TCFD Report 2023

Contents

Lerøy's Sustainability Ambition

Lerøy Seafood Group (hereinafter called LSG or the Group) aims to create the world's most efficient value chain for sustainable seafood. To achieve this goal, we will explore a range of strategies that focus on reducing our greenhouse gas emissions, help us establish responsible business practices, and drive the transition to a low-carbon economy. The Group will also investigate the opportunities that climate change is creating and the way in which climate change is affecting our wider value chain.

To reduce its carbon footprint, the Group has set ambitious targets for decreasing its greenhouse gas emissions. Through the Science Based Targets initiative (SBTi), LSG has committed to reducing its overall Scope 1, 2, and 3 emissions by 46% by 2030. Lerøy has an ambition to be climate neutral by 2050.

To mitigate and manage risks related to climate change that have a potential to affect our operations, we devote considerable resources to identifying the risks and implementing measures to safeguard our operations. We also explore the opportunities that climate change can give us and investigate if it can strengthen our operations. The Group has implemented several measures and awareness campaigns to ensure that all employees in our various subsidiaries are aware of how they can affect greenhouse gas emissions in their daily operations. As a starting point, all employees have been given the opportunity to complete an online training course on environmental, social and economic sustainability factors. The purpose of these initiatives is to raise awareness as well as enable the employees to make sustainable choices in their everyday work life.

The Group is currently re-calculating its Science-Based Target base year (2019) and will submit its recalculated application to the SBTi. The Group will also set a Forest, Land, and Agriculture (FLAG) Science-Based Target and submit an application to the SBTi in accordance with its recommendations and given time horizon. This work will commence when an updated version of the GHG Protocol: Corporate Accounting and Reporting Standard is published in Q2 2024.

About Lerøy Seafood Group

Lerøy Seafood Group is a fully integrated and world-leading seafood supplier, with more than 70 subsidiaries around the world and a history dating back to 1899. The Group has three core business segments: the production of salmon and trout ("Farming"), the catching and processing of white fish ("Wild Catch"), and the processing, product development, marketing, sales, and distribution of seafood ("VAP (value- added products), Sales & Distribution").

We currently employ around 6,000 people worldwide, delivering seafood to shops, restaurants, canteens, and hotels in more than 80 countries. We are a proud supplier of seafood, delivering approximately 5 million meals every day. Our head office is located in Bergen, Norway. Lerøy has fishing vessels and fish farms in operation along the entire Norwegian coast. In addition to production and packaging plants in Norway, we have processing and distribution in Sweden, Denmark, Finland, France, the Netherlands, Portugal, Spain, Italy, and Turkey. We also have sales offices in the UK, USA, Japan, and China.

TCFD Recommendations

The recommendations issued by the Task Force on Climate-related Financial Disclosure (TCFD) are widely adoptable and applicable to organizations across sectors and jurisdictions. The recommendations are designed to solicit decision-useful, forward-looking information that can be included in mainstream financial filings.

There is an increasing call for decision-useful, climate-related information, and creditors and investors are progressively demanding access to risk information that is consistent, comparable, and clear.

TCFD has developed its disclosure recommendations to augment market transparency and stability.

Additionally, TCFD encourages the use of a standardized reporting structure for financially material climate-related risks and opportunities to give investors, lenders, and insurers enhanced comparability when assessing and pricing pertinent companies.

The TCFD recommendations are structured around four thematic areas that represent core elements of how organizations operate: governance, strategy, risk management, and metrics and targets. Moreover, the framework separates into three main categories: risks related to the transition to a lower-carbon economy, risks related to the physical impacts of climate change, and climate-related opportunities. The TCFD has also incorporated financial impact as an integral part of its disclosure recommendations.

In line with the TCFD disclosure recommendations, TCFD is an integrated part of LSG's annual financial reporting, and the report is reviewed by the Audit Committee and the Board annually.

Governance

The organization's governance around climate-related risks and opportunities

Strategy

The actual and potential impacts of climate-related risks and opportunities on the organization's business, strategy, and financial planning

Risk Management

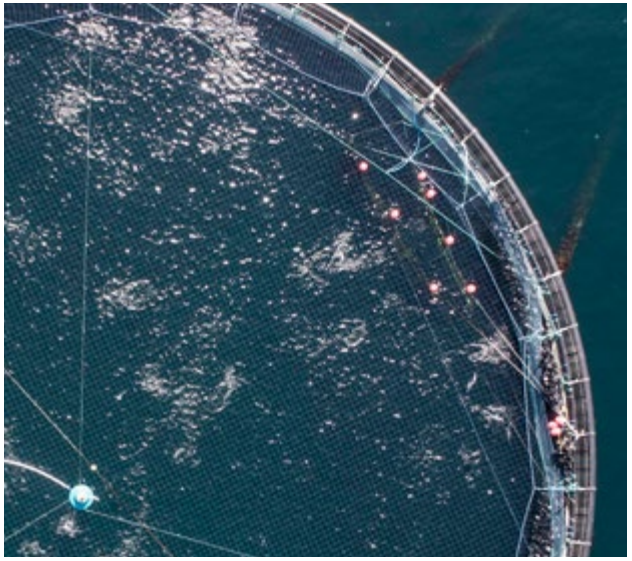
The process used by the organization to identify, assess, and manage climate-related risks

Metrics and Targets

The metrics and targets used to assess and manage relevant climate-related risks and opportunities

TCFD Content Index

Governance	Strategy	Risk Management	Metrics and Targets
Disclose the organization's governance around climate-related risks and opportunities.	Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's business, strategy, and financial planning where such information is material.	Disclose how the organization identifies, assesses, and manages climate-related risks.	Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.
Recommended Disclosures			
a) Describe the board's oversight of climate-related risks and opportunities.	**a)** Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.	**a)** Describe the organization's processes for identifying and assessing climate-related risks.	**a)** Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.
b) Describe management's role in assessing and managing climate-related risks and opportunities.	**b)** Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	**b)** Describe the organization's processes for managing climate-related risks.	**b)** Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and related risks.
	c) Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	**c)** Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management.	**c)** Describe the targets used by the organization to manage climate-related risks and opportunities and performance against the targets.



CDP Climate Change and TCFD

LSG has reported to the Carbon Disclosure Project (CDP) via the CDP Climate questionnaire since 2013, as well as CDP Water (since 2020) and CDP Forests (since 2020). Reporting to the CDP has been an important step for the Group to better identify and manage the climate-related impacts of our business activities. 2022 was the first year where our CDP report was aligned with the TCFD framework. The Group delivered a TCFD aligned report in 2023 as well. Climate scenario analysis was first developed in 2020/2021 and advanced in 2023. TCFD's focus and guidance on our climate-related financial impact and scenario analysis is an important process, both to ensure transparency and to improve our understanding of how climate-related issues can affect us and how we can mitigate expected climate changes in the future.

In 2023, LSG achieved an A- (Leadership) score in the CDP Climate Change section. To earn an A/A- score from CDP, organizations must show environmental leadership, disclosing action on climate change as well as demonstrating best practice in strategy and action. LSG has an ambition to improve its score in 2024 by working systematically with our climate and sustainability strategy and initiatives as well as by further developing our reporting routines to enable more accurate and transparent reporting. Since we started to collect and report our emissions data in 2010, we have established a solid reporting foundation. Our TCFD assessment has played an important role in further developing this, as it helps us to continuously assess what short- and longterm actual and potential risks are relevant to us. Thus, we are able to identify gaps and build mitigation strategies around them to ensure the future-proofing of LSG.

The EU's Corporate Sustainability Reporting Directive (CSRD) and TCFD

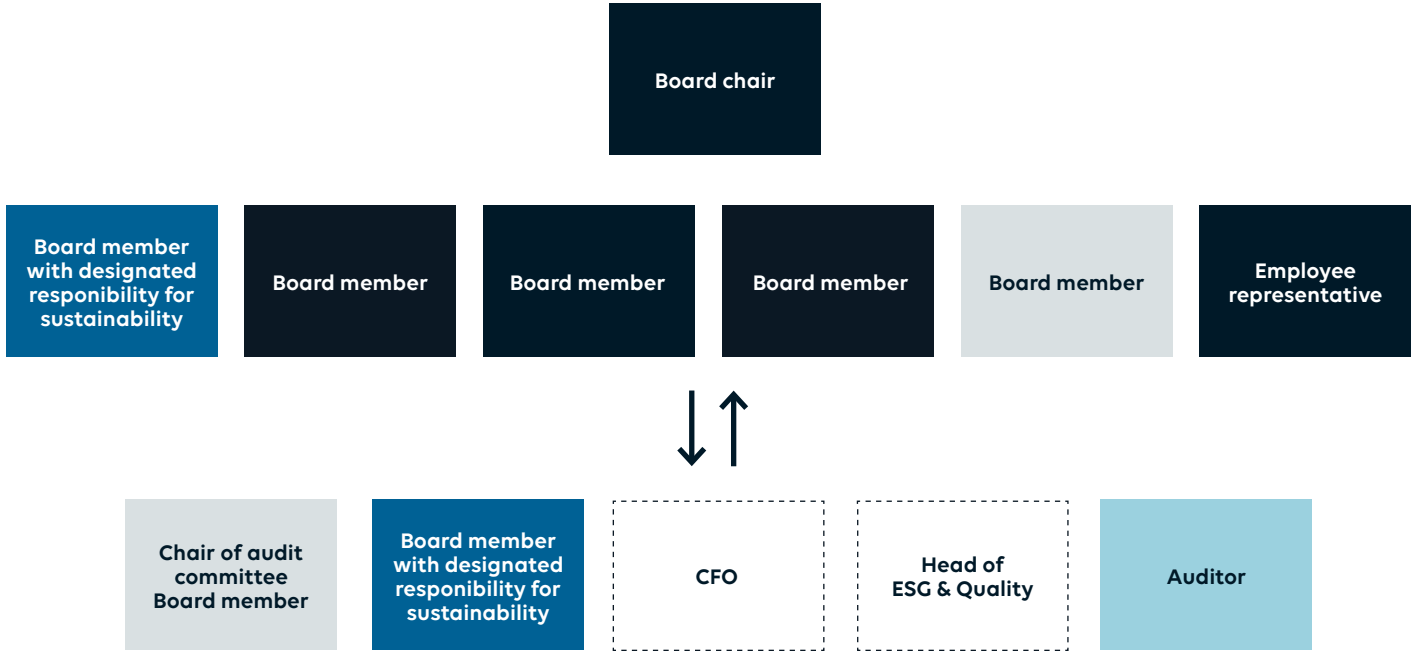
The CSRD aims to improve the way companies report sustainability information, as sustainability reporting will in future be placed on an equal footing with financial reporting. Investors will have access to the information they need to assess as well as investment risks arising from climate change and other sustainability issues. The CSRD also incorporates the concept of "double materiality". This means that companies must report not only on how sustainability issues might contribute to financial risks for the company (financial materiality), but also on the company's own impacts on people and the environment (impact materiality). LSG is currently carrying out its double materiality assessment.

CSRD requirements also incorporate the TCFD recommendations.

The CSRD went into effect from January 1, 2024, for reports to be published in 2025.

Governance

The organization's governance of climate-related risks and opportunities.



Board-level oversight

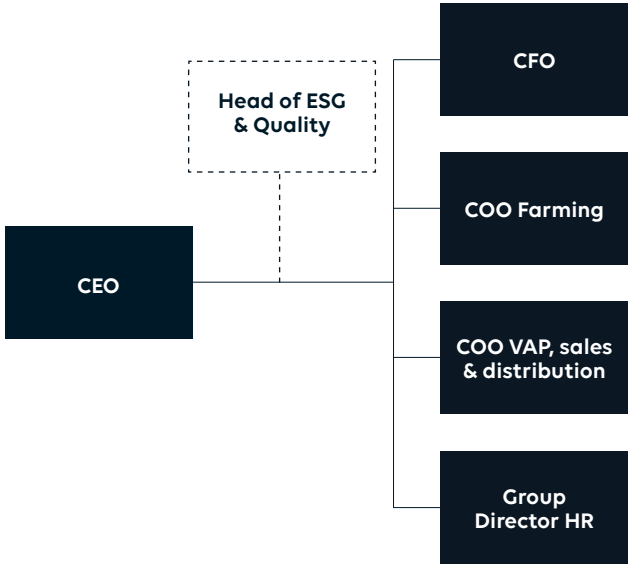
Climate-related risks and opportunities are integrated into LSG's overall governance mechanisms. The Board of Directors has ultimate responsibility for the company management, including oversight of Economic, Social and Governance (ESG) strategic planning, as well as risk and opportunity management. The Board Chair has overall responsibility for the management of climate-related issues in The Group. The Board has a responsibility to ensure that the Group's activities pertaining to climate issues are included in the company's strategy. This includes defining, monitoring, and ensuring that climate-related targets are achieved.

The Board has given extended responsibility for ESG issues to one designated Board member. This Board member holds meetings with the Head of ESG & Quality during the year. Discussion points at these scheduled meetings include the Group's ESG and climate-change strategy and its developments, as well as the necessity for any adjustments to the strategy. They also review policies to be approved and amended (the Board is the ultimate approver of all policies in the Group) as well as plans of action and budgets. Further discussion points include climate-related KPIs, current and future projects, news, legislation updates, trends, and experiences/best practices regarding various ESG and climate-related issues. In addition to the meetings with the responsible Board member, the Head of ESG & Quality maintains a continuous dialogue with the Board regarding relevant ESG and climate-related issues. The Board also reviews and provides strategic guidance regarding risk management. Climate-related risks are included in the Group's overall risk analysis.

Performance objectives are set by corporate management and approved by the Board. The performance objectives are measured quarterly, and they also constitute a part of the discussion between the responsible Board member and the Head of ESG & Quality. A report regarding the Group's performance objectives and their development is produced and sent to the Board member responsible for ESG for quarterly review.

Discrepancies and (negative) trends regarding target achievement are reported to the Board, which then decides if any corrective actions should be taken to achieve the defined targets.

Through this structural setup, ESG and climate-related issues receive direct oversight from the Board. We believe that having oversight on the highest executive level is crucial for our success as a sustainable business.



Management-level oversight

The CEO is the highest management level responsible for ESG and climate-related issues. The CEO is responsible for ensuring that climate-related risks and opportunities are adequately assessed and managed. The Head of ESG & Quality reports directly to the Group's CEO. Lerøy considers this way of working highly effective, taking into consideration the proximity of decision-making and ability to influence decisions regarding climate-related issues.

The ESG & Quality Department manages climate-related issues on a daily basis. The department plays a central role in the management, coordination, and reporting of climate-related issues. The team dedicated to climate-related issues provides oversight, support, and coordination regarding climate-related matters across the Group, is responsible for reporting on ESG and climate-related issues both internally and externally. Each company in the Group is responsible for implementing climate-related actions (incl. monitoring and reporting) in their respective areas. Climate-related data is collected from the companies in the Group and is communicated both internally and externally.

Lerøy has defined various ESG-related KPIs and a number of these are audited annually (please, visit our Annual Report 2023 for a complete overview).

Two of the Group's strategic KPIs address the Group's emissions of greenhouse gases (one directly and the other indirectly). The Group's management team reviews climate-related KPIs monthly. Strategic projects intended to reduce greenhouse gas emissions have been initiated to ensure the goals are met. These projects address our most significant emission areas: sustainable fish feed production, sustainable transportation of goods, and alternative fuel sources. The Group management team reviews the progress of strategic projects monthly. If necessary, corrective measures are implemented.

Strategy

The actual and potential impacts of climate related risks and opportunities on the organization's businesses, strategy, and financial planning.

Climate-related risks and opportunities influence LSG's strategic and financial planning and consider short-, medium-, and long-term time horizons, likelihood of impact, as well as financial impact, in the assessments of these risks and opportunities. The following definitions of time horizons and financial impacts are applied:

Time horizon	Year
Short-term	0 – 5
Medium-term	5 – 10
Long-term	10 +

Financial impact	Percentage of revenue
Low impact	< 5%
Medium impact	5%
High Impact	> 5%

Identified climate-related risks and opportunities

In 2020/2021, the Group conducted its first climate scenario analysis using the TCFD framework. The analysis was based on in-depth interviews with the Group's 20 key internal and external stakeholders and identified LSG's main risks and opportunities related to climate change, in combination with objective climate research correlating to the respective geographical locations. The results of the analysis were discussed with the Group's management team and serve as building blocks for the Group's future climate-related strategy.

During Q2 2023, a new assessment/review of the identified risks was completed to evaluate their impact, using a risks and opportunities matrix (R&O Matrix) where time horizon, likelihood of impact, and financial impact were considered. The new evaluation of risks and opportunities triggered a need to expand our scenario analysis. On the foundation of the new R&O Matrix, six top climate-related risks were selected as the focal point for their own individual scenario analysis. These are the six top climate-related risks: Ability to fill the catch quota; Fish health; Shortages and price development of fish feed raw materials; Fossil fuel regulations; Norwegian Traffic Light System for aquaculture production; Market changes. The scenario analysis can be found in a separate published document (addendum to the main document). A summary of each scenario analysis can be found in the Strategy chapter of this document.

We understand the importance of assessing climate-related factors and their potential financial impact. When conducting this assessment, we have carefully taken into account marginal differences in our revenue. This approach recognizes the distinctive financial context of our company and ensures a thorough evaluation of the potential consequences. When categorizing the financial impact, we consider the specific circumstances of each of our subsidiaries, including their annual income and revenue composition. For instance, a marginal impact of 5% on the revenue of one of our smaller subsidiaries might be classified as high due to their reliance on core business operations for generating profit. We understand that even a small decrease in revenue can have significant implications for their financial health. They may experience reduced profitability, cash flow constraints, or challenges in meeting financial obligations more severely than our larger subsidiaries. On the other hand, we also recognize that our larger subsidiaries, with their higher annual income and more diversified revenue streams, may have a different impact profile. A 5% reduction in revenue for them might be considered a lower impact due to the presence of alternative income sources, such as different segments, services, or investments. Their financial resilience and ability to absorb such impacts set them apart from our smaller subsidiaries.

By incorporating these marginal differences in revenue, our assessment allows us to tailor strategies and allocate resources effectively, in order to address the identified climate-related impacts. It supports us in enhancing the resilience of our portfolio as a whole and enables informed decisions that align with our objectives.

Summary of risks considered in our climate-related risk assessments

LSG is continuously monitoring the actual and potential impacts of existing and emerging regulations, both in our production countries and in the markets we serve. The risks connected to these regulations are always included in our risk assessments.

Risk type		Description of risk	Mitigation Strategy
Current & Emerging regulation	1.	**Grow-out seawater licenses for salmon and trout (being allowed to produce a certain volume):** Grow-out licenses are auctioned to enterprises in politically adopted allocation rounds. The number of these is already limited – a risk we currently account for. Moreover, the allocation rounds may become even stricter and more selective in the future due to environmental concerns. This is highly relevant to LSG, as a large-scale producer of seafood. **Proposal to decrease Norwegian cod fishing quota by approximately 20%** A proposal states that in 2024 the cod catch quotas shall be significantly reduced. The reduction in quotas can result in financial consequences such as decline in the company's income and impact on our operations – for instance catch of other species. The new proposed regulations on quotas suggests that a higher share of the quota for cod shall be allocated to the costal fleet. This will give lower qouta to our trawling fleet, and thus impact revenues and catch values negatively. The consequence of this will be longer trawling distances to fishing areas resulting in more use of MGO, thereby contributing to increased GHG emissions. Another contributing factor to increased GHG emissions when catching other species is that some species require more intense trawler activity (for example triple trawling).	To mitigate this risk, we stay in close contact with relevant authorities. By facilitating clear communication both ways, we stay up to date on potential upcoming changes to the licensing scheme, which makes it possible to plan accordingly. Lerøy is providing feedback to relevant authorities as well as participating in public hearings in order to provide qualified input to highlight and address the variety of challenges the decrease in quota is presenting. The company is constantly exploring opportunities for optimizing its operations in order to allow the business to operate more efficiently, increase profits and reduce its GHG emissions.
	2.	**Uncertainty related to the EU Taxonomy and how this will impact Lerøy in the short term:** As the seafood sector is among the sectors for which some of the EU Taxonomy criteria are yet to be developed, there is uncertainty associated with what share of LSG's business activities will be classified as "green". If a significant percentage of our activities are deemed to not be Taxonomy-aligned, this will affect our access to capital. The fisheries and aquaculture sectors are not yet included in the EU Taxonomy classification system, however it is expected that it will be included in the next update of EU Taxonomy.	In order to prepare and progress towards EU Taxonomy, LSG has been working on getting all relevant reporting in place, in line with best-practice procedures. We also cooperate closely with other organizations in the sector to identify gaps, exchange experiences and improve our reporting. Lerøy has employed a dedicated resource who is responsible for coordinating the implementation of the EU Taxonomy. The Group has also engaged a consultancy company (PWC) which is assisting with getting the right systems in place in order to complete reporting in accordance with the upcoming requirements. A chapter on EU Taxonomy will be included in Lerøy's Annual Report 2023.
	3.	**Carbon pricing and taxes:** LSG transports products to overseas markets by air freight. Any carbon taxes will have a significant financial impact, making products more expensive and thus less competitive. Norway, for example, which accounts for approximately 98% of the Group's Scope 1 emissions and 57% of the Group's Scope 2 emissions, will seek to more than triple its tax on carbon dioxide by 2030. Lerøy uses Marine Gas Oil (MGO) and diesel in its operations (both in farming and wild catch), and taxation on fossil fuels will impact the cost of fuel significantly.	Our number one priority to mitigate this risk is to lower our emissions. We prioritize the activities that produce the most GHG emissions (MGO, fish feed, and air freight), as reductions in these categories will significantly lower our overall GHG emissions. We are also actively participating in various R&D activities and projects that explore potential use of alternative fuels.

Risk type		Description of risk	Mitigation Strategy
Current & Emerging regulation	4.	**Stricter requirements for ASC certifications:** It is important for Lerøy to continue to meet the criteria for the ASC certifications. If these criteria are not met and the products lose their certifications, this could lead to loss of market share and decreased profitability.	It is crucial for us to keep our certifications, and we ensure that we stay up to date on their associated requirements.
	5	**New legislation and requirements concerning the use and disposal of Styrofoam and plastics:** Stringent regulations concerning the use and recycling of plastics in all markets may increase operating costs. As such, LSG will have to allocate capital to invest in new types of packaging material as well as further explore recycling opportunities.	As this risk is highly relevant to LSG, we participate in projects focused on developing new types of sustainable packaging
	6.	**Taxation or prohibition on the use of soy in fish feed:** Due to the issues and negative image associated with soy production globally, there is a risk that the purchasing and/or use of the commodity will be regulated. Traditionally (and currently), soy has been and is the important ingredient in fish feed. If the price of soy increases, this will generate significant costs for LSG. Moreover, if the use of the commodity in feed production is banned, LSG will need to find alternative ingredients. The current alternatives to soy-based feed on the market are either underdeveloped or highly priced. It is Lerøy's hope that both these aspects will improve in the coming years.	In order to avoid risks associated with soy, LSG is determined to significantly reduce the use of soy over time. We are involved in multiple projects focused on alternative feed ingredients (blue mussels, sugar kelp, etc.), we also keep in close communication with our feed suppliers, in order to push the development of feed in the right direction. In 2023 Lerøy entered a strategic partnership agreement with a fish feed supplier which also has high sustainability related ambitions.
	7.	**Norwegian aquaculture traffic-light system (TLS):** Under the TLS, Norway is divided into 13 production areas that are assessed every other year and given a color based on sea lice levels and their impact on wild salmon populations. Production capacity is then adjusted by 6%. The TLS came into force in October in 2017, and aims to regulate sustainable growth of Norwegian aquaculture based on environmental aspects. Climate change and the associated increase in surface water temperature, periods of extreme regional ocean warming, and lower salinity of coastal waters increase the physiological stress on salmon and increase their susceptibility to salmon lice. The TLS in combination with climate change poses financial risks to Lerøy Seafood Group, as a number of its operations are located in less favorable production zones. In case salmon lice infection pressure increases, it may exceed the limit values in Norwegian regulations and lead to increased costs for the company, fines, downgrading of fish, reduced fish welfare and, in worst case, fish mortality.	Lerøy is focusing on keeping average numbers of mature female sea lice as low as possible. The company has defined acceptable levels of sea lice as well as preventive measures (structural measures targeted at optimal locality use, coordinated operations over larger geographical areas, zone collaboration, fallow periods in between production cycles, smolt quality and smolt weight as measures to reduce periods of exposure, as well as use of various types of physical barriers, monitoring, biological control and active interventions). Monitoring and controlling its operations at sea is one of the priority focus areas in Lerøy. The company uses targeted measures (described above) to reduce the number of lice by reducing exposure in the sea, using Recirculating Aquaculture System (RAS) technology, biological delousing using cleaner fish, and developing technology, such as semi-closed facilities, to help control sea lice levels. The company has in 2023 made investments in shielding (semi-closed containments) technology which has promesing early results (practically no lice treatments, high survival rates and improved fish welfare). However, this is an early stage of implementing shielding technology with steep learning curve.

Based on our risk assessment, we have identified a variety of risks connected to the emergence of new technologies:

Risk type	Description of risk		Mitigation Strategy
Technology	1.	**Unsuccessful investments in new technologies:** This may pose a financial and operational risk. In this regard, a relevant example pertaining to LSG would be to invest in a new fleet whose performance proved inadequate after a short period time. This would mean that we again would need to invest in new technology, which would incur significant costs and may further affect our operations in the transition time.	In order to avoid this, thorough assessments need to be conducted prior to purchase/ implementation. To implement new technology, we need to ensure that procedures are in place to minimize the potential (negative) impact on our operations.
	2.	**Technological developments in alternative protein production:** As developments in alternative-protein technologies are increasing, this may pose a threat to LSG if consumers shift from seafood to these alternative protein sources. Furthermore, there have recently been developments in the production of alternative "seafood" from plants, microbes, and animal cells. It is expected that plant-based seafood options are to expand in restaurants, grocery stores, and online marketplaces.	The development of new protein sources is unavoidable. Therefore, we are also engaged in projects developing new and high-quality forms of both marine protein (mussel meal, sugar kelp, and macroalgae) as well as plant-based protein products to be able to meet customer needs and requirements.
	3.	**Technological developments in land-based fish farming**: Land-based farming poses a threat to LSG, as this moves production closer to the market, thereby eliminating the need for, and costs relating to, long-distance transport, especially air freight.	We are currently engaged in multiple projects pertaining to land-based farming of juvenile fish (post-smolt) at many of our Norwegian locations. Moreover, we are participating in multiple land- based projects being managed by other actors.

Globally, we are seeing an increased focus on how food production is connected to climate change, which is creating changes in market patterns.

Risk type	Description of risk		Mitigation Strategy
Market	1.	**Change in consumer needs and behavior:** An example relating to this is younger consumers (with increasing purchasing power) changing their eating habits and having a greater focus on climate-related issues. Alternative protein sources could potentially threaten LSG's market position, causing a negative financial impact.	We cooperate closely with grocery chains and other actors to conduct market research projects and reputation assessments. This way, we can assess consumer patterns and adapt accordingly.
	2.	**Increasing demand for climate-conscious food:** Climate action is becoming increasingly important for consumers, especially in Norway, where we deem it poses the largest market risk. Consumers set higher standards and requirements for the products they purchase. There may be an increase in demand for certified fish, and this may have a financial impact if these requirements are not met.	To meet these demands, we stay vigilant when it comes to fulfilling relevant certification requirements. Moreover, we are actively working on taking climate action, to increase the probability of staying compliant as the requirements become stricter, as well as developing our business as a responsible actor. Lerøy Seafood Group has set a target to be the most sustainable seafood producer in the world. The company has defined specific KPIs that are monitored and (if necessary) adjusted to achieve the defined targets. The company is also ensuring transparency with regard to its operations and is reporting its ESG performance in accordance with the Global Reporting Initiative (GRI). The reporting is verified by a third party (PWC).

If LSG is unsuccessful in contributing to the transition to a low carbon economy, and/or fails to communicate its sustainability efforts and developments, there is a risk that this could be detrimental to our reputation and negatively affect our business. Lerøy is a well-known name to consumers, and given our brand recognizability, the risks associated with a tarnished reputation are significant.

Risk type	Description of risk		Mitigation Strategy
Reputation	1.	**The use of soy in fish feed is increasingly affecting our reputation:** The use of soy in fish feed is becoming more and more controversial, as consumers' awareness of the issues connected to its production (deforestation, land-use change, etc.) is increasing. Even though 100% of the soy used in our feed is certified, the use of soy alone can impact our reputation.	First and foremost, we are actively working towards deforestation-free soy through our supplier requirements. We have signed the Cerrado Manifesto, which was issued in 2017 and calls for a voluntary pledge by companies to help halt deforestation and native vegetation loss in the Cerrado region of Brazil. Signatories are also supporting the expansion of existing environmental legislation pertaining to soy production. We must further ensure that we communicate our efforts, to ensure that customers know we are actively trying to better the industry as a whole.
	2.	**Growing awareness of the use of air freight in transportation may harm the overall reputation of seafood:**	LSG is working on decreasing the amount of product transported by air, which will have a positive impact on our GHG emissions. Optimizing our transportation logistics is high on the agenda, as this affects both our emissions, reputation, and the final balance sheet. Lerøy is actively collaborating with its suppliers of transportation services in order to find solutions for more efficient transportation of goods. Air freight transportation contributes significantly to global carbon emissions, and this number is expected to increase as transportation by air continues to grow.
	3.	**Negative portrayal of aquaculture industry in media:** If the media is portraying the aquaculture industry in general in a negative light with respect to the environment it could have a negative impact on the company.	To mitigate this risk, we take responsibility for negative environmental impacts, monitor them closely and work actively to reduce their effects. We also work actively to educate the wider public about the aquaculture industry. Lerøy strives to innovate its operations, both to future-proof the Group, and to push the industry as a whole in the right direction.

Acute physical risks, such as storms, hurricanes, floods, and heavy precipitation of rain and snow are considered highly relevant risks for LSG. Such events may impact LSG's direct operations, or cause disruptions in the supply chain. For LSG, any events delaying production have a financial implication. Due to the uncertainty of the timing of events, LSG must be prepared for such scenarios. We have identified the following as the most significant physical risks:

Risk type	Description of risk		Mitigation Strategy
Direct operations	1.	Extreme weather events such as storms and waves can have a direct impact on production sites and fishing operations, and may lead to major material damage. This could cause LSG to lose production capacity short term, which will have a direct impact on revenue. Material damage at sea farms further increases the risk of escape events. Extreme weather can damage our fishing fleet's performance. In 2023, however, extreme weather events caused no damage. Extreme weather is a relevant risk which the company must be aware of.	All LSG's sea farms are certified according to NS 9415, which means that they are sturdy enough to endure extreme weather.
	2.	Extreme weather can cause oil spills along the Norwegian coastline, further impacting aquaculture. If there are no healthy fish in Norwegian waters, operations will come to a standstill, directly impacting revenue.	We have agreements with local actors to access their oil spill emergency equipment in case it is needed. We also have our own equipment, which is tested regularly.
	3.	Extreme weather events pose direct health and safety risks to all sites and fleets.	We have developed robust procedures to ensure the health and safety of our employees. The health and safety of our employees is defined as one of the Group's top priorities.
	4.	Facilities in coastal areas are increasingly exposed to landslides.	We are currently in the process of improving our facilities to mitigate this risk, where relevant.
	5.	Extreme weather events can lead to changes in water quality, leading to disease, parasites, and algae that can kill the fish overnight. This will have a direct impact on our operations and revenue. Any events impacting biology in the ocean, especially algae blooms, are potentially a risk that can have a major impact on LSG's operations.	We have developed procedures to be implemented if this should occur.
Supply chain	1.	Extreme weather, such as droughts and floods can affect the production of raw materials that LSG depends on in fish feed (soy, wheat, rapeseed oil, corn). This could impact both the availability and cost of raw materials.	We conduct risk assessments for all ingredients used for our feed, in order to mitigate this risk.

Part of our operations within aquaculture and 100% of our fishing activity take place in the sea. Any changes in sea levels or temperature could potentially impact the company's long-term livelihood.

Risk type	Description of risk		Mitigation Strategy
Chronic physical	1.	Sea temperatures affect the migration patterns of wild fish. Changes in sea temperatures lead the cod stocks to migrate further north. This causes the fishing zones to move, directly impacting the transportation radius of trawlers, increasing fuel use and hence costs. It poses a major challenge for coastal fishing if cod is no longer found along the Norwegian coastline. There is a financial risk if LSG cannot prove to its investors that we can take advantage of our full fishing quota. Changes in sea temperatures also lead other fish stocks to migrate north and come closer inshore. These species can make holes in the aquaculture pens that can result in escapes of farmed fish. Increased sea temperatures also provide better conditions for salmon lice. This currently makes operations in the south more challenging and can also affect aquaculture in the north in the long term. Changes in oxygen levels, increased precipitation, and changes in sea levels in the fjords can lead to poorer conditions for farming, increasing the risk of disease and mortality.	Some species will be affected more than others, but it will be important for LSG to monitor this development over time. Higher sea temperatures may mean that we need to diversify our products and look at other species than the ones we are currently producing. In 2023, Lerøy invested approximatelly 1 billion NOK to fight sea lice (which will become more relevant if the water temperature rises) as well as upgrade existing technology to combat sea lice.

If seafood continues to be viewed as a healthy and sustainable protein, opportunities will open in new and growing markets.

Summary of opportunities considered in our climate-related risk assessments

Opportunity type	Description of opportunity	
Market shifts	1.	Alternative transportation solutions (blue wrap or sub-chilling) to increase the durability of fresh fish will eliminate or reduce dependency on air freight of fresh fish. This may reduce costs, greenhouse gas emissions and improve our reputation. We are currently involved in multiple projects to test various alternative transportation solutions. Simultaneously, we are developing new cooling methods to enable more products to be transported by sea, rather than by air.
	2.	Innovations enabling the production of fish feed ingredients in markets closer to Norway, potentially in lab-based controlled environments, may eliminate or reduce our dependency on the supply of overseas raw materials such as soy. This will also decrease the need for transportation, further reducing costs and emissions. We are involved in multiple projects to facilitate feed production closer to home (blue mussels, sugar kelp, macroalga, and insect meal). For now, we are focusing on the Norwegian market, as it has a promising potential. We are planning on expanding these projects, to create new revenue streams.
	3.	Moving towards more climate-friendly packaging, with a focus on recycling, is a clear signal to the customers that LSG has ambitions regarding mitigating climate change and ensuring sustainable operations. This may have a positive impact on our reputation and revenue growth. We actively work to improve our packaging. We are involved in multiple projects to create more sustainable alternatives, all while maintaining product safety.
	4.	Reaching existing and potential consumers who are concerned about climate change is an area offering considerable potential, as this can have a positive impact on the revenue. To realize this opportunity, the key will be communication, transparency, innovation, and education. We will continue to contribute on educational platforms in order to teach the wider public about our developments and the health benefits of seafood.
	5.	Seafood can have a lower carbon footprint than other animal products. Choosing seafood over another animal products can be one way to lower one's carbon footprint as seafood generates less carbon per unit of protein than beef and pork, and has a carbon footprint similar to poultry. Customers, making more climate-friendly choices, can contribute to increased revenue for the company.

Opportunity type	Description of opportunity	
New positioning	1.	A shift in market preference from whole fresh fish to ready-cut fillets or frozen fish may increase market share, directly impacting revenue, while lowering refined costs and emissions from air freight. Our strategy to realize this opportunity is to make it convenient for customers to purchase frozen and fillet fish.
	2.	There are considerable opportunities associated with the perception of seafood and aquaculture as a contributor to sustainable food production for a growing world population. We will leverage the fact that marine proteins, when produced properly and sustainably, have a significantly lower climate footprint than land-based proteins. We will need to continue to improve our products and be proactive when it comes to informing the market about the benefits of marine protein.
	3.	A growing population will increase the global demand for food and protein. If seafood continues to be viewed as a healthy and sustainable protein, opportunities will open up in new and growing markets, it will impact revenue growth. To realize this opportunity, efficiency and innovation will be very important. We want to be able to provide sustainable food for a growing population, but we need to ensure that we do not compromise on our climate commitments in the process.
	4.	Investments in low-carbon solutions could lead to eligibility for financial support schemes from, for instance, Enova (a Norwegian government-owned company aiming to contribute to the restructuring of energy use and energy production). We are already involved in multiple projects aimed at substituting fossil fuels with renewable sources, some of which Enova is involved in.

LSG sees a considerable potential to improve our competitive position by collaborating with suppliers to accelerate the switch to climate-friendly solutions.

Opportunity type	Description of opportunity	
Collaborative efforts	1.	There is a lot of potential for improvements in the fish feed industry, and by collaborating with our suppliers, we can ensure that we are at the forefront of sustainable feed developments. We engage in quarterly meetings with our feed suppliers to discuss developments, and we are working closely with other actors to develop and promote sustainable fish feed.
	2.	We work actively with transportation providers to be at the forefront of low-emission goods transportation. This will potentially improve our reputation, and reduce overall emissions and costs through avoided carbon or fuel taxes. We have, in the last few years, kicked off collaborative projects with our transportation suppliers, in order to realize this opportunity.
	3.	Active communications with public authorities and involvement in policy making will reduce climate-related risks and enable LSG to be ahead of any regulatory changes. LSG has established roles within our organization with responsibility for this, in order to ensure that we keep up with potential and actual developments.

To ensure operational sustainability, the Group has to find new and innovative ways to operate.

The impact of climate-related risks and opportunities on the Group's strategic and financial planning

Our strategy and financial planning have been influenced by climate-related risks and opportunities in several business areas as demonstrated in the table below:

Areas influenced by climate-related risks and opportunities	Description
Products and services	LSG's goal is to become the leading and most profitable global supplier of sustainable, high-quality seafood. In order to ensure operational sustainability, the Group has to find new and innovative ways to operate.
	Firstly, we need to ensure that our current operations are optimized. We are committed to working towards highly sustainable seafood production at all our sites, and are thoroughly documenting our progress. We aspire to become a trusted name as climate and environmental concerns grow in the market. By ensuring that our products are safe and sustainably produced, we can educate the public on the benefits of marine protein.
	Through our joint venture (Ocean Forest) with the NGO Bellona Holding AS, we are producing macroalgae, sugar kelp, blue mussels, and polychaetae near several of our sea farms. The purpose of this is to absorb excess nutrients (mainly nitrogen and phosphorus) from our salmon and trout production, as well as carbon sequestration. Moreover, these species (especially blue mussels and sugar kelp) are high-quality and sustainable sources of protein. The mussels, for example, can be converted into meal and be a key ingredient in sustainable fish feed. This business venture has a promising potential. Today, we are already producing blue mussels at 2 locations and sugar kelp at 4 locations. Our ambition is to develop the knowledge, technology, and customer base to be able to make this an important revenue stream.
	We also include 1.5–2% insect meal in some of our freshwater feed, as a replacement for fish meal. From a nutritional point of view, it is considered a high-quality and sustainable protein source. At present, however, it is a very costly ingredient. Once the market for insect-based feed solutions grows, as we assume it will (based on market projections), adding a larger share of insect meal to our feed will be feasible.
Supply chain and/ or value chain	The volume of fish transported by air has increased in recent years, due to increased sales to Asia, Australia, and the USA. We work closely with our air transportation suppliers to identify the best air freight solutions for the environment. The Group is aware that transporting seafood by air has a significant climate impact and we are working closely with transport suppliers and customers, as well as Bellona, to find future-proof transportation solutions. Initially, we will strive to increase sales of processed products and try to send more products by sea, if possible. The Group has also developed procedures to check and assess our largest suppliers with respect to their ESG (including climate-related issues) strategy and performance.

LSG focuses strongly on innovation and views this as the core of our sustainability strategy going forward. We are committed to forming alliances, entering new (and further developing existing) partnerships to help achieve our targets and goals. Examples of R&D projects already in place, aiming to reduce our GHG emissions:

Areas influenced by climate-related risks and opportunities	Description	
Investment in R&D	1.	**Production of sugar kelp:** Producing sugar kelp is a very efficient way of binding CO_2 already dissolved in the sea. Farming sugar kelp does not require any input of freshwater, fertilizer, or pesticides, or take up any land. The plant captures nitrogen, phosphorus, and carbon directly from the ocean. On average, 1,000 kg (wet weight) of sugar kelp contains 26 kg of carbon, equal to 100 kg CO_2, which is higher than for the same volume of wood. This project has shown promising results so far, and we are making efforts to expand it in the years to come.
	2.	**Production of blue mussel meal:** Ocean Forest AS, our joint venture with Bellona, also focuses on the production of blue mussels, not for human consumption but mainly as a source of marine protein. We have conducted a series of growth studies with Atlantic salmon demonstrating that blue mussel is an excellent fish meal alternative.
	3.	**Innovative raw material for fish feed:** The Group has an ongoing program focused on developing new innovative raw materials for fish feed. Historically, LSG has been a leader in the industry, when it comes to the use of Omega-3 fatty acids produced from macroalgae. We use the macroalgae to increase the level of Omega-3 in our feed compared to industry standards. In 2022, we produced approximately 300 metric tons of macroalgae and in 2023, the output was 233 metric tons. Moreover, we have introduced Camelina oil in our feed, whilst banning ethoxyquin. In 2020, we were the first company to start using insect meal in all the freshwater feed delivered by one of our feed suppliers.
	4.	**Project 50/50-5:** This is an ongoing project aimed at reducing non-recyclable plastic by 50%, including a reduction in total plastic consumption. All companies in the Group will contribute to achieving the target and have established sub-projects with goals for each company. Data is systematically collected from the companies every month, in order to track the progress being made.

The Group has established different innovative measures to help reduce the environmental impact of our activities. Examples are:

Areas influenced by climate-related risks and opportunities		Description
Operations	1.	**Water usage:** We have carried out a risk assessment, using the WRI Aqueduct tool, of water withdrawal from areas with medium to high risk of water stress. Our targets for decreasing water consumption have been revised accordingly (for more information, please, visit www.leroyseafood.com, Sustainability Library 2023). In addition, we have devised strict protocols and procedures, based on extensive risk analyses, to make sure we never draw more water than we are permitted to. For example, we have invested in water-saving technology and equipment at several locations and this will continue to be a priority. These initiatives also protect local habitats and wildlife, while reducing our impact on local water levels. We are continuing our effort to switch all flow-through systems to Recirculating Aquaculture Systems (RAS). RAS technology allows Lerøy Seafood Group to produce fish using up to 99% less water than conventional flow-through systems.
	2.	**Wastewater**: We continue our work with water treatment and discharge quality. All our processing factories, new and old, are equipped with either fat separators and/or UV light treatment. In some factories, where necessary, we also have chemical treatment of wastewater in addition to mechanical treatment.
	3.	**Waste handling and sorting:** Improving our handling and sorting of waste is a continuous priority for LSG. Sorting waste for reuse and material recovery will greatly reduce the amount of unwanted, hazardous and non-biodegradable waste in the environment. We have implemented strict sorting regimes at all our locations and strive, in collaboration with our waste handling companies, to make sure that all our waste is handled correctly by us and the waste recipient.
	4.	**Electrification**: The Group has established a variety of measures to reduce its environmental impact through electrification. These range from obtaining power from land or floating solar cells to installing hybrid propulsion systems in the fishing vessels and operating electrically powered service boats. Lerøy will continue its electrification in the years to come.
	5.	**Organic non-edible materials:** Organic non-edible materials from all our activities represent about 11.9% of our total volume produced. The Group is working to increase the share produced for human consumption by 50% by 2025.
	6.	**Recycling:** The Group is actively involved in the process of recovering plastic waste from the oceans through different programs, in order to protect marine wildlife. One of the activities is focused on recycling our fish farming nets, ropes, and old trawls.
	7.	**Use of organic sludge from smolt production:** The sludge from smolt production is either used for biogas production or as fertilizer in agriculture.

Scenario analysis: summary

Scenario analysis is a process of analyzing future events by considering alternative possible outcomes. It is a tool companies can use to make strategic risk management decisions, as it provides insights and clarifies predictable and uncertain elements in different possible futures. It is meant to help frame and evaluate the strategic and financial consequences of climate change. In line with the recommendations laid out by TCFD, we perform qualitative scenario analyses. A full version of the analysis is included as an addendum to this report.

Time horizon	Year
Short-term	0 – 5
Medium-term	5 – 10
Long-term	10 +

Financial impact	Percentage of revenue
Low impact	< 5%
Medium impact	5%
High Impact	> 5%

Identification of risks

Climate-related risks and opportunities influence Lerøy's strategic and financial planning. The assessment of these risks and opportunities includes short-, medium-, and long-term time horizons, as well as their financial impact. The following definitions of time horizons and financial impacts are applied:

Following risks have been included in this scenario analysis:

- The risk of not being able to fill the catch quota due to extreme weather conditions and changed fishing grounds caused by higher sea temperatures and changes in oxygen levels.
- The risk of decreased fish health in aquaculture due to higher sea temperatures, changes in oxygen levels, and increased runoff.
- The risk of shortages or increases in the price of fish feed raw materials due to climate-related events in the sourcing country.
- The risk of financial impacts related to fossil fuel regulations, such as increased fuel prices due to carbon taxation and the phasing out of fossil fuels in the maritime sector, as well as future electricity price developments.
- The risk of decreased (Maximum Allowable Biomass) quotas under the Norwegian Traffic Light System for aquaculture production, due to climate-related events affecting fish health.
- The risk of decreasing demand for LSG's products due to behavioral changes in customers and the need to meet stricter requirements.

Scenarios

The scenarios presented here are descriptions of hypothetical, plausible futures (not forecasts) that help companies answer the question, "What would be the potential implications for our strategy if the future described in a scenario came to pass."

The assessed scenarios are mainly based on existing publicly available scenarios:

1. Well-below 2°C scenario:
   Transition Risk Increase • IEA World Energy Outlook (WEO) 2021
   I. IEA Sustainable Development Scenario (SDS)
   II. IEA Net Zero Emissions (NZE)

2. 4°C scenario: Physical Risk Increase
   I. IPCC 5th (RCP 8.5) and 6th AR (SSP5-8.5)
   II. II. Business-as-usual (BAU) Scenario

The six scenarios inform the identified transition risks and physical risks:

Transition risks relate to the financial risks of not being prepared for the socioeconomic changes taking place in a world striving to meet the Paris Agreement's ambition of limiting global warming to well-below 2°C while pursuing efforts to limit the increase to 1,5 degrees.

- Physical risks relate to the financial risks of not being prepared for the physical changes taking place in a world where ambitious climate policies fail or fall short, and global warming pushes towards 4°C.

Narrative 4°C (RCP 8.5/SSP5-8.5)

The Business-as-Usual scenario of 4°C warming is characterized by a lack of coordinated policies to limit climate change, leading to escalating physical risks. In this scenario, economic growth takes precedence over climate action, resulting in excessive resource consumption.

Fossil fuels remain the primary energy source, and energy intensity remains high. Under this scenario, the growth of greenhouse gas emissions continues, leading to further global warming and enduring changes in the climate system.

Risk: Ability to fill the catch quota

LSG's wild catch operations face a significant climate-related financial risk: being unable to harvest the full quota. Adverse weather conditions and increased swell size restrict fishing days and jeopardize safety at sea. Adapting to changing weather patterns and the migration and dispersal of fish stocks may require fishing operations to be expanded to distant areas and investments in vessel capacity and equipment. Potential conflicts over the allocation of quotas, due to a northward movement of fish species, further complicate matters.

Risk: Fish health

While LSG's northern fish farms might profit from a rise in the sea's surface temperature, the likelihood of the occurrence, frequency, and severity of Marine Heatwaves (MWHs), as well as lower salinity due to precipitation and runoff, increases simultaneously, thereby increasing production risk.

Especially for LSG's southern aquaculture operations, increased risk of diseases or pathogens, and sea lice, lower oxygen content in the waters, and Harmful Algal Blooms (HAB) potentially threaten production. The threat to production output represents a potential financial risk to LSG, as do additional costs associated with climate change adaptation, such as increased expenditure on veterinary services and medication relating to delousing or a potential northward relocation of facilities.

Risk: Shortages and price development of fish feed raw materials

There is some uncertainty about the extent to which climate change will affect the production of raw materials for fish feed, as different models consider different variables that affect projected yields. These include the occurrence of extreme weather events and the adaptation measures taken. While some models project increases in crop yields due to CO_2 fertilization, it is important to note that these yield increases will be outweighed by higher demand due to global population growth. Crop prices are likely to rise. However, it is important to note that short-term price increases in one raw material may, to some extent, be offset by increasing the share of another raw material. While this mitigates the risk in the short term, over the long term, climate change is likely to pose a financial risk to the raw materials needed for fish feed production.

Narrative well-below 2°C (RCP 2.6/ SSP1-2.6 & IEA SDS and NZE)

This scenario envisions a smooth transition to limiting global warming to well below 2°C. There is a notable increase in climate policy ambition and coordinated global action against climate change, starting in the near future. The scenario assumes that global CO_2 emissions reached their peak in 2020 and are now rapidly declining. This transition presents both risks and opportunities for various stakeholders. In this well-below 2°C scenario, transitional risks and opportunities emerge, as most economies adopt a high carbon price and heavily rely on renewable energy sources for global power generation.

Risk: Fossil fuel regulations

Given Norway's emission reduction targets, the increasing pressure to decarbonize the maritime sector through the EU Maritime Fuel Regulation, and the continuing effects of climate change, it is likely that similar regulations will be adopted for fishing vessels. The development of low or zero-emission technologies will be crucial in this context. Furthermore, at present, and based on projections of EU Emissions Trading System (ETS) price developments, the inclusion of the fishing industry in the EU ETS is expected to cost LSG less than the Norwegian non-ETS carbon tax by 2030. However, uncertainty about whether the fisheries sector will be included in the ETS and fluctuating carbon prices under the ETS limit LSG's planning. Nevertheless, the cost of using mineral oils will increase by 2030, whether under the ETS or a non-ETS carbon tax, which poses a financial risk to LSG. On the other hand, equipping the fleet with low-carbon technology will also be costly. Future electricity price development is also a risk factor that must be taken into consideration.

Risk: Norwegian Traffic Light System for aquaculture production

As LSG's farms are spread over large parts of the Norway's coast, financial risks, such as a reduction in (MAB) in a specific production zone under the aquaculture Traffic Light System (TLS), are also dispersed. Climate change and the associated increase in surface water temperature, periods of extreme regional ocean warming, and lower salinity of coastal waters increase the physiological stress on salmon and increase their susceptibility to salmon lice. Some of LSG's aquaculture facilities are located in production zones that have historically seen reductions in MAB or at least no increases. Adapting to these conditions involves the cost of relocating or investing in new technology. Continuing operations without adaptation involves the cost deriving from reduced MAB in these production areas.

Risk: Market changes

There is growing interest in sustainable fish products and the trend is likely to continue as climate change progresses and awareness about environmental sustainability increases. LSG has a large share of its products certified by the MSC and ASC, which focus on sustainable and responsible fishing and farming practices. However, the requirements for certification may become stricter through stakeholder pressure. Losing certification for products could have financial implications for LSG, as sustainability-aware customers might avoid those products. As a result, LSG could lose market share.

Risk Management

Disclose how the organization identifies, assesses, and manages climate-related risks.

LSG has set ambitious science-based targets to actively reduce its overall carbon footprint and the environmental impact of the Group's activities. Setting science-based targets was a "defining moment" for the Group and enabled us to look at climate-change management from a wider perspective. To achieve the targets, it is important to have a systematic and methodical assessment of climate-related risks and opportunities in place.

The identification, assessment, and management of climate-related risks and opportunities is an integral part of LSG's multidisciplinary risk and opportunity management. To systemize our risk management process, we utilize a Material Climate-Related Risk and Opportunity Assessment and Response Matrix (R&O Matrix). The identification and assessment processes are conducted through in-depth interviews and discussions with relevant internal and external stakeholders, representing different organizational levels and functions (internally) and interested parties (externally). This provides an accurate and balanced picture of the risks and opportunities faced by the Group.

Once the risks are identified, the impact and likelihood (high/low) of each risk and opportunity are determined. Based on where on the R&O Matrix the risk falls, the Group then establishes which mitigation strategy will be the most appropriate: Mitigate, Transfer, Accept, or Control. Based on each risk's categorization, as well as internal and external recommendations, we develop, review, and implement our response plans

Metrics and Targets

The metrics and targets used to assess and manage relevant climate-related risks and opportunities.

Greenhouse Gas (GHG) Emissions

Lerøy's greenhouse gas emissions are reported in accordance with the GHG Protocol: Corporate Accounting and Reporting Standard. The Group uses the operational control approach for consolidating GHG emission accounting. Emissions from operations, over which the Group has operational control, are included in Scope 1 and 2 reporting. Indirect upstream and downstream emissions relating to the Group's operations are accounted for in Scope 3 reporting. The Company has reported its Scope 1, 2 and 3 emissions since 2019.

In 2023, GHG emissions from the Group's activities were 1 198 439 tCO_2e. This includes our Scope 1 emissions, location-based Scope 2 emissions and Scope 3 emissions (indirect emissions from our value chain). There is a slight decrease (1,5 %) in the company's emissions of greenhouse gases compared to 2022 levels. In 2023 the Company continued to strengthen its reporting processes and practices. The Group has developed its reporting routines; however, we acknowledge that we need to focus on further improvement of quality of the reported data to ensure that the reporting is more accurate, complete and transparent.

A key change which was introduced in 2022 is that a major part of well boat and service boat activity (time chartered vessels) was moved from Scope 3 to Scope 1 reporting including operating leases (as defined by IFRS 16) in Scope 1 accounting (for more detailed information regarding operating leases, please, visit https://www.ifrs.org/). This change has had a significant effect on Scope 1 reporting results - substantial increase of Scope 1 emissions compared to levels from previous reporting years. Emissions from well boats and service boats represent approximately 22% of total Scope 1 emissions in 2023. During 2023 Lerøy continued to facilitate closer cooperation with shipping companies that provide well boat and service boat services and has worked on enabling the shipping companies to improve their procedures for gathering and reporting of relevant data.

Scope 1 emissions include all use of fossil fuels from stationary combustion or transportation, in owned, leased, or rented assets. It also includes direct emissions from the use of refrigerants.

Scope 2 emissions include indirect emissions related to purchased electricity as well as district heating/ cooling in assets over which the Group has operational control.

Scope 3 emissions comprise indirect emissions from our value chain activities. The Scope 3 categories have been assessed and included by relevance. The following categories are included in Lerøy's Scope 3 inventory:

- Purchased goods and services (fish feed, EPS boxes, plastic bags/ sheets, single use hygiene plastic items, vacuum packaging/ film, cardboard/ carton boxes, rope and feeding tubes as well as municipal water);
- Fuel and energy related activities (Well to Tank (WTT) calculations from consumption data for Scope 1 and 2);
- Upstream transportation and distribution (sea transportation, service boats and well boats as well as transportation of produced products to customers);
- Waste generated in operations (data on waste volumes and waste composition);
- Business travel (data on business related air travel);
- Employee commuting (data on estimated emissions form employee commuting);
- Downstream transportation and distribution (transportation of products carried out by customers themselves);
- Processing of sold products (use of electricity for storage of fish in the country of consumption

before the products are sold to end customer as well as estimated emissions related to third party processing);
- End of life treatment of sold products (organic waste estimated share (%) of non-edible fish).

Science Based Targets

The Group works purposefully to reduce its carbon footprint, both within our own operations and across our value chain. In 2020, the Group set a Science-Based Target (SBT) which has been approved by the Science Based Targets initiative. By committing to a SBT, the Group has set a strategic direction that defines our climate-related objectives and measures to be implemented in order to achieve an ambitious reduction target:

Lerøy Seafood Group has committed to reducing absolute Scope 1, 2, and 3 GHG emissions by 46 % by 2030 from a 2019 base year.

This target is aligned with a 1.5ºC pathway. 2019 was identified as a base year for the Science-Based Target as this was the first year all operating segments across the Group were included in the carbon accounting across all scopes.

The Group is currently evaluating option to change its Science-Based Target base year (2019) because we have gained more knowledge and expertise and are aware that the information reported in 2019 has deficiencies. This process has commenced recently, and the Group will look at the possible impacts of this change before making any decisions regarding the change.

Once the revised version of GHG Protocol is published, Lerøy will start the process of setting a Forest, Land and Agriculture (FLAG) Science-Based Target and deliver an application to Science Based Targets Initiative according to Science Based Targets recommendations and given time frameworks.

We aim to reach our target by concentrating our efforts on three strategic areas that combined constitute 85 % of the Group's total emissions:

1. Fish feed
2. Goods transport
3. Fleet (MGO)

For more information regarding our ESG-related work, please, visit Lerøy's Sustainability Library 2023 (https:// www.leroyseafood.com/en/ sustainability/ sustainability-library-2023/).

GHG Emissions 2021–2023

Scope	Unit	2021	2022	2023
Scope 1	tCO_2e	141 523	169 913	168 064
Scope 2 (location based)	tCO_2e	9 581	8 970	9759
Scope 2 (market based)	tCO_2e	49 208	44 843	58 359
Scope 3	tCO_2e	1 157 174	1 038 392	1 021 417
Total emissions				
(includes location-based Scope 2)	tCO_2e	1 308 278	1 217 274	1 199 239
Energy consumption (Scope 1 & 2)	MWh	752 471	874 516	844 624

Scenario analysis

aligned with the TCFD recommendations

Methodology and Background

The growing focus on climate change and its financial impacts has created a call for businesses to disclose how climate change is affecting their financial performance and strategy.

Historically, reporting on climate risk has been largely non-existent and highly fragmented. To bridge this information gap, the Financial Stability Board created the Task Force on Climate-related Financial Disclosures (TCFD), which has developed a set of recommendations on climate-change disclosures in the financial sector. In particular, TCFD developed a uniform framework for disclosing climate-related risks affecting businesses.

The TCFD recommendations take an investor-focused approach to climate-related reporting, with the aim of providing investors with the information they need to ensure their investments are resilient to climate-change risks and built for long-term value creation. TCFD therefore recommends the use of scenario analysis in the disclosure of climate-related risks and opportunities. Scenario analyses aligned with the TCFD framework help companies explore different possible futures and the implications of climate-related factors on business strategy. It is one of the cornerstones of a complete TCFD report on climate-related risks and opportunities.

Scenario analysis is a process of analyzing future events by considering alternative possible outcomes. It is meant as a tool for companies to make strategic risk management decisions, providing insights and clarifying predictable and uncertain elements in different futures. It is meant to help frame and evaluate the strategic and financial consequences of climate change.

Methodology

In line with the recommendations laid out by TCFD, the following presentations rest on a qualitative scenario analysis. TCFD recommendations state the importance of the development of a sound scenario narrative, before proceeding to quantifying the scenarios. Quantifications should be an objective for future maturity reporting levels. The quantification of our identified risks and opportunities, as well as mitigation strategy, can be found in our separately published TCFD report.

The defined scope and boundary of this project, involving CEMAsys, Austevoll Seafood ASA (AUSS) the owner of Lerøy Seafood Group ASA, and Lerøy Seafood Group ASA (LSG), were determined jointly on the basis of an analysis of six risks deemed to be relevant for LSG's business.

Identification of risks

Climate-related risks and opportunities influence LSG's and AUSS's strategic and financial planning, and include short-, medium-, and long-term time horizons, as well as financial impact, in the assessments of these risks and opportunities. The following definitions of time horizons and financial impact are applied:

Time horizon	Year
Short-term	0 – 5
Medium-term	5 – 10
Long-term	10 +

Financial impact	Percentage of revenue
Low impact	< 5%
Medium impact	5%
High Impact	> 5%

CEMAsys facilitated a workshop with representatives from LSG to identify material climate-related risks and opportunities based on the TCFD framework.

The workshop focused on identifying the possible climate-related risks and opportunities that could arise in LSG's business areas. The risks and opportunities identified were then placed in a risk and opportunities matrix to start the process of quantification and determine their impact by giving a score to the factors time horizon, financial impact, and likelihood, in order to determine which risks and opportunities to include in the scenario analysis. In addition, TCFD's recommendations to include scenarios that explore alternatives that will significantly alter the basis for business-as-usual assumptions in a changing environment and society due to the implications of climate change were considered when the six risks where chosen.

Based on discussions between LSG and CEMAsys, the following risks have been included in this scenario analysis:

- The risk of not being able to fill the catch quota due to extreme weather conditions and changed fishing grounds due to higher sea temperatures and changes in oxygen levels.
- The risk of decreased fish health in aquaculture due to higher sea temperatures, changes in oxygen levels, and increased run-off.
- The risk of shortages of or price increases for fish feed raw materials due to climate-related events in the sourcing country.
- The risk of financial impacts related to fossil fuel regulations, such as increased fuel prices due to carbon taxation and the phasing out of fossil fuels in the maritime sector.
- The risk of decreased MAB quotas under the Norwegian Traffic Light System for aquaculture production, due to climate-related events affecting fish health.
- The risk of decreasing demand for LSG's products due to behavioral changes in customers and the need to meet stricter requirements.

Scenarios

The presented scenarios are descriptions of hypothetical, plausible futures (not forecasts) that help companies answer the question: «What would be the potential implications for our strategy if the future, described in a scenario, came to pass.»

Existing publicly available scenarios

The assessed scenarios are mainly based on existing publicly available scenarios:

1. Well-below 2°C scenario: Transition Risk Increase
   - IEA World Energy Outlook (WEO) 2021
   a. IEA Sustainable Development Scenario (SDS)
   b. IEA Net Zero Emissions (NZE)

2. 4°C scenario: Physical Risk Increase
   a. IPCC 5th (RCP 8.5) and 6th AR (SSP5-8.5)
   b. Business-as-usual (BAU) Scenario

Transition risks and physical risks

The six scenarios inform the identified transition risks and physical risks:

A. Transition risks relate to the financial risks of not being prepared for the socio-economic changes taking place in a world striving to meet the Paris Agreement's ambition of limiting global warming to well-below 2°C while pursuing efforts to limit the increase to 1,5 degrees.

B. Physical risks relate to the financial risks of not being prepared for the physical changes taking place in a world where ambitious climate policies fail or fall short, and the global warming of the world pushes towards 4°C.

Narrative 4°C (RCP 8.5/SSP5-8.5)

The Business-as-Usual scenario of 4°C warming is characterized by a lack of coordinated policies to limit climate change, leading to escalating physical risks. In this scenario, economic growth takes precedence over climate action, resulting in excessive resource consumption.

Fossil fuels remain the primary energy source, and energy intensity remains high. Under this scenario, the growth of greenhouse gas emissions continues, leading to further global warming and enduring changes in the climate system. This significantly increases the probability of severe, pervasive, and irreversible impacts on both people and ecosystems.

Unfortunately, climate considerations are frequently not given priority by consumers when making decisions. Water becomes a crucial resource with limited availability, and climate-related conflicts intensify due to poor agricultural practices and living conditions. A considerable number of individuals, classified as climate refugees, migrate towards northern regions in search of a more secure life. As the planet warms, the frequency and severity of extreme weather events, such as flooding, heavy precipitation, and rising sea levels, escalate. These events may have detrimental effects on operations and the value chain.

Despite the ambition for economic growth, the scenario falls short, as the rise in temperatures leads to GDP losses due to increased physical risks. The consequences of climate change-related extreme events are projected to increase as the planet warms further.

Increased urban flood damage from extreme precipitation is a critical climate-related risk in most regions, including South America and Europe. Increased drought stress and associated water restrictions and wildfires are expected in southern Europe, Australia, and parts

of Africa, Asia, and North America. The global mean sea level will continue to rise during the 21st century.

Risk: Ability to fill the catch quota

LSG's wild catch operations face significant climate-related financial risk if they are unable to fill their catch quotas. LSG focuses primarily on catching species such as cod, haddock, saithe and shrimp in the North Sea, Norwegian Sea and Barents Sea. The occurrence of more severe weather conditions, including high winds, storms, storm surges and large waves, can severely affect safety at sea and limit the number of viable fishing days. As a result, these conditions can adversely affect fishermen's livelihoods. Traditionally, local knowledge of sea conditions has been relied upon. However, with new and changing weather patterns, this knowledge may no longer be sufficient. In such circumstances, fishing operations may need to expand to more distant and more dispersed areas, potentially targeting different fish stocks. This expansion might require increased investment in vessel capacity to ensure safety in rougher seas and when fishing further from shore. There is also a need for updated fishing gear to meet the challenges of deeper waters and more diverse catch compositions. Furthermore, the migratory patterns of fish stocks can disrupt the allocation of fishing quotas. The limited number of fishing days available, coupled with the dispersal of fish stocks over a wider geographical area and the possibility of changes in fishing quotas, may make it increasingly difficult to fully fill the fishing quotas awarded.

Extreme winds are defined here in terms of the strongest near-surface wind speeds that are generally associated with extreme storms, such as tropical cyclones (TCs), extratropical cyclones (ETCs), and severe convective storms. The characteristics of extreme winds have changed over time. Globally, the proportion of category 3–5 tropical cyclone instances and the frequency of rapid intensification events have increased over the past 40 years.

While negative surface wind speed trends (stilling) were found in the tropics and mid-latitudes of both hemispheres, positive trends were reported at high latitudes of plus 60 degrees. TCs and ETCs have shifted poleward, and projections show that the mean intensity of storms, as well as the frequency of the strongest storms, will increase with climate change, especially in ocean basins.

In the North Atlantic, vertical wind shear, which inhibits TC genesis and intensification, varies in a quasi-dipole pattern. This pattern of variability creates a protective barrier of high shear along the US coast during periods of heightened TC activity in the tropics and appears to be a natural part of the Atlantic Ocean climate system. Vertical wind shear can either enhance or inhibit the development of tropical cyclones. When vertical wind shear is low, it allows for the organization and strengthening of a storm's core. Conversely, high vertical wind shear can disrupt the storm's structure, preventing it from intensifying or even causing it to weaken. Due to greenhouse gas forcing, the vertical wind shear is projected to erode. Following the RCP8.5 emissions scenario, the magnitude of the erosion of the barrier equals the amplitude of past natural variability (time of emergence) by the mid-21st century. Thus, a potential strengthening of TCs is expected in the North Atlantic.

As the swell size is determined by the strength and persistence of wind blowing over a large area of the ocean's surface, the North Sea, the Norwegian Sea as well as the Barents Sea are expected to be influenced by storms and increased swell size.

With ongoing climate change, essential physical and chemical conditions of the ocean are changing. As temperature, oxygen, and acidity levels are causing marine animals' habitats to be restricted, several species of fish are moving. In recent years, a northward expansion of the distributional range of several fish species has been driven by warming. Countries or regions in northern parts might benefit from a northward shift of the new distributional range, and the effect of rising seawater temperatures may be positive for the commercial fish species which Norway currently exploits. The RCP8.5 scenario projects a large-scale redistribution of maximum fisheries yield potential, including a 30–70% increase in yield in high latitude regions such as Norway's exclusive economic zone (EEZ).

While the redistribution of fisheries comes with an increase in the projected maximum yield, the movement of fish might also entail negative consequences. Pronounced range expansions of species in the north, due to warming and habitat changes, affect the concentration of fish stocks and impede operational effectiveness. For example, the area occupied by the Atlantic mackerel increased from 0.4 to 2.5 million square kilometers between 1997 and 2016, and is projected to further expand into Greenland waters under the RCP8.5 scenario. Cod and haddock stocks have already expanded their range, and a further expansion is expected under RCP8.5.

Furthermore, as species migrate across political or management boundaries, conflict over the allocation of quotas may arise. A recent example of such conflict is the quota allocation of North Sea mackerel.

In conclusion, LSG's wild catch operations face a significant climate-related financial risk: being unable to harvest the full quota. Adverse weather conditions and increased swell size restrict fishing days and jeopardize safety at sea. Adapting to changing weather patterns and the migration and dispersal of fish stocks may require fishing operations to be expanded to distant areas and potential in vessel capacity and equipment.

Potential conflicts over the allocation of quotas, due to a northward movement of fish species, further complicate matters.

Risk: Fish health

For LSG's aquaculture operations, the health of its farmed fish poses a potential climate-related financial risk. Marine life is sensitive to temperature changes, and most species perform poorly outside their optimal temperature range.

Salmonids have a relatively narrow range of temperatures for optimal growth and thrive in the temperature range 9–14°C. In 2012, optimum conditions for salmon farming were documented at a latitude of 62–64° (from Stad to Fosen) along the Norwegian coast. For the farms currently located at optimum or higher temperatures, ocean warming has the potential to decrease production, as increased temperatures heighten the risk of diseases or pathogens and lice infestations, lower oxygen content in the water, increased harmful algal blooms (HABs), and increases in runoff.

A high water temperature can accelerate disease progression by directly impairing the functioning of the host's immune system or the parasite's reproduction rate. Furthermore, lice become more resistant in warmer waters. The occurrence and growth of parasitic organisms are temperature dependent, as shorter generation time is associated with increased temperature. The most common parasite in salmon farming is sea lice. This parasite is more common in southern waters than in the Arctic, and ocean warming could increase its prevalence in the north. It is likely that infestations will become more frequent as the temperature rises, with associated increased costs for fish treatments to avoid or reduce mortality of farmed fish, as well as limiting transmission to wild salmon.

Climate models project increased precipitation and runoff that will likely lower the salinity of coastal water, strengthening the stratification and influencing the availability of nutrients available to algae. As a result, aquaculture installations could be impacted by harmful algal blooms (HABs). Towards the end of the century, runoff is projected to increase by 7% on an annual basis in RCP8.5. Especially in northern Norway, increases in runoff are mostly expected in the spring and autumn. In addition, several coastal areas are prone to eutrophication.

Many eutrophic habitats that host recurring HABs already experience extreme temperatures, low dissolved oxygen levels, and a low pH, making these locations potential sentinel sites for conditions that will become more common in the future as global changes progress. Increased temperature can also favor HABs via accelerated growth and an expanded realized niche. Reduced pH can increase the toxin production of several harmful algae.

LSG's aquaculture operations are spread out along the Norwegian coast, with most located north of 62°, the lower threshold latitude of for optimum salmon farming conditions. Some of LSG's aquaculture operations are, however, located south of this threshold latitude. Consequently, the fish at these farms are particularly vulnerable to the effects of climate change. The average sea surface temperature in the North Sea and along the Skagerrak coast of Norway is projected to rise by between 2°C and 5°C in a far future (2081–2100) scenario, according to RCP 8.5. On the other hand, the remaining fish farms are likely to profit from the sea surface temperature rise along Norway's coastline, as water temperatures will be closer to salmonids' optimal temperature range.

Abrupt changes in biophysical conditions could nevertheless increase production risk and lead to considerable variations in industry profit levels. Discrete periods of extreme regional ocean warming (marine heatwaves, (MHWs)) have increased in frequency in the northeast Atlantic, with an approximate doubling from 1982 to 2016. The occurrence of MHWs is predicted to be coupled to a sea surface temperature rise. If these extremes are close to the fish tolerance level and occur in combination with oxygen depletion, it could result in extreme physiological stress and increased susceptibility to disease. Recent MHWs led to

unprecedented levels of vibriosis infections along the Baltic Sea and North Sea coasts.

While LSG's northern fish farms might profit from a sea surface temperature rise, the likelihood of the occurrence, frequency, and severity of MHWs, and lower salinity due to precipitation and runoff, increases simultaneously, thereby also increasing the production risk.

Especially for LSG's southern aquaculture operations, any increased risk of diseases or pathogens and lice infestations, lower oxygen content in the water, and HABs could potentially threaten production. The threat to production output represents a potential financial risk to LSG, as do additional costs associated with climate change adaptation, such as increased expenditure on veterinary services and medication relating to delousing or a potential northward relocation of facilities.

Risk: Shortages and price development of fish feed raw materials

For LSG's aquaculture operations, future shortages and rapid price developments of fish feed raw materials pose a potential climate-related financial risk. As a result of global warming and changes in weather patterns and extreme weather events, key raw materials for fish feed production could be affected by reduced yields. As fish feed contains several different raw materials, this analysis focuses on the four ingredients that make up the largest proportion: wheat, fishmeal, fish oil, and soybeans. The analysis takes a closer look at how climate change is affecting crops in the main sourcing regions: Europe, Brazil, and the USA.

Globally, the effects of climate change are putting pressure on agriculture and increasingly hampering efforts to meet human needs. Over the past 50 years, human-induced global warming has slowed agricultural productivity growth in mid and low latitudes. Climate-related hazards that cause crop losses are increasing. Drought-related crop losses have occurred on about 75% of the world's cropland and have increased in recent years. Heat waves have reduced wheat and rice yields. The combined effects of heat and drought reduced global average yields of soybeans by 12.4%, and wheat by 9.2%.

Europe (Wheat & Soybeans)

Under the RCP 8.5 scenario, Europe is projected to experience several climate-related changes that may affect wheat yields by the end of the century. These changes include rising temperatures, changing precipitation patterns, and potential shifts in extreme weather events.

In Europe, crop losses due to drought and heat have tripled over the last five decades, highlighting the importance of assessing multiple stresses. Under RCP 8.5, heat extremes and droughts are projected to become more frequent and widespread by mid-century. The impact of climate change on wheat yields varies between regions in Europe. In a scenario with a modelled temperature increase of 4°C, yield losses will be higher in the southern regions, while in the northern regions' losses will be lower or yields will even increase. However, the benefits of a longer growing season in northern and eastern Europe are offset by an increased risk of early spring and summer heat waves. In addition, warming is causing range expansions and changes in host-pathogen associations of pests, diseases, and weeds, affecting the health of European crops with a high risk of cereals becoming contaminated. Regionally predicted reductions in rainfall may lead to herbicide carry-over. Due to rising temperatures and changes in precipitation patterns, damage and losses from river flooding are projected to increase significantly in Europe during the 21st century, which may lead to the contamination of crops.

Wheat is a largely non-irrigated, rainfed crop in Europe, and due to regional changes in precipitation, eight out of ten models show a projected yield increase in northern Europe under RCP 8.5, ranging from 5% to 16%, whereas all but one model project decreases in southern Europe around 2050, reaching up to -49%. The effect of CO_2 fertilization of wheat due to the increase in atmospheric CO_2 under RCP 8.5 is a key driver of the projected yield increases in northern Europe. However, the effects of climate extremes, such as heat stress and drought, are likely to be underestimated in these models.

There are therefore considerable uncertainties attached to these results. The World Bank estimates an increase in the nominal prices of wheat from USD 211 per metric ton to USD 259 per metric ton by 2030.

When it comes to soybean production in Europe, models applying the RCP 8.5 scenario suggest that climate change will lead to a 37.7% expansion in suitable production areas in the period 2040–2069. While yield reductions due to droughts are a potential risk, studies suggest that the positive effects of CO_2 and temperature on photosynthesis in many European regions will outweigh the potential negative effects of droughts. Thus, the suggested average productivity would rise by 8.7%. However, the effect of heat stress on the soybean yield potential has not been assessed and is likely to dampen the projections. Cold spells and wet conditions at harvest will remain major challenges for soybean production in Europe for some time to come, while drought and heat will become increasingly important. The World Bank has projected that the price of soybeans will rise from a nominal USD 407 per metric ton in 2020 to a nominal USD 584 per metric ton by 2030.

Brazil (Soybean)

Brazil is one of the world's largest soybean producers and the RCP 8.5 scenario could have a significant impact on soybean yields in the country. However, specific projections may vary by region within Brazil. In general, the impacts of climate change on soybean production in Brazil are likely to be complex.

Increased temperatures, changes in precipitation patterns, and the potential for more frequent and intense extreme weather events, such as droughts, heavy rains, or fires, could all affect soybean yields.

The Amazon Rainforest is highly vulnerable to drought and has been severely affected by the unprecedented droughts and higher temperatures observed in 1998, 2005, 2010, and 2015/16, which have been attributed to climate change. An increase in the frequency and geographic extent of meteorological droughts is projected for the eastern part of Brazil, while the opposite is projected for the western part of Brazil. In addition, Brazil is very likely to experience an increase in the intensity and frequency of heat waves under RCP 8.5. In the period between 2016 and 2020, Brazil experienced an additional 3.1 days of heatwaves compared to the period between 1986 and 2005. Thus, regional temperature increases, coupled with drought and anthropogenic land-use change, are projected to increase the frequency and intensity of wildfires. On average, people in the region were exposed to between 1 and 26 additional days of high fire risk in 2017–2020 compared to 2001–2004, depending on the sub-region. Due to the strong relationship between drought and the occurrence of wildfires, the Cerrado region is modelled to experience a 95% increase in area burned under RCP 8.5. In addition, while annual precipitation is decreasing in most regions, there has been an overall increase in extreme precipitation and a significant intensification of heavy downpours since the early 20th century. All these climate-related factors affect projected soybean yields. While crops can be contaminated by river flooding due to heavy rainfall, they are also threatened by droughts, fires, pests, and diseases due to rising temperatures.

On the other hand, some studies suggest that the above-mentioned negative effects and the accelerated lifecycle of the soybean crop are offset by the positive effect of increased CO_2 on crop water productivity, which overcomes the negative effects of increased temperature and water stress on rainfed Brazilian soybeans under RCP 8.5. As a result, Brazilian soybean yields are projected to increase by 1–32% by 2050, depending on the production area.

USA (Soybean)

Climate change and extreme weather events have impacted North American agroecosystems, with crop-specific effects that vary in direction and magnitude by event and location. Climate change has generally reduced agricultural productivity by 12.5% since 1961, with progressively greater losses moving south from Canada to Mexico and in drought-prone rainfed systems, while favorable conditions increased yields of maize and soybeans in regions like the USA Great Plains.

Heavy exploitation of limited water supplies, especially in the western USA, and deteriorating freshwater management infrastructure have heightened the risks of freshwater supply security. Climate change will continue to shift North American agricultural suitability ranges and intensify production losses for key crops. In the absence of mitigation, incremental adaptation measures may not be sufficient to address rapidly changing conditions and extreme events, increasing the need for cross-sectoral coordination in the implementation of mitigation and adaptation measures.

Climate hazards are projected to intensify further across North America. Heatwaves, as well as wildfire activity, will intensify. Humidity-enhanced heat stress, aridification and extreme precipitation events that lead to severe flooding, erosion, debris flows and ultimately loss of ecosystem function, life, and property are projected to intensify. Hotter droughts and progressive loss of seasonal water storage in snow and ice will tend to reduce summer season stream flows in much of western North America, while population growth and extensive irrigated agriculture will continue to place high demands on those flows. Under the RCP8.5 scenario, a temperature rise of 4–6°C is projected for the USA. The southeast of the country, in particular, is projected to experience an additional 45 days with a temperature exceeding 40°C.

While the observed impacts of climate change on soybean yield and productivity in North America are positive, models that do not account for CO_2 fertilization project a significant negative impact on the soybean yield in North America under RCP8.5. However, models accounting for the positive effects on crop growth due to increased levels of atmospheric CO_2 project that soybean production is likely to rise in the USA by 2100 under RCP8.5. Depending on the model chosen and whether the soybeans are rainfed or irrigated, soybean yield under RCP8.5 is projected to fall by 11,427–15,481 kg/ha-1 in the USA compared to the baseline scenario (8,895–14,011 kg/ha-1).

Fishmeal & Fish oil

Fish meal and fish oil (FMFO) are essential ingredients in the production of fish feed. They provide protein, omega-3 fatty acids and other essential nutrients to farmed aquatic organisms. There are several sources of FMFO, including the small pelagic species: anchovies, herring, menhaden, capelin, sardines, and mackerel. While pelagic fishing occurs throughout the world, the main fisheries are located along the Peruvian and Chilean coasts in the cold Humboldt Current. This area is one of the four Eastern Boundary Upwelling Systems, which are characterized by wind-driven oceanic upwelling and consequently high primary productivity. The stock of these fisheries is highly variable due to the short life span of the species and environmental elements such as sea surface temperature and other climatic/ hydrological patterns such as El Niño.

Climate change has a global impact on the productivity of fisheries and aquaculture, and through globalized markets, shifts in distant regions can have considerable economic consequences for Europe, the world's largest importer of fish products. For example, declining catches of small pelagic fish, such as the Peruvian anchoveta, are leading to a reduction in production and an increase in the price of fishmeal and fish oil used in aquaculture feeds. Thus, a decline in Peruvian anchovy can reduce profits in the European aquaculture sector, which relies on fishmeal and fish oil.

Globally, the projected wild catch yield under RCP 8.5 decreases by 16.2% to 25.2% by the end of the 21st century. Projections of the overall catch potential in the Peruvian EEZ paint a dramatic picture. According to the results of the dynamic bioclimate envelope model under the RCP8.5 scenario, the average fishing potential in the Peruvian EEZ is predicted to decrease by 30.21% by 2050 and by 55.3% by 2100. Although less extreme, the dynamic size-based food web model suggests a decrease in average catch potential under RCP8.5 of 8.88% by 2050 and 22.68% by 2100 within the Peruvian EEZ. Predictions of the overall fishing potential in the Chilean EEZ show a mixed picture. According to the results of the dynamic bioclimate envelope model under the RCP8.5 scenario, the average catch potential within the Chilean EEZ is predicted to increase by 10.19% by 2050 and by 34.81% by 2100. On the other hand, the dynamic size-based food web model predicts a decrease of 3.6% by 2050 and 3.38% by 2100 in the average fishing potential within the Chilean EEZ under RCP8.5.

Nevertheless, the relationship between the maximum catch potential and the price evolution of FMFO is quite complex and is affected not only by varying environmental changes, along with the accessibility of fisheries, the intensity of demand from a growing human population, and the availability of substitutes for FMFO. The FMFO model can take these variables into account by using nodes to define the main production activities, such as fishing and fishmeal production, and consumption activities, such as commodity markets, while the links are commodity trade flows between producers and consumers. According to this model, projected FMFO prices increase to EUR 2,282 per metric ton (fishmeal in the national enterprise scenario) and EUR 1,921 per metric ton (fish oil in the national enterprise scenario) by 2050 under RCP8.5. In the World Market scenario under RCP 8.5, FMFO prices are significantly lower by 2050, increasing to EUR1,269 per metric ton (fishmeal) and EUR 1,306 per metric ton (fish oil).

The Food and Agricultural Organization (FAO) has also looked at future projections of production and price trends for FMFO, albeit over a shorter time horizon. In 2030, production of fishmeal and fish oil is expected to have risen by 11% and 13% respectively compared to 2020, although the share of wild catch fisheries production rendered into fishmeal and fish oil is expected to decrease slightly (17% in 2030 compared to 18% in 2020). The expected increase in fishmeal and fish oil production is due to the overall increase in wild catch fishery production in 2030 compared to 2020, combined with the increase in fishmeal and fish oil production from fish waste and by-products of the processing industry. Between 2020 and 2030, the share of fish waste in total fishmeal is projected to increase from 27% to 29%, while the share in fish oil is projected to decrease slightly from 48% to 47%.

Between 2020 and 2030, the FAO expects a sharp decline in FMFO prices (in real terms). However, both prices are from historically high levels. Fishmeal prices in 2030 will still be 28% higher than in 2005, when the major price increases began. This situation is even more pronounced for fish oil, where the real price in 2030 is expected to be 70% higher than in 2005. All things considered, this suggests that the conversion of wild catch fisheries and fish waste into fishmeal and fish oil will remain a lucrative activity over the projected period.

Outlook

There is some uncertainty about the extent to which climate change will affect the production of raw materials for fish feed, as different models take into account different variables, such as the occurrence of extreme weather events and the specific adaptation measures implemented, which affect projected yields. While some models project increases in crop yields due to CO_2 fertilization, it is important to note that these yield increases will be outweighed by increasing demand due to global population growth. Crop prices are likely to rise. However, it is important to note that short-term price increases in one raw material may, to some extent, be offset by increasing the share of another raw material. While this mitigates the risk in the short term, over the long term, climate change is likely to pose a financial risk to the raw materials needed for fish feed.

Narrative well-below 2°C (RCP 2.6/ SSP1-2.6 & IEA SDS and NZE)

This scenario envisions a smooth transition to limiting global warming to well below 2°C. There is a notable increase in climate policy ambition and coordinated global action against climate change, starting in the near future.

The scenario assumes that global CO_2 emissions reached their peak in 2020 and are now rapidly declining. This transition presents both risks and opportunities for various stakeholders. In this well-below 2°C scenario, transitional risks and opportunities emerge, as most economies adopt a high carbon price and heavily rely on renewable energy sources for global power generation. As the demand for fossil fuels diminishes, their prices experience a significant decline. Furthermore, there is a growing awareness among consumers and investors, who are becoming increasingly environmentally conscious.

Consequently, the demand for more sustainable products from LSG's business sector will rise sharply. To fulfil the objective of the Paris Agreement, which is to limit global warming to well below 2°C, stricter regulations are expected to be implemented. These regulations are highly likely to directly impact LSG's business, as the world transitions towards a lower-emission economy.

Policy assumptions include:

- Norwegian government target of 50% reduction in emissions by 2030 from domestic shipping and fishing vessels
- Long-term strategy for climate neutrality by 2050
- Inclusion of Norwegian fishing vessels in the EUFuel Maritime initiative by 2028
- Increase of the Norwegian carbon price to NOK 2,000 by 2030
- Inclusion of the fishing sector in the EU's Emission Trading Scheme
- The Norwegian Traffic Light System for aquaculture production will continue unchanged

In February 2020, the Norwegian government submitted an updated Nationally Determined Contribution (NDC) in accordance with the Paris Agreement. The revised target is to reduce greenhouse gas emissions by at least 50% and up to 55% by 2030 (excluding carbon uptake by forests), compared to 1990 levels, in line with the EU's decision to strengthen its 2030 goal. Norway contributes to social and economic cohesion in Europe through the EEA and Norway Grants, with a significant portion of the funds aimed at protecting the environment and promoting innovative green and blue economies in the beneficiary states. The impact of the European Commission's 'Fit for 55 package' on Norwegian companies is not yet clear. However, Norway has indicated that it intends to prioritize interventions that support the core objectives of the European Green Deal in the next financing period of the Grants. Further, Norway pledged to reduce its non-ETS emissions by 40% by 2030. Non-ETS emissions are those that fall outside the scope of the European Emissions Trading Scheme (ETS), which Norway joined in 2008. Thus, Norway's carbon price will increase to NOK 2,000 by 2030 to reach this goal. The fisheries sector is not yet covered by the ETS, but there are proposals to extend the scope of the ETS to include the maritime sector. Therefore, the carbon emissions of the fishing sector might fall under the EU's carbon taxation regime. The Norwegian aquaculture Traffic Light System (TLS) came into force in October 2017. Its aim is to regulate Norwegian aquaculture's sustainable growth based on environmental impacts. Within Norway's 13 Production Zones, the environmental condition is assessed biannually, with the outcome determining whether the Maximum Allowable Biomass (MAB) is increased by 6%, stays the same, or decreases by 6% for the next two years.

Risk: Fossil Fuel Regulations

For LSG's wild catch operations, fossil fuel regulations such as carbon taxation and the phasing out of fossil fuels pose potential climate-related financial risks.

Global fuel use and greenhouse gas emissions from wild catch fisheries account for 4% of global food system production emissions. In Norway, the fishing fleet represents only 5% of the total number of vessels but is responsible for a significant proportion of CO_2 emissions. Although the number of fishing vessels has decreased in recent decades, their total engine power has increased, highlighting the need for a transition to alternative energy sources to improve operating efficiency. The development of low- or zero-emission vessels is underway to meet stringent emission requirements and possible new regulations as climate change progresses.

The Norwegian government has set an ambitious target to reduce emissions from domestic shipping and fishing vessels by 50% from 2005 levels by 2030. They are actively working on policy instruments and evaluating new measures needed to achieve this target. While zero- and low-emission criteria have been mentioned for ferries, high-speed passenger vessels, and aquaculture service vessels, fishing vessels have not yet been included in zero- and low-emission solutions. Aquaculture service vessels, which are smaller and operate locally, are well suited to using shore-side electricity. Therefore, the government plans to gradually introduce zero- and low-emission requirements for the feed barge fleet and aquaculture service vessels operating in a given area from 2024. For fishing vessels, however, the focus has been on incentivizing emission reduction projects through initiatives such as the Enova Fund, which supports the introduction of new technologies.

While Norway has not implemented regulations on the use of fossil fuels in wild catch fisheries, it remains important to monitor developments in international organizations such as the International Maritime Organization (IMO) and the European Union (EU) regarding energy efficiency regulations for ships. The IMO introduced the Ship Energy Efficiency Management Plan (SEEMP) in 2013. This emphasizes the importance of reducing fossil fuel consumption and managing the environmental performance of ships of over 400 gross tonnage and 5,000 gross tonnage. The FuelEU Maritime initiative, part of the EU's 'Fit for 55 package', aims to decarbonize the maritime sector and increase demand for renewable and low-carbon fuels. While the FuelEU Maritime regulation currently applies to larger ships over 5,000 gross tonnage calling at European ports, the European Parliament intends to review the rules by 2028 and consider extending the emission reduction requirements to smaller ships or increasing the use of clean energy from outside the EU.

Given Norway's commitment to reducing CO_2 emissions and complying with the Paris Agreement, the country has adopted a carbon tax on mineral oil as the main instrument for reducing greenhouse gas emissions in the fisheries sector. The carbon tax rate, currently NOK 2.53 per liter of mineral oil, is expected to increase annually in order to meet Norway's emission reduction targets. While the price per emitted metric ton of CO_2e is NOK 927, it is planned to increase to NOK 2,000 per metric ton of CO_2e by 2030 (in 2020 NOK). However, the rate for non-ETS emissions is regularly reviewed as part of the Norwegian government's budget process, leading to short-term uncertainties in price movements.

Norway joined the European Emissions Trading Scheme (ETS) in 2008. The ETS operates on the principle of "cap and trade" to limit greenhouse gas emissions from covered companies. The fishing industry is currently not covered by the ETS, but proposals have been made to extend its scope to the maritime sector. The price per metric ton of CO_2e emitted under the ETS is determined by supply and demand, resulting in a variable price. While the price of a metric ton of CO_2e under the ETS was around EUR 25 in January 2020, it was around EUR 90 in January 2023. The price is projected to vary between EUR 80 and EUR 160 per metric ton by 2030, depending on the models used.

In addition, electricity prices are expected to rise because of higher carbon prices, as Norway "imports" electricity prices from the European continent. Higher carbon prices lead to a significant redistribution in favor of Norwegian hydropower as long as Norway has a surplus of electricity. However, Norwegian electricity prices do not increase as much as continental electricity prices for a given increase in carbon prices. Thus, Norway receives relatively lower electricity prices than the Continent, and the price difference between Norway and the Continent increases as the carbon price increases. As a result, Norway becomes relatively more competitive in terms of attracting industry. The simulated average electricity price in Norway is between EUR 34 and EUR 57 per MWh in 2030 and between EUR 37 and EUR 59 per MWh in 2040. Given Norway's emission reduction targets, the increasing pressure to decarbonize the maritime sector through the EU Maritime Fuel Regulation, and the continuing effects of climate change, it is likely that similar regulations will be adopted for fishing vessels. The development of low- or zero-emission technologies will be crucial in this context. Furthermore, at present,

and based on projections of ETS price developments, the inclusion of the fishing industry in the EU ETS is expected to cost LSG less than the Norwegian non-ETS carbon tax by 2030. However, uncertainty about whether the fisheries sector will be included in the ETS, and the fluctuating carbon prices under the ETS, limit LSG's planning.

Nevertheless, the cost of using mineral oils will increase by 2030, whether under the ETS or a non-ETS carbon tax, and will pose a financial risk to LSG. On the other hand, equipping the fleet with low-carbon technology will also be costly.

Risk: Norwegian Traffic Light System for aquaculture production

For LSG's aquaculture operations, the Norwegian traffic light system (TLS) poses a potential climate-related financial risk. The TLS came into force in October 2017 and aims to regulate the sustainable growth of Norwegian aquaculture based on environmental impacts. The Report to the Storting (white paper) Meld. St. 16 (2014–2015) laid the foundation for the TLS. Demand for salmon was high, but volume growth had stagnated. The Norwegian government therefore wanted the Ministry of Trade, Industry, and Fisheries (MTIF) to develop a system that would prioritize environmental aspects when allocating growth in the form of Maximum Allowable Biomass (MAB). MTIF commissioned a steering committee to establish an expert group to report annually on the status of environmental aspects.

While the TLS is modular, allowing the system to adapt to future changes in factors affecting the environmental sustainability of Norwegian aquaculture production, the only environmental indicator considered so far is the level of salmon lice in wild salmon.

As the spread of salmon lice to wild salmon is a local phenomenon rather than a farm-specific issue, the Norwegian coast has been divided into 13 individual production zones, which in turn are intended to be as biologically independent from each other as possible. Within each production zone, the expert group's annual analysis of the spread of salmon lice to wild salmon forms the basis for the Steering Committee's review of the state of the spread of salmon lice. This review of the salmon lice situation is used by the MTIF in its biannual decision on whether a production zone should receive a further allocation of MAB, maintain its current level of MAB, or have its MAB reduced. Production areas where the spread of salmon lice does not exceed sustainable levels are categorized as green and can be allocated an additional 6% MAB. In amber production zones, there will be no change in MAB, while in red production zones, there will be a 6% reduction in MAB. In green production zones, 1% growth may be purchased at a fixed price of NOK 120,000, while the remaining 5% may be purchased at auction (please, see reference no. 11 in Sources & References at the end of the document).

Since the scheme's entry into force in 2017, the MTIF has applied the TLS to the 13 production zones in 2018, 2020, and 2022. This has resulted in a net increase in MAB of 23,772 metric tons in 2018, 23,786 metric tons in 2020, and 13,078 metric tons in 2022. However, Production Zone 3 (Karmøy to Sotra), Production Zone 4 (Nordhordland to Stad), Production Zone 5 (Stad to Hustadvika), areas in which LSG has aquaculture operations, were classified as either yellow or even red from 2018 onwards. As a result, there was no room for further growth and the MAB was reduced by 6% in some years. Production Zone 6 (Nordmøre and Sør-Trøndelag), in which LSG operates the largest share of its farms, was classified as a yellow zone in 2018 but has been classified as a green zone since 2020. Production Zone 11 (Kvaløya to Loppa) and Production Zone 13 (Øst-Finnmark), where the LSG's remaining farms are located, have been classified as green zones since the start of the TLS. Consequently, an additional 6% MAB was allocated there in 2018, 2020, and 2022.

As explained above (under risk: fish diseases), climate change and the associated increase in surface water temperature, periods of extreme regional ocean warming, and lower salinity of coastal waters increase the physiological stress on salmon and increase susceptibility to salmon lice. Under the TLS and its focus on lice numbers, the industry is not expected to meet Norway's production target of 5 million metric tons in 2050 using conventional lice prevention and treatment methods. However, new production technology that is better able to reduce the spread of sea lice provides better conditions for volume growth.

Enclosed or semi-enclosed pens have the advantage of preventing the spread of sea lice by providing a physical barrier between the fish inside and outside the structure. However, this technology is more energy intensive. In addition, such technology is still affected by the TLS when operating in a red zone, as the reduction in MAB counts is per production zone and not per facility. One technology that operates outside the TLS would be ocean-based farming solutions.

These take advantage of the large distances between sites provided by the vast offshore areas, reduce the risk of lice, and use the depth of the water and stable water currents to improve salmon welfare. However, this technology is still under development and the proposed Norwegian aquaculture tax, which will add a 25% tax burden to the ordinary 22% income tax, is likely to restrict the flow of capital from investors.

As LSG's farms are located along large parts of Norway's coast, financial risks, such as a TLS-related reduction in MAB in a particular production zone, are also widely spread. Some of LSG's aquaculture facilities are located in production zones that have historically seen reductions in MAB, or at least no increases. Adapting to these conditions involves the cost of relocating or investing in new technology. Continuing operations without adaptation involves the cost deriving from lower MAB levels in these production areas.

Risk: Market Changes

For both LSG's wild catch fishery and aquaculture operations, market changes such as altered customer behavior and stricter certification requirements pose potential climate-related financial risks. As the European market is LSG's largest market and salmon products represent the largest share of this market, changes in the European salmon market are assessed.

The global salmon market was valued at USD 3,355.11 million in 2022 and is expected to grow at a CAGR of 5.7% to reach USD 4,688.19 million by 2028. The European salmon market reached 1.7 million metric tons in 2022 and is expected to reach 2.1 million metric tons by 2028, a CAGR of 3.3%. Thus, although the European salmon market is expected to grow, it is expected to grow by less than the global salmon market by 2028. Considering projected changes in global supply and international economic conditions, the models predict higher salmon prices in 2024 and 2025, as increased demand and higher production costs will support global salmon prices. With considerable uncertainty remaining, the models predict an average salmon price of NOK 90 per kg by 2025 (please, see reference no. 30 in Sources & References at the end of the document).

Price is an important purchasing factor in the European fish market. Studies have shown that, apart from customers in northern European countries, European fish consumers are price sensitive. At the EU level, 68% of consumers would increase their fish consumption if prices were lower. However, the European economy is expected to grow, and households are likely to be able to afford salmon in the future. While the GDP of the EU17 OECD countries is expected to increase by 21% by 2030, GDP per capita is expected to increase by 20%.

In addition to price, the sustainability of fish and aquaculture products (FAP) will become an increasingly important purchasing factor for individuals and retailers in the European market. Environmental information on FAP is of particular interest to young people and socio-professional categories with the highest levels of education and wealth. In general, the carbon footprint of fish is around 3.49 kg CO_2e/kg compared to beef at around 26.61 kg CO_2e/kg. Farmed Atlantic salmon have an even lower carbon footprint of around 3.3 kg CO_2e/kg and can be seen as a more sustainable alternative when looking at carbon emissions. In the context of growing concern about the state of the world's fish stocks, ecolabels have become a growing feature of international fish trade and marketing. The topics covered by ecolabels can vary widely: bycatch issues, fishing methods and gear, sustainability of stocks, ecosystem conservation, and even social and economic development.

95% of LSG's catch is certified by the Marine Stewardship Council (MSC) and 69% of LSG's aquaculture volume is certified by the Aquaculture Stewardship Council. The MSC certifies fisheries of sustainable fish stocks. This requires that fishing operations are carefully managed to maintain the structure, productivity, function, and biodiversity of the marine ecosystem. Fisheries must also comply with relevant laws and have a management system that allow them to respond quickly to changes in the status quo. The ASC certifies aquaculture facilities that actively minimize their impact on the surrounding natural environment, through biodiversity protection measures, feed requirements, pollution parameters, and disease mitigation requirements. Furthermore, the ASC accounts for the social impact of aquaculture by imposing requirements based on the core principles of the International Labor Organization (ILO).

With continued climate change, increasing awareness of the need for stricter regulations and higher sustainability standards in the fishing industry, combined with advances in scientific knowledge, there might be calls for more rigorous standards and improved criteria for certification. In this context, it is worth noting that the evolution of eco-label requirements also depends on the collaborative efforts

of stakeholders such as NGOs, governments, industry representatives, scientists, and consumer advocates.

Furthermore, consumer interest in plant-based alternatives is growing and is poised for a rapid rise, like other alternative protein products. LSG plans to offer additional plant-based alternative products in the future and has ongoing projects in the R&D phase.

In sum, there is an increasing interest in sustainable fish products and the trend is likely to continue as climate change progresses and awareness about environmental sustainability increases. LSG has a large share of its products certified by the MSC and ASC, which both focus on sustainable and responsible fishing and farming practices. However, the requirements for certification may become stricter through stakeholder pressure. Losing certification for products could have financial consequences for LSG, as sustainability-aware customers might avoid those products, resulting in a loss of LSG market share.

Scenarioer iht. IPCC og IEA 2oC Scenario

IPCC RCP2.6

IEA Sustainable Development Scenario

4oC Scenario:

IPCC RCP8.5

IEA High Emission Business as Usual

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