



# SeaScope

Climate-proof your seafood exports

GROUP 2

Institution: Norwegian School of Economics  
Course: Green Digitalization and App Development

# Table of Contents

**1.0 Introduction..... 2**

**2.0 Organizing the Team..... 3**

**3.0 Methodology..... 3**

**3.1 Data Sources..... 3**

**3.2 Approach and Assumptions ..... 3**

**3.3 Formula ..... 4**

**3.4 Transport Modes and Emission Factors..... 4**

        Road Freight..... 5

        Sea Freight ..... 5

        Air Freight..... 6

**3.5 Summary of Emission Factors..... 6**

**4.0 Business Model Canvas ..... 7**

**4.1 Value Creation..... 7**

        Key Partners..... 7

        Key Activities..... 8

        Key Resources..... 8

**4.2 Value Delivery ..... 8**

        Value Propositions..... 8

        Customer Relationships..... 9

        Channels..... 9

        Customer Segments..... 9

**4.3 Value Capture ..... 10**

        Cost Structure..... 10

        Revenue Streams..... 10

**5.0 Summary..... 10**

**6.0 References..... 11**



## 1.0 Introduction

Norway is one of the world's leading exporters of seafood, and the industry plays a central role in the Norwegian economy as the country transitions beyond oil and gas. In 2024, Norway exported seafood worth NOK 175.4 billion, equivalent to 38 million meals every single day (Norges sjømatråd, 2025). Beyond its economic significance, seafood is one of the most climate-efficient sources of animal protein available. Greenhouse gas emissions from fish and seafood are generally lower than those from meat (Helsedirektoratet, 2024). This makes Norwegian seafood uniquely positioned to contribute to UNs Sustainable Development Goal 2 (Zero Hunger) and 12 (Responsible Consumption and Production). As awareness of food's climate impact grows, consumers and buyers increasingly pay a price premium for seafood that can document its sustainability credentials, representing a direct commercial incentive for the industry to reduce and measure its emissions (Norges Sjømatråd, 2020).

However, seafood's climate credentials are only as strong as the weakest link in its supply chain. According to the International Transport Forum, the transport sector alone accounts for 23% of global energy-related CO<sub>2</sub> emissions (ITF, 2023), making it one of the most significant areas for targeted emission reductions. For the seafood industry specifically, transport is among the most significant contributors to a product's total carbon footprint, and the choice of transport mode is decisive. High-value products like fresh Norwegian salmon are particularly reliant on-air freight to reach international markets quickly, yet air freight carries a dramatically higher emissions intensity than sea freight. For an industry exporting to over 150 markets worldwide, this gap remains largely invisible at the company level, representing both a climate problem and a commercial vulnerability.

SeaScope was developed to close that gap. By giving seafood producers and sales companies a precise, route-level tool to calculate transport emissions per kilogram of product, SeaScope turns an invisible cost into a manageable one. Our goal is not only to help companies measure their emissions, but to drive real reductions by making the right transport choices visible, comparable, and commercially compelling.



## 2.0 Organizing the Team

Our team consists of students at the Norwegian School of Economics (NHH), bringing together backgrounds in business administration, digital development and industry knowledge in the seafood industry. Tasks were divided according to individual strengths, with some members focusing on Python development and data modeling, and others on business development, user experience, and analysis. Key decisions were made collaboratively through regular weekly meetings. Differences in perspective led to constructive discussions, particularly around how to present emissions data in a way that is both scientifically accurate and commercially relevant. What began as a course project gradually became something we genuinely believed could solve a real problem in an industry we know well.

## 3.0 Methodology

### 3.1 Data Sources

Our emission calculations are based on two primary sources. The first is the Global Logistics Emissions Council (GLEC) Framework, published by Smart Freight Centre (2025). This is the leading international standard for calculating and reporting logistics-related greenhouse gas emissions, aligned with ISO 14083 and recognized by the GHG Protocol and the Science-Based Targets initiative. The second is ClimaTiq (2019), which provides verified emission factors directly derived from the GLEC framework. ClimaTiq holds ISO 27001 certification and Smart Freight Centre accreditation, ensuring the credibility and consistency of the data used in our application.

All emission factors are expressed as well-to-wheel (WTW) CO<sub>2</sub> equivalents, capturing both direct combustion emissions and indirect emissions from energy production. This provides the most complete picture of each transport mode's climate impact and aligns Scope 3 reporting requirements under the GHG Protocol.

### 3.2 Approach and Assumptions

Our methodology is built to be scientifically reliable while remaining practical for business users. Before further development of our product, several simplifying assumptions will be necessary to keep the application functional and accessible.



We use standardized average emission factors for each transport mode and route type, reflecting typical operational conditions rather than vessel or vehicle-specific data. For containerized shipping, we apply a standard payload of 10 tonnes per TEU, in line with GLEC Framework guidelines, to convert TEU-km based factors into per-kilogram figures. Distances are entered by the user and assumed to represent direct routing, without adjustment for transshipment legs or port delays.

These simplifications allow us to deliver fast and credible emission estimates while laying the groundwork for more advanced functionality in future development.

### 3.3 Formulas

To allow for comparison across different greenhouse gases, emissions are expressed in carbon dioxide equivalents (CO<sub>2e</sub>). Gases such as methane and nitrous oxide, which trap significantly more heat than CO<sub>2</sub>, are converted into a single comparable unit using established global warming potential factors. Emissions are calculated using the following distance-based formula, consistent with the GHG Protocol (2013):

$$CO_2e = \text{Distance} \times \text{Emission factor}$$

Where distance is the number of kilometers traveled for a specific transport leg, and the emission factor represents the average grams of CO<sub>2e</sub> released per kilogram of product per kilometer. For shipments involving multiple transport legs, total emissions are the sum across all legs:

$$\text{Total } CO_2e = \Sigma (\text{Distance}_i \times \text{Emission factor}_i)$$

To calculate emissions per kilogram of product, the total emissions are divided by the cargo weight. This allows direct comparison of transport options across different routes and modes, regardless of shipment size.

$$CO_2e/kg = \frac{w \cdot d \cdot ef}{w_{kg}}$$

Where  $w$  is the cargo weight,  $d$  is the distance traveled in kilometers,  $ef$  is the emission factor in grams of CO<sub>2e</sub> per kilogram per kilometer, and  $w_{kg}$  is the total cargo weight in kilograms,



yielding a standardized per-kilogram emission figure that enables direct comparison across routes and transport modes.

### 3.4 Transport Modes and Emission Factors

All emission factors below are expressed in grams of CO<sub>2e</sub> per kilogram of product per kilometer (g CO<sub>2e</sub>/kg/km) on a WTW basis, sourced from the GLEC Framework v3.2 (Smart Freight Centre, 2025).

#### Road Freight

Trucks are the primary mode for domestic distribution within Norway and for land-based transport across European markets. Emission factors vary by vehicle size, reflecting differences in fuel efficiency and carrying capacity. For Norwegian seafood distribution articulated trucks represent the most relevant category.

Fuel Type Truck	g CO <sub>2e</sub> /kg/km
Diesel	0.096
LNG (Liquid Natural Gass)	0.080
HVO (Biodiesel)	0.010
Electric	0.00

#### Sea Freight

Containerized shipping is the dominant mode for Norwegian seafood exports to international markets. For temperature-sensitive products such as fresh and chilled salmon, reefer containers are required throughout transport. The values below are derived from Clean Cargo Working Group trade lane data (reporting year 2023), converted from g CO<sub>2e</sub> per TEU-km using a standard payload of 10 tonnes per TEU, and include a 15% distance adjustment factor for actual versus shortest feasible routing. Reefer containers are temperature-controlled shipping containers that maintain a consistent refrigerated environment throughout transport, essential



for preserving the quality and safety of perishable goods such as fresh salmon during long-distance sea freight. For most Norwegian salmon exports, reefer values should be applied.

Fuel Type Cargo Reefer Ship	g CO <sub>2</sub> e/kg/km
Diesel / HFO	<b>0.016</b>
LNG	<b>0.013</b>
Electric / Zero Emission	<b>0.000</b>

### Air Freight

Air freight is used for fresh, high-value products requiring fast delivery to distant markets such as Asia and North America. It carries by far the highest emission intensity of any transport mode, and its use represents the single largest lever for emission reduction in seafood logistics.

Fuel Type Cargo Plane	g CO <sub>2</sub> e/kg/km
Jet Fuel (Kerosene)	<b>0.800</b>
SAF (Sustainable Aviation Fuel)	<b>0.160</b>

### 3.5 Summary of Emission Factors

The following example illustrates the practical significance of transport mode selection, calculating total emissions for 1 kg of Norwegian salmon transported approximately 9,000 km to Asia:

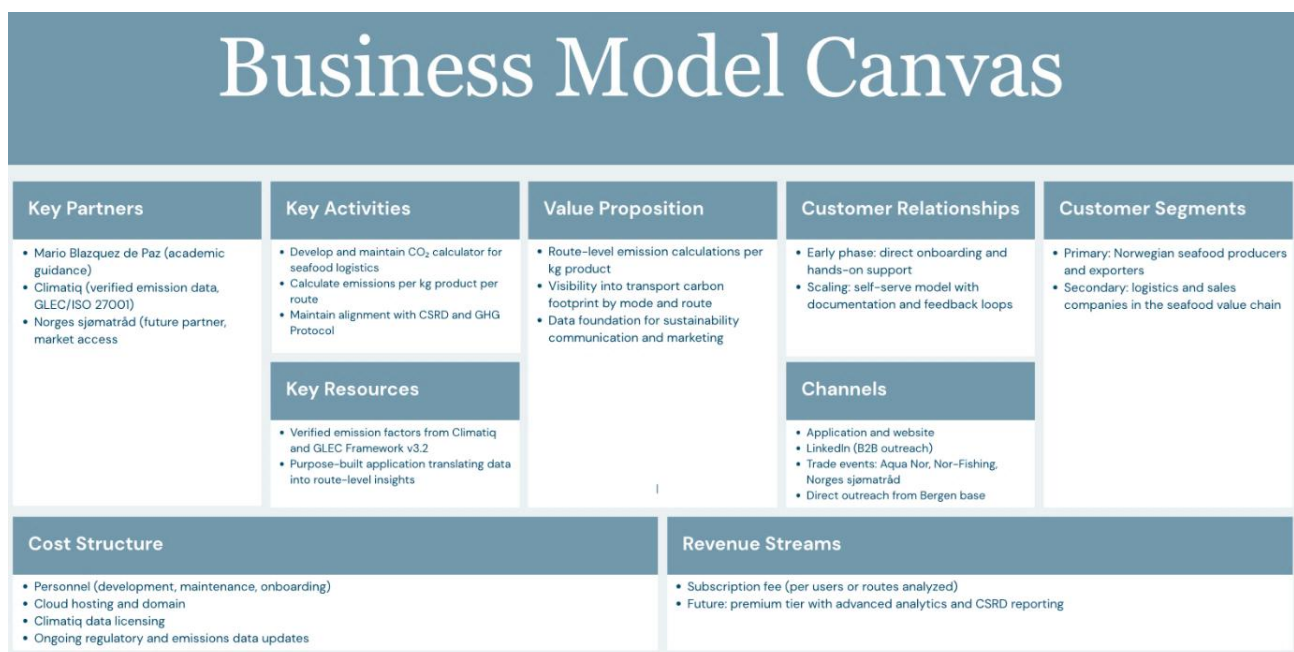
Transport Mode	Total g CO <sub>2</sub> e per kg
Containership (reefer), Diesel	144
Heavy goods vehicle, Diesel	864
Air freight, Jet fuel	7,200

The difference between sea and air freight represents a fiftyfold gap in per-kilogram emissions. This single comparison encapsulates the core value of SeaScope: making transport emission decisions visible, comparable, and actionable for companies that currently lack the data to act on them.



## 4.0 Business Model Canvas

The Business Model Canvas is a strategic framework consisting of nine building blocks that together map out how a company creates, delivers, and captures value, covering customer segments, value proposition, channels, customer relationships, revenue streams, key resources, key activities, key partners, and cost structure (Innovasjon Norge, 2018). We applied this framework to SeaScope to structure our thinking around where core value lies, how to reach our customers, and what it will realistically cost to sustain the product over time. The following sections present each building block as it applies to our application.



### 4.1 Value Creation

#### Key Partners

Our professor Mario Blazquez de Paz provides academic guidance and methodological grounding throughout the development process. Climatiq serves as our primary emissions data provider, supplying verified emission factors anchored in the GLEC framework. Industry organizations such as Norwegian Seafood Council represent a potential future partner, offering market insight and industry credibility that could accelerate adoption across the seafood value chain.



## Key Activities

Our core activity is the development and continuous improvement of a CO<sub>2</sub> calculator tailored to the logistics of the seafood industry. Users input kilometers per transport route, and the application calculates emissions per kilogram of product across all relevant transport modes including road freight, sea freight, and air freight. In the future we want to maintain alignment with evolving regulatory frameworks, including the EU's Corporate Sustainability Reporting Directive (CSRD) and Scope 3 reporting under the GHG Protocol, to ensure the application remains relevant as compliance requirements develop.

## Key Resources

The application rests on two categories of key resources. First, verified emissions data from ClimaTiq and the GLEC Framework provides the scientific backbone of our calculations. Without accurate and credible emission factors, the application cannot fulfill its purpose as a reliable decision-support tool. Second, and most critically, the application itself is our primary resource: a purpose-built software solution that translates raw emissions data into actionable, route-level insights tailored to the seafood industry. The value lies not in the data alone, but in how we structure and present it for companies that currently lack the tools to act on it.

## 4.2 Value Delivery

### Value Propositions

The application provides seafood companies with a practical, data-driven tool to calculate transport-related emissions at the route level, producing results down to per-kilogram output. In its current form, it enables two core use cases.

First, it gives companies immediate visibility into the carbon footprint of their transport operations, broken down by route and mode. This creates a foundation for informed decision-making, allowing managers to identify where emission reductions are most achievable. Second, it strengthens sustainability communication toward customers, buyers, and partners. As willingness to pay for sustainable seafood is growing and products documented as sustainable command measurable price premiums in global markets (Norges sjømatråd, 2020), the ability to present concrete, route-level emission data represents a tangible commercial advantage.

As the application matures, there is clear potential to expand toward formal ESG and regulatory reporting, including Scope 3 documentation under the GHG Protocol and alignment with



CSRD requirements. This represents a natural next step in development, rather than a current offering.

## Customer Relationships

In the early phase, customer engagement will be direct and relationship-based, with hands-on onboarding to ensure companies realize the full potential of the tool. As the user base scales, the platform will evolve toward a self-serve model with clear documentation and structured feedback mechanisms that inform continuous product improvement. Trust is central to this relationship, particularly as the application's output may over time feed into external sustainability communications and regulatory submissions.

## Channels

The application and accompanying website constitute the primary delivery channel. LinkedIn serves as the principal channel for reaching sustainability officers, logistics managers, and decision-makers within the seafood industry. Industry trade events, including Aqua Nor, Nor-Fishing, and forums organized under the auspices of Norges sjømatråd, provide arenas for live demonstration and partnership development.

Our base in Bergen further strengthens our go-to-market position. Bergen is home to the headquarters of several of Norway's largest seafood companies, as well as key sales organizations and logistics operators. This proximity enables direct, relationship-based outreach, a meaningful advantage in the early stages of market entry where trust and personal contact are critical to adoption.

## Customer Segments

The primary customer segment comprises Norwegian seafood producers and exporters who require granular transport emission data to support internal carbon management or sustainability-oriented marketing. A secondary segment consists of logistics and sales companies operating within the seafood value chain, for whom emission documentation may be required by downstream buyers or retail partners. Over time, the application's methodology is readily generalizable to other sectors within the food and aquaculture industries.



## 4.3 Value Capture

### Cost Structure

The dominant cost driver is personnel, specifically the time invested in development, data maintenance, and customer onboarding. Recurring technical costs include cloud hosting, domain management, and potential licensing of emission data from ClimaTiq. A structurally important ongoing cost is the continuous updating of emission factors and regulatory alignment, as both the scientific landscape and compliance requirements evolve. Failure to maintain this currency would compromise the application's commercial viability.

### Revenue Streams

Our primary revenue stream is subscription-based access to the application. Companies pay a recurring fee structured according to the scale of their operations, for instance based on the number of users or transport routes analyzed. This model creates a predictable, scalable revenue base while aligning incentives with customer value: increased use to manage transport emissions leads to greater returns on the subscription investment.

As the application matures, there is potential to introduce a premium tier including advanced analytics, multi-user access, and automated generation of CSRD-compliant climate reports. This represents a future development ambition, and our immediate focus remains on delivering core value through the base subscription.

## 5.0 Summary

SeaScope addresses a critical and underserved need in Norway's seafood industry: the systematic measurement and management of transport-related carbon emissions. The emission data presented in this paper illustrates precisely why this matters. The difference between shipping fresh salmon to Asia by air versus sea represents a more than fiftyfold difference in per-kilogram emissions, a gap that remains invisible without the right tools. As Norges sjømatråd's own leadership has acknowledged, seafood is a key part of the solution to achieving the UN's sustainability goals, and Norway has both the capacity and the responsibility to lead by example (Norges sjømatråd, 2025). Delivering on that ambition requires moving beyond general sustainability narratives toward precise, data-driven accountability, beginning with knowing exactly where emissions originate in the supply chain. That is the problem SeaScope solves.



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