

POLICY BRIEF

On identified regulatory barriers to more circularity in the blue bioeconomy

A sustainable European bioeconomy is pivotal for achieving the European Green Deal's objectives. The vitality of the blue pillar within our bioeconomy, in particular the fisheries and aquaculture sectors, holds significant promise. With the EU Mission to restore our Ocean and Waters, Europe has committed to make the blue economy carbon-neutral and circular. Like every other sector, fisheries and aquaculture need to become circular to be competitive and sustainable, and to fit the limits of natural resources while providing for people and society.

This policy brief examines the existing regulatory barriers and bottlenecks in two blue bioeconomy sectors:

- I. Clearing the way for algae as an ingredient.
- II. Aquaculture and fisheries side-streams: shifting from waste to resources.

I. Clearing the way for algae as an ingredient

Algae is widely recognised as a promising renewable resource, both globally and in Europe. With its recent Communication '[Towards a Strong and Sustainable EU Algae Sector](#)', the European Commission has acknowledged that the European algae sector has the potential to become a significant part of the EU blue bioeconomy, with many applications ranging from bio-based plastic alternatives to biofuels and as ingredients in animal feed, food, pharmaceuticals and fertilisers. Algae farming also presents multiple environmental benefits such as water depollution, acting as marine biodiversity hubs, CO₂ sink etc. It also offers possibilities for fishers and farmers to diversify their income sources.

The potential of algae is widely acknowledged. But developing the whole sector and the necessary value chains is complex. **Policies and regulations applying to algae can act either as barriers or as gateways** to the cultivation, processing, product development and marketing of algae-based and algae-derived products.

Focusing on algae as an ingredient in food, feed and nutraceuticals

Algae has many applications in food and feed products. Several complex, costly and long authorisation processes, in addition to the lack of harmonisation, considerably slows down the integration of algae in food and feed products.

a) The lengthy authorisation for the marketing of novel food slows down the integration of algae as an ingredient

Algae as a food ingredient can be an alternative to animal-derived gelatines. Algae can also be an ingredient in nutraceutical / dietary supplements. As these uses of algae were not significant in Europe before 1997, most algae species are considered novel food and thus governed by the **EU 2015/2283 Novel Food Regulation**. It defines the safety assessment that a novel food or food ingredient must undergo to be legally marketed. Only a small number of species are currently authorised. However, the **authorisation process**, mostly managed by the European Food Safety Agency, **is long (several years) and costly** (between 50 000 and 200 000 EUR). This severely hinders the growth of the sector, discouraging smaller players, including those offering alternative processing methods.

b) The lengthy and complex approval of new feed additives stalls the uptake of algae as feed

Algae can be a **feed component for livestock and pets**, with the advantage of mitigating enteric methane emissions. This is a promising market, with the added possibility of expanding to fish feed. However, the cost and complexities of registering and obtaining regulatory **approval for new feed additives**, under EC **Regulation 1831/2003 for animal nutrition**, can be considerable and sometimes impossible to overcome for SMEs. In addition to be used as feed, algae must be compliant with the **EU Regulation 183/2005 on feed hygiene**, with a low threshold for undesirable substances.

c) Maximum concentration levels of heavy metals in algae are not harmonised

There is currently **no binding harmonised regulation concerning maximum concentration levels of heavy metals** (arsenic, cadmium, lead and mercury) in algae for human consumption as food, or as food ingredient. It is only indirectly regulated through the **Food hygiene EC Regulation 852/2004**. Some countries such as France have adopted legal limits for these contaminants, but the current situation creates **uncertainty** for the production and use of algae as food. An additional challenge is that, in existing regulations, there is no distinction being made between organic arsenic (harmless) and inorganic arsenic (toxic).

d) Facilitating the recognition of algae nutritional and health benefits remains challenging

Valorising **health benefits** of algae as food or feed could be an important element to make them competitive on the market, as production costs still remain high compared to other protein sources. However, the **process to validate the positive health effects is very challenging** and resource intensive.

All nutrition and health claims made in commercial communications, must be supported by an authorisation from the EU either under the **Nutrition claims Regulation 1924/2006** or under the **EU Health claims Regulations 432/2012 and 957/2010**.

The EU requirements for nutrition and health claims are demanding and place a substantial burden on businesses in terms of time and resources. **Communicating on preliminary evidence to consumers is not allowed, while it is possible in other markets**. This is particularly challenging for a market that is dominated by SMEs and start-ups.

Scaling up the production

As a background to the regulatory challenges of algae as an ingredient for food and feed, increasing the production is also crucial to **reach a sufficient biomass and to allow economies of scale**.

There is no EU-wide legislation dedicated to the macroalgae cultivation. There is a set of pre-existing legislations related to Maritime Spatial Planning, environmental impact assessments, water legislation and aquaculture licensing applied to seaweed cultivation at sea. On top of these, national legislations differ across member states.

The **licensing procedures** for algae farming are particularly complex and lengthy, usually **involving various state authorities** and varying from one country to another.

In parallel, setting up **certification systems to acknowledge the ecosystem services** of algae farming, on which subsidies could be based, would help to scale up the production and create a level playing field with other food or feed sources.

Conclusion

There is a need for harmonisation, simplification and acceleration of the authorisation processes to help develop algae farming and increase novel algae applications. By identifying 20 to 30 species of algae for which the authorisation process can be streamlined and fast-tracked, the European Commission could help clear the way for algae as an ingredient.

II. Aquaculture and fisheries side-streams: shifting from waste to resources

Aquaculture, fisheries and seafood processing side-streams are currently still mostly considered as waste and are increasingly regulated to decrease their impact on the environment. However, a number of **outdated regulations** prevent unleashing its potential. As a result, sludge from Recirculating Aquaculture Systems (RAS) and rests from seafood processing are not sufficiently valorised to help close the loop and create circular value chains.

An amendment of the Animal by-product regulation could allow the use of aquaculture effluents as manure and fertiliser component

As explained by a recent recommendation of the Aquaculture Advisory Council (AAC), Recirculating Aquaculture Systems (RAS) are land-based aquaculture facilities where water use is minimised through water reconditioning measurements and water reuse. The water recirculation process in RAS makes it possible to control the culture conditions and to collect fish waste. These systems allow the collection of organic materials.

Aquaculture effluents mainly consist of faeces, feed spill, excretory products and water. They **do not differ nor present higher risk of spreading diseases to human than manure from other farmed animals**. However, the use of aquaculture effluents as fertiliser and soil improver has been prohibited in some European countries because of the definition of 'manure' under the **Animal By-Products Regulation (EC) 1069/2009**. This regulation defines 'manure' as "any excrement and/or urine of farmed animals other than farmed fish, with or without litter". **Aquaculture effluents cannot therefore automatically be considered as ingredient of organic fertiliser and soil improver**. In some countries, this type of aquaculture 'waste' has been considered as sludge and regulated by the Council Directive 86/278 on the use of sewage sludges in agriculture. This restricts the possible uses of aquaculture effluents (types of cultures on which it can be used), and imposes stricter safety and monitoring standards that are relevant in the case for example of sludge from urban wastewater but not in the case of RAS.

A simple amendment to the definition of 'manure' under the Animal By-Product regulation would allow the valorisation of aquaculture effluents.

Allowing the use of aquaculture sludge for feed production requires a reassessment of animal and human health risks

Sludge is a nutrient-rich resource, which is typically incinerated, but could be used for anything from heating, fertiliser or growth substrate for novel feed resources.

Aquaculture sludge – in this case, the mixture of faeces, urine and in some case fish processing waste, blood, fishbone, etc. - **could be used as feed for insect farming or to rear low-trophic marine invertebrates** and bacteria, which can then be used as alternative feed ingredients in aquaculture.

However, under the **EU Regulation (EC) No 767/2009** on the placing on the market and use of feed, **it is not allowed to use sludge as production animal feed for farmed animals**, even as substrate for **farmed insects or gammarids and polychaetes**, to avoid adverse effects on animal or human health.

For aquaculture sludge to be used as insect farming substrate and increase circularity and sustainability of aquaculture feed, **new assessments by the European Food Safety Agency are needed** to evaluate and, where possible, dismiss any significant risk to animal and human health.

Conclusion

The different aquaculture side-streams must be adequately categorised to adapt the relevant regulations such as the Animal By-Product regulation, the fertiliser regulation as well as the feed regulation and food hygiene law, in the light of the latest scientific findings for the policy objective of shifting towards a more circular and sustainable use of resources.