



SUSTAINABILITY
HORIZONS:

EPA and DHA Omega-3 Oils

GOED



July 2023

Mark Driscoll

Founder and Director, Tasting the Future

CONTENTS

Introduction **3**

What is Sustainability? **4**

Tackling Sustainability Across the Omega-3 Oil Value Chain **5**

Mounting Stakeholder Pressure to Tackle **6**

The Business Case for Sustainability **7**

Key Risks of Inaction **8**

The UN Sustainable Development Goals **9**

Index of 25 Sustainability Trends **11**

 LANDSCAPE LEVEL TRENDS **12**

 INDUSTRY LEVEL TRENDS **21**

 DISRUPTER LEVEL TRENDS **34**

Conclusions **40**

Acknowledgements **42**

Further Information **43**

References **44**

Appendix: What is Horizon Scanning? **47**

Introduction

GOED is a membership driven association representing the EPA and DHA omega-3 industry with over 180 members from around the world. GOED is committed to the sustainability of the industry and as such are keen to glean a better sense of the sustainability impacts across the sector and identify those sustainability issues, including environmental, social, health, economic and governance issues, which can be improved.

The objective of this report is to provide a detailed description of the most relevant global sustainability trends that could impact on the eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) omega-3 oils industry over the next 10 years (up to 2033). To identify industry changes and longer-term trends we scanned the omega-3 industry landscape. To do this we worked closely with the GOED team, GOED members and a range of other stakeholders to gather, analyse and share information on those sustainability trends which we judge will have the most material impact on the omega-3 oils sector in the years to come. This report, designed to be easy to read and digest, shares our insights to help omega-3 oils businesses respond and inform their longer-term decision making and strategic thinking. The aim is to help GOED and its members to assess potential future sustainability changes or threats and can help identify the most important gaps or needs within the omega-3 oils sector. We hope this report and trends identified can be used as a tool to help identify future opportunities within international markets or prepare for and mitigate risks within evolving legislative, consumer, industry and technological landscapes. Further information on the process and benefits of horizon scanning can be found in the appendix.



For the purposes of this report, we define an omega-3 oil as an oil containing EPA and/or DHA as an ingredient for inclusion in a consumer product including dietary supplements, fortified foods and beverages, infant formula, pharmaceuticals, medical foods/clinical nutrition and pet foods. The report excludes oils used as ingredients for feed in aquaculture or livestock/ poultry production, as well as products that contain only alpha-linolenic acid (ALA), an omega-3 fatty acid derived from vegetable sources. Specific attention is given to EPA and DHA omega-3s from marine sources (including fatty or oily fish, fish body or liver oils, marine crustaceans such as krill), marine microorganisms such as algae, and plants that have been modified to produce EPA and DHA.

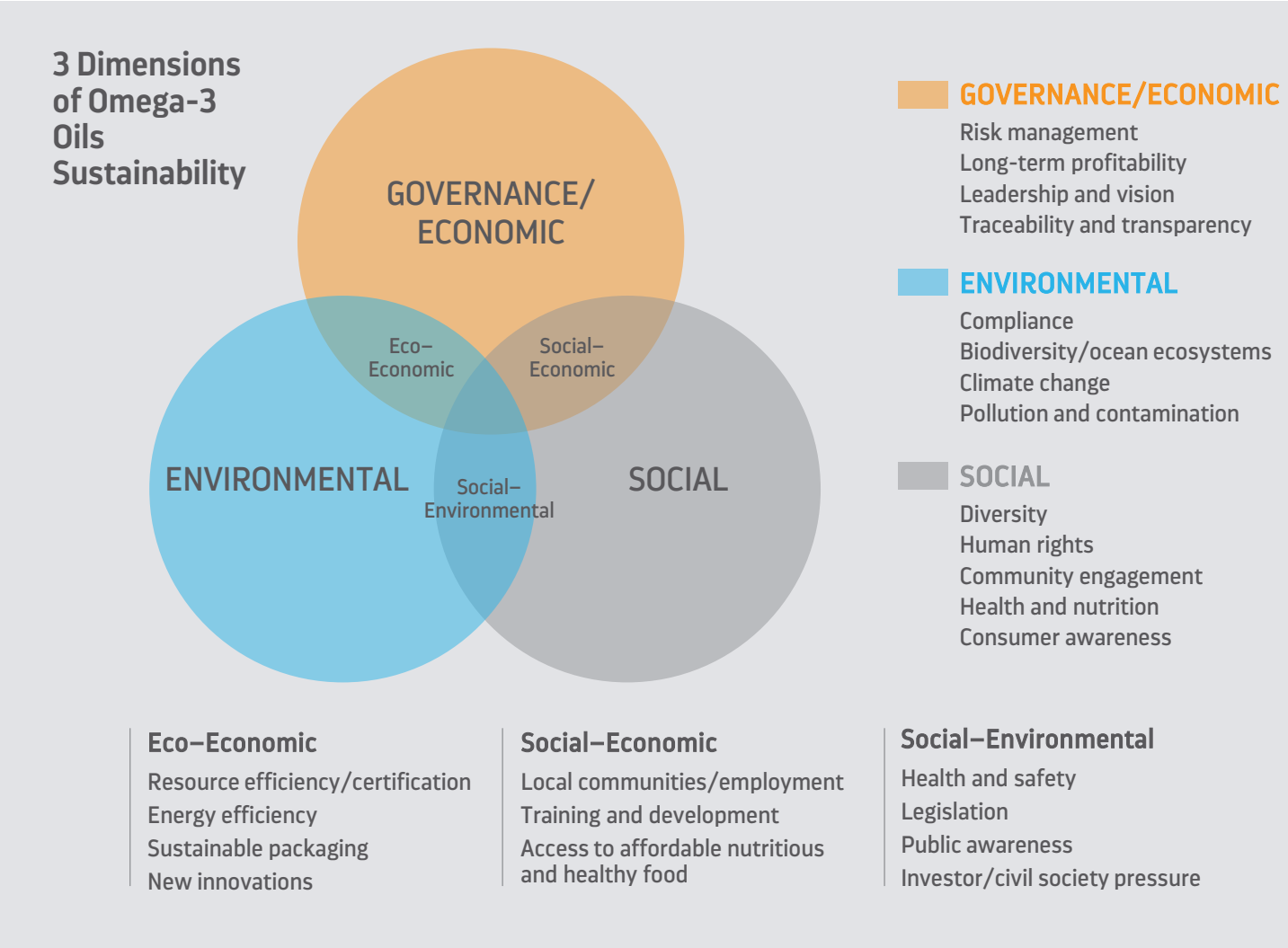
This report is based on consultant insights, interviews with over 20 GOED members and other stakeholders across the omega-3 oil value chain, and desk-based research. A total of 25 sustainability trends are described in detail together with a few case studies and 'signals of change', which describe ideas or innovations that could change the game for omega-3 oil sustainability in the future. Finally, we provide a set of recommendations and next steps for GOED and its membership. We welcome comments or feedback on this report.

What is Sustainability?

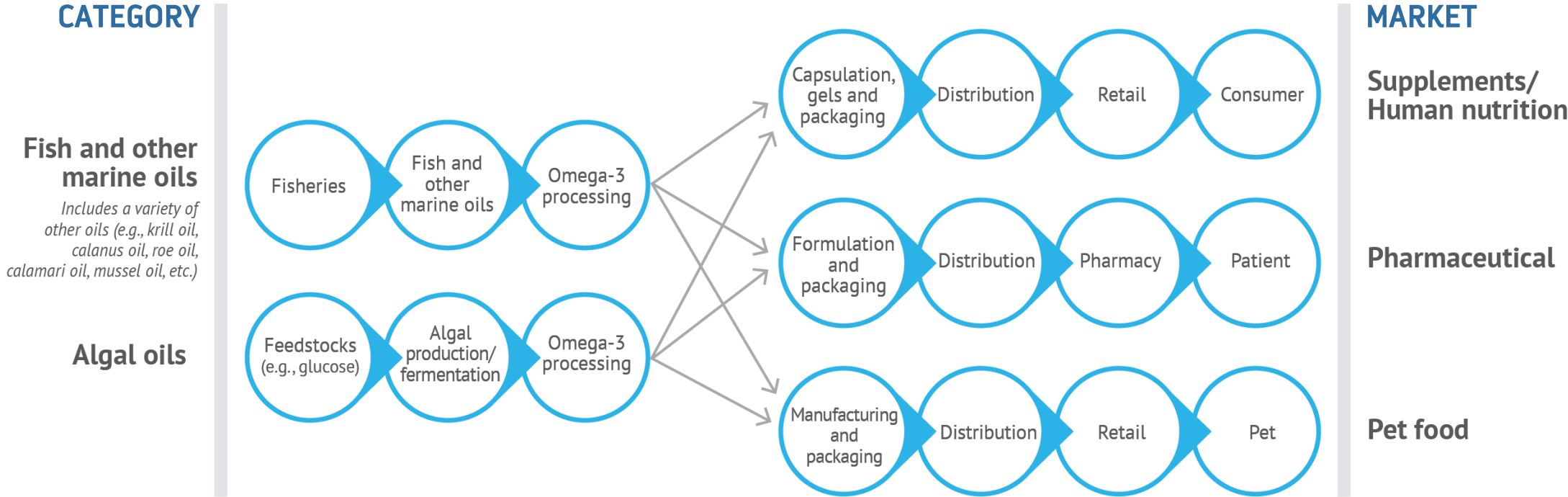
In 1987, the United Nations Brundtland Commission defined sustainability as *“meeting the needs of the present without compromising the ability of future generations to meet their own needs”* (1).

Sustainability is about more than the environment. It is a continually evolving area that encompasses all environmental, social and governance (sometimes referred to as economic) (ESG) issues.

Sustainability in business refers to a company’s strategy to reduce negative ESG impacts resulting from their operations in a particular market(s). It’s about creating a tangible, practical plan that achieves real results.



Tackling sustainability across the omega-3 oil value chain



This report explores sustainability trends across the EPA/DHA omega-3 oil value chain. Up to 90% of an organisation’s environmental impact lies in the value chain—either upstream (supply chain/production phase) or downstream (product use/consumer phase). Analysing key trends and acting across the value chain is therefore a vital step for any business that wants to become more sustainable. Omega-3 value chains stretch around the world—it is no longer enough for companies to focus only on what they control directly. Customers, consumers, investors and civil society organisations will hold you responsible for any ESG discrepancies across the omega-3 value chain, even if these originate from one of your suppliers. A value chain approach to sustainability is critical to long term business success, resilience and your licence to operate.

Mounting stakeholder pressure to tackle sustainability

Pressure from a variety of stakeholders for the omega-3 sector to act on sustainability continues to mount. These stakeholders include:

- **Governments:** Pressure increases on governments to implement a raft of legislative changes to address declining fish stocks, reduce the impacts of climate change and address issues such as marine and plastic pollution.
- **Retail/pharmaceutical:** Supermarkets, retailers (supplements, pet food etc.) and the pharmaceutical sector are demanding ever greater levels of traceability and transparency and improvements in sustainability standards.
- **Certification bodies:** With around 20–25% of global wild caught fish used for fish meal and fish oil production, environmental certification schemes such as Friend of the Sea (FoS) (1), MarinTrust (2) and the Marine Stewardship Council (MSC) (3) have been putting increasing pressure on the omega-3 sector to improve sustainable fisheries management.
- **Consumers/citizens:** Health, sustainability and animal welfare concerns are driving purchasing decisions particularly in North America and Europe, but with a rise in the numbers of ethically conscious consumers across Asia and South America.
- **Civil society organisations:** Organisations such as Greenpeace, Friends of the Earth and WWF are actively campaigning for significant reductions in 'bycatch' to reduce pressure on wild fisheries.
- **Investors:** Public and private investors are shifting funding to reduce long term financial and sustainability reputational risks.



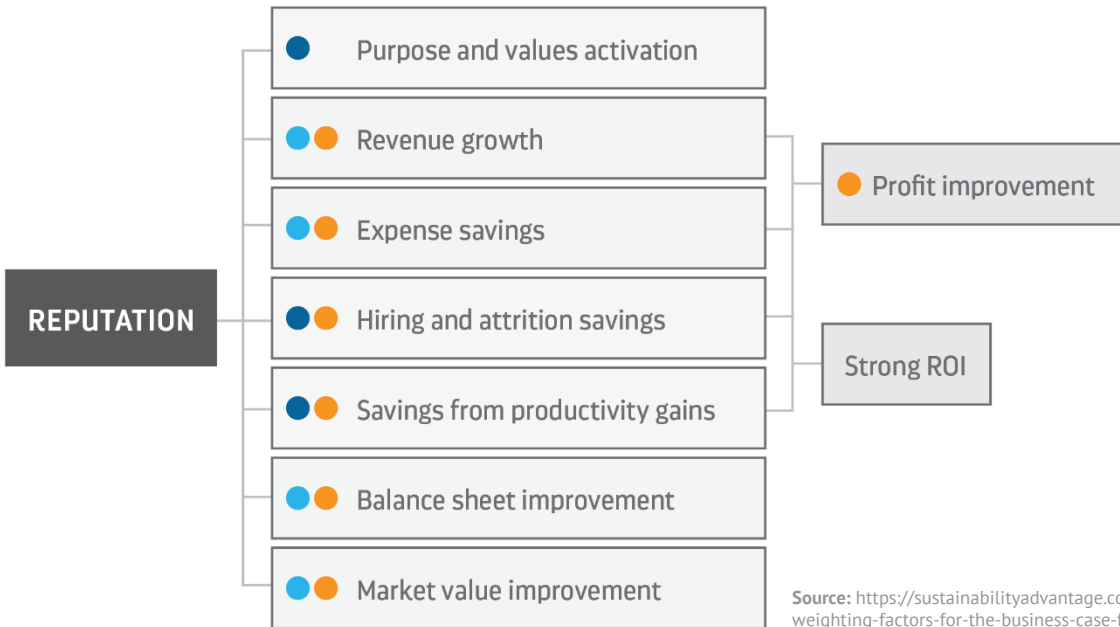
The business case for sustainability



3 JUSTIFICATIONS



10 BUSINESS CASE ELEMENTS



Source: <https://sustainabilityadvantage.com/2016/11/02/3-weighting-factors-for-the-business-case-for-sustainability>

A clear business case for sustainability is vital. Companies don't engage or deal with sustainability seriously when their board of directors fail to understand the business case—developing sustainability strategies and programmes takes time, money and resources. Companies engage in sustainability when they see a positive business case for action—when the increased profits from an investment outweigh the costs. The case for sustainability includes:

- It is the right thing to do
- It protects your social license to operate
- It reduces cost and promotes resource efficiency
- It builds brand equity
- It helps you understand and manage risks and identify future market opportunities
- It builds greater business resilience in a volatile, uncertain and complex world
- It improves business reputation with suppliers and customers
- It improves trust with consumers
- It stimulates innovation

Key risks of inaction

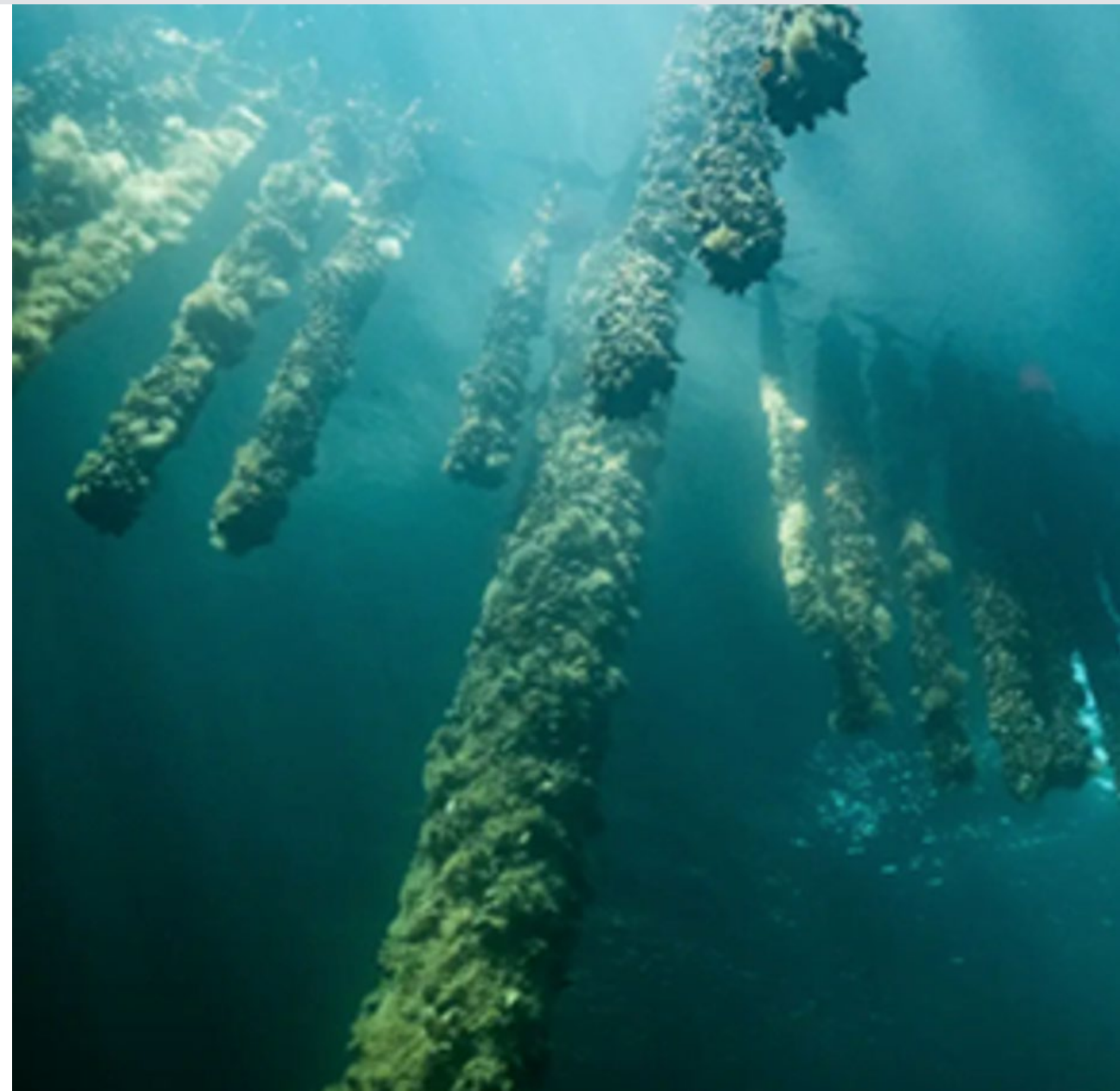
Operational risks: The financial impacts of resource degradation are beginning to materialise for omega-3 oil companies in the form of limitations in supply and price volatility. A supply and demand crunch for omega-3 products, underpinned by resource constraints and climate impacts (e.g., El Nino), are likely to continue to lead to ongoing future price/cost shocks.

Reputation risks: Retailers, investors, consumers and civil society organisations are demanding ever greater levels of traceability and transparency and improvements in standards.

Market risks: End markets for omega-3 oils are also changing in response to heightened consumer awareness of ESG issues. One indicator of this trend is the growth in sales of certified products, driven almost entirely by end-buyer commitments to sustainable sourcing.

Regulatory risks: Regulatory measures in both the E.U. and U.S., two of the most important export markets for omega-3 oils, are tightening and producing or exporting countries are being penalised if they are not compliant with new regulatory requirements.

Societal risks: The risks of ecosystem collapse, climate breakdown and resource scarcity will have a devastating impact on the ability to provide enough food and water in the future and ultimately undermine the quality of life for all.



The UN Sustainable Development Goals

The Sustainable Development Goals (SDGs) (1) are the universal call for action on sustainability. The SDG framework commits all 193 UN member states to the achievement of 17 goals and 169 targets, spanning the three dimensions of economic, social and environmental development. Under this framework, each national government—as well as other stakeholders, including local governments, business and civil society—are expected to identify, implement and report on specific actions that lead to their achievement. Whilst each goal focuses on resolving specific issues by 2030, achieving sustainable development relies on strategies that tackle multiple issues at the same time.

Many businesses working within the omega-3 industry are linking their sustainability endeavours to the UN Sustainable Development Goals (SDGs), which are 17 interlinked global goals designed to be a ‘shared blueprint for peace and prosperity for people and the planet’.



The omega-3 industry and the Sustainable Development Goals

The omega-3 oil industry should be salient and commit to all 17 SDGs which hold enormous potential for positive change. Whilst companies should be committing to these goals, there are 8 SDGs which in general are of most relevance (are key material issues) to the omega-3 sector. These include:

- SDG2:** Ending hunger, achieving food security and improved nutrition and promoting sustainable agriculture.
- SDG3:** Ensure healthy lives and promote well-being for all at all ages.
- SDG7:** Ensure access to affordable, reliable, sustainable and modern energy for all.
- SDG8:** Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.
- SDG12:** Ensure sustainable consumption and production patterns.
- SDG13:** Take urgent action to combat climate change and its impacts.
- SDG14:** Conserve and sustainably use the oceans, seas and marine resources for sustainable development.
- SDG17:** Strengthen the means of implementation and revitalize the global partnership for sustainable development.



Index of 25 sustainability trends



LANDSCAPE LEVEL TRENDS

Trends the omega-3 oils industry can't control easily but must respond to

1. Population growth and demographic changes
2. Consumer awareness of sustainability
3. Climate change
4. Declining wild caught fish populations
5. Increased price volatility and geopolitical instability
6. Growing focus on health and well-being
7. Regulatory pressures on the rise
8. Eco-logistics (distribution networks)



INDUSTRY LEVEL TRENDS

Trends that are changing within the omega-3 oils industry and which the sector can influence directly

9. Increasing demand for omega-3 oils
10. Contaminants in the oceans
11. Growth of algal and plant-based oil alternatives
12. A circular economy
13. Reducing plastic waste
14. Sustainable packaging
15. The renewable energy transition
16. Achieving net zero
17. Dealing with scope 3 emissions
18. Protecting human, labour and artisanal rights
19. Sustainable sourcing: certification and standards
20. Regenerative ocean fisheries



DISRUPTER LEVEL TRENDS

Trends originating from sectors outside the omega-3 oils industry which have the potential to cause disruption

21. Traceability for trust and transparency
22. Greenwashing crackdown
23. Biotechnology and transgenic crops
24. Fermentation and cell free innovation
25. Sustainability leadership and collaboration

LANDSCAPE LEVEL TRENDS

1. Population growth and demographic changes
2. Consumer awareness of sustainability
3. Climate change
4. Declining wild caught fish populations
5. Increased price volatility and geopolitical instability
6. Growing focus on health and well-being
7. Regulatory pressures on the rise
8. Eco logistics (distribution networks)



1. Population growth and demographic changes

What's changing?

There are four broad demographic trends:

1. The **global population** is expected to increase from 8 billion today to 8.6 billion in 2030 and 9.7 billion by 2050 (1). The population of sub-Saharan Africa is likely to double, while the population of Europe is likely to shrink.
2. An **aging population** is occurring in most countries and fastest in developing countries. By 2030, 1 in 6 people in the world will be aged 60 years or over. The number of people aged 80 years or older is expected to triple between 2020 and 2050 (2).
3. There will be a rapid rise in **urbanisation** and an **affluent middle class**. By 2030, China and India together will account for 66% of the world middle class population and 59% of the middle-class consumption (3).
4. In 2019, **international migrants**, people living outside their country of origin, numbered around 272 million, or almost 3.5% of the global population (4). This is expected to rise in the coming decade, driven by the impacts of climate change and geopolitical instability.



What will this mean for the omega-3 oils sector?

Higher global populations mean greater resource demands that in turn, increase pressures on the natural environment and marine ecosystems. Civil society and investor pressure to find sustainable alternatives is likely to accelerate. The omega-3 sector is likely to see continued growth (the EPA and DHA market is expected to reach 121,266 metric tons by 2024, at an average 1.8% annual growth rate) (5).

The fastest growth in demand for omega-3 oils is likely to continue to be observed in the developing markets of Asia and Latin America as a result in a rapid rise of incomes and the affluent middle class. Demand is further driven by an increase in the proportion of women in the workplace who turn to infant formula as a result. More affluent populations also creates demand for more pet foods and food supplements.

An aging population is likely to drive increased consumption of omega-3s due to their preventive health properties—an increased status of DHA and EPA in the elderly has been linked to better cognitive function and a lower risk of dementia (6).

Younger consumers are more aware of and focused on sustainability and the footprints of the products they choose—and they're willing to pay more for ones that demonstrate traceability, certifications, and sustainable sourcing and production.



SIGNALS OF CHANGE

Increased civil society pressure to act on sustainability from organisations like Greenpeace as a result of population and demand increases. For example, Greenpeace, WWF and others are calling for the protection of at least 30% of the world's oceans by 2030 (7).

New market opportunities in countries such as Japan, China and India associated with the growth in the numbers of middle-class and an aging population.

Social media opportunities: On social media there's a large conversation surrounding omega-3s, with more than 2.1 million Instagram uses of #Omega3, and nearly 72,000 more of #Omega3s." TikTok videos with #Omega3 in the captions have captured 220 million-plus views as of August 30, 2022 (8).

2. Consumer awareness of sustainability

What's changing?

Sustainability has become an increasingly important concern for consumers in recent years. In a survey conducted by IBM in 2022, 51% of respondents said that sustainability is even more important than it was 12 months ago (1). Young people are more aware of environmental challenges than older populations. However, given the current cost of living crisis and financial pressures, many consumers feel frustrated that they cannot make sustainability a top priority, focusing on price, despite their increasing concerns about ESG issues.

In Europe sustainability awareness remains relatively high, closely followed by a significant rise of sustainability awareness across North America. In contrast, awareness rates in developing countries are often much lower with price, health and safety concerns driving consumer buying decisions. There are, however, signs now that with a burgeoning middle class, consumers in countries such as Japan, South Korea, China and SE Asia/South America are becoming more environmentally conscious (2).



What will this mean for the omega-3 oils sector?

Whilst demand for omega-3 will continue to be driven by personal health, consumers are increasingly questioning the sustainability of omega-3 oil products and demanding transparent and traceable ingredients. Consumers, led by increasing awareness amongst young people and parents with young children, are interested in the provenance and origin (clean sourcing) of omega-3 oils and ingredients within food supplements.

The latest research from the Marine Stewardship Council (MSC) shows as American and Canadian consumers grow more concerned about the environment (3), US health supplement shoppers are increasingly worried about the ocean and overfishing is a top concern.

Companies will need to ensure their products are sourced using approved accreditation schemes, such as MSC and Friend of the Sea, whilst clearly labelling their products to communicate their sustainability credentials. Expect to see the plant-based eating trend (vegan, vegetarian and flexitarian diets) continue over the next few years as a result of increased awareness of the climate and biodiversity impacts of livestock products. There will be specific opportunities for algal based supplements, plant-based capsules and more plant-based pet foods, tapping into the popularity of plant-based eating.



 SIGNALS OF CHANGE

Increased civil society pressure to act on sustainability from Greenpeace, Friends of the Earth, WWF and other human rights organisations continues to shape consumer awareness of sustainability issues such as fish oil production. For example, in 2021 Greenpeace activists intercepted tankers carrying fish oil from west Africa (Mauritania, Senegal and the Gambia) to Europe, to highlight the threat they say the industry poses to food security and to livelihoods in the region⁽⁴⁾. Greenpeace Africa is calling for a 50% reduction in industrial fishing in the region to allow stocks to recover.

3. Climate change

What's changing?

A large-scale, long-term shift in the planet's weather patterns and average temperatures is happening as a direct result of human induced greenhouse gas emissions (GHGs).

Today the earth's surface is 1.2° C warmer than in the pre-industrial world and we are a long way off from limiting long-term warming to 2° C (under the international Paris Climate Change agreement) or below to avoid the most dangerous impacts of climate change. The world is still heading for a temperature rise in excess of 3°C this century. Every month of 2022 ranked among the ten warmest for that month, despite the cooling influence from the La Niña climate pattern in the tropical Pacific (1).

As a result of global warming areas in the tropics are predicted to see declines of up to 40% in potential seafood catch by 2050. In contrast, areas in higher latitudes, such as the North Atlantic and North Pacific, are seeing increases in the range of some fish species (2).



What will this mean for the omega-3 oils sector?

Despite having a low carbon footprint, fisheries are among the sectors most impacted by climate change. Warming oceans lead to ocean acidification and oxygen depletion, which may have significant consequences for the composition of fish stocks. Catches of fish such as anchovy in the Humboldt upwelling system are currently declining and this decline is likely to accelerate according to scientists (3). Ocean warming has already driven a 4.1% decline in the maximum sustainable yield of 235 of the largest industrial fisheries over the past 80 years (4). Pelagic fish stocks have already begun to adapt to climatic changes by shifting their distributions towards the North and South Pole.

Changes to the distribution of small pelagic stocks can lead to disputes between governments over how to share fishery resources—a challenge that was recently faced by a number of fisheries for mackerel, herring and blue whiting in the MSC program in the Northeast Atlantic. Effective fisheries management, collaboration between governments, scientists and the fishing industry will be vital to delivering and maintaining sustainable stocks.

One starting point for omega-3 oil companies is to commit to setting a 1.5°C aligned science-based emission reduction target (SBTs) (5). SBTs provide clearly-defined, near-term and long-term routes to reduce emissions in line with science.



SIGNALS OF CHANGE

Rising sea temperatures are decreasing the amount of EPA in plankton, which could impact the nutritional quality of food we consume from the ocean, a recent study shows (6). This first ever survey of planktonic lipids in the global ocean, led by scientists at the Woods Hole Oceanographic Institution (WHOI), found a temperature-linked decrease in the level of EPA production. Fish and seafood typically gain their essential fatty acid content from these plankton—which are the foundation of the aquatic food chain.

Aker Biomarine has set up an internal accounting system such that all emissions in Scope 1, 2 and 3 can be identified (see trend 17 for more details on Scope 1, 2 and 3 emissions). This accounting system is audited externally. Aker Biomarine has set targets with a focus on carbon dioxide monitoring in order to determine what areas of the value chain result in the largest GHG emissions. They found that fisheries related activities and on-board production represent most GHG emissions, followed by on-land production and Scope 3 emissions. To report, the Task Force on Climate related Financial Disclosures is used (7).

4. Declining wild caught fish populations

What's changing?

The number of overfished stocks globally has tripled in half a century and today one-third of the world's assessed fisheries are currently pushed beyond their biological limits, according to the Food and Agriculture Organization of the United Nations (1). Around 46% of small pelagic fish stocks, one of the most significant sources of global fish oils, are currently overfished (2). The continued existence of widespread illegal, unreported and unregulated (IUU) fishing threatens the economic, social and environmental viability of the sector.

Overfishing is closely tied to bycatch—the capture of unwanted sea life while fishing for a different species. This, too, is a serious marine threat that causes the death hundreds of thousands of sea turtles and cetaceans.

Overfishing remains a threat to the social and economic welfare of many countries, particularly within low- and middle-income countries. Fishing is not only an important facet of these economies—in many cases it is a central element in the traditional diet of its citizens.



What will this mean for the omega-3 oils sector?

Dwindling fish stocks worldwide, combined with a growing population, means there is an increasing likelihood of a supply gap in omega-3 fatty acids—this will drive research and innovation in the search for new novel sources. There are few opportunities to expand omega-3 supply from wild fisheries given ongoing sustainability challenges and resource constraints.

Reducing the overall pressure on global fisheries is crucial for reviving fish stocks, avoiding catastrophic collapses, restoring marine ecosystems' functionality and ensuring long term security of fish oil supplies into the future. Sustainable fishing practice means leaving enough fish in the ocean and protecting habitats and threatened species.

Pressure will continue to grow from investors, governments and citizens to ensure that businesses source fish oils from alternative sustainable sources and improve fishery management (such as further catch restrictions and gear modifications, to reduce waste). Between 2010 and 2019 the total global catch of MSC certified wild seafood rose from ten to over fifteen percent. There will be an expectation that all wild caught fisheries will be sustainably managed in the future and that all omega-3 oils are certified sustainable (e.g., MSC/Friend of the Sea). Stakeholder pressure is likely to drive sustainably sourced fish and seafood products to go beyond fish counters and canned goods aisles (retail) and into the health food, supplements and pet food markets.



📡 SIGNALS OF CHANGE

Tightening international regulatory frameworks:

In June 2022, the World Trade Organisation (WTO) agreed on a deal to ban subsidies for fisheries deemed to be overexploited. Under the deal, WTO members cannot grant or maintain subsidies to vessels or operators engaged in Illegal, unreported and unregulated (IUU) fishing activities. Members are prohibited from offering subsidies for fishing or related activities in the high seas outside the jurisdiction of a relevant regional fisheries management organization (RFMO) (3).

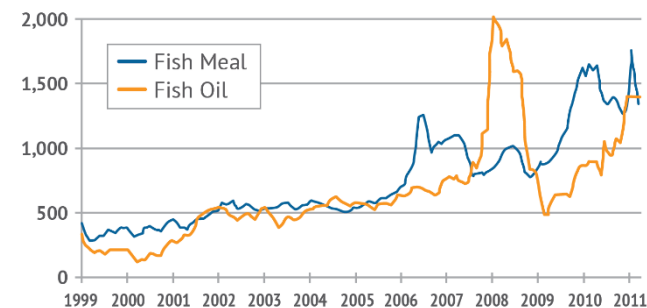
Global Fishing Watch has developed a tool to track fishing vessels using vessel data. Machine learning algorithms are employed to identify vessels involved in illegal fishing practices. The use and success of this tool is growing rapidly, with support from partners like Google, the National Oceanic and Atmospheric Administration (NOAA) and the International Union for Conservation of Nature (IUCN). Geospatial analysis of illegal fishing practices has the potential to inform future policies promoting sustainable fisheries (4).

5. Increased price volatility and geopolitical instability

What's changing?

Food and energy prices surged to near historic highs in 2022 amid the Covid-19 pandemic and the war in Ukraine, which both prompted major supply disruptions. This was accompanied by a sharp rise in both price and the volatility of prices of some omega-3 oils. The Ukraine war increased prices of energy and other inputs which in turn contributed towards prices of crude fish oil reaching historic highs, increasing the cost of production for several important omega-3 ingredient oils. These inflationary pressures have the potential to reduce the demand for omega-3 dietary supplements and other consumer products, demonstrating how sudden shocks can impact on the sector.

In addition, U.S.–China competition has fuelled fragmentation and the emergence of geopolitical blocs. Climate change, resource scarcity, poverty, and ideological conflicts all threaten to continue or deepen geopolitical instability. Today's supply chains are global in nature, meaning that localized disasters and conflicts, or global shocks (e.g., Covid-19) can significantly disrupt them or cause commodity price volatility. Food price inflation across the world remains close to all-time highs.



Price of Fish Oil (\$ per tonne) 1999–2011 (1)

What will this mean for the omega-3 oils sector?

Increases in the price of basic food commodities can result in a reduction of discretionary spending, which may reduce the demand for omega-3 dietary supplements and other consumer products. Future geopolitical tensions could erupt very quickly and have the potential to cause significant supply chain disruptions which, in turn, have the potential to slow the growth of multiple segments of the omega-3 market.

The price of fish oils has been affected by inflation during the last 18 months and this has resulted in increasing prices for ingredient omega-3 oils. It is probably inevitable that finished product companies will need to pass those price increases to the final consumer, and it is unclear how this may affect demand.

The evolution of fish oil prices is, to a large extent, linked to Peruvian fish oil prices. Peru is the largest source of fishmeal and fish oil output today, and the world's largest producer and exporter of fishmeal and fish oil—an unsuccessful season in Peru is estimated to cause as much as a 20% decrease in global output (2).

Managing price volatility and risk is not easy. In the long-term companies are looking at ways of diversifying and shortening their supply chains—looking at new local sources of more omega-3 oils to ensure longer term resilience.



SIGNALS OF CHANGE

Researchers at the Evonik Group and the Dutch company DSM through their Veramaris joint venture are mitigating risks to marine oil supply challenges by creating a manufacturing plant in Blair, Nebraska to produce a North Pacific algae strain as a sustainable source of omega-3 fatty acids. Researchers developed a fermentation process that produces EPA and DHA directly from the microalgae. The product is an algae oil with a more than 50 percent content of EPA and DHA. The plant is claimed to provide as much EPA and DHA as 1.2 million tons of wild fish (2).

6. Growing focus on health and well-being

What's changing?

Good health and nutrition is what enables people to live a full and active life. Yet globally, around 1.9 billion people are over-consuming food, a third of people suffer from some form of micronutrient deficiency/malnutrition, and 828 million people suffer from chronic hunger (1).

Today, consumers are prioritising holistic health as they increasingly focus on the inextricable link between mental and physical well-being. Food manufacturers and retailers are starting to converge on health, wellness and sustainability (sustainable nutrition).

Omega-3s are an example of a healthy fat. Omega-3s are known to ensure heart, brain and eyes develop and function properly. Omega-3 oils may help you maintain healthy blood pressure, support healthy triglyceride levels and manage your risk of heart disease. An increasing body of evidence suggest that EPA and DHA could help treat various neuropsychiatric conditions such as depression, dementia and Parkinson's disease (2). Demand for mood and memory boosting ingredients and supplements is growing quickly in the post Covid-19 world.



What will this mean for the omega-3 oils sector?

Supplements are seeing a growth in popularity, partly because they are easily incorporated into daily routines; 21% of global consumers are already using nutritional supplements to boost their health (3). Omega-3 oils, for the human and pet food markets, are set to benefit. Given this increased interest it's important to point out that if everyone starts taking even the minimum recommended dose of EPA and DHA there would not be enough fish in the oceans to supply that demand.

With consumer interest in physical and mental health and wellbeing on the rise, there are plenty of opportunities for omega-3 brands and manufacturers to create solutions to meet growing demand, linking the co benefits in relation to health, nutrition and sustainability. Looking ahead, we are likely to see even more interest in products that can support cognitive well-being, as well as combined applications that support other aspects of mental and physical health. Within the pet food sector pet owners are also increasingly looking for healthy foods with proactive ingredients (4).

New innovative human omega-3 products are appearing that are clearly positioned to benefit cognitive function, mood and mental health, with names such as 'Brain Omega-3,' 'Omega-3 Mood' and 'Omega Memory with Curcumin'.



SIGNALS OF CHANGE

Generation Z and Millennials are factoring sustainability and health concerns into their buying decisions:

These consumer demographic populations care not just about their own health but also care for the health of the planet. When asked about their most sought-after health benefits, American Gen Z prioritized bolstering both their physical and mental health; the top benefits they seek out from foods, beverages, and nutrients were having more energy or less fatigue (with 38% saying this), improved sleep (35%), emotional or mental health (33%), and digestive or gut health (29%) (5).

7. Regulatory pressures on the rise



SIGNALS OF CHANGE

The Peruvian government continues to strengthen their quota system with new quota limits and reductions in the time allowed to catch these quotas. This year (as of Jan 2023) 20% of the anchovy quota went uncaught. The government has also decreed a large strip of Peru's coastal waters off limits to industrial fishing. The quotas and length of fishing seasons are now reviewed every five years with no quotas guarantees as to which companies/fishers will be given these (Source: from a stakeholder interview).

The Taskforce on Nature-related Financial Disclosures (TNFD) will provide frameworks to identify, measure and disclose nature-related risks and impacts. During the biodiversity COP15, the International Sustainability Standards Board (ISSB) announced that it will research the link between climate and biodiversity. Some regulators and central banks have already made the case as to why and how financial institutions should respond to rising risks and biodiversity losses. These initiatives, among others, will serve as catalysts for greater reflection by stakeholders about the impact, risks and opportunities associated with nature and biodiversity (3).

The UK National Health Service aims to be the world's first net zero national health service, setting a 2040 net zero target into statutory legislation. It includes asking all its suppliers for carbon reduction plans, including, for example, the pharmaceutical sector. It indicates that there may be increasing pressure for more reporting within this sector, which until now, has not been subjected to too much sustainability scrutiny (4).

What's changing?

Several international initiatives (e.g., the Convention on Climate Change (1) and the Convention on Biological Diversity (2)) help spotlight the links between two global environmental crises, climate change and biodiversity loss—and national governments have been tasked with implementing national action plans and frameworks which deliver on these global commitments.

In response to reductions in some fish stocks (see trend 4), some governments are exploring the potential of introducing quotas to limit fish catches and this has the potential to significantly limit supply over the next 5–10 years (see Peru signal of change opposite).

Furthermore, businesses will be pressed to invest more resources into managing the resilience and sustainability of their supply chains in the face of a more rigorous regulatory landscape governing corporate responsibility around the impact on human rights.



What will this mean for the omega-3 oils sector?

Expectations for consistent, comparable and transparent information on climate and other environmental, social and corporate governance (ESG) information are growing steadily—driven by investor pressure, stakeholder pressure and, increasingly, regulatory action.

The omega-3 oils industry is subject to the vast body of sustainability laws which vary greatly between regions. Regulations are an important factor in determining which, and how, innovations reach the consumer and the food industry, and have a key role in the evolution of the marketplace.

Key trends and topics across various ESG issues include the importance of dealing with scope 3 emissions, marine based ecosystem restoration, nature-related reporting, the development of global disclosure standards, the impact of social issues and trading and offsetting carbon. Mandatory climate disclosures is a prominent topic for regulators worldwide.

Europe continues to be seen as a pioneer in new sustainability legislation, followed by legislators (particularly at a state level) in North America. Food safety still trumps sustainability amongst regulators in South America and China (and E Asia) but as sustainability awareness builds within a more affluent and growing middle class populations, expect ESG issues to become more prominent.

8. Eco logistics (distribution networks)

What's changing?

With the Covid-19 global pandemic still having a lingering effect on cargo shipping and causing shortages, delays, and port shutdowns, unexpected events can have a significant impact on the distribution of ingredients, packaging and capsules within the omega-3 oil sector. These disruptions, combined with geopolitical tensions in certain parts of the world, are causing some companies to rethink their sourcing and logistics approaches.

Instead of cost-optimized logistics and supply strategies, there will be more focus on resilience and agility. Whilst some companies are looking to shorten their value chains (linked to circular production approaches), others are looking at diversifying their ingredient sourcing policies.

In addition, with a recognition that the logistics sector has a significant environmental footprint (accounting for 17% of global GHGs) (1), there will be greater emphasis from customers on low emission transport solutions, with a focus on last-mile delivery performance.



What will this mean for the omega-3 oils sector?

It is possible for the omega-3 sector to make more sustainable choices across their distribution and logistical networks, helping to ensure both waste and emissions are reduced during transportation.

Warehouses and distribution hubs can often be energy inefficient with opportunities to improve insulation, a great place to install solar panels and to change towards purchasing energy from renewable energy providers. Where third party warehouse suppliers are used, locations which reduce distribution miles are key (2).

When shipping by air or sea, consider consolidating goods as much as possible to minimize the number of shipments made in a given time frame. By packing more efficiently, you could ultimately reduce your carbon footprint. Ideally partner with shipping companies that are committed to sustainability and are looking at shipping solutions that reduce reliance on fossil fuels.

In the medium to long term, you will need to assess the risks and opportunities of sourcing ingredients or products from a limited number of geographical regions, particularly those that may be prone to rising geopolitical tensions and hence any potential supply chain disruptions. Explore opportunities to source products more locally or diversify your supply base.



SIGNALS OF CHANGE

The Sustainable Shipping Initiative is a multi-stakeholder initiative that brings together like-minded and leading organisations with shared goals and equal determination in improving the sustainability of the shipping industry in terms of social, environmental and economic impacts (3).

INDUSTRY LEVEL TRENDS

9. Increasing demand for omega-3 oils
10. Contaminants in the oceans
11. Growth of algal and plant-based oil alternatives
12. A circular economy
13. Reducing plastic waste: Plastic pollution, packaging and fishing gear
14. Sustainable packaging
15. The renewable energy transition
16. Achieving Net Zero
17. Dealing with scope 3 emissions
18. Protecting human, labour and artisanal rights
19. Sustainable sourcing: certification and standards
20. Regenerative ocean fisheries



9. Increasing demand for omega-3 oils

What's changing?

Overall, the EPA and DHA omega-3 market globally was worth \$1.58bn in 2021. The volume of ingredient oils used by the EPA and DHA omega-3 market is expected to reach 121,266 metric tons by 2024, at an average 1.8% annual growth rate. The rising application of omega-3 fats in pet food and pharmaceuticals combined with innovation and developments related to supplements and functional foods is expected to contribute towards sustained growth over the forecast period (1). The Chinese, Asia-Pacific and South American markets are likely to experience the fastest growth rates, driven by socioeconomic factors that include a rapid expansion of the affluent middle class, and an increased participation of women in the workforce.

Consumer demand for omega-3s will continue to grow primarily driven by a focus on personal health—EPA and DHA have been linked to favourable pregnancy outcomes, healthy baby and child development, as well as to heart, eye, brain and joint health. In addition, there is a latent demand for sustainable products and ingredients that are sourced using transparent and traceable ingredients.



What will this mean for the omega-3 oils sector?

The demand for omega-3 EPA and DHA oils to meet current human nutritional requirements is greater than supply—a gap that is likely to increase in years to come and which will be further compounded by climate change and resource constraints (2).

A brand's commitment to sustainability appeals to consumers and is going to be a decisive factor when it comes to purchasing omega-3 products in the future—whilst today this demand is primarily driven by perceptions of sustainability in Western markets (Europe/US), there are signs that this is slowly changing with more environmental consciousness emerging in parts of Asia for example (where health and safety and quality issues still trump sustainability).

Despite ongoing cost of living crises in many parts of the world, young people (millennials and Generation Z) appear willing to pay more for sustainable products (3). This is a strong signal for brands that committing to sustainability is key to maintaining the trust of consumers, now and in the future.



SIGNALS OF CHANGE

Generation Z and Millennials are showing changing tastes: According to recent studies Generation Z (up to 26 years old) shoppers demand sustainable retail. Most Generation Z shoppers prefer to buy sustainable brands, and most are willing to spend 10% more on sustainable products (3). 75% of Millennials (27–42 years old) are eco-conscious to the point of changing their buying habits to favour environmentally-friendly product (4).

Support for sustainable fish and seafood products among the health supplement shopper is growing according to research by the Marine Stewardship Council. 64% of American supplement shoppers report that ecolabels on fish and seafood products raise their trust and confidence in the brand. 70% of these shoppers report that they would like to hear more from companies on their approach to sustainability (5).

10. Contaminants in the oceans

What's changing?

Contaminants in our oceans are increasing globally as our marine ecosystems are polluted by a cocktail of chemicals (1). Ocean pollutants include persistent organic pollutants (POPs), endocrine disrupting compounds (EDCs), heavy metals, plastic wastes and related chemical compounds (e.g., BPA, phthalates), as well as other industrial and agricultural pollutants (2). Pollutants of particular concern to the omega-3 oils sector include heavy metals, polychlorinated biphenyls (PCBs), residual pesticides and plastic based contaminants which bio-accumulate within the food chain and within larger fish species.

There is increasing media attention on the impacts of these marine contaminants on fish oil production, which is likely to increase in the years to come as our scientific understanding of the impacts of the combined cocktail of chemicals comes to light.



What will this mean for the omega-3 oils sector?

To mitigate possible health risks associated with contamination, the fish oil industry utilizes several omega-3 oil refining techniques, including steam stripping, bleaching, distillation and activated charcoal filtration. In general fish oils are well within accepted standards for contaminant allowances (3) with most contaminants being removed. However, as the list of contaminants gets longer, the risk of potential omega-3 fish oil contamination gets greater, further compounded by the likely increase in scientific, public and media scrutiny.

Expect to see food safety bodies, such as the European Food Safety Authority (EFSA), increase their level of scrutiny on contaminants in food chains more generally (4). These bodies tend to set the standard for other authorities in other parts of the world.

Investing and innovating in oil refining techniques to reduce contamination (whilst maintaining nutritional quality) will be crucial moving forward. Monitoring systems for new and emerging contaminants in partnership with academic institutions will also be crucial.

The use of mechanisms such as GOED's voluntary monograph that hold companies accountable for adhering to contamination standards will become more important for the sector over the coming years (see opposite).



SIGNALS OF CHANGE

The Hong Kong Consumer Council issued a consumer warning in November 2022 claiming that some health supplements were found to contain contaminants or carcinogens in some popular fish oil products after they tested 25 fish oil samples (5). Only four out of the 25 products were out of compliance with at least one contaminant limit, while 21 product (84%) were in full compliance with all parameters—whilst the news story misinterpreted the results of the study, given several highly prominent health and food safety scares in past years, consumers in parts of Asia are particularly sensitive to any potential health and safety or quality concerns.

The GOED Voluntary Monograph (6) has served as the omega-3 industry's standard of quality since 2002. It ensures that omega-3 oils reaching consumers are both safe and of high quality and focuses on oxidative quality, environmental contaminants and the measurement of EPA and DHA.

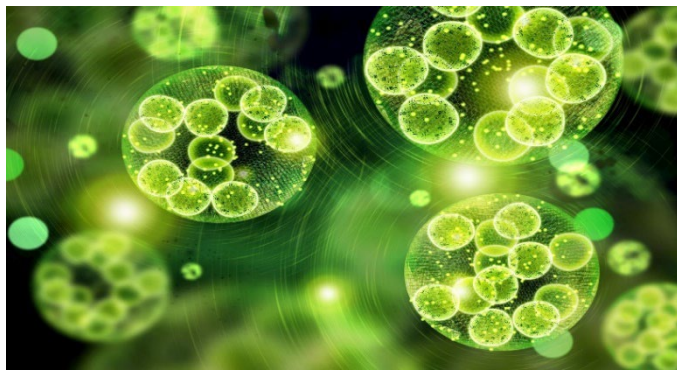
11. Growth of algal and plant-based oil alternatives

What's changing?

With more and more people following a vegan, vegetarian or flexitarian lifestyle or choosing to cut down on their meat, fish and dairy consumption for environmental, animal welfare and health reasons, the plant-based market is expected to see continued growth in the foreseeable future (although demand fell slightly in 2022 linked to the cost-of-living crisis)—with more of a focus on those ingredients that offer both health and sustainability benefits.

Consumer interest in plant-based ingredients and a growing variety of strains and compositions have helped algae achieve a global growth rate of 10.3% in 2022 (1). 62% of consumers report a preference for plant-based omega-3s (2).

There is increasing recognition that the growing global demand for omega-3 cannot be met solely by the traditional wild catch fisheries with the need to find sustainable alternatives, including single cell organisms such as microalgae.



What will this mean for the omega-3 oils sector?

There are opportunities to introduce many new plant-based and algal products capitalizing on both the new capacity coming online and the rise in numbers of health and environmentally conscious consumers who are moving towards flexitarian, vegetarian and vegan diets.

The use of algal/plant-based oils in foods and supplements will continue to grow as demand for EPA/DHA increases. The use of algal oils will reduce pressure on vulnerable fish stocks, which remain a limitation to meeting projections for future demand. While early life cycle assessments suggest that algal production remains favourable to fish oil in terms of biodiversity impacts and climate impacts (across the whole lifecycle from fishing to final end consumption), microalgal oils can have a higher environmental impact against other measures (land use, eutrophication potential and water use) (3). The higher environmental impact of algal based ingredients in these areas is mainly due to the use of sugar stocks as carbon and energy sources—moving to closed loop sugar stocks (4), such as using sugars from renewable waste resources (cellulose) or by avoiding the need for carbon sources altogether, will reduce the environmental burden of algae production.

New technology will also further enhance the yields of algal oil from open pond algae fermentation, and we can expect to see further growth of production plants in sun-rich areas.

There is also an opportunity to move away from animal-based gelatine gummy formulations to plant-based alternatives (5).



SIGNALS OF CHANGE

DSM has been building its life's OMEGA portfolio around 100% vegan omega-3 oils, which are derived from sustainably cultivated algae—leaving no impact on marine ecosystems and appealing to eco-conscious consumers. Driven by sustainability and resource constraints, DSM aims to make the transition away from fish-based oils to oils entirely sourced from algal products (6).

12. A circular economy

What's changing?

A circular economy means moving away from the world's current and enormously wasteful business model of 'take, make, throw away', in which resources are extracted, turned into products, used, and discarded. It entails redesigning out waste with circularity, reducing both our demand for raw materials and the environmental impact associated with obtaining them.

33% of all food produced globally is wasted contributing to 8% of global GHGs (1). There is now greater pressure on businesses to invest in solutions that focus on circularity as well as the valorisation of food waste and loss into side streams and new resources. According to the Upcycled Foods Association, 62% of consumers are indicating a willingness to pay more for a product that prevents waste (2). The FAO has made it clear that the blue food system must be circular, and fish byproducts must not be thrown away, but instead should be captured and repurposed to ensure no nutrition is lost to the global human food system (3).



What will this mean for the omega-3 oils sector?

51% of fish oil is already estimated to come from fish byproducts (4). Globally there is still an estimated 12 million tonnes of byproduct produced in processing plants that are not collected, thereby offering significant opportunities for the omega-3 sector to increase the use of these byproducts. Asia is by far the area with the largest potential for the utilisation of these byproducts, although other regions such as Europe and Latin America are also believed to have a great unutilised tonnage of offcuts (5).

The traditional "make-take-waste" model, also known as the linear model, is beginning to disappear from the omega-3 oil sector with a recognition that there are significant cost and sustainability benefits from circular economy business models. There are significant opportunities to businesses operating across different parts of the omega-3 oils value chain to collaborate to ensure byproducts can be supplied in sufficient quantities and quality (key challenges) to ensure production can be achieved at scale.

In recent years, due to less fish availability (quotas, El Niño effect etc), there has been a big drop in the amount of fish oil produced. This drop in production is causing a demand-supply gap in industries that use fish oil. Increasing the proportion of fish oils sourced using fish byproducts, combined with more efficient use of these products (improving processing), has the potential to increase availability and the sustainability of the sector and use of omega-3 oils found in foods, pet foods and dietary supplements.



SIGNALS OF CHANGE

A Circular Economy Approach to Fish Oil Extraction: Fish oils are now being extracted in high yield from anchovy filleting waste using limonene which is renewably obtained from waste orange peel as green solvent. The method closes the materials cycle and establishes a circular economy process to obtain high quality fish oil from biowaste available worldwide in several million tonnes/year. Significant economic, social and environmental benefits are anticipated as a result of this circular approach to fish oil extraction (6).

Epax is on the verge of total circularity for its marine biomaterials: The Norwegian company attributes this to its strict zero-waste policy. According to Epax, in the year 2022, 96.7% of the byproducts resulting from the manufacturing of its marine oil ingredients have been used for the creation of other valuable resources such as animal feed, fertilizer, and biogas (7).

13. Reducing plastic waste: Plastic pollution, packaging and fishing gear



SIGNALS OF CHANGE

The Alliance to End Plastic Waste is an alliance of over 70 companies that have come together to improve the circularity in plastics and end plastic waste/pollution, including more recyclable packaging solutions (3). In the U.S., this work towards circularity was best exemplified by the U.S. Plastics Pact (4). The Pact's goals will quickly and significantly drive the increased use of recycled plastics across the country by creating markets for recycled plastic and ensuring that packaging is fully recyclable.

Reporting Fishing Gear Loss: As one of the world's largest seafood companies, Thai Union is committed to addressing the issue of abandoned, lost and discarded fishing gear from its supply chains and working to find solutions to remove or prevent plastic pollution from entering the oceans. They are part of the Global Ghost Gear Initiative (GGGI), working together to help identify ways to tackle this problem (5).

AION is a sustainable business model innovation that grew out of Aker BioMarine's ESG ambitions on circularity for plastic waste streams. AION specializes in helping clients across industries turn plastic challenges into valuable solutions, driving the transition towards a circular economy for industrial plastics (6). They have produced trays, pallets and take away boxes made from plastic waste.

What's changing?

Concern about the presence of plastics in the environment and in food has increased in recent years. Plastics are found in just about every inch of the earth, including the Arctic and Antarctic. Microplastics enter the marine, freshwater and terrestrial environments through wastewater discharges, and runoff into the ocean, as well as from plastics used in marine events like shipping, fisheries and off-shore activities.

Plastic pollution in our marine environment is taking place on a staggering scale with 9.5 million tonnes of new plastic waste flowing into the ocean each year (1). There is still insufficient information to draw firm conclusions on the toxicity related to the physical or toxicological health impacts related to microplastic particles.

Pressure to reduce plastics used in both the fishing and packaging industries is increasing apace—the challenge remains how to develop lightweight, cheap and convenient sustainable alternatives, including the use of paper and other bio-based products in packaging.



What will this mean for the omega-3 oils sector?

Several strategies are available to the omega-3 oils sector to reduce plastic pollution. In packaging these include the need to look for more sustainable alternatives including substituting alternative materials, investing in the development of bio-based plastics, designing packs to make them easier to process in recycling, and improving recycling and processing of plastic waste.

Whilst there have not been any reports of the presence of chemical components of plastics (alkylphenols, bisphenol A etc) (2) in EPA/DHA omega-3 oils, research is still in its infancy and the industry needs to be seen as supporting initiatives which reduce the quantity of plastics entering the marine environment—by tackling plastic packaging and reducing the use/loss of plastic fishing gear. Regulators are likely to come under increasing pressure to address microplastic pollution and 'ghost' fishing gear in the coming years.

In terms of fishing gear options these include supporting designers in developing biodegradable fishing gear and satellite-traceable buoys that allow fishers to track and retrieve lost traps. Schemes which support fishing gear recycling are also becoming more common (see opposite).



14. Sustainable packaging

What's changing?

The world produces 141 million tonnes of plastic packaging a year and around a third of all plastic packaging ends up polluting the ocean and land environment (1).

Sustainable packaging refers to the sourcing, development, and use of packaging solutions that have minimal environmental and social impacts. Packaging design, including minimal and recyclable packaging, is one of the top influences for shoppers concerned with sustainability.

Biodegradable and compostable materials are expected to become increasingly popular as is the use of recyclable materials like paper and cardboard. Plant-based packaging, using materials such as cornstarch, sugarcane, and bamboo, is also a key trend with expected growth of 8.8% between 2022 and 2028 (1). More companies are also exploring ways to recycle plastic packaging instead of throwing it into landfill.



What will this mean for the omega-3 oils sector?

Sustainable packaging concerns for the omega-3 sector are not drastically different from other markets.

Whilst product safety and hygiene requirements will be a primary driver of packaging choice, much more can be done to address the sustainability credentials of packaging. If your product requires plastic packaging, use 100% recycled plastic and consider offering a 'refill pouch' version of the product to encourage buyers to re-use the plastic container in the future.

With a rise in the interest of plant-based EPA and DHA omega-3 oils, there are opportunities for companies selling these products to consider plant-based packaging alternatives with opportunities to market this products as 'ocean friendly', given they will naturally break down if they do end up in our seas.

A significant challenge is recycling packaging (paper, cartons) without causing contamination from the chemicals they contain (printing inks, bleaching chemicals). Removing these inks and other chemicals can both be costly and energy intensive.



SIGNALS OF CHANGE

The Sustainable Packaging Coalition is a membership-based collaborative that believes in the power of industry to make packaging more sustainable. Their work is based on the principles of collaboration, education, and action—inclusive of all materials, all supply chain positions, and all industry, academic and government stakeholders (2).

Calgee launched new plant-based plastic pouches for their omega-3 supplements and are switching from virgin fossil fuel based plastic bottles. They claim their plastic pouches are carbon negative—removing more carbon dioxide from the atmosphere than they emit. Their initial run of pouches generated a negative carbon footprint of 31 kg after taking production and logistics emissions into account (3).

15. The renewable energy transition

What's changing?

2022 was a tumultuous year for the world's energy systems, with the worst global energy crisis in decades, caused by the war in Ukraine having a ripple effect on people across the world. The International Energy Agency predicts the world is set to add as much renewable power in the next five years as it did in the past twenty. This means that total capacity growth worldwide of renewable power is set to almost double in the next five years, overtaking coal as the largest source of electricity generation by early 2025 globally (1).

In 2018, the International Maritime Organisation adopted a strategy to reduce CO₂ emissions across international shipping by at least 40% by 2030, and 70% by 2050, compared to 2008 (2)—pressure from governments is likely to grow to include emissions reductions from international shipping. In addition, fishing fleets will need to demonstrate cuts in greenhouse gas emissions which have quadrupled since 1950 (3).



What will this mean for the omega-3 oils sector?

The omega-3 sector is very reliant on fossil fuels and must transition to renewable energy to reduce carbon emissions and meet global planetary health goals. There are specific energy challenges for the sector because of their often-remote geographic locations (fisheries), seasonal patterns in energy use, and low ability to invest in new technology.

Rising fuel costs and political interventions to reduce carbon emissions are likely to result in additional burdens/pressures to invest in renewable energy solutions such as wind, solar and biofuels.

Transitioning to renewable energy is often the biggest lever a company has to reduce its emissions. Switching to 100% renewable energy suppliers (as an individual company or through joint purchasing in collaboration with others), generating on-site renewable power or implementing energy efficiency measures can reduce carbon footprint and save money. Fisheries can reduce their GHG emissions by investing in low-carbon technologies and operations, reducing pollution and promoting greater digitalization for better monitoring.

There are many promising measures that are already being utilised to achieve emission reductions and fuel savings across the fishing sector with electric, shipping and dual fuel systems (electric with fossil fuel e.g., diesel back up). With further improvements in battery technologies electric systems are being trialled that not only significantly reduce the use of fossil fuels but use up less space onboard, freeing up space for more catch.



SIGNALS OF CHANGE

Olvea's fish oil refinery is housed within a building designed to have the lowest environmental impact with 1,300m² of photovoltaic panels installed on the roof. The rest of the energy supply of the plant is purchased from green sources of gas and electricity. The green plant is equipped with numerous heat exchangers to recover and interchange heat energy at different stages of the process. Olvea has also installed 3 rainwater storage tanks, with a storage capacity of 1 million litres, to recover up to 12 million litres per year. In 2022, Olvea was recognized for its excellence in terms of CSR performance and was awarded with the Platinum Medal, the highest distinction for top 1% companies globally assessed by EcoVadis (4).

Decarbonisation of fishing fleets: In 2015 Siemens built Karoline, the world's first hybrid fishing boat which began operations off the coast of Norway in 2015. Whilst still running on diesel to and from the fishing grounds, Karoline switches to electricity for fishing, loading and unloading. It runs electric-only for almost three hours every day, and the batteries are fully recharged in port overnight. Fuel savings are close to 70% (5).

Recognizing the power of partnerships and scale in delivering climate action, ten global pharmaceutical companies collaborated to fund the creation of the **Energize program**, a unique sector-wide initiative. Designed to help accelerate renewable energy adoption through education and functional support, this program aims to help suppliers act on climate change (6).



16. Achieving net zero

What's changing?

Governments around the world have agreed to limit global warming to well below 2°C, preferably to 1.5°C. Achieving this goal requires global greenhouse gas emissions to fall to Net Zero as soon as possible, and by mid-century at the latest. Many companies are also making Net Zero commitments, often through public international initiatives such as the Science Based Targets Initiative (1), Race to Zero (2) and The Climate Pledge (3).

Recognising that carbon offsets will be required in the interim to remove unavoidable emissions, the market for carbon credits continues to evolve at pace and hit \$1 billion for the first time in 2021 (4). The IPCC describes carbon removal as essential to meeting our climate goals—however, there has been a significant uptick in scepticism about the offset market and its ability to deliver carbon reductions and removal. The We Mean Business Coalition and the Voluntary Carbon Markets Integrity Initiative have continued moving towards better regulation and standards for carbon credits (5).



What will this mean for the omega-3 oils sector?

All companies need to respond to the shift to Net Zero, and the omega-3 sector will need to adapt to climate change to ensure the resilient provision of healthy, sustainable and affordable oils. Climate strategy is becoming core business strategy, and this presents opportunities—to cut costs, raise productivity, improve supply chain resilience, innovate new products, attract investors and gain a market edge. Achieving Net Zero requires action at every stage of the value chain. These actions should be implemented within the context of an overarching strategic framework for Net Zero. Most emissions lie within supply chains (Scope 3), so having visibility of suppliers and mapping emissions from your supply chain is an essential first step.

There is also an opportunity for collaboration. Large businesses have a responsibility to collaborate with and support their suppliers, to share the burden of tracking and reducing scope 3 emissions (see next trend) through best practices in processes, technology and even funding. Demanding data whilst failing to support smaller suppliers will do little to solve shared problems.

Other ways to transition to net zero include investing in renewable energy technologies and 'Blue carbon' initiatives (6): recognising the carbon stored in marine ecosystems and the importance of maintaining this; also exploring the potential for future carbon sequestration and blue carbon credits.



SIGNALS OF CHANGE

The Science Based Targets Initiative drives ambitious climate action in the private sector by enabling organizations to set science-based emissions reduction targets. The initiative, with membership from over 2000 organisations worldwide, defines and promotes best practices in emissions reductions and net-zero targets in line with climate science. It also provides technical assistance and expert resources to companies who set science-based targets in line with the latest climate science (7).

BASF aims to be net zero by 2050 with a focus on replacing all their fossil fuel use with renewable electricity. As part of their approach, they are building the world's biggest subsidy-free offshore wind park in the North Sea. They have committed to publishing an annual CO₂ emissions forecast. They are also scaling up the use of bio-based feedstocks and highly efficient processes to offer their customers net-zero products (8).

17. Dealing with scope 3 emissions

What's changing?

Scope 1 covers emissions from sources that an organisation owns or controls directly. Scope 2 are emissions that a company causes indirectly and comes from where the energy it purchases and uses is produced. Scope 3 encompasses emissions that are not produced by the company itself but elsewhere in the supply chain.

To tackle climate change and achieve Net Zero emissions (previous trend), companies are now being expected to tackle scope 3 greenhouse gas emissions. Unlike scope 1 and 2 emissions which originate from a company's direct operations, scope 3 emissions are both large (making up 65–95% of most companies' carbon impact) and indirect, a consequence of a company's activities outside its direct control (across their supply chain).

To date scope 3 reporting has been mostly voluntary, but the pressure to make it mandatory is growing. For example, the International Sustainability Standards Board (ISSB) and the US Securities and Exchange Commission have all drafted recommendations requiring some disclosure of scope 3 emissions. In addition, a recent survey of 325 investors (representing \$14 trillion in assets under management) found that more than one-third of them identified reducing scope 3 emissions as a priority (1).



What will this mean for the omega-3 oils sector?

Collecting and reporting data for scope 3 emissions can be time-consuming and resource-intensive. Because companies that rely very heavily on third-party sources often aren't involved in the scope 3 calculations themselves, many struggle to understand their own scope 3 footprint and thus work out how to improve it.

To achieve net zero many companies will need to develop a scope 3 strategy—this will not succeed unless there is a close working relationship with suppliers and customers. As with many areas of sustainability, dealing with scope 3 emissions needs the full support of the leadership team. Given its far-reaching impact, every area of the business could be affected, including supply chain, product development and marketing. Measuring and managing these emissions working closely with suppliers and using tools such as the GHG Protocol (see opposite) will be key.



SIGNALS OF CHANGE

The GHG Protocol is the widely-accepted international accounting tool for measuring scope 3 GHG emissions. Their Corporate Value Chain (scope 3) Standard allows companies to assess their entire value chain emissions impact and identify where to focus reduction activities (2).

Veramaris has committed to reducing greenhouse gas emissions by setting a science-based target which has now been approved by the Science Based Target initiative (SBTi) aimed at urgently limiting global warming to below 1.5°C. Veramaris aims to achieve a 38% reduction in absolute scope 1 and scope 2 emissions by 2030. The company, which focusses on omega-3 oil production, recognises that through their own commitment to decarbonise, they help their own retail customers address their scope 3 emissions while also creating additional transparency in their supply chains (3).

18. Protecting human, labour and artisanal rights



SIGNALS OF CHANGE

Thai Union is one of the world's largest seafood processors and is actively working to enhance human rights across its supply chain. They have introduced a human rights due diligence programme, which outlines the process of identifying and monitoring human rights risks and remediating any violations. They also list various organisations that they partner with to improve human rights due diligence activities. This includes Vessel Code of Conduct (VCoC), which provides clear guidance to fishing vessels from which the company sources as well as improves labour and ethical performance in the fishing sector (4).

The UK Modern Slavery Act 2015 is an example of governments focusing on legislation in this area. The act is designed to tackle slavery in the UK. Notably, amendments to the bill included measures asking businesses to audit and report on modern slavery in their supply chains. Organizations with an annual turnover above £36 million must have a public statement confirming the steps taken to ensure slavery and human trafficking are not taking place in their business (or that steps to confirm the existence of this have not been taken). As of January 2017, 10,153 companies held statements in an open register, making it the largest modern slavery statement register globally (5).

What's changing?

Issues such as human rights abuses and labour standards are rising on political agendas and gaining ground in the media and, as such, present increasing reputational risks for companies, particularly those with complex supply chains. High-profile reports have created unprecedented awareness of issues such as slavery on fishing vessels. Heightened awareness by the public and law-makers is increasingly requiring companies to find solutions to eliminate violations in their supply chain. A recent report by the World Benchmarking Alliance highlighted that seafood companies are performing poorly on critical social issues. Half of the companies have no or a weak commitment to protect human rights in their operations and supply chains (1).

Businesses are increasingly recognizing their legal, moral and commercial need to respect human rights. Companies that tackle human rights issues such as forced labour, human trafficking, discriminatory practices, the use of child labour, poverty wages and hazardous working conditions—whilst cultivating positive relationships with their stakeholders—can help ensure their businesses continued growth and social license to operate.



What will this mean for the omega-3 oils sector?

Demand is rising for the promotion of socially responsible omega-3 oils more centrally within the marketplace. Advancing a more central recognition of human well-being in omega-3 production can help to comply with national laws and international obligations concerning human and labour rights, as well as more aspirational commitments such as the UN SDGs. At the same time, many of the commitments enshrined within the legal and political framework for the protection of human rights are also pertinent to the pursuit of a socially responsible omega-3 oil sector.

Companies will be expected to have a comprehensive commitment to protect human rights in their operations and supply chains with due diligence mechanisms in place so they can identify, assess and act on human rights risks in their business activities and supply chains. Working and living conditions should be supported by the development and implementation of social responsibility standards that are in line with relevant International Labour Organisation (ILO) standards or the support of Living wages, for example. There are a range of social auditing tools/platforms businesses can use, including SEMTA (2) which is used by several GOED members.

The UN Global Compact is an opportunity for companies to close the gap between business aspiration and business action on human rights, providing tools and resources aligned with the UN Guiding Principles on Business and Human Rights (3).



19. Sustainable sourcing: Certification & standards



SIGNALS OF CHANGE

The Global Sustainable Seafood Initiative (GSSI) is a benchmark system for sustainability certification. The GSSI assures that approved certifications, like MSC and ASC, are aligned with the FAO Code of Conduct for Responsible Fisheries and are therefore the best to use. This universal benchmarking tool provides greater clarity about seafood certification worldwide, meaning that seafood buyers across the supply chain, including consumers, have greater confidence about sustainability certifications. As a result, there is a gradual shift in customers (retailers etc.) committing to specific eco-labels such as MSC, to a commitment to selling seafood which is certified by any GSSI-benchmarked standards (5).

BASF has a detailed sustainable sourcing policy that requires all their fisheries to source from 3rd-party certification of sustainable practices with their suppliers needing to provide traceability of their fish oil to the vessel, fish species, and catch area, period, and method (6).

The Marin Trust Standard has been developed as a credible, robust tool that enables producers of raw materials in the fishmeal and fish oil industry to demonstrate responsible practice. It was formerly known as the IFFO RS Standard and the IFFO RS Version 2.0 Standard (7).

What's changing?

A 2022 Globe Scan survey found 90% of consumers are worried about the state of the oceans and are increasingly asking for more information on the origins, whereabouts and legality of seafood products (1). This has resulted in rapid growth of certified seafood products across the world.

Between April 2021 and March 2022, the number of Marine Stewardship Council (MSC) certified fisheries increased from 499 to 539, representing 15% of all wild marine catch (2). Between 2014 and 2019, the number of MSC certified omega-3 products available worldwide more than tripled (3). Whilst voluntary sustainability standards can contribute significantly towards the attainment of the UN SDGs, there is also increasing recognition that on their own, they will not reverse the degradation of our seas and land—forward leaning companies need to ensure certification works alongside a range of other improvements in private sector practice, regulatory enforcement and consumer awareness/educational activities.

What will this mean for the omega-3 oils sector?

By obtaining sustainable certification, companies can improve their credibility and trust with customers (by improving traceability and transparency), increase customer loyalty, reduce costs (through efficiency gains), improve employee satisfaction, and enhance their reputation. There are also significant commercial opportunities with 70% of millennials aged 20–35 now willing to pay more for sustainable products (4). Soon sourcing from accredited certification schemes will be a 'licence to operate' issue and will be expected as a minimum.

All companies should consider joining GSSI (see opposite) recognised certification and auditing schemes and commit to 100% certified products. For example, the Marine Stewardship Council (MSC) standard requires fisheries to be managed to environmentally sustainable and legal harvest levels, minimise bycatch of non-target or endangered species and minimise impacts on wider marine ecosystems.

Given best practice standards and certification schemes are not necessarily a 'silver bullet'—they do not always address the full suite of sustainability issues (they focus on environmental rather than social or other governance issues) or deal with systemic risks—it is important that the omega-3 oils sector complements certification with other measures. Examples include working collaboratively to improve standards, ensuring long term contracts with suppliers (so they can invest in sustainability), improving transparency and traceability or joining other collaborative platforms to tackle issues not covered by certification (e.g., plastic pollution).

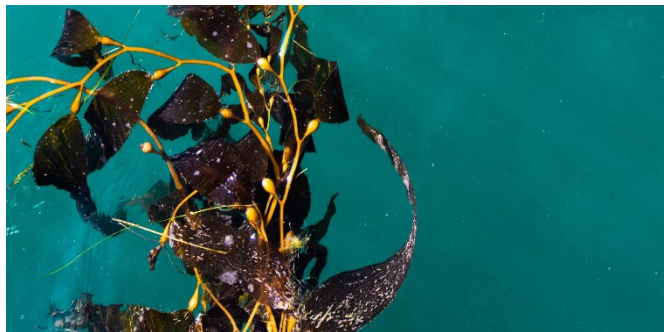


20. Regenerative ocean fisheries

What's changing?

The ocean economy is valued at around \$3 trillion annually and supports the livelihoods of more than 3 billion people (1). An increasing number of scientists, fisherfolk and non-profit organizations now see a 'regenerative oceans' approach as an opportunity to provide food and create jobs while also benefitting the ocean. The growing seaweed and shellfish (oysters, mussels, clams) in underwater coastal gardens is one example of meeting the growing demand for seafood while protecting the environment. They can, for example, help protect coastlines from erosion and coastal storms.

Regenerative crops absorb nutrients from the sea, bind CO₂, create new underwater habitats (spawning grounds for many fisheries) and have the potential to offer new sustainable sources of omega-3 oils.



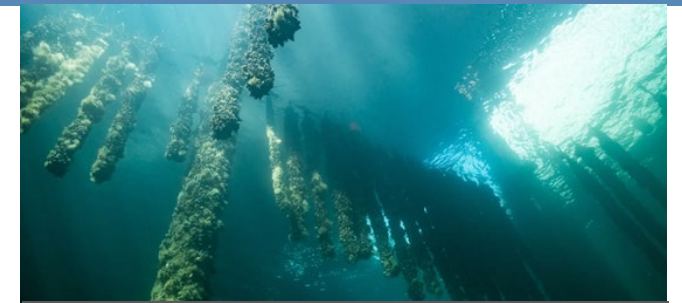
What will this mean for the omega-3 oils sector?

A regenerative ocean economy requires the omega-3 oil sector to move away from extractive business models whilst unlocking the potential for positive contributions to nature and society. It requires a mindset shift from 'doing less harm' to restoring ocean ecosystems and improving fisherfolk livelihoods.

Regenerative ocean fisheries practice would require companies to take a long-term view and develop a long-term vision for the sector—bringing more industry, stakeholders and participants to the table to help solve the various issues the sector confronts (overfishing, climate change etc). Initiatives could include, for example, collaborating with other organisations to establish marine conservation areas, investments in regenerative marine products and supporting further research and development.

Until now, many organizations have predominantly focused on certification or the use of carbon footprint as a single metric, which is too narrow to capture the breadth of social, economic and environmental sustainability challenges that we confront. Companies not looking to reduce impact more widely demonstrate a lack of understanding of the systemic implications of their operations—something without which they cannot hope to put impactful solutions in place.

Companies can start by setting regenerative strategy: define how you will deliver value through regenerative outcomes.



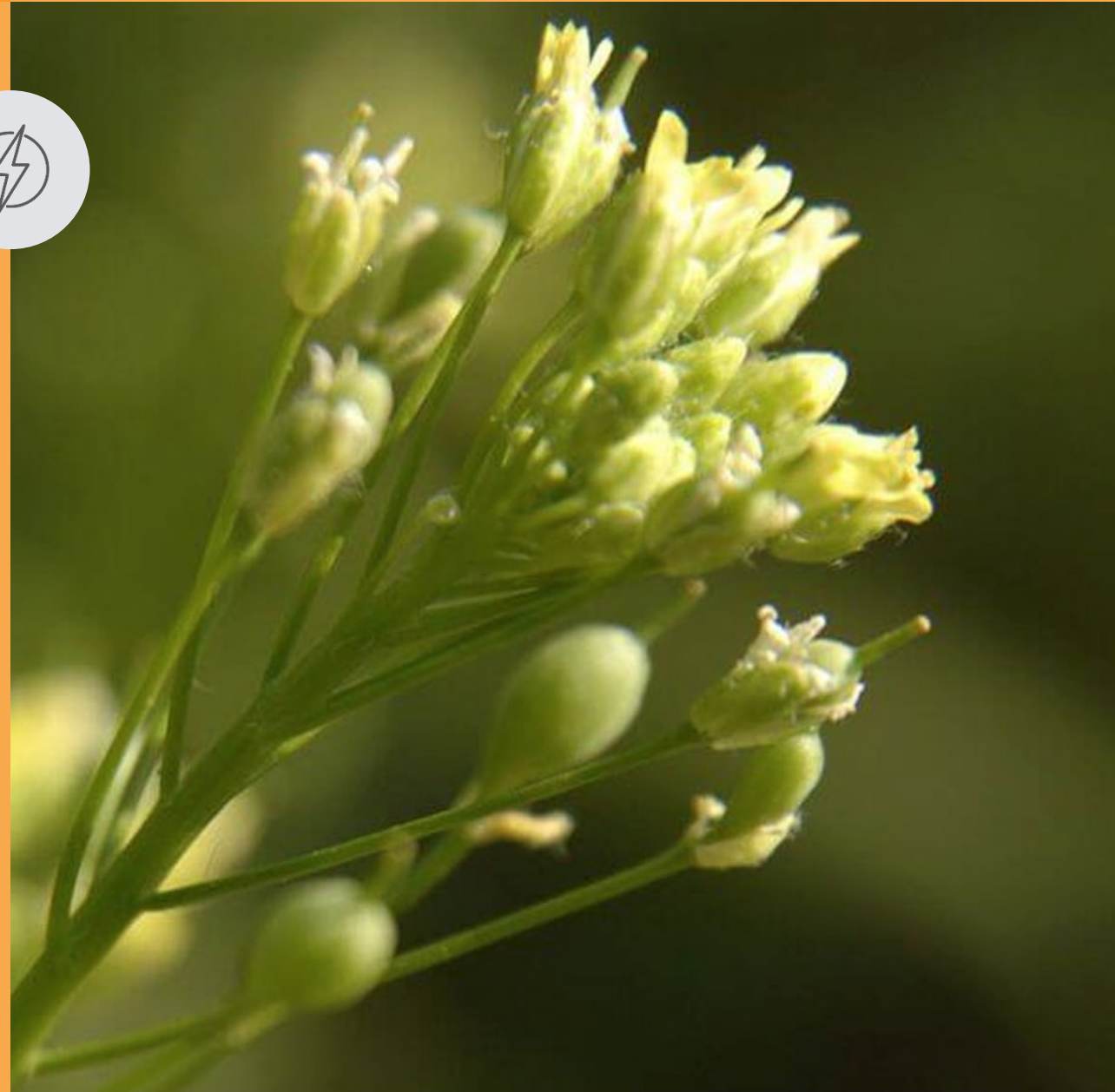
SIGNALS OF CHANGE

Greenwave Polyculture Ocean farming method produces a mixture of shellfish and seaweeds in a nature-positive way. Their system comprises a simple 3D lattice of ropes and baskets suspended just below the surface, with different species growing at different depths. The system can be used for commercial farming of marine products that are used for food, fertiliser, animal feed and bioplastics, as well as for the restoration of marine ecosystems. GreenWave's ten-year goal is to provide training, tools, and support to a baseline of 10,000 regenerative ocean farmers to catalyse the planting of one million acres and yield meaningful economic and climate impacts (2).

No-take Marine Reserves Benefit Overfished Reefs: A powerful, long-term study from WCS adds scientific backing for global calls for conserving 30 percent of the world's ocean. The studied no-take marine protected areas (MPAs) increased the growth of fish populations by 42 percent when fishing was unsustainable in surrounding areas, achieving the benefits of stable and high production of fish populations for fishers, while protecting threatened ecosystems (3).

DISRUPTER LEVEL TRENDS

21. Traceability for trust and transparency
22. Greenwashing crackdown
23. Biotechnology and transgenic crops
24. Fermentation and cell free innovation
25. Sustainability leadership and collaboration



21. Traceability for trust and transparency

What's changing?

More and more buyers, investors, civil society organisations and consumers are now looking for suppliers that can provide traceability across their value chains as a way of buying consumer trust and loyalty. At the same time, there is a big effort from regulators to improve seafood traceability as part of the fight against illegal fishing and irresponsible production practices. Full traceability and transparency means that documentation on all the steps of the supply chain is available, and that companies are open and transparent in their communications.

Some products are relatively easy to trace, but others can be much more complicated. For example, maintaining traceability on catches of multiple fish species, through the landing, processing and distribution steps, can be exceptionally challenging.

A variety of emerging technologies such as blockchain technology is making end to end traceability across value chains much easier and is facilitating the sharing of data across companies.



What will this mean for the omega-3 oils sector?

Major issues such as food safety, human rights and unsustainable fishing practices can affect consumer and investor trust in the omega-3 oils sector. The Covid-19 pandemic led to consumers placing greater emphasis on health and well-being, generating increasing interest in where their food comes from. As a result, mechanisms that provide assurance about the production process and origin of omega-3 oils become increasingly important. The traceability of seafood products is becoming a popular assurance mechanism in the seafood industry and buyers are increasingly asking for it.

There are a series of simple steps to help companies improve the traceability of their supply chain, including communicating their expectations to suppliers, improving internal tracking systems, conducting risk assessments, auditing high risk items and ensuring database systems are configured to receive and store pertinent details.

Companies can provide data transparency via several credible platforms, for example using Ecovadis (1) or the Disclosure Insight Project (CDP) (2).



SIGNALS OF CHANGE

John West launched the Trace Your Plate initiative which enables consumers to discover from where their fish has been sourced. They developed an online tracking tool which allows consumers to check their seafood products' history and origin (3).

DNA TraceBack helps safeguard and strengthen the integrity of the supply chain for meat, poultry and seafood products through the world's most accurate and precise traceability platform. A unique solution for industry, using DNA TraceBack enables seafood products to be reliably traced back to the fisheries from which they were sourced (4).

Blockchain technologies are just one way that companies are trying to ensure better traceability from hook to plate which is garnering a lot of interest. Blockchain cannot be tampered with, and the data can be accessed by everyone along the supply chain, from certification schemes to the final consumer. Because it is digital, decentralised and updated in real time, a blockchain tag contains valuable information that a physical label never could (5).



22. Greenwashing crackdown

What's changing?

Greenwashing is the act of making a product, policy or activity appear more sustainable than it really is. There are signs that there could be a crackdown on greenwashing claims made by companies over the next few years with civil society organisations and some governments policing the language of sustainability more strictly than ever before. Vague terms like 'eco-friendly', 'green' and 'all-natural' are increasingly being criticised as misleading.

The European Commission recently published its so-called "Green Claims Directive" (1), which seeks to establish an EU-wide methodology that will help to clean up the environmental claims marketplace. Under the legislation companies will have 10 days to justify and provide evidence for green claims or face financial penalties. Korea is taking the lead on the clampdown on greenwashing in Asia as the country is poised to become the first nation in Asia to hand out fines for the practice. Last year (2022), Australia introduced its first fine for greenwashing.



What will this mean for the omega-3 oils sector?

Misinformation and greenwashing pose a threat not only to the credibility and reputation of the industry but also to the collective ability of the sector to transition to a sustainable future. Companies need to thoroughly trace the sustainability impact of their omega-3 oils if they are to avoid accusations of greenwashing. Companies need to consider all relevant factors before making claims and need to ensure they have quantifiable data proving any assertion that is made publicly.

Companies should avoid ambiguous buzzwords like "green," "natural," and "eco-friendly" which do little to communicate the credentials of omega-3 oil products. It is best to use messaging and labels that are verified, for example, through the Marine Stewardship Council Scheme on sustainable fisheries. Key to avoiding greenwashing is transparency—this includes acknowledging that the sector is not perfect and that there are sustainability issues which you are working hard to address.



SIGNALS OF CHANGE

In Morocco, Olvea has been working towards the improvement of the sustainability of its fisheries, supporting a FIP (Fisheries Improvement Project) with the final objective to obtain MSC certification. The fishery has recently been evaluated as reaching the requirements for MSC certification and work is underway to start the process of assessment (2).



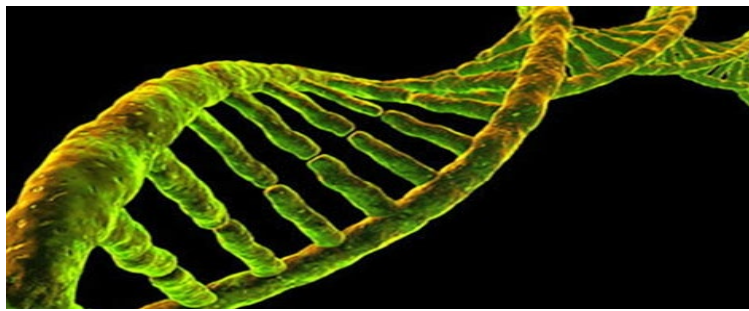
23. Biotechnology and transgenic crops

What's changing?

While humans have been improving crop and fish quality and productivity for thousands of years through selection and breeding, modern biotechnology offers potential opportunities to speed this process up, particularly within the biotechnological production of single celled oils (microalgae, yeast and fungi).

Research in molecular biology, metabolic engineering, and genetic engineering is contributing to developing new strains with high performance to produce microbial omega 3 EPA/DHA oils for the food, pet food, feed and pharmaceutical industries (1). However, growth of products is likely to be hindered by legal restrictions and ongoing consumer concerns on the cultivation of genetically modified organisms, particularly in Europe. In other parts of the world, such as North America, there is growing acceptance of such technologies.

While 5–10 years away from commercialisation (subject to market acceptance), CRISPR is a new gene-editing method receiving significant interest. This powerful technology promises to be much cheaper and more accessible to smaller companies.



What will this mean for the omega-3 oils sector?

Given the opportunity to reduce pressure on wild fish stocks and other environmental benefits, there are significant opportunities for the omega-3 oils sector to innovate and focus on biotechnological solutions which focus on single celled oils and crops that provide significant sources of EPA and DHA omega 3 oils. Preference should be given to those crops that use feedstocks that use waste materials from other sectors, focusing on closed loop solutions.

In certain markets where consumers are more resistant to GM crops, the focus should be on the use of plant breeding technologies that avoid GM technologies, focusing instead on traditional plant breeding techniques. Where GM is used, companies should have a clear publicly available policy on the use of GM technologies explaining when and how they are used. Companies should consider having an open and transparent conversation with consumers and key stakeholders on the use of such technologies—highlighting the benefits and addressing any perceived safety concerns that consumers may have.



SIGNALS OF CHANGE

MiAlgae is a Scottish based company that applies advances in science and technology to improve food security and reduce the environmental impact of omega-3 oil production. They use waste byproducts from the whisky industry as feedstock for their algae, which in turn keeps their costs down. Their products are then used both within the pet food and feed industries (2).

Fish oils from the land: Using gene technology, CSIRO scientists have transferred the ability to produce long chain omega-3 oils from lower plants (the marine microalgae that fish consume) into canola, the world's second largest and Australia's largest oilseed crop. This involved introducing a set of eight transgenes which extended canola's short-chain omega-3 synthesis pathway all the way to marine-type EPA and DHA fatty acids. There is considerable interest and a field of science that is synthesising omega-3 fish oils in transgenic plants (3).

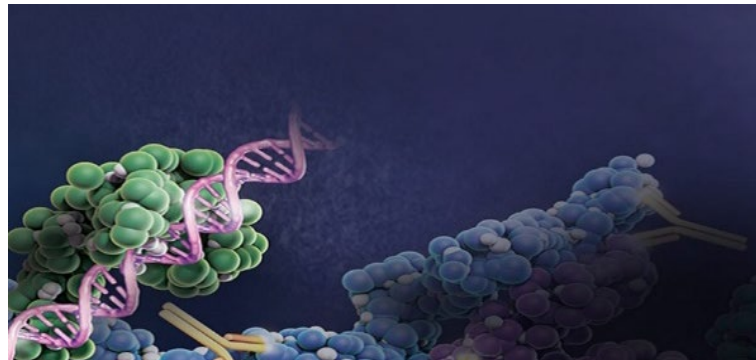
Camelina Oils: By transferring genes from marine microbes, it is now possible to engineer plants, such as *Camelina sativa* (a relative of oilseed rape), to make omega-3 fish oils. Initial studies confirm the promise and utility of this terrestrial source of omega-3 fish oils (4).

24. Fermentation and cell-free innovation

What's changing?

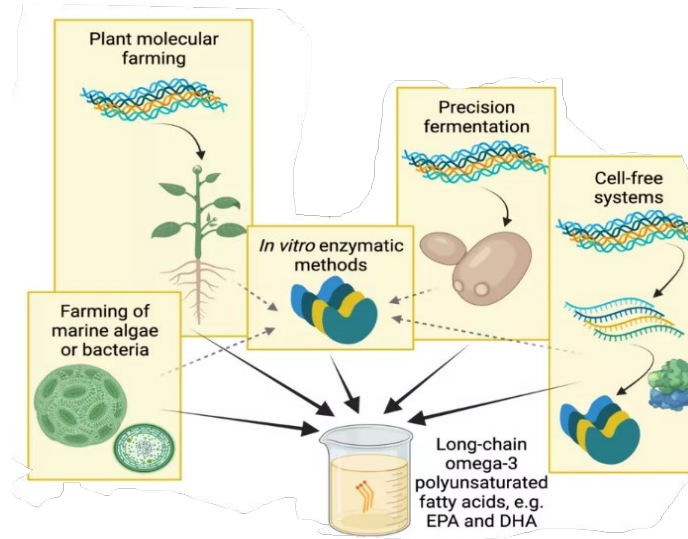
Other new forms of technological innovation which have the potential to produce omega-3 oils from methods, such as precision fermentation and cell free systems, are being developed (1). Precision fermentation, in which microorganisms (such as yeasts) are utilized as a production host to synthesize one or more specific proteins, is one emerging approach for the large-scale production of omega-3 oils. In addition, according to the Good Food Institute, cell free systems, whilst very much in their infancy, could offer significant future opportunities to produce omega-3 oils at scale. Cell-free gene expression systems present an alternative approach to synthetic biology, where biological gene expression is harnessed inside non-living, *in vitro* biochemical reactions (instead of within animal or plant cells).

It is difficult to predict with any level of certainty how novel methods of producing omega-3 oils might compare to existing methods once optimized and scaled up—there are still significant research, technological and regulatory barriers to overcome, particularly with regards to cell free systems.



What will this mean for the omega-3 oils sector?

As interest in alternative seafood industry scales up, there is an increasing amount of investment going into solutions that can produce EPA/DHA omega-3 oils at scale and at a cost which is not prohibitive. Whilst these sources are some way from being commercially viable, investors are putting more money into precision fermentation and cell-free systems-based research.



SIGNALS OF CHANGE

Yeasts, molds and bacteria as a source of omega-3 oils: Researchers are exploring the use of yeasts, molds and bacteria as potential future sources of EPA/DHA oils. Oleaginous yeasts with the ability to grow in high cell densities can produce high lipid content using several carbon sources (such as lignocellulose substrates). They possess lipids accounting to 20% of their dry cell biomass and are being explored as potential industrial sources of omega-3 oils. Filamentous fungi are also a potential source and can be cultivated on several feedstock that are economical, such as sewage sludge, glycerol, water molasses and agricultural residues (2).



25. Sustainability leadership and collaboration

What's changing?

Leadership is not only about managing priorities and people but also about envisioning and shaping the future—business leaders are coming to realize that a sustainable business strategy is not only good for the environment but also beneficial to an organization's bottom line. Sustainable leadership is a management approach that provides solutions for environmental, social, and economic challenges in the world. As sustainability moves up the agenda, it is increasingly integrated into all facets of planning and strategy (embedded as part of business DNA), rather than seen as a side-lined topic for a CSR team or philanthropy.

With the need to deliver on the 17 UN Sustainable Development Goals and the consequences of climate change and biodiversity loss becoming better understood, business leaders across the globe are increasingly collaborating with suppliers, customers, civil society organisations and competitors to address shared challenges.



What will this mean for the omega-3 oils sector?

There are opportunities for omega-3 companies to develop sustainability strategies and approaches that are embedded across the organisation—from the CEO to the shop floor. Companies need to consider developing their strategies in line with the Sustainable Development Goals and identify a set of actions/priorities in line with their key material risks and opportunities.

Business leaders should understand 'systems thinking approaches—systems thinkers understand a business is part of a system of relationships across the omega-3 value chain. Within this context progressive businesses are increasingly recognising the critical role of collaboration in their strategies.

Leaders must be willing to work with suppliers, customers, and even at times competitors to build social capital and explore new market opportunities. Progressive omega-3 businesses are increasingly recognising the critical role of collaboration in their strategies, on the basis that alone, they are unable to tackle the complex and integrated sustainability challenges existing in their value chains.



SIGNALS OF CHANGE

The Pharmaceutical Supply Chain Initiative (PSCI) is a group of pharmaceutical and healthcare companies who share a vision of better social, health, safety and environmental outcomes in the communities where they buy. Collectively, PSCI members can share knowledge and expertise, across the industry, to drive complex, global sustainability change more effectively than any one organisation alone. They have joined forces to promote responsible supply chain management and better business conditions across the industry. They have created 5 Principles of Supply Chain Management, including ethics, labour, health and safety, environment, and management systems, to articulate what the industry expects from the supply chain (1).

The NGO Tuna Forum is a collective of independently coordinated and funded companies, NGOs and organizations dedicated to improving global tuna sustainability through advocacy, and market partner activation (2). For example, they organized a single collective call for action on sustainability improvements that are needed to improve tuna stocks in the Western Central Pacific Ocean.

Conclusions

Over the coming decade companies working across the EPA/DHA omega-3 value chain will have to grapple with critical ESG sustainability trends if the sector is to thrive in the future and meet the growing global demands for a variety of sustainable omega-3 products. Whilst we have highlighted 25 trends within this report, issues such as climate change, resource scarcity, ocean ecosystem health, closed loop systems, environmental contaminants and a greater focus on human rights issues will attract greater consumer, civil society, investor and government attention. **Individual companies and GOED as an industry association will be called upon to contribute insights and expertise to foster solutions which tackle these issues because it is the right thing to do and because there is a clear long term business case for doing so.**

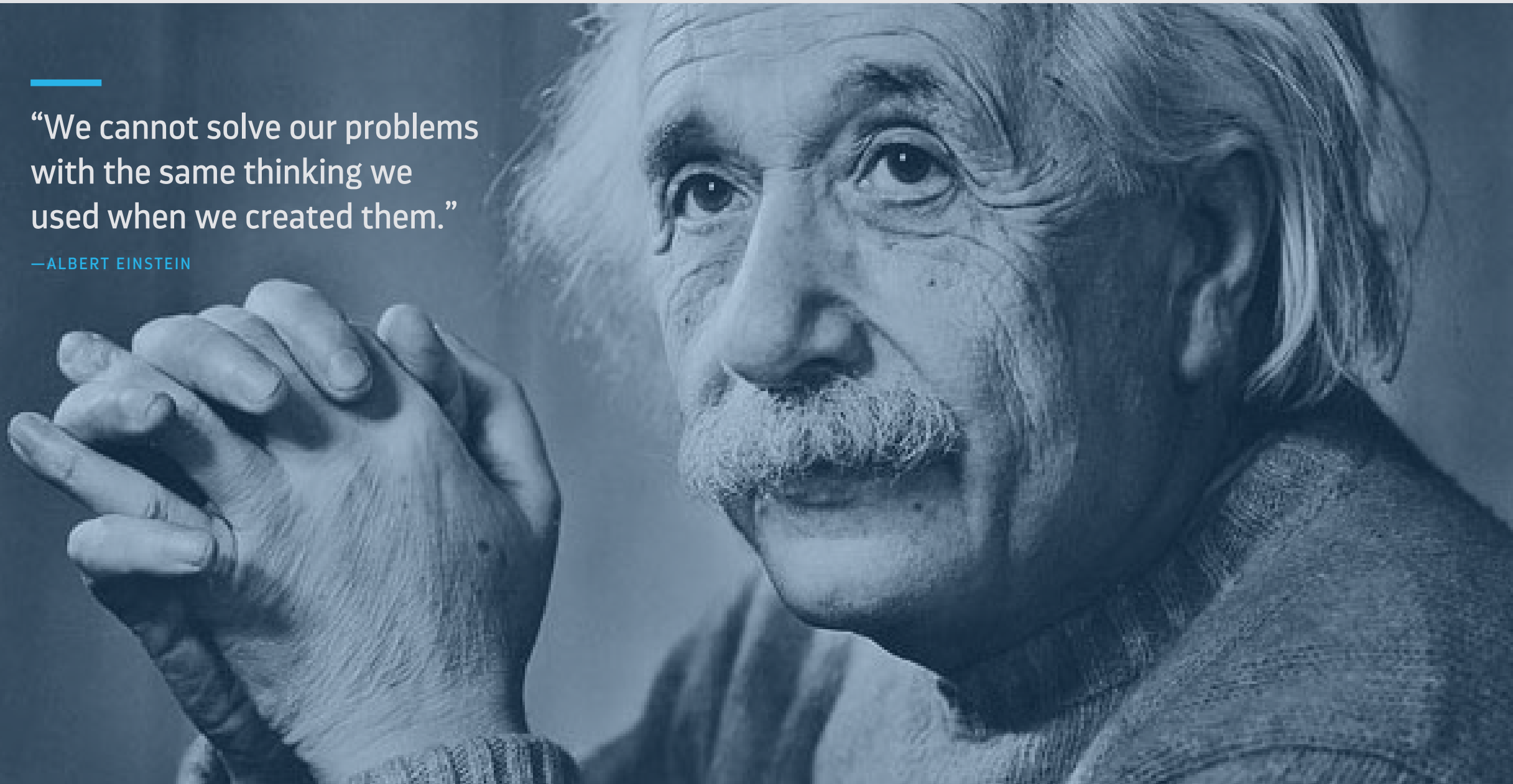
Whilst there are a lot of great examples of sustainability best practices, as illustrated within some of the examples given in this report, much more could be done to transform the sector so that sustainability is at the heart of decision making. There is a need for the sector to move beyond a license to operate to transform the omega-3 value chain—moving from a narrative based on ‘doing less harm’ to one based on restoring and regenerating ecosystems and the environment on which the omega-3 sector ultimately depends. There is a need to set the sustainability agenda, through a proactive approach to communications, setting the stories as well as reacting to them.

Every company should have a sustainability strategy, ideally aligned to the UN Sustainable Development Goals. Given each company is unique, each will have an opportunity to identify 2–3 key material issues and develop actions that can make a real difference across multiple SDGs. In addition, GOED, as an industry body, is in a unique position to support members with their sustainability journeys and tackle some of the most systemic challenges which confront many members, with a recognition that no one organisation can tackle some of the trends outlined within this report alone.



“We cannot solve our problems
with the same thinking we
used when we created them.”

—ALBERT EINSTEIN



Acknowledgements

This report was prepared by Mark Driscoll, Founder and Director of Tasting the Future. Special thanks go to Ellen Schutt, Chris Gearheart, and Gerard Bannenberg at GOED for providing advice and support with the development of this report. We acknowledge and thank the many experts who provided valuable insights through a process of stakeholder interviews. Interviews were conducted with people from the following organisations:



AKER BIOMARINE

BASF

BLACKMORES

CRODA

DSM

**GOOD FOOD
INSTITUTE**

**MARINE STEWARDSHIP
COUNCIL**

MBP SOLUTIONS

NOW FOODS

NUVISAN

SCOULAR

SIFAR ILACLARI

SOLUTEX

**SUSTAINABLE
FISHERIES
PARTNERSHIP**

TASA

The views, opinions or recommendations within this report are not necessarily the views of the people who were interviewed.

Further information

For further information with regards to this report or to provide feedback please contact:

CHRIS GEARHART

Director of Growth & Engagement, GOED

chris@goedomega3.com

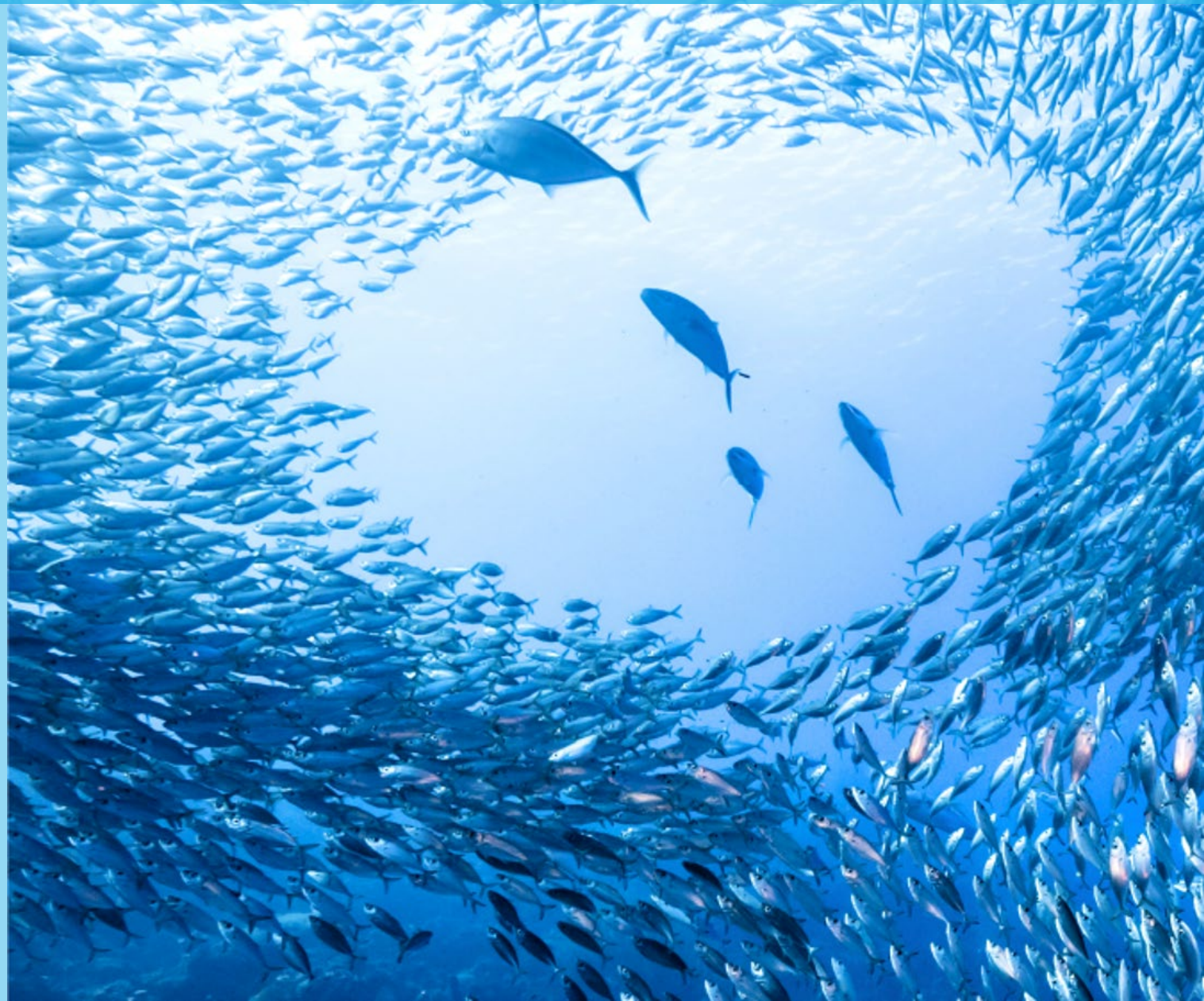
www.goedomega3.com

MARK DRISCOLL

Founder and Director, Tasting the Future

mark@tastingthefuture.com

www.tastingthefuture.com



References

Page 4

- 1) <https://www.un.org/en/academic-impact/sustainability>

Page 6

- 1) <https://friendofthesea.org/>
- 2) <https://www.marin-trust.com/>
- 3) <https://www.msc.org/>

Page 9

- 1) <https://sdqs.un.org/goals>

Page 13

- 1) World Population Prospects 2019, Population Data, File: Total Population Both Sexes, Medium Variant tab. United Nations Population Division. 2019. <https://population.un.org/wpp/Download/Standard/Population/>
- 2) <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health#:~:text=Every%20country%20in%20the%20world,aged%2060%20years%20or%20over.>
- 3) <https://www.statista.com/statistics/255591/forecast-on-the-worldwide-middle-class-population-by-region/>
- 4) <https://www.un.org/en/un75/shifting-demographics>
- 5) 2022 GLOBAL EPA & DHA OMEGA-3 INGREDIENT MARKET REPORT 2020–2021 Data & Forecasts Through 2024
- 6) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8998232/>
- 7) <https://www.greenpeace.org/static/planet4-international-stateless/2018/03/a73adc3b-krill-report-final-english-email-web-update.pdf>
- 8) <https://www.nutritionaloutlook.com/view/lasting-benefits-how-omega-3s-remain-relevant-in-a-complicated-wellness-space>

Page 14

- 1) <https://www.ibm.com/thought-leadership/institute-business-value/en-us/report/2022-sustainability-consumer-research>
- 2) <https://multimedialibrary.msc.org/pages/view.php?ref=17630&k=12baf8ab3c#>
- 3) <https://www.theguardian.com/environment/2021/oct/07/greenpeace-stops-fish-oil-tanker-in-channel-in-protest-over-african-food-insecurity>

Page 15

- 1) <https://www.ncei.noaa.gov/access/monitoring/monthly-report/global/202213>
- 2) <https://www.semanticscholar.org/paper/Large-scale-redistribution-of-maximum-fisheries-in-W.ILLI-M.W.L.CHEUN/ff07a2cbe82b9c4fd826292726aa63ebd4fae9fc?p2df>
- 3) <https://www.science.org/content/article/climate-change-threatens-one-world-s-biggest-fish-harvests>
- 4) Free, C.M., Thorson, J.T., Pinsky, M.L., Oken, K.L., Wiedenmann, J. & Jensen, O.P. 2019. Impacts of historical warming on marine fisheries production. *Science*, 365(6430): 979–983. <https://doi.org/10.1126/science.aau1758>
- 5) <https://sciencebasedtargets.org/>
- 6) https://www.science.org/doi/10.1126/science.abn7455?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%20pubmed
- 7) <https://www.akerbiomarine.com/hubfs/Aker%20Biomarine%20Annual%20Report%202022.pdf>

Page 16

- 1) https://www.fao.org/3/cc0461en/online/sofia/2022/status-of-fishery-resources.html#note-1_13
- 2) <https://www.iffco.com/status-forage-fish>
- 3) <https://oursharedseas.com/wp-content/uploads/2022/09/2022-Progress-Toward-Sustainable-Seafood-By-the-Numbers.pdf>
- 4) <https://globalfishingwatch.org/>

Page 17

- 1) https://www.researchgate.net/figure/Evolution-of-fish-meal-and-fish-oil-prices-during-19992011-source-http_fig2_269985676
- 2) <https://www.eumofa.eu/documents/20178/432372/Fishmeal+and+fish+oil.pdf>
- 3) <https://elements.evonik.com/research-and-innovation/small-algae-big-effect/>

Page 18

- 1) <https://www.who.int/news/item/06-07-2022-un-report--global-hunger-numbers-rose-to-as-many-as-828-million-in-2021>
- 2) <https://fmcggurus.com/blog/fmcg-gurus-tapping-into-nutritional-supplement-trends/>
- 3) <https://www.qrillpet.com/blog-and-news/omega-3-a-trendy-ingredient-for-pet-food>
- 4) <https://foodinsight.org/2022-food-and-health-survey/>

Page 19

- 1) <https://unfccc.int/>
- 2) <https://www.cbd.int/>
- 3) <https://tnfd.global/>
- 4) <https://www.england.nhs.uk/greenernhs/a-net-zero-nhs/>

Page 20

- 1) <https://www.statista.com/topics/7476/transportation-emissions-worldwide/>
- 2) <https://www.un.org/sustainabledevelopment/oceans/>
- 3) <https://www.sustainablesshipping.org/>

Page 22

- 1) <https://goedomega3.com/purchase/ingredient-market-report>
- 2) <https://www.sciencedirect.com/science/article/pii/S0921344922001082>
- 3) <https://www.forbes.com/sites/gregpetro/2021/04/30/gen-z-is-emerging-as-the-sustainability-generation/?sh=79adeb798699>
- 4) <https://wickedbionic.com/blog/marketing-to-eco-conscious-millennials-dos-and-donts>
- 5) <https://multimedialibrary.msc.org/pages/download.php?direct=1&noattach=true&ref=17630&ext=pdf&k=12baf8ab3c>

Page 23

- 1) <https://www.sciencedirect.com/science/article/abs/pii/B9780124105270000363#:~:text=Sources%20of%20omega%2D3%20fatty,may%20compromise%20their%20health%20benefits.>
- 2) <https://www.sciencedirect.com/science/article/pii/S0025326X16304957>
- 3) <https://goedomega3.com/storage/app/media/scientific-reports/contaminants-in-fish-oil-supplements-joint-goed-nutrasource-white-paper.pdf>
- 4) <https://www.efsa.europa.eu/en/science/scientific-committee-and-panels/contam>
- 5) <https://news.rthk.hk/rthk/en/component/k2/1675655-20221115.htm>
- 6) <https://goedomega3.com/storage/app/media/technical%20reports/GOED%20Monograph%20-%202022%2001%2006.pdf>

Page 24

- 1) 2022 GLOBAL EPA & DHA OMEGA-3 INGREDIENT MARKET REPORT 2020–2021 Data & Forecasts Through 2024 (GOED)
- 2) DSM Consumer FGs, July 2019. https://www.dsm.com/human-nutrition/en_GB/talking-nutrition/meet-the-demands-of-a-new-generation-of-consumer-with-plant-based-lifes-omega.html

- 3) <https://www.feednavigator.com/Article/2022/08/04/which-is-more-sustainable-microalgae-or-fish-oil>
- 4) https://pub.epsilon.slu.se/25635/1/bartek_l_211011.pdf
- 5) <https://www.saintytec.com/tapioca-starch-softgels/>
- 6) <https://gfi.org/solutions/omega-3-ingredients/>

Page 25

- 1) <https://wrap.org.uk/media-centre/press-releases/wasting-food-feeds-climate-change-food-waste-action-week-launches-help>
- 2) <https://www.upcycledfood.org/>
- 3) <https://www.fao.org/state-of-fisheries-aquaculture/en/>
- 4) <https://www.iffco.com/product>
- 5) A. Jackson, R.W. Newton, Project to Model the use of Fisheries by-Products in the Production of Marine Ingredients with Special Reference to Omega-3 Fatty Acids EPA and DHA, 2016
- 6) <https://pubs.acs.org/doi/10.1021/acsomega.9b01168>
- 7) <https://www.nutritionaloutlook.com/view/new-report-from-epax-highlights-near-100-circularity-of-marine-biomaterials>

Page 26

- 1) Julien Boucher, Damien Friot. 2017. Primary Microplastics in the Oceans: a Global Evaluation of Sources. ICUN. <https://portals.iucn.org/library/sites/library/files/documents/2017-002-En.pdf>
- 2) [https://enveurope.springeropen.com/articles/10.1186/s12302-018-0139-z#:~:text=Other%20chemicals%20of%20concern%20include,ethylhexyl\)%20phthalate%20\(DEHP\)%20C](https://enveurope.springeropen.com/articles/10.1186/s12302-018-0139-z#:~:text=Other%20chemicals%20of%20concern%20include,ethylhexyl)%20phthalate%20(DEHP)%20C)
- 3) <https://endplasticwaste.org/en/our-purpose>
- 4) <https://usplasticspact.org/>
- 5) <https://www.ghostgear.org/>
- 6) <https://www.aion.eco/>

Page 27

- 1) <https://www.resourcelabel.com/resources/sustainable-packaging-trends-and-statistics/>
- 2) <https://sustainablepackaging.org/>
- 3) <https://calgee.com/a/blog/calgees-vegan-omega-3-is-now-even-more-sustainable>

Page 28

- 1) <https://www.iea.org/reports/renewables-2022>
- 2) <https://www.imo.org/en/MediaCentre/HotTopics/pages/reducing-greenhouse-gas-emissions-from-ships.aspx#:~:text=The%20initial%20GHG%20strategy%20envisages,that%20total%20annual%20GHG%20emissions>
- 3) <https://www.globalseafood.org/advocate/net-zero-heroes-hybrid-and-electric-commercial-fishing-vessels-set-out-to-cut-the-industrys-carbon-emissions/>
- 4) <https://www.olvea.com/oil-eco-refining-france/>
- 5) <https://businessnorway.com/solutions/Selfa-arctic-world-first-hybrid-fishing-boat>
- 6) <https://neonetworkexchange.com/Energize>

Page 29

- 1) <https://sciencebasedtargets.org/>
- 2) <https://unfccc.int/climate-action/race-to-zero-campaign>
- 3) <https://www.theclimatepledge.com/#main-navigation>
- 4) <https://www.ecosystemmarketplace.com/articles/press-release-voluntary-carbon-markets-rocket-in-2021-on-track-to-break-1b-for-first-time/>
- 5) <https://www.wemeanbusinesscoalition.org/blog/we-mean-business-coalition-and-voluntary-carbon-markets-integrity-vcmi-initiative-aim-to-accelerate-corporate-climate-action/>
- 6) <https://www.thebluecarboninitiative.org/>
- 7) <https://sciencebasedtargets.org/>
- 8) https://pharma.basf.com/files/brochures/2023-02-22-Omega-3_Sustainability_PPT_landscape.pdf

Page 30

- 1) <https://www.pwc.com/gx/en/services/audit-assurance/corporate-reporting/2021-esg-investor-survey.html>
- 2) <https://ghgprotocol.org/>
- 3) <https://www.veramaris.com/press-releases-detail/veramaris-sets-science-based-target-to-further-reduce-carbon-footprint.html>

Page 31

- 1) <https://www.worldbenchmarkingalliance.org/publication/seafood-stewardship-index/findings/seafood-companies-fall-short-on-addressing-human-and-labour-rights/>
- 2) <https://lp.sedex.com/smeta/>
- 3) <https://unglobalcompact.org/what-is-gc/our-work/social/human-rights>
- 4) <https://www.thaiunion.com/files/download/sustainability/20220311-tu-code-of-conduct-2.0-en.pdf>
- 5) <https://www.gov.uk/government/collections/modern-slavery-bill>

Page 32

- 1) <https://globescan.com/2022/06/07/shoppers-change-buying-habits-amid-rising-eco-anxiety-about->

- future-of-oceans/
- 2) <https://www.msc.org/docs/default-source/default-document-library/about-the-msc/msc-annual-report-2021-2022.pdf> <https://www.cbi.eu/market-information/fish-seafood/which-trends-offer-opportunities>
- 3) <https://www.msc.org/uk/media-centre/blog/news/2020/01/29/omeg-osh!-record-number-of-choices-for-sustainable-supplements-shoppers>
- 4) <https://engageforgood.com/2015-nielsen-global-sustainability-report/>
- 5) <https://www.ourgssi.org/>
- 6) https://pharma.basf.com/files/brochures/2023-02-22-Omega-3_Sustainability_PPT_landscape.pdf
- 7) <https://www.marin-trust.com/>

Page 33

- 1) <https://www.un.org/sustainabledevelopment/oceans/>
- 2) <https://www.greenwave.org/>
- 3) <https://www.sciencedirect.com/science/article/abs/pii/S0308597X21000890?via%3Dihub>

Page 35

- 1) <https://ecovadis.com/>
- 2) <https://www.cdp.net/en>
- 3) <https://www.john-west.co.uk/sustainability/trace-your-plate/>
- 4) <https://www.identigen.com/DnaTraceback/Index>
- 5) <https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-blockchain>

Page 36

- 1) https://environment.ec.europa.eu/topics/circular-economy/green-claims_en
- 2) <https://fisheryprogress.org/fip-profile/mauritania-small-pelagics-purse-seine/>

Page 37

- 1) <https://pubmed.ncbi.nlm.nih.gov/27653190/>
- 2) <https://www.mialgae.com/>
- 3) <https://www.csiro.au/en/research/production/biotechnology/omega-3-canola>
- 4) <https://www.rothamsted.ac.uk/projects/omega-3-camelina-development#DETAIL-1>

Page 38

- 1) <https://gfi.org/solutions/omega-3-novel-methods/>
- 2) <https://ami-journals.onlinelibrary.wiley.com/doi/10.1111/jam.15034?af=R>

Page 39

- 1) <https://pscinitiative.org/home>
- 2) <https://ngotunaforum.org/>

Appendix: What is Horizon Scanning?

Horizon scanning involves taking a systematic, medium- to long-term view of the future to appropriately guide present-day decisions. It involves acknowledging that the roots of multiple plausible future scenarios exist today in the form of weak and early signs that signal potential change. Monitoring these signs through systematic gathering of intelligence (research combined with interviews and data gathering from key stakeholders) increases the likelihood of being prepared for emerging opportunities or challenges. Though the future remains unpredictable, it may be possible to actively influence and shape it, to some extent, to ensure a more sustainable future. Several factors both inside and outside omega-3 oil systems can either have a direct or indirect influence on sustainability (categorised in this report as landscape, industry and niche trends). Monitoring emerging trends and innovations that can have positive impacts across the omega-3 oil sector will ensure that there is ample time to weigh the pros and cons and therefore be better placed to take advantage of them as they materialize in the mainstream. Horizon scanning allows us to ask what may be coming in the medium to long-term time frame, how it might affect us and what can be done in advance to facilitate prioritization of resources and development of relevant strategies to bring about favourable outcomes in response to future threats or opportunities.

A note of caution: It's hard to nail down solid predictions for the omega-3 oils industry because there are so many complex variables and unknowns in play. Furthermore, there is always the possibility of a “black swan” event on the horizon—something sudden and unexpected that completely disrupts our lives or changes what is ‘normal’. No one could have predicted the Covid-19 pandemic in 2020, and similarly, the omega-3 sector could end up on a totally different course in 2023 because of something that’s going to completely blindside the industry.

