

## **Regulatory and policy framework for energy transition of fisheries in Europe.**

### **Executive Summary**

*This deliverable provides a comprehensive overview of the regulatory and policy frameworks guiding the energy transition in European fisheries, with a specific focus on the small-scale fishing fleet (SSF) of the Baltic and North Sea. It also synthesizes scientific, technical, and socioeconomic insights on decarbonisation options to support the SEAGLOW project's future demonstrations and policy recommendations.*

*Global fishing activities emitted 207 million tonnes of CO<sub>2</sub> in 2018, of which 23% originated from SSF. The EU stands out as the only region where emissions have continuously declined, falling from 8.9 to 4.3 million tonnes between 1990 and 2021, largely due to a reduction in fleet size. Fuel costs represent up to 60% of vessel operational expenses, making decarbonisation both a climate and an economic priority.*

*Workshops with fishers from 13 European countries highlighted critical challenges for SSF, including limited capital for investments, safety concerns regarding emerging fuels, regulatory gaps, and uncertainties about how future climate regulations will apply to small vessels. However, the comparatively low-carbon profile of small-scale fisheries relative to industrial fleets provides a strategic opportunity to position as a leading contributor to sustainable seafood production.*

*The regulatory review covers frameworks from the United Nations, European Union Common Fisheries Policy (CFP), and the International Maritime Organization (IMO). A central trend is evident: rules originally designed for merchant shipping (ETS, FuelEU Maritime, energy efficiency indicators) are progressively extending toward smaller fishing vessels, implying growing compliance obligations.*

*A systematic literature review of 604 studies (122 retained) identifies five main decarbonisation pathways:*

#### *1- Alternative fuels*

- 2- *Energy Audits*
- 3- *Operational changes*
- 4- *Policy and management actions*
- 5- *Technical and structural modifications*

*Operational changes can lead to substantial fuel savings, while technical improvements such as engine tuning, hull optimization, lighting, refrigeration, or gear design also make an important contribution depending on the vessel type and fishery. Low-emission fuels like methanol, biodiesel, hydrogen, ammonia, and LNG show promising potential, although they still face challenges related to infrastructure, safety, and the storage volume required. Hybrid electric solutions, particularly when port-side charging is available, can deliver significant emission reductions and are currently the most mature option for small-scale fisheries.*

*Key barriers include the higher cost of new technologies (especially hydrogen/ammonia systems), limited port infrastructure, and CFP fleet capacity constraints that restrict installation of larger or heavier decarbonisation equipment. Nonetheless, funding instruments, including EMFAF, Horizon Europe, Interreg, and the Innovation Fund, provide avenues to partly support these deployments.*

*In summary, a coordinated approach that integrates technology, policy, and capacity-building, while anchoring decision-making in fishers' real operational constraints, is essential for enabling a socially fair, technologically feasible, and environmentally meaningful transition for Europe's small-scale fisheries.*