

# The Norwegian Bioeconomy Strategy and the Way Forward for Blue Growth

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## Abstract

The Arctic Council Sustainable Development Working Group (SDWG) recently released a report on the blue bioeconomy in the Arctic. In this paper, we discuss the Norwegian policy to promote the Norwegian blue bioeconomy, analysing the government's bioeconomy strategy and its strategy for marine residuals. We find that the strategies have several and partly incompatible goals, related to improving the economic, environmental, and social sustainability of the seafood sector. We discuss challenges and (missed) opportunities in the Norwegian government's strategy for turning the Norwegian economy towards blue growth. Our findings are supported by recent studies that conclude that more efficient and coherent policy actions are needed to ensure the sustainability of the marine bioeconomy.

**Keywords:** *Arctic blue bioeconomy, bioeconomy, blue growth, sustainable economic development, marine by-products, marine residuals, marine ingredients, marine side streams*

## 1 The blue growth paradigm and the Norwegian strategy

The Norwegian bioeconomy strategy is part of the global effort to boost the (green and blue) bioeconomy. The terms blue economy or blue growth are used interchangeably. They advocate ways to balance economic growth, social development, food security, and sustainable use of aquatic living resources, and seek to maximize economic and social benefits while minimizing negative environmental impacts from

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these sectors. Hence both are based on the three pillars of sustainable development. They also correspond with the Sustainable Development Goals (SDGs), addressing SDG 1 on No poverty, SDG 2 on Zero hunger, and SDG 14 on Life below water. However, blue growth to a greater extent emphasizes the need for growth in the fisheries and aquaculture sectors to ensure food security.<sup>1</sup> The Norwegian bioeconomy strategy is in line with these goals, where increased value creation and employment are the main goals, and the food-first principle is the primary guiding principle (“Familiar resources – undreamt of possibilities. The government’s bioeconomy strategy”, 11/2016).<sup>2</sup>

Norway is a significant fisheries nation, and seafood is an important part of the Norwegian bioeconomy strategy where “utilizing the potential for increased, profitable and more efficient production, extraction and use of renewable biomass from [...] fisheries and aquaculture within sustainable boundaries” is highlighted. One measure to implement this is by developing a strategy for landing and using residuals<sup>3</sup> from the fisheries sector. “The strategy for marine residuals” was released in 2019,<sup>4</sup> together with a White Paper on the organization of the fisheries sector.<sup>5</sup> A pertinent question is whether the goals of these two strategies are compatible.

## **2 Contradictions in the goals and strategies for blue growth**

Balancing the pillars of sustainable development and reaching the sustainability goals is challenging because of the inherent contradiction between economic growth, environmental protection, and social equity. Several studies criticize the lack of strategies and clarification regarding how to measure the sustainability of the bioeconomy.<sup>6</sup> A study of the Faroese Blue Economy finds that there is a mismatch between the rhetoric around blue growth, framed within mainstream sustainability discourse, and the concrete blue growth strategies that promote conventional economic growth.<sup>7</sup> A study of the Nordic bioeconomy, however, finds that social, environmental, and economic objectives are compatible in some industries, while in others, trade-offs between these objectives are unavoidable.<sup>8</sup> Still, stated priorities seem to be made inconsistent rather than based on trade-off considerations between particular policy goals. Similar findings are found in an analysis of the EU bioeconomy strategy.<sup>9</sup> Both studies conclude that more efficient and coherent policies are needed to ensure the sustainability of the marine bioeconomy.

There are also contradictions and trade-offs in the Norwegian blue growth policy. One is the ‘food first’ principle.<sup>10</sup> The SDGs are not specifically mentioned in the bioeconomy strategy, but the ‘food first’ principle clearly relates to SDG 2: Zero hunger, and the mentioned white paper on the fisheries sector highlights better utilisation of resources from the ocean as an important factor in future food production.<sup>11</sup> However, food first is not at the core of the strategy for marine residuals.<sup>12</sup> This strategy refers to an agreement with the national food industry to reduce food waste with the aim of achieving SDG 12 on sustainable consumption

and production. The need to increase food production is only mentioned as an argument against throwing away protein suitable for human consumption or as raw material in feed production. There is no mention of the ‘food first’ principle in “The strategy for marine residuals”. Two areas are highlighted: increased utilisation of residuals from the ocean-going fleet (cod trawlers) and converting the production of already utilised residuals to more high-value products. The aim is increased value creation. There are no reflections on possible contradictions between the goal of maximising economic value and how proteins should be utilised according to the food first principle. The aims of these two strategies might be synergetic, but sometimes residuals suitable for human consumption are processed and used as marine ingredients in better paying markets. Extraction of collagen from residuals, or protein powder from fish heads are examples of paths explored to increase the value of marine raw material.<sup>13</sup> Collagen is used within the cosmetics market as a skincare agent or as a product to relieve muscle tension and joint pain, and hence does not feed people. Dried fish heads are an important foodstuff in many countries in the developing world as they are highly nutritious and relatively cheap. For Norway, Nigeria has been an important yet unstable market for this product. In 2015, the market closed due to currency restrictions. Supported by public research funding, technology to process the heads into protein powder for the supplements market was developed,<sup>14</sup> rather than supporting the search for new markets for the fish heads.<sup>15</sup> The Norwegian government has stated that market intelligence is to be achieved by the companies themselves, but it is willing to fund R&D for new products, which has incentivised the companies to move away from food production. This illustrates possible contradictions between the goal of creating higher economic value and the food-first principle, for both the industry and the government. Incorporation of residuals as marine ingredients in cosmetics or nutrition supplements is not necessarily problematic, but the trade-offs should be considered. In addition, there seems to be an assumption that high value products generate higher profits for all parties in the value chain. But even though a final product may attain a high price, this is not necessarily reflected in value creation for the seafood industry. Production costs might rise, and extra value created might rather benefit actors in the value chain closer to the market. Policy makers tend to focus on high value product avenues, and signal to the industry that this is the most important goal. The case of the Norwegian blue growth strategy might therefore illustrate the difficulty of moving from overarching policy objectives to concrete goals and policy measures adopted for an industry.

### **3 How to facilitate the Norwegian blue bioeconomy – strategies and policy measures**

A strategy is generally accompanied by a road map or action plan with targeted measures to overcome identified barriers and fulfil its goal. In an analysis of Norwegian

firms producing marine ingredients,<sup>16</sup> firms report market and raw material access as their most pressing challenges. These barriers are also acknowledged in the strategy, where seven factors critical for increased value creation are discussed: market and product development, access to and quality of the raw material, technology and competence, coordination of the value chain, capacity at the landing stations, and market access. Most attention is, however, devoted to constraints on the utilisation of the residuals of the ocean-going fleet. While resources are fully utilised within the aquaculture and pelagic sectors, there is still potential for increased utilisation in the whitefish sector, as the sea-going fleet, to a limited degree, processes or brings the residuals ashore.<sup>17</sup> To improve the situation, four policy areas or sub-goals have been identified by the government: good access to raw materials, fewer restrictions on vessel design, increased knowledge and technology development, and improving conditions for trade in residuals. However, the concrete measures to achieve these goals are somewhat modest or even absent.

The means of ensuring increased access to residuals is “sustainable management of the Norwegian fisheries sector and the aquaculture industry”.<sup>18</sup> However, it also refers to the government’s policy to improve the competitiveness of the seafood industry, which states that access to residuals might also increase if domestic processing increases.<sup>19</sup> In 2016, the Norwegian Parliament requested that the Government develop a strategy for the utilisation of all residuals by “adopting measures providing incentives for landing the residuals”<sup>20</sup> including “assessing and setting a reasonable date for when ‘everything ashore’ can be implemented in Norway”.<sup>21</sup> Three years later, as an appendix to the white paper on the quota system, the strategy for residuals was presented.<sup>22</sup> However, it does not set a target date for when all residuals should be landed. Rather, it concludes that vessels should not be obliged to land the residuals, because it would probably reduce rather than increase value creation – the main goal of the strategy. The argument is that if the demand for protein from marine residuals is sufficiently high, with correspondingly higher prices, it will be profitable for the vessels to land these residuals. A similar argument is provided on vessel design. Still, it is stated that increased utilisation of residuals remains a priority for the government, and the long-term goal is that all the residuals shall be landed – but without policy interference it seems.

An area the government is willing to act on is investing in research, technological development, and cooperation, where several instruments are already in place. These are to be continued and targeted to facilitate increased value creation. As strategy goals and measures to reach them are not in compliance with one another, it is not known whether the prioritisation of investment will support the need for more sustainably produced food or high value processing.

As mentioned above, stiff competition in international markets and achieving sufficiently high product prices to defend investments are important barriers. The government considers these commercial questions as matters to be handled by the

industry. However, ensuring market access for Norwegian seafood is of great importance for the government, and efforts to ensure market access for Norwegian seafood, addressing both tariff and non-tariff barriers for products based on residuals, are to be continued.

#### **4 Known challenges – limited interventions**

Analysing the Norwegian government's bioeconomy strategy and the strategy for marine residuals, we find partly incompatible goals and missed opportunities to turn the Norwegian economy towards blue growth. The Norwegian bioeconomy strategy is both ambitious and optimistic when describing the potential for blue growth, but regarding value creation from marine residuals, no interventions have been mapped out to realise this potential. Besides funding research and innovation, development of the bioeconomy is mainly left to the market.

A study of the conditions for realising blue growth in the Icelandic and Norwegian fishing industry, analysed four factors considered critical for the industry: regulatory-, resource-, market-, and social factors.<sup>23</sup> A key finding from the study is that the industry considers regulations both a key driver and barrier to blue growth.<sup>24</sup> However, the regulations assessed in this study comprise the general fisheries regulations, including stock management and allocation of quotas between fleet groups, not regulations or policies adopted for the realisation of blue growth in the fisheries industry per se.<sup>25</sup>

The white paper on the organisation of the fisheries sector states that the quota system as such does not affect the availability of raw materials.<sup>26</sup> However, it does affect the structure of the fleet, which might be relevant for the utilisation of residuals. For years, the policy has been to reduce overcapacity in the ocean-going fleet (the cod trawlers), without residuals being considered. A challenge for the cod trawlers, even if the profitability of residuals should improve, is capacity. Today the vessels have quotas to operate all year round. Keeping residuals is not considered worthwhile.<sup>27</sup> Policy adopted to attain one goal (overcapacity) might become a regulatory barrier for another policy goal (utilisation of residuals). To ensure processing onboard or bringing the residuals ashore, a change in regulations might be needed. The government must make some trade-off decisions between profitability and increased utilisation of residuals and 'food first', as well as the environmental costs of increased CO<sub>2</sub>-emissions.<sup>28</sup>

Considering that most marine residuals in Norway are already utilised, it is time to define new goals with concrete targets and measures that provide clearer direction for how the Norwegian blue bioeconomy – balancing on the three pillars of sustainability – should develop in the future. If marine residuals are to contribute substantially to the development of the Norwegian blue bioeconomy, the products developed must have a competitive sustainable advantage.

## NOTES

1. “Blue Growth Initiative: Partnering with Countries to achieve the Sustainability Goals,” Food and Agriculture Organization of the United Nations, (2017), <http://www.fao.org/3/i7862e/i7862e.pdf>
2. Ministry of industry and fisheries, “Familiar resources – undreamt of possibilities. The governments bioeconomy strategy,” no 11/2016, (Oslo, Norway, 2016).
3. We use the term residuals for the raw material that are not the primary/main product after gutting and further processing of fish and shellfish (in Norwegian ‘restråstoff’). Another concept frequently used is by-products. This however is easily confused with residuals that according to the Animal by-products regulation are not usable for human consumption based on sanitary regulations (Animal by-products (europa.eu)).
4. Ministry of industry and fisheries, “The government’s strategy for increased value creation from marine residuals,” no 09/2019, (Oslo, Norway, 2019).
5. Ministry of industry and fisheries, “A quota system for increased value creation – A future-oriented fishing industry,” *White Paper no. 32* (2018–2019), (Oslo, Norway, 2019).
6. Tobias Heimann, “Bioeconomy and SDGs: Does the bioeconomy support the achievement of the SDGs?” *Earth’s Future* 7 (2019): 43–57. <https://doi.org/10.1029/2018EF001014>
7. Ragnheidur Bogadóttir. “Blue Growth and its discontents in the Faroe Islands: An island perspective on Blue (De)Growth, sustainability, and environmental justice,” *Sustainability Science* 15 (2020): 103–115.
8. Lotte Dalgaard Christensen, “When Bioeconomy Policy Objectives (Fail To) Overlap: Rethinking the analysis of necessity to detect causal interdependencies among sustainable development goals in the Nordic bioeconomy strategy,” *COMPASS Working Paper 2019–93* (2019).
9. Tévécia Ronzon and Ana I. Sanjuán, “Friends or foes? A compatibility assessment of bioeconomy-related Sustainable Development Goals for European policy coherence,” *Journal of Cleaner Production* 254 (2020).
10. Ministry of industry and fisheries, “Familiar resources – undreamt possibilities. The governments bioeconomy strategy”.
11. Ministry of industry and fisheries, “A quota system for increased value creation – A future-oriented fishing industry”.
12. Ministry of industry and fisheries, “The government’s strategy for increased value creation from marine residuals”.
13. Jan Arne Arnesen et al., “Høyverdiskaping fra hvitfisk restråstoff,” *Rapport 25/2017, Nofima* (2017).
14. Jannicke Fugledal Remme et al., “HEADS UP I. Alternativ anvendelse av torskehoder,” *Sluttrapport FHF, SinteF* (2018).
15. Nevertheless, last year, there was a record export of fish heads from Norway to Nigeria. Statistics Norway, “External trade in goods,” 08799: External trade in goods, by commodity number (HS) and country 1988M01 – 2021M05. Statbank Norway (ssb.no) (2020).
16. Ingelinn Eskildsen Pleym et al., “Valuable waste. Opportunities for Norwegian marine raw material,” *Report 9/2019, Nofima* (2019).
17. Magnus Myhre et al., “Analyse av marint restråstoff 2019. Tilgjengelighet og anvendelse av marint restråstoff i fra fiskerier- og havbruksnæring,” *Rapport, SINTEF Ocean AS* (2020).
18. Ministry of industry and fisheries, “The government’s strategy for increased value creation from marine residuals”: 28.
19. Ministry of industry and fisheries, “A competitive seafood industry”, *White Paper no. 10* (2015–2016), (Oslo, Norway 2015).

20. Ministry of industry and fisheries, “A quota system for increased value creation – A future-oriented fishing industry”: 90.
21. *Ibid.*, 90.
22. Ministry of industry and fisheries, “The government’s strategy for increased value creation from marine residuals”.
23. Nina M. Saviolidis et al., “Realising blue growth in the fishing industry in Iceland and Norway: Industry perceptions on drivers and barriers to blue growth investments and policy implications,” *Marine Policy* 117 (2020).
24. *Ibid.*
25. *Ibid.*
26. Ministry of industry and fisheries, “A quota system for increased value creation – A future-oriented fishing industry”.
27. Marianne Svorken et al., “Alt på land,” *Økonomisk fiskeriforskning* 20 (2020): 1–14.
28. John Roald Isaksen et al., “Economic and environmental consequences of regulations and institutional framework,” *Report 13/2021, Nofima* (2021).