

RE-IMAGINING GEAR IN A CIRCULAR ECONOMY

Workshop Report

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BELOW WATER



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CONSUMPTION
AND PRODUCTION



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BACKGROUND

In January 2018, the EU adopted the Plastics Strategy in a Circular Economy in order to help European businesses and consumers to use resources in a more sustainable way. Two Directives adopted in 2019 contain measures that address the fishing sector. The [Single Use Plastics \(SUP\) Directive](#) entered into force on 2 July 2019 and foresees measures on extended producer responsibility schemes, the establishment of national minimum annual collection targets in each Member State and the monitoring and reporting of fishing gear. Fishing gear that is returned to shore must be properly dealt with from a Circular Economy point of view.

The [Directive on Port Reception Facilities \(PRF\)](#) was adopted on 17th April 2019 and deals with all types of waste from ships as well as with waste collected in nets during fishing operations and includes measures and incentives to ensure the waste is returned to land to adequate port reception facilities. The SUP Directive and the PRF Directive are looking for specific but differing reporting, though they both have a common goal, which makes it imperative that both Directives be read together.

The pressing issues surrounding marine plastics set the stakeholders in motion. Two ACs have set up Focus Groups to deal with aspects of both Directives:

- North Sea AC: Focus Group on Circular Design of Fishing Gear
- North Western Waters AC: Focus Group Marine Plastics.

Additionally, the NWWAC and the Market AC held a first workshop on Plastics and the Seafood Supply Chain in Brussels on 7th November 2019. It brought together members of several Advisory Councils, experts and scientists to explore the impact of plastics on fisheries.

Finally, the four Advisory Councils, the NWWAC, PelAC, NSAC and BSAC held a second workshop in Brussels on 28th January 2020. It brought together invited experts, as well as stakeholders from the ACs, and representatives from the Commission to look at the specifics of fishing gear in a circular economy. The experts were invited to make short presentations of key themes relevant to their field. This was followed by a plenary session on defining gear, after which all the participants divided into groups to deal with three specific topics.

The meeting concluded with a plenary session to present the groups' findings, as well as a concluding discussion and summary. The meeting was opened and moderated by the Deputy Executive Secretary of the NWWAC Mo Mathies.



EXPERT PRESENTATIONS

The attending experts, bringing with them expertise from different backgrounds, were invited to present to the plenary their main discussion points and input regarding the impact of the requirements of the SUP Directive and the PRF Directive on the fishing sector. The following sections summarise their presentations.

There is a need to differentiate between static gear (gillnets), pelagic and demersal gears (trawls), as they pose different challenges. Fishing gear is complex and consists of many different materials, making recycling challenging and at times impossible. With many different producers of gear components, it is important to link up the supply chain to address this issue. Fishing gear is assembled and placed on the market in the European Union, while its components are produced at both EU and international level.

In order to tackle the issue of waste from lost, abandoned and/or discarded fishing gear at EU level it is important to understand the magnitude of the problem. There is currently a lack of independent data and research, with no clear and harmonized statistics identifying amounts and types of material. It is crucial to fully understand the sources and pathways of fishing gear waste to avoid loss of material into the marine environment.

Currently, fishing gear design does not include considerations regarding ecodesign, lifecycle thinking and built-in recyclability. While most of the fishing gear is reusable, repairable and used for a long time, little attention is given to what happens to it at the end-of-life stage. Disassembly amounts to approximately one third of the price of assembly and it is unclear who should cover the cost.

Taking into account the waste hierarchy and following the EU Waste Framework Directive, the aim is to design a gear that uses the least resources and has most longevity, but also to create a design most suitable for recycling, ensuring easy stripping of the material.

Offcuts are clean and easily recycled, but they often consist of very small pieces which are not being collected effectively. Among other things, changes in design could include the concept of monitoring and marking gear, for example via colour coding of materials for easy identification. There was no agreement among the participants on the need for the gear to be marked, as some of them feared this would unfairly expose the fishers instead of the producers.

When establishing an Extended Producer Responsibility (EPR) scheme for producers of fishing gear, it is important to understand what the costs of each step are, and to avoid that these costs are borne by the fishers rather than the producers. Fishers should not fund an EPR scheme, and their participation in voluntary schemes such as Fishing for Litter should be rewarded through effective fee modulation.

The fishing sector nationally as well as EU wide is often fragmented, something which can be seen in the different collection approaches between ports.

Several Member States have shown that separate waste collection in ports and harbours works. However, the issue of contamination, and different levels of contamination of fishing gear remains.

Fishing for Litter as a source-based approach is currently carried out in several MS. However, methods used in measuring marine litter are blurring the issues. For instance, during beach cleans every individual item is counted separately with little harmonization of results. The cleaning up is carried out by the fishing industry, and while the cost for disposal is covered, the cost of labour, provision of space on board, and damage to nets are not.

The legislation currently governing marine plastics and fishing gear is broad. The practicalities of both Directives are complex, and dissonance exists between the certainty of the legislation and economic viability. In addition, questions arise around enforcement with respect to how reliable control and enforcement will be.

To tackle the issue of legal compliance, a constructive and inclusive communication with the stakeholders is of paramount importance. A bottom-up as opposed to a top-down approach should be utilized to ensure adherence on the one hand, and pragmatic solutions for end-users (the fishers) on the other.

Sustainability training and awareness-raising should be carried out to ensure a broadening of the sustainability vision for the sector. It is important to acknowledge and praise voluntary initiatives such as Fishing for Litter and ensure that the proposed solutions are pragmatic and functional. Goodwill can be activated through creating incentives, with the new EMFF offering a huge opportunity to make such incentives a key priority.

To address this issue, OSPAR has produced two sets of guidelines linked to the issue: the OSPAR background document on Sustainable Fishing Education at fishing academies in OSPAR countries, OSPAR 2018, and the OSPAR Fishing-for-Litter Guidelines (OSPAR Agreement 2017-08), Source: EIHA 17/9/1, Annex 13.

SUMMARY DEFINING GEAR

The main challenges regarding the fishing gear of the future will be to design gear with a maximum lifespan, suitable for re-use and/or recycling and with a minimum risk of losing, abandoning or discarding it before the end of its life.

The fishing sector is using materials that optimise functionality at sea and reduce the CO2 footprint. One example is Dyneema. Brought in to replace the wire, Dyneema is very light and durable, easier to tow, and reduces stability problems on the boat. It is also largely unaffected by oil and UV light. However, a trade-off to these improvements is that Dyneema is currently non-recyclable and thus poses a problem at its end-of-life stage.

There are currently only limited options available for recycling end-of-life gear, with Plastix (Denmark) and Aquafil (Slovenia) being the only major players in Europe, although several small players are active in various countries as well. When examining various treatment options, it is important to identify and take into account the environmental impacts of those options.

Due to the cost and complexity of separation, the question of design becomes highly relevant. When designing gear, it is important to look at the various parts of the gear and their different functions. One example is the dolly rope which is in place to protect the gear. Being highly exposed to wear and tear, the replacement of the dolly rope could focus on a biodegradable component. While biodegradability seems rational for dolly rope, other gear parts serving different purposes (nets serving the catching and retaining of fish) need different approaches for ensuring/enhancing circularity. In addition, changes to the gear design are subject to the EU Technical Measures Regulation, adding to the complexity of the issue.

Following the SUP and PRF Directives, recycling of fishing gear as a multi-material product should encompass all parts and materials of the gear, including metals and/or other materials. Solutions must be investigated and established for all materials.

Mechanical and chemical recycling are complementary to each other and new recycling technology is currently being investigated. Chemical recycling is appropriate for materials that cannot be separated easily, with special attention given to sorting and preparation. Chemical recycling includes thermo-chemical recycling (transforming plastics into oil), while depolymerisation is a process of converting a polymer into a monomer or a mixture of monomers. Depolymerisation is difficult to carry out on a small scale, and thus not always economically viable.

The Waste Framework Directive includes chemical recycling, for example pyrolysis of fishing gear where the resulting oil is used as feedstock for chemical production. However, using the resulting oil for heating or fuel is not considered recycling. It is also worth noting that due to the dispersed geographical position of ports in many countries, one important aspect regarding recycling solutions is decentralization of operations to enhance their availability.

Costs analysis should be carried out, not only in relation to the materials, but also to the economics of the vessels. As fishers have limited time to deal with and sort the waste, it would be prudent to calculate how much time a fisher can spend on waste management in order for his fishing activity to remain profitable, while also taking into account the conditions of the ILO convention. In any case, the cost of implementation and management should not be passed on to the fishers.

Stakeholder involvement remains key to solving the issues. Behaviour can be changed through education and awareness raising, for example by promoting sustainable marine litter management and no discarding of fishing gear, and by communicating the resource value and the economic opportunities. This should include communicating the impact of microplastics on zoo plankton which forms the basis of life in the oceans. It is vital to remove any barriers to responsible behaviour and to promote informed decision-making.

Handling netting in a responsible way adds to the bottom line and means value in the long run. The preferred option for fishers is always to repair and extend the life of their nets, but this should be done with as little cross-contamination as possible. Additionally, dealing with waste material includes special permissions required, imposing additional administrative burdens which are highly undesirable by the fishers. It is therefore crucial to try to keep the legislative and administrative hurdles to a minimum.

A holistic implementation approach is needed making use of policy instruments and including cooperation with various DGs, for example around decontamination and chemical recycling. Management should be science-based and make use of the social sciences to investigate how best to ensure a willing and effective participation of the fishers in these issues, and thus take stakeholder involvement to the next level. Most importantly, there should be a level playing field across all EU Member States.

SUMMARY DESIGNING GEAR

“The role of fishers is to fish and not to be the garbagemen of the sea.”

To address the state of play, possibilities and obstacles in achieving greater recyclability of gear, it is important to firstly define gear. Three main groups were identified:

- active demersal gear,
- active pelagic gear, and
- static gear.

Static gear, such as gillnets, seems to be most frequently lost (and become ghost gear), and even though it usually accounts for a small share of used gear (for example in Ireland only approx. 3% of fisheries use static gear), it throws a negative light on all fisheries, making them accountable for the lost gear, even when the linkage from waste to fishery is not proven. Another problematic feature of such gear is its price – being relatively cheap it offers no incentive for fishers to find and retrieve the lost gear, as new gear is widely available and can be imported from third countries (mostly Asia) at significantly lower costs.

One of the solutions for making the gear more recyclable is to reduce the number of materials used in gears, while not compromising its functionality. Most mixed material gear seems to be used out of habit, making the potential move to single material gear easy and effective, without affecting its functionality.

To achieve this, financial incentives seem widely accepted as an appropriate means to boost the move to circularity, for example by setting up projects to explore reduction of materials, increased ability to disassemble etc. In the framework of the Port Reception Facilities Directive, such a financial incentive should be a norm for collecting and disposing of the gear.

Any efforts towards collecting, disposing, re-use and recyclability should be appropriately credited as the contribution by fishers to the solutions. Although a large share of fishers is not accountable for most of the discarded/lost gear, they feel responsible for keeping the sea waste-free and often show goodwill in engaging in such activities. This has been proven by many voluntary initiatives, in which they participate often after a long and hard day's work at sea.

One of the important points made was the fact that each gear part serves a specific purpose. It is therefore important to consider the different parts and their transition towards circularity, subject to their functionality. For example, some gear parts are less appropriate for the introduction of biodegradable materials than others.



Another issue needing consideration is where in the supply chain the decision on (eco) design is made. Some eco-design companies already have the knowledge and solutions, but these are not yet accessed by the fishing gear industry. It is therefore of utmost importance to link the different stakeholders, so as to make them aware of what is 'out there' in terms of innovation, research and knowledge. A top-down approach in the sense of standardisation is important.

However, it is also crucial to address and incorporate the needs of gear end-users (fishers), and to involve them in the development of alternative designs, such as for example DollyRopeFree and in the Thünen DollyRope projects.

Several aspects regarding the design development of gear were identified, including design for:

- disassembly,
- recyclability,
- traceability, and/or
- reduction of harm to the marine environment.

These should be taken on board when deciding on standardisation. One of the solutions for increasing recyclability could be EU-wide colour coding as part of the standardisation.

Regarding any EPR scheme, it was identified that there are many varieties in which this could take form in the EU and that such forms comprising voluntary and monetary measures should be further investigated. Examples of good practice, such as the Icelandic model, should be taken into consideration and adjusted to EU conditions.

When exploring viable technical and economical solutions for designing gear with a circular economy approach in mind, functionality and environmental impact must be fully considered.

SUMMARY MONITORING GEAR

The net making sector encompasses different types of industries, mainly chemical companies providing input into filaments and materials, net makers (representing around 300 companies in Europe), and net assemblers (also called "net lofts").

There is currently no proper registration in place for fishing gear. However, the Control Regulation sets down requirements for marking some gears. Individual Member States have additional requirements, for example the marking of steel parts in Belgium.

Nets and other gears are registered when sold by the assemblers.

These companies usually keep a unique number (and sometimes an RFID chip) for each net that is sold. For each gear a precise description of material, shape and record of jobs done is kept. While fishers repair nets, they do not have the capacity to make drastic modifications to them. This is usually done when the nets enter the net assemblers' workshops for repair and/or modification.

Current marking requirements do not include information on the material of the gears. New technologies such as electronic marking make it possible to store more information. There is a need to define the term “registration system” as it can mean anything from the simple identification of the boat to which the gear belongs, to the use of sophisticated GPS systems attached to the gear.

Marking and monitoring of gears was linked by fishing representatives to the contribution they make to the Fishing for Litter (FFL) schemes. They stressed the importance of not closing down voluntary initiatives that currently exist by means of introducing strict legislation. Control and enforcement are seen as challenges to the creativity and the goodwill of the fishers.

The registration of trawl nets for monitoring of the market seemed important to the participants. The general idea was that such a scheme would need to be implemented at the level of the “provider” (i.e. net assembler). Participants highlighted again the practical complexity of marking nets, as these were modified and evolving according to the needs of the fishers. Sometimes one net is used with several different cod-ends, and this would make marking at fisher level even more complicated. More research is needed on the life span of nets, the frequency and detail of any repairs, and the potential of using one part of the net with a number of additional add-ons.



There are regional and national differences, with some areas having pro-active fishers on the issue, while others might require regulations to be implemented to see some change. The fact that boats land in different harbours from their original ones also means that national differences are challenging.

Gear loss is an important financial loss and fishers do all they can to avoid this and retrieve their gears. The focus should be on creating incentives for better Fishing for Litter and gear recycling in harbours. There is a need for more data to understand the scale and sources of the problem of lost gear. Marking and registration of gear is potentially costly as well as complex. If and when gear marking is introduced, this should be made compulsory for all users of the sea, including for example recreational fishers.

Monitoring the market (at the level of gear manufacturers) and conducting research on the topic are very important. The risk of having the costs of the EPR borne by fishers was stressed. Finally, participants also expressed the need to be vigilant so as not to create an unbalanced overburden on European producers.

The issue of imports of netting from outside the EU was raised. This does not affect all types of fishing gear, but mainly fixed nets. For importers, as for other products entering the EU's single market, the regulation could apply in the form of a requirement (registration) for entry onto the market. This, however, would not prevent nets from being directly bought outside the EU and then used in the EU, even though some participants signalled that this would be quite unlikely.

Monitoring fishing gear brings with it a number of advantages, from an increased accountability across the value chain, to potential cost reduction through retrieval. It would make it possible to evaluate the proportion as waste found at sea and help identify sources and pathways.

SUMMARY COLLECTING GEAR

Fishers are increasingly working on their green profile and want to be part of the solution. Voluntary initiatives, such as the Green Deal scheme in the Netherlands, can serve as best practice examples.

To assist them in their (largely voluntary) endeavours, a properly managed logistics around waste and end-of-use gear collection should be ensured. This includes unified collection of the gear onboard vessels in bags and containers – which can be a challenge to small vessels – to providing adequate facilities in the ports.

The ports need to support this as part of the services they provide and ensure that there is sufficient and separate storage as well as capacity in terms of staff available to handle any materials brought to shore, including end-of-life gear. The stored end-of-life fishing gear that has not yet been dealt with (between the sea and the landfill) should be processed. There is a complexity and differences in port reception facilities between Member States, and this needs to be addressed.

It is essential that different waste materials are clearly defined under the relevant legislation and that legacy issues around historic nets are addressed appropriately. For this, additional resources may need to be provided in order to address for example transportation, separation and disposal. Furthermore, not all gears can be dealt with in the same way due to the differences in their materials and make up, and this may require separate storage for different gear types.

Currently, the assignment of responsibilities regarding handling, processing and disposal seems unclear. To successfully implement any solutions, the legislation must clearly define them.

The scale of the issue around end-of-use gear needs to be assessed. More data is needed on this. In addition, it is important to include recreational fisheries in this discussion.

Fishers are one part of the chain. However, it is felt that the main responsibility lies with the net producers and assemblers when it comes to separation, disposing and recycling of end-of-life gear.

One of the biggest problems is disposal. If gear is contaminated, for example by seawater absorption, dead animals, or sand, it has to go to landfill, unless it can be transported to Plastix in Denmark, who are accepting even contaminated gear as they are able to clean it.

The logistics around collection and dismantling must be considered, such as the costs involved in stripping nets. Static gear, such as gillnets, are very cheap and can easily be dumped with no incentives to be retrieved when no longer used. Gillnets may also contain lead, and this is an issue regarding recyclability.



It is important to discuss the source and design of gears and communicate with the trawl binders and producers about the materials used. Knowledge is also needed regarding the eco-design of products and their feasibility. Currently recycling technology exists for the four main polymers, which means that up to 80% of gear can currently be recycled, but with considerable preparatory work required.

When buying from chemical companies, net makers know what type of plastic they acquire. The EU producers specialise in high molecular polyethylene (stability, elongation, tenacity) and Polyamide-6 ("Nylon") (flexibility, strength, durability) to meet market demands, with lots of materials also being imported from outside the EU (especially cheap grades of PE, PP, PET, PA).

Although there are many different types of material available, the general consensus is that only around ten different types are being used in net making and that the rest are simply variations of, for example colour or additives.

More than 700 different types of ropes are currently in use, with each of them having various pigments, colours, additives. This creates much complexity for recycling. Different important characteristics of materials need to be considered when recycling.

Chemical recycling does not need a completely pure input (less effort upon manual dismantling/separation of the net) and can produce output of high plastic quality (suitable for multiple reoccurring material circulations). The downside of this is the cost of the operation and the need to go back to the monomer-step in the process.

Mechanical recycling on the other hand requires purer input in order to obtain good quality output (down to the type of PE for instance).

If different types of plastic are mixed in the input, the mechanical recycling can only be on a downgrading slope, giving low quality plastic that will not itself be recyclable.

Taking all this into account, it is important to have information on the composition of the material marked on the gears. Affordable technology already exists to scan plastic and determine which kind of plastic a material is made of, for example PE, PA. However, Dyneema is not suitable for recycling because it does not melt, it burns. Theoretically, it would be possible to make oil from this via chemical recycling and reuse this feedstock for production of new materials.

It is already possible to recycle certain end-of-life gear in two European facilities. The logistics surrounding collection and recycling must be economically viable, and transportation costs to these facilities must be evaluated, including the carbon footprint. In addition, the available volume of material for recycling must be investigated to create a viable industry for net recycling. In order to encourage more professional recycling facilities, it is important to centralize and scale fishing gear dismantling and material sorting to some extent and provide figures of collected/ available end-of-life volumes.

The market exists for recycled material, especially from fishing gear, so there is a potential to make the use of recyclable materials a requirement. It is also important to show the fishers that "their" materials are being used, so that they can see the value.

While it is recognised that recycled materials are currently more expensive than virgin materials, there is the view that consumers should be willing to contribute financially to covering the costs of collection, recycling and re-use of gear.

Looking beyond the fishing sector to other industries and their approaches to implementing circular economy principles may present opportunities for collaboration.

Fishing for Litter (FFL) is generally regarded as a good initiative. The approaches to its implementation should be more streamlined and complimentary between the various Member States, since this is a transnational issue with fleets moving between different areas. Funding of FFL schemes needs to be discussed in a wider context.

Current best practices need to be shared with a view to them being replicated across Member States that do not have FFL schemes in place yet and which are struggling to establish such schemes. Financial incentives for fishing for litter are needed. Member States should be given an incentive to work with passively fished waste.

It was concluded that positive communication to the public and to the other fishers is essential.

THE WAY FORWARD

The Commission workshop on the Implementation of measures under SUP and PRF directives (Brussels, 18 Feb 2020) and the MRAG/OSPAR Workshop on Challenges and Solutions to Circular Fishing Gear Design (Brussels 19 & 20 Feb 2020) will be informed of the conclusions and proceedings gathered at this workshop. Both workshops, together with the report from the NWWAC/MAC Workshop on Marine Plastics and the Seafood Supply Chain, will contribute to providing DG MARE with supporting details for the development of proposed gear standards as well as other requirements regarding the implementation of the SUP and PRF Directives.

Looking ahead, it is vital to have a good and clear understanding of what is expected from the fishing sector regarding the requirements of both the SUP and the PRF Directives. When it comes to any EPR scheme there is a need to identify who is going to be targeted and what such a scheme might look like. It may be possible to incorporate knowledge from other sectors that have implemented EPR schemes, for example packaging or electronics, and to observe their processes.

There is a need to share knowledge and experience in a non-competitive way across the net making and net assembling sector. The industry is currently working on developing recommendations on the proposed standardisation.

While the fishing sector realises the importance of the issue and its contribution to both the impact and the solution, it must be borne in mind that the impact from the fishing industry regarding plastics in the oceans is much smaller than for example the impact from the car tyre industry or soft drinks manufacturers.

From an economical point of view, it would be useful to understand the scale of the issue as well as to outline how complex the topic is and how much effort each step would require in order to enable making a product that is recyclable. Greater transparency is required, as this is currently not available. Different players see different parts of the issue, but no global data has been collected.

This would be assisted by mapping the entire supply chain and identifying how and from where material arrives on the market, how it is monitored and how it is disposed of. For a true circular economy approach, everyone involved needs to come together for an international discussion, including for example rope and netting manufacturers from third countries.

It would be beneficial for fishers to be involved in identifying new materials and designing new gear. While this is a long-term approach, short-term goals can be achieved through awareness-raising, which can be started immediately.

Fishers' knowledge should feed into establishing what type of research is needed to move things forward. One simple goal might be a move to fewer polymer combinations being used for gears, which may make them more easily recycled at end-of-life.

More focus should be put on the social dimension to study what impact the new legislation may have on human behaviour and current practices. Additional incentives and funding should be made available.

Conclusions: Mr Maris Stulgis, DG MARE

DG MARE appreciated that this workshop had gathered together several ACs. The workshop had good content with the right stakeholders who could contribute and work collaboratively together.

DG MARE sees a window of opportunity now under the European Green Deal and HORIZON Europe to better tackle the marine litter issue and to identify what kind of research is needed to bring things forward and to use available funding.

The SUP Directive and the requirement for the Commission to develop a standard for circular design of fishing gear were the triggers to set this work in motion. In addition to the request to the European Standardisation Organization, the development of solutions to meet the remaining provisions of the SUP Directive can be dealt with by means of a bottom-up approach.

The workshop generated some good input and detected the challenges, for example the collection of waste, contamination, and the challenge of the recycling of PE nets. Several positive things were brought to the surface as well, including the positive Irish case of Fishing for Litter and its Clean Oceans Initiative, and tackling initiatives in a collaborative way, with stakeholders working well together.

The development by VisNed of bio-degradable dolly ropes, was presented as a good initiative. Another good initiative was presented by Eurocord, the European Association of Rope, Twine and Netting manufacturers, their suppliers and their affiliate industries, which were working with fishers to develop a standard for ropes.

The meeting also highlighted great potential to move towards a circular life for fishing gear which may include aspects of biodegradability, reduced use of polymer types to make it recyclable at its end of life, as well as the design of new materials.

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