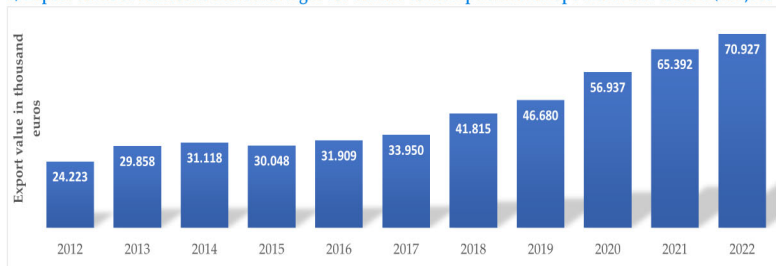


Table S1: The potential of macroalgae biomass valorization on the UN Sustainable Development Goals implementation.

Goal	Possible Contribution
1. No Poverty	Countries facing poverty can harness their inherent natural resource, providing job opportunities for the local population. Seaweed cultivation and collaboration with the industry would strengthen the economic activity of these coastal areas.
2. Zero Hunger	Seaweed has a substantial presence in the food market, especially in Asia. The expansion of seaweed-based food production on a larger scale can globally address a significant portion of the population experiencing hunger.
3. Good Health and Well – Being	Macroalgae biomass contains many bioactive compounds with antimicrobial, antiviral, immunostimulatory, antioxidant, anti-inflammatory, and anticancer activities [9]. Further research on the pharmaceuticals, nutraceuticals, and cosmetic applications of macroalgae is anticipated to reveal a plethora of useful compounds and value-added products.
6. Clean Water and Sanitation	Algae-based water & wastewater treatment has been asserted as a promising cost-effective, and energy-efficient alternative to conventional methods. In addition, they contribute to mitigating issues such as nutrient pollution and climate change [10].
7. Affordable and Clean Energy	Several studies have been conducted in the last years on the biofuel production from macroalgae biomass. Such biofuels are bioethanol, biogas, biodiesel, biohydrogen, the production of which paves the way for minimizing the dependence on fossil fuels [11]. Particular emphasis should be placed on the sustainable operation of these systems on larger scales. Electricity and heat can also be generated in many exploitation paths.
11. Sustainable Cities and Communities	Biofuel derived from macroalgae serves as an alternative to conventional fossil fuels. Therefore, it could contribute to the sustainable transport concept within the cities.

12. Responsible consumption and production	Alginate is a polysaccharide extracted from brown macroalgae with various applications; among them, it can be used as biopackaging material. Biodegradable alginate-based films could serve as environmentally friendly and sustainable packaging solutions.
13. Climate Action	The future scenario of clean fuel and energy production from macroalgae could play a significant role in climate change impact mitigation; however, these technologies are in an early stage of development. Another aspect of macroalgae which needs to be further investigated is their role as carbon capture technology, given the CO ₂ uptake during their cultivation.
14. Life Below Water	Responsible utilization of macroalgae biomass could prevent the problem of macroalgal blooms and their environmental and socio-economic negative impacts in coastal areas.
15. Life on Land	Macroalgae can be used as feedstock for bioethanol production, offering an alternative to conventional food crops. In these terms, no use of agricultural land is needed, as the cultivation occurs in the aquatic environment.

i) Export value of seaweeds and other algae for human consumption in Europe from 2012 to 2022 (in 1,000 euros)



ii) Volume of seaweed harvested in Norway from 2010 to 2021 (in metric tons)

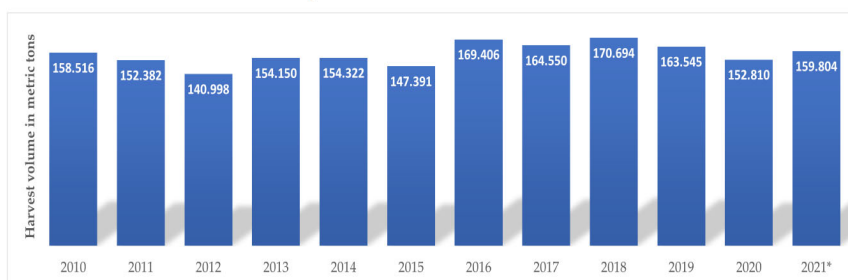
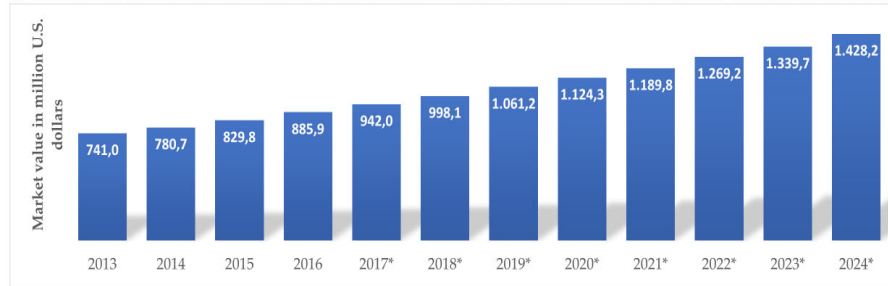


Figure S1. Data for EU retrieved from Statista platform: i) Total export worth of seaweed for human consumption traded with European and non-European countries from 2012 to 2022, ii) Metric tons of seaweed harvested in Norway between 2010 and 2021.

i) Estimated value of the commercial seaweed market in the United States from 2013 to 2024 (in million U.S. dollars)



ii) Estimated value of the commercial seaweed market in the United States in 2017 and 2024, by product (in million U.S. dollars)

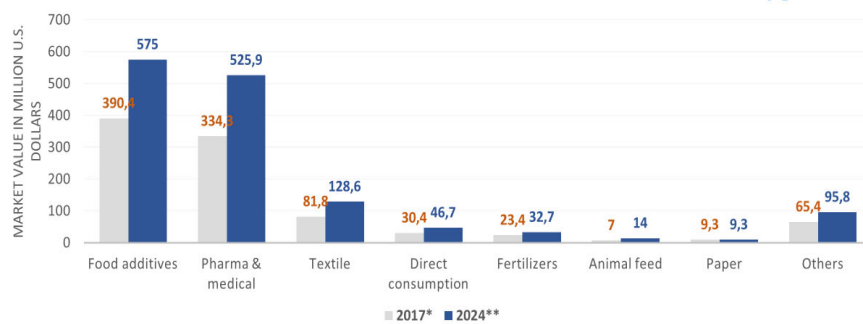


Figure S2. Data for the US seaweed market, retrieved from Statista platform: i) Projected values (*) for the commercial seaweed market in the US from 2013 to 2024. ii) Estimated (*) and projected (**) values of the US seaweed market by product, for the year