Investment Fund (EIF)⁹⁶.

⁹¹ As proposed in the State of the Union 2022 Letter of Intent of 14 September 2022.

⁹² COM(2022) 473 final.

⁹³ <https://maritime-spatial-planning.ec.europa.eu/projects/black-sea-assistance-mechanism>; <https://atlantic-maritime-strategy.ec.europa.eu/en/contact-us/assistance-mechanism-atlantic-action-plan>; <https://westmed-initiative.ec.europa.eu/assistance-mechanism/>.

⁹⁴ https://cinea.ec.europa.eu/news-events/news/new-aquaculture-assistance-mechanism-support-eu-sustainable-aquaculture-2022-07-29_en.

⁹⁵ https://investeu.europa.eu/index_en.

⁹⁶ https://www.eif.org/what_we_do/equity/news/2022/commission-and-eif-agree-to-mobilize-500-million-with-new-equity-initiative-for-blue-economy.htm

The InvestEU programme⁹⁷ enables private funding via financial guarantees to support the design of instruments to share risk with the private sector and, as a result, increase resources for investment into climate, environment and clean-energy technology, including on vessels and in aquaculture sites. All four ‘windows’ of this programme⁹⁸ can already be used to support the energy transition.

In 2022, the Commission and the EIF launched an earmarked product for the blue economy⁹⁹: InvestEU Blue Economy. This initiative will mobilise EUR 500 million over seven years (2021-2027) that, together with private capital, will result in up to EUR 1.5 billion of risk-financing for innovative and investable SMEs in the blue economy by intermediaries, such as venture capital funds. The initiative is open to various projects and companies, including companies that work on new types of clean ships or on retrofitting existing ships with low- and zero-emission technologies.

In addition, the EU’s BlueInvest platform¹⁰⁰ will work to support the project pipeline¹⁰¹, help SMEs to navigate the maze of funding options, and strengthen the financing ecosystem. The BlueInvest platform will do this by continuing to **provide targeted investment-readiness support and access to finance** to SMEs and start-ups. This support will focus on: (i) accelerating innovative and sustainable technologies, solutions and business models; and (ii) supporting the transformation of the sector. It will give visibility to the energy transition and related investment opportunities, including the energy transition in fisheries and aquaculture. The BlueInvest platform will achieve this through: (i) its pitching and matchmaking events, thematic workshops, and webinars; (ii) its online community; and (iii) its capacity-building programme for investors. The BlueInvest platform has a target to reach EUR 1 billion in investment for the sustainable blue economy by 2024.

The Commission will also publish a BlueInvest investor report in early 2023 highlighting key technologies supporting the green and digital transition and related investment opportunities for equity investors in SMEs and start-ups that are part of the BlueInvest project pipeline¹⁰². A survey was undertaken in September 2022 among 87 venture capital and private equity investors to gather data for this investor report. The survey already found a combined intention from these investors to invest a total of EUR 2.14 billion between now and 2030,¹⁰³ including in companies that offer solutions and technologies for the energy transition in the fisheries and aquaculture sector¹⁰⁴.

⁹⁷ https://investeu.europa.eu/index_en

⁹⁸ Social Investment and Skills; Sustainable Infrastructure; SMEs; and Research, Innovation and Digitalisation.

⁹⁹ Under the Joint SME-RDI Equity Product of InvestEU.

¹⁰⁰ <https://webgate.ec.europa.eu/maritimeforum/en/frontpage/1451>.

¹⁰¹ <https://webgate.ec.europa.eu/maritimeforum/en/pipeline/projects/4361>.

¹⁰² This features more than 330 innovative and high-potential blue-economy companies.

¹⁰³ These figures will still be consolidated and will be included in the BlueInvest Investor Report to be launched at BlueInvest Day on 9 March 2023. The report, looking at 10 blue-economy sectors, will also include in-depth research on green shipping and ship retrofitting.

¹⁰⁴ Fisheries, Aquaculture, Blue Biotech, Shipbuilding & Refit, Shipping & Ports, Blue Renewable Energy, Blue Tech & Ocean Observation, Coastal & Maritime Tourism, Ocean Pollution & Water Management, Coastal and Environmental Protection and Regeneration.

The Commission will in 2023:

- further help Member States to translate the commitments of their EMFAF programmes into concrete investments for the energy transition in the sector.
- promote specific assistance for matching specific projects with the most relevant funds for the energy transition of EU fisheries and aquaculture through the assistance mechanisms of the different sea basins (e.g. Baltic Sea, Black Sea, Atlantic Ocean, and western Mediterranean).
- improve targeted support to make companies investment-ready and improve their access to finance. This will be done through the EU BlueInvest platform to accelerate technologies and solutions by innovative blue-economy companies (including for the sector's energy transition, in areas such as green shipping and retrofitting technologies).
- develop a guide and database on the wide range of EU funding and financing instruments. This guide and database will give information on financing opportunities to support innovation projects and the energy transition in the EU fisheries and aquaculture sector.
- explore with the EIF and EIB how to: (i) further channel and accelerate lending in the area of clean-energy technology; and (ii) continue mobilising private financing to support the development and adaptation of new clean-energy technology in vessels and aquaculture sites.

The Commission calls on Member States to:

- come forward with strategic and ambitious approaches to investments in energy efficiency in their national fisheries and aquaculture sectors, from both the EMFAF programmes and other available EU financial tools;
- use the flexibility within their fishing-capacity ceilings, in cooperation with the sector, to facilitate reallocation of capacity to where it is needed to enable the uptake of technologies for the energy transition on vessels.
- include in their RRF national plans, reforms and investments linked to blue technologies and clean energies.

8. The energy transition in an international context

The EU can play a leading role in the energy transition of fisheries and aquaculture at international level. The measures taken by the EU will re-confirm the credibility of its commitment to international climate action. They are concrete examples of how to foster sustainable and responsible fisheries and aquaculture in line with our commitments in key international fora.

Furthermore, the sea-basin strategies and macro-regional strategies with a maritime component within the framework of Regional Sea Conventions also play a critical role. These strategies are particularly important in promoting a sustainable and resilient 'blue economy', because they highlight innovation and research as crucial tools for the development of coastal communities and sustainable fisheries and aquaculture. The EU should therefore promote the energy transition in fisheries and aquaculture, in bilateral and multilateral cooperation with non-EU countries, including in the regional fisheries-management organisations.

The Commission will also give specific attention to the energy transition of the fisheries and aquaculture sector of neighbourhood and, in particular, enlargement countries. The Commission will inform about opportunities to advance in the energy transition, and for enlargement

countries will address how to integrate the energy transition into the enlargement process. Tools being developed for the energy transition shall be made available to neighbourhood and enlargement countries, such as the planned guide and database on the EU funding and financing instruments for the energy transition in the fisheries sector.

Globally, an International Maritime Organization (IMO) regulatory framework on the energy efficiency of new ships is in place¹⁰⁵. Work is also under way to draw up a new set of concrete ‘mid-term’ measures for GHG emission reductions, as well as guidelines for ships using alternative fuels.

Nevertheless, in the short term, the costs of investing in the energy transition should not put EU operators at a disadvantage compared to competitors operating with less demanding energy-reduction policies and regulations. At international level, the EU, in line with the international ocean governance agenda¹⁰⁶, will continue to advocate for: (i) greater ambition in the IMO strategy on reducing GHG emissions at the occasion of its forthcoming revision promoting its ambitious target for phasing out emissions by 2050; and (ii) a combination of a global GHG fuel standard with a market-based measure for renewable, low and zero GHG-fuels.

Using the OECD policy coherence framework¹⁰⁷ for guidance, the EU will promote coherence between the energy transition in fisheries and aquaculture, on the one hand, and major development policies, on the other. The key areas between which coherence must be ensured are: (i) the energy transition; (ii) the EU’s poverty-reduction and food-security policies in developing countries; and (iii) the EU’s biodiversity and the ‘Zero Pollution Action Plan’¹⁰⁸ and its environmental goals. This will uphold the spirit of coherence of the European Green Deal. Special attention will be paid to biofuel development and policies that promote biofuel as an alternative fuel in fisheries and aquaculture, while making sure to avoid adverse effects on global food security and biodiversity. This will also be supported by the actions under the recent EU algae initiative¹⁰⁹, which are related to the development of industry standards and dedicating further research efforts in Horizon Europe to algae biofuels.

The Commission will continue to promote work and exchanges of best practice on the energy transition for the fisheries and aquaculture sector in key international organisations (OECD, IMO, and FAO). More specifically, it will work with the OECD’s Committee for Fisheries to improve the analytical foundations of debate in international fisheries and aquaculture policy. It will do this by holding dedicated strategic discussions and by providing data, policy analysis and advice, in particular on cost-benefit analyses for new technologies.

¹⁰⁵ <https://www.imo.org/en/ourwork/environment/pages/technical-and-operational-measures.aspx>

¹⁰⁶ JOIN(2022) 28 final.

¹⁰⁷ <https://www.oecd.org/gov/pcsd/pcsd-framework.htm>.

¹⁰⁸ COM(2021) 400 final.

¹⁰⁹ COM(2022) 592 final.

Starting in 2023, the Commission will:

- promote analysis and discussions related to the energy transition in the sector at the OECD's Committee for Fisheries.
- advocate for raising the level of ambition on reducing GHG emissions in the IMO strategy, in combination with a global GHG fuel standard with a market-based measure for renewable, low and zero GHG-fuels.
- promote work and exchanges of best practice on the energy transition for the fisheries and aquaculture sector in international organisations (e.g. OECD, IMO, FAO).

9. Conclusions

This is the moment to start building the future of the fisheries and aquaculture sector and to be bold in our ambitions. The unprecedented energy crisis has shown how vital it is to accelerate the pace of the energy transition and ensure the sustainability and economic resilience of the sector. This Communication is consistent with both the action plan for protecting and restoring marine ecosystems for sustainable and resilient fisheries and the Communication on the functioning of the CFP. It puts forward the Commission's vision and proposals to promote the sustainability transition in the fisheries and aquaculture sectors. This transition in the sector will also support the EU objectives on sustainable energy, strategic autonomy, and a climate-neutral, pollution-free EU economy by 2050.

Until today, this sector suffered from insufficient incentives to accelerate the energy transition. Some of the reasons were: (i) a lack of affordable, widespread and mature technologies that can replace the current reliance on fossil fuels; (ii) uncertainty over the choice of technologies in the context of long-lived and costly assets (vessels and bunkering infrastructures); and (iii) a lack of sufficient private and public financing for this shift in the sector. Acting now requires united and extraordinary cooperation and a response by all stakeholders in the sector, including national and regional authorities.

The energy transition in the fisheries and aquaculture sector can only be successful if there is sufficient commitment and close cooperation towards this new vision. The Commission will work closely with all stakeholders through the new ETP, including: industry (including small-scale businesses); shipbuilders; ports; energy providers; research centres; academia; Member State authorities at all levels of government; national institutions; NGOs; and the wider public. The Commission is ready and keen to develop closer cooperation in this area with the European Parliament, the Council and other EU institutions.

Together with the stakeholders, the Commission will further work on proposing milestones for the energy transition in the sector that are backed by data and scientific evidence. Annually, the Commission will take stock of the implementation of the actions under this Communication and will propose supplementary actions, if relevant, to further support the energy transition in the sector, including in areas where gaps persist or where ongoing developments require new action to support the transition.