

Navigating the energy transition: strategic goals for a resilient and sustainable Large-Scale Fisheries

Organised by the Energy Transition Partnership, set under DG MARE (European Commission).

Background

In its latest round of consultations, the Energy Transition Partnership (ETP) has adopted a segmented approach to address the unique needs of various stakeholders with the goal of advancing the energy transition. The present report focuses on the workshop specifically dedicated to large-scale fisheries (LSF), which aimed to:

1. **Identify challenges and needs**
2. **Identify concrete short-term, mid-term, and long-term actions for the energy transition of the EU fisheries and aquaculture sector**
3. **Showcase innovations and best practices**

Key outcomes

The LSF sector faces several significant challenges in meeting energy transition goals for 2030, 2040, and 2050. These include a **lack of a supportive regulatory framework financial barriers**, and **technological limitations** such as the current inadequacy of green technologies and insufficient infrastructure. Moreover, the sector must also address human resource challenges, including attracting skilled workers and overcoming gaps in training for new technologies. Additionally, competition from countries with less stringent environmental regulations and a lack of comprehensive data on fuel consumption further complicate the sector's efforts to reduce emissions. Moreover, the sector must also address human resource challenges, including attracting skilled workers and overcoming gaps in training for new technologies.

To achieve the energy transition objectives, it is critical to create a solid foundation of **collaboration across industries**, particularly in adopting and adapting new technologies. The sector must focus on practical, scalable solutions in the short-term, such as improving **energy efficiency** and developing **tailored training programmes**. Long-term solutions will depend on **innovative vessel designs**,

sustainable fishing practices, and **continued investment in R&D**. With effective support from **Member States** and industry-wide cooperation, the sector can work towards a sustainable future.

Key actions identified can be summarised as follows:

1. Immediate actions (by 2030):

- Collaborate with the **maritime industry** to adopt technological innovations, (e.g. prioritise the most relevant fuels and propulsion systems based on tangible assessments).
- Ensure **Member States support** R&D efforts.
- Raise **awareness among fishers** about the developmental phase of solutions, through tailored initiatives and pilot projects.
- **Improve energy efficiency** in existing fleets by implementing solutions such as antifouling treatments, propeller replacement, and fishing pattern optimization.
- Provide **flexible funding** and **incentives** for alternative technologies.
- Implement **regulatory adjustments** to enable a sustainable profitable sector, its energy transition and sufficient funding, particularly for the acquisition and design of new vessels.

2. Medium-term objectives (by 2040):

- Transition to **practical, scalable solutions** for everyday use.
- **Ensure affordability and feasibility** of new technologies through rigorous testing, as demonstrated in the SEAGLOW project.
- Focus on **fleet renewal**
- Invest in **research and development** for **green technologies**.

3. Long-term objectives (by 2050):

- Achieve a **fully decarbonised fleet** with **emission-free vessels**.
- Address the **distinct needs** of **pelagic and demersal fisheries**.
- Ensure **sustainable fishing practices** and **monitor fish stocks**.
- Focus on **continuous adaptation, innovation**, and **policy support** to meet sustainability goals.

What did we discuss?

Participants were divided into breakout rooms to address one of three key questions. After the discussions, all reconvened in a plenary workshop where a rapporteur from each group presented their findings. This section summarizes the proposals generated during these discussions.

Question 1: What challenges do the LSF sector foresee in meeting the energy transition objectives for 2030/2040/2050?

Challenges identified:

1. **Regulatory and policy issues:** Lack of a **supportive regulatory framework** to facilitate energy transition.
2. **Financial and investment barriers:** **Lack of investment** in future capacities despite current profitability. **High initial costs** for new technologies and retrofitting existing vessels. Lack of **public funding, subsidies, and low-interest loans** to support the transition. The influence of **taxonomy** on investment decisions.
3. **Technological challenges:** **Current technologies are not yet fit for purpose**, with a need for advancements in green energy solutions like LNG, hydrogen, and biofuels. Lack of available **green energy** sources and infrastructure. The challenge of **designing vessels** that can be retrofitted to **zero-emission standards** in the future.
4. **Human resources and skills gaps:** Difficulty in attracting and retaining **skilled workers**, particularly **younger generations**. The **lack of human resources** to participate in **training and development** activities.
5. **Environmental and market considerations:** Ensuring **sustainable fish stocks** and **resilient fishing practices**.

Solutions proposed:

1. **Human resources and skills gaps:** Development of **training programs** to upskill the workforce in new technologies and sustainable practices.
2. **Environmental and market considerations:** Ensuring **sustainable fish stocks** and **resilient fishing practices**.

Question 2: What are the conditions and solutions needed to meet the energy transition objectives for 2030/2040/2050?

Short-term goals (by 2030):

1. **Skills development:** Emphasise the development of skills through targeted **training programs**. **Engage and coordinate** with the **industry** and advisory councils to facilitate training despite capacity constraints.
2. **Energy efficiency:** Improve the energy efficiency of the existing fleet by adopting **new types of gears** and vessel designs. Conduct projects to **analyse energy and fuel usage** to guide investment decisions.
3. **Collaboration with other industries:** **Establish interactions** with the shipping industry and other sectors to exchange best practices and leverage their advancements in energy transition.
4. **Incentives and funding:** Provide incentives and flexible **public and private funding** to support the development and testing of alternative fuels and technologies.

5. **Regulatory adjustments:** Address regulatory issues such as **capacity limitations**. **Amend current regulations** creatively to facilitate the energy transition.
6. **Technology choices:** **Make informed decisions** on green technologies to **prioritise and discard** those that are less promising. **Align and coordinate existing projects** at the Member State and EU levels.

Medium-term goals (by 2040):

1. **Investment in new technologies:** Start **calls for funding** to support the development and testing of new technologies on the ground. Ensure **regulations** are **flexible** to allow innovation and the use of new technologies.
2. **Building new vessels:** Focus on building **new, 100% efficient vessels** rather than only retrofitting old ones.
3. **Fleet renewal:** Achieve **fleet renewal** through coordinated investments and scaling up of successful initiatives.

Long-term goals (by 2050):

1. **Stock status monitoring:** **Monitor and focus** on the **status of fish stocks** to ensure **sustainable fishing practices**.

Question 3: What is the sector ready to deliver by 2030/2040/2050 to achieve its energy transition?

Solutions for short-term (by 2030):

1. **Energy savings:** Achieve immediate **energy savings** by focusing on quick, impactful solutions.
2. **Collaboration with the maritime industry:** Align fisheries organizations with the broader maritime sector to **capitalize on technological advancements from shipbuilding**.
3. **Research and development support:** Highlight the critical role of Member States in advancing **research and development initiatives**.
4. **Fishermen awareness:** Ensure **fishermen understand** that these solutions are still in the development phase and are not yet operational.

Solutions for medium-term (2040):

1. **Transition to practical solutions:** Move from developmental stages to **practical solutions** based on ongoing research and development.
2. **Feasibility of costs:** Ensure that **capital and operational expenditures** for new technologies are financially viable.
3. **R&D support:** **Facilitate research and development efforts** through continued support from Member States and relevant authorities.
4. **Vessel design innovation:** **Develop new vessel concepts** with modern designs, addressing resistance to change among fishermen.

Solutions for long-term (2050):

1. **Separation of fisheries types:** Address the distinct needs of pelagic and demersal fisheries. Focus on **developing emission-free vessels** for both types of fisheries.

Annex 1 – Points to be further developed in the working groups

Based on the key outcomes from the workshop, the following points could be further developed in the working groups:

- I. Foresight and ambition goals**
 - Long-term vision: establish a clear, long-term vision for the LSF sector's energy transition that aligns with global sustainability goals.
 - Sustainable practices: discuss best practices for ensuring sustainable fish stocks and resilient fishing methods.
- II. Research and knowledge gaps**
 - Green technology development: prioritise research on promising green technologies and assess infrastructure needs.
 - Pilot projects: develop pilot projects to test new technologies and raise awareness among fishers about energy transition solutions.
- III. Skills and social aspects**
 - Training programs: design training initiatives to address skills gaps and attract younger talent to the sector.
 - Cross-industry partnerships: encourage collaboration with the maritime industry to share best practices and innovations
- IV. Finance and business environment**
 - Investment strategies: develop strategies to attract private investment in green technologies and sustainable practices within the LSF sector.
 - Funding mechanisms: explore public and private funding sources, including subsidies and loans, to support the transition.
- V. Regulatory framework**
 - Policy alignment: ensure alignment of national EU policies to create a supportive regulatory environment for the energy transition.
 - Incentives for innovation: develop regulatory incentives that encourage innovation and the adoption of new technologies in the sector.
- VI. Data and monitoring**
 - Monitoring systems: implement real-time monitoring systems to track fuel consumption and emissions in fisheries.

Annex 2 – Workshop execution

Part 1: Welcome and introduction

Title	Name and affiliation of the speaker
Welcome and presentation of the ETP	Sven Langedijk , Head of Unit, DG MARE
DG MARE emphasised the critical importance of achieving climate neutrality by 2050. To this end, the speaker highlighted key regulatory frameworks, including the Common Fisheries Policy (CFP) and the European Maritime, Fisheries and Aquaculture Fund (EMFAF), as crucial to addressing challenges in energy efficiency and alternative fuels. Since 2009, CO₂ emissions have decreased due to improved efficiency and fleet reductions, but the LSF sector, encompassing vessels over 12 metres using static and towed gears, constitutes 73% of the EU's fisheries emissions. The energy transition is vital for reducing CO₂ footprints and improving profitability, given the high correlation between fuel prices and profits. Developing a roadmap in collaboration with the sector will address current challenges and opportunities, energy efficiency, alternative fuels, and regulatory updates. In general, the speaker pointed out how achieving climate neutrality by 2050 requires a collective effort and stakeholder support. During the interactive Slido session, participants were asked to envision their initial steps towards energy transition in LSF. Their input strongly pointed towards conducting audits as a first step: beyond assessing sustainability and profitability, workshop participants stressed the importance of evaluating available technologies and best practices, as well as implementing pilot projects to test these solutions. Moreover, they expressed that it is crucial to analyse energy usage and ensure the involvement of fishers and stakeholders at all stages. This comprehensive approach is what will set the foundation for a successful transition.	

Part 2: Setting the scene

Title	Name and affiliation of the speaker
LSF sector general overview	Jules Danto , Support Group Coordinator for LSF, European Association of fish Producers Organisations (EAPO)
The speaker explained how it is important to understand the significant role of the LSF within the EU. The LSF represents nearly 25% of the EU fleet but accounts for around 50% of employment, and 70% of landings by weight and value. Notably, vessels under 12 meters make up about one-third of the LSF. This diversity in vessel profiles, operational areas, and fishing practices poses significant challenges in finding universal solutions. Among the key challenges are securing funds, managing high initial costs of alternative fuels, and ensuring port facilities for fuel access. Addressing these issues involves strengthening financial planning and encouraging public-private partnerships. Additionally, innovation and technology challenges, such as high costs and integrating scalable energy solutions, require attention. Potential solutions include pilot projects, collaboration with other maritime sectors, implementing renewable-powered systems at ports and engine upgrades to hybrid or alternative fuels. Furthermore, developing a skilled workforce was presented as a key premise for a resilient aquaculture and fisheries sector requiring tailored training programmes for advanced technologies and energy solutions to be designed and implemented on a large scale. To this end, with a collaborative approach between maritime academies and international bodies in developing said training and certification programs could be a solution, allowing to address the diverse needs of the LSF.	
Title	Name and affiliation of the speaker

Presentation of the summary fiche for the LSF on Techno-economic analysis for the energy transition of the EU fisheries and aquaculture sector ¹	Gema San Bruno , CINEA
The results of a recent study funded by the Energy Transition Partnership and CINEA analysed 45 innovative solutions to enhance energy efficiency and reduce CO₂ emissions in LSF. These innovations were assessed for their advantages, limitations, costs, and feasibility. Categories included alternative propulsion systems, vessel operation, fishing gear, on board processing, training initiatives and facilitation measures. The study underlined that some innovations are highly developed and provenly efficient, while others vary in CO₂ reduction potential. Recommendations emphasised the need for policymaking and regulatory changes, funding and financing mechanisms, industry engagement and involvement, and skills development with capacity building. Expanding on these innovations, the study delves into the specific challenges faced by LSF, particularly concerning high energy costs and CO₂ emissions. It proposes short-term solutions such as waste heat recovery systems, anti-fouling optimisation, smart steaming and route optimisation software. For the long term, the focus shifts to alternative fuels and hybrid systems. However, key challenges remain, including high initial capital investment, limited infrastructure for alternative fuels, downtime and operational disruptions and technical and skills gaps, and regulatory uncertainties. To mitigate these challenges, the study suggests several strategies. Financial assistance through subsidies and low-interest loans can help alleviate the burden of high initial costs. Partnerships with key ports and the development of training programmes are essential for building the necessary infrastructure and skills. Additionally, retrofitting and maintenance, stable regulatory frameworks, and long-term fuel procurement contracts are recommended. Engaging with regulatory bodies and planning flexible investments is also crucial to adapt to future regulations.	

Part 3: Innovative solutions for energy transition in LSF

To complement the overview of the sector, the challenges, potential risks and their corresponding mitigations, examples of potential solutions have been explored.

Title	Name and affiliation of the speaker
Empowering the energy transition, SEAGLOW project solution	Michael Rafn , Northern Denmark EU-Office
The SEAGLOW project, funded with €4.5 million (Horizon Europe Programme) over four years aims to reduce operational costs and carbon footprints for Small-Scale Fisheries in the Baltic and North Seas. The project brings together a multidisciplinary team including research institutions, the fishery industry, fishing associations, SMEs, and propulsion experts. The objectives of the SEAGLOW project include analysing conditions along the value chain for decarbonisation, adapting robust technologies to reduce fossil fuel use, deploying and testing solutions, and validating environmental and socio-economic impacts. Four demonstration vessels from Denmark, Sweden, Estonia, and Norway will be equipped with sensor systems to monitor fishing patterns and outcomes. Specifically, the Danish vessel will test a hybrid driveline, the Swedish vessel will use a hybrid plug-in solution, the Estonian vessel will focus on net fishing efficiency, and the Norwegian vessel will serve as a baseline measurement. All vessels will use toxin-free biosolutions coating to reduce fuel consumption by approximately 10%.	

¹ Study on: Techno-economic analysis for the energy transition of the EU fisheries and aquaculture sector - European Commission

Sensors will monitor fuel consumption, operational effects, engine speed, and noise, providing baseline data to compare with post-implementation results. Currently, all vessels are equipped with sensors, and data collection is underway. The project will continue with engine upgrades and further testing, aiming to provide a comprehensive regulatory framework for decarbonising the fishing sector.

Title	Name and affiliation of the speaker
Greening fishing boats in the Mediterranean - POWER4MED's proposal for LSF	Giulia Antidormi , Sustainable Development Goal for the Mediterranean

The **Power4Med project**, funded by the **European Maritime, Fisheries, and Aquaculture Fund (EMFAF)**, explores the integration of advanced energy solutions in the fisheries sector. Liquefied natural gas (**LNG**) presents a promising pathway for decarbonisation in large-scale fishing operations, given the vessels' average engine power of **216 kilowatts**, a specification comparable to that of LNG-powered heavy-duty trucks. Europe's expanding network of LNG refuelling stations further enhances the feasibility of equipping fishing ports with necessary LNG bunkering infrastructure. Additionally, **compressed natural gas (CNG)** is identified as a viable energy alternative for smaller coastal fishing vessels.

In the **short term**, actionable measures include replacing outdated engines with modern diesel or LNG counterparts, optimising propeller designs to enhance propulsion efficiency, and upgrading refrigerated holds to reduce energy consumption. However, significant barriers remain, such as the absence of local retrofitting facilities, discrepancies in national regulatory frameworks, and the shortage of technical expertise and financing mechanisms to support these initiatives.

Over the **medium term**, LNG is poised to play a more central role as refuelling infrastructure continues to expand across the Mediterranean region. Realising this potential requires developing robust capacity-building frameworks, establishing resilient value chains, and disseminating targeted technical knowledge. The **Power4Med project** is instrumental in facilitating this transition, offering a comprehensive suite of best practices, training programmes, and standardised retrofitting specifications to support stakeholders. These efforts aim to enable the fisheries sector to progress towards achieving carbon neutrality and aligning with broader sustainability targets.

Annex 3 – Agenda

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AGENDA

*11 December 2024, 14:30-18:30 CET – workshop dedicated to LSF
Brussels and Online*

*Thon Hotel Bristol Stephanie - Brussels (interpretation in EN/FR/ES/IT available) or online
(transcription in all EU languages available)*

14:15 – 14:30 Registration of the participants on site

14:30 – 14:45 Opening

Welcome and presentation of the ETP (**Sven Langedijk**, Head of Unit, DG MARE)

14:45 – 15:10 Setting the scene

ETP-AM introduction and explanation of the aims of the workshop (**Mihaela Mirea**, ETP-AM Project Leader)

LSF sector general overview (**Jules Danto**, Support Group Coordinator for LSF)

Presentation of the summary fiche for the LSF (**Gema San Bruno**, CINEA)

15:10 – 16:00 Innovative solutions for energy transition in LSF

Empowering the energy transition, **SEAGLOW** project solution (**Michael Rafn**, Northern Denmark EU-Office)

Greening fishing boats in the Med – **POWER4MED's** proposal for LSF (**Giulia Antidormi**, Sustainable Development Goal for the Mediterranean)

Q&A through Slido

16:00 – 16:20 Coffee break

16:20 – 17:45 Breakout sessions

(there will be organised 2 on-site and 4 online)

Guiding questions:

- 1. What challenges do the LSF sector foresee in meeting the energy transition objectives for 2030/2040/2050?**
 - 2. What are the conditions and solutions needed to meet the energy transition objectives for 2030/2040/2050?**
 - 3. What is the sector ready to deliver by 2030/2040/2050 to achieve its energy transition?**
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SLIDO will be used to support gathering the feedback

17:45 – 18:15 Summary of the outcomes

Each group will have maximum 5 minutes to present the results.

18:15 – 18:30 Closing

(DG MARE, LSF Support Group Coordinator)
