2022 Green Bond Impact Report

August 2022

Contents

Green Bond Impact Report

In accordance with the SpareBank 1 Nord-Norge ("SNN") Green Finance Framework 2021, this document provides:

1. A description of Green Loans
2. The breakdown of Green Loans by nature of what is being financed
3. Metrics regarding Green Loans' environmental impacts

1 Description of Green Loans

SNN intends to allocate the net proceeds of the green finance instruments to a portfolio of new and existing loans in the following categories:

- **Green Buildings**
- **Renewable Energy**
- **Clean Transportation**
- **Environmentally Sustainable Management of Living Natural Resources and Land Use**

Eligibility Criteria to select the Eligible Green Loan Portfolio are set out in the SNN Green Finance Framework[1]. Such Eligibility Criteria are aligned on a best efforts basis with the criteria in the EU Taxonomy Climate Delegated Act[2] for relevant sectors.

SNN has relied on the support of an external consultant (Multiconsult ASA) to provide the impact calculations and output for the following categories: Green Buildings, Renewable Energy and Clean Transportation.

2 Breakdown of Green Loans by nature of what is being financed

100% Financial Assets

3 Metrics regarding Loans' environmental impacts

Portfolio-based reporting is prepared taking into account the ICMA Handbook Harmonized Framework for Impact Reporting (version June 2022)[3].

[1] See here for 2021 SNN Green Finance Framework
[2] To be found here
[3] To be found here

Impact overview

Portfolio date: 31 December 2021

Eligible Project Category	Eligible Project Subcategory	Eligible portfolio (NOK m)	Share of Total Financing	Eligibility for Green Bonds	Estimated reduced energy (in GWh/year)	Estimated renewable energy produced (GWh/year)	Direct emissions avoided vs baseline in tons of CO_2/year (Scope 1)	Indirect emissions avoided vs baseline in tons of CO_2/year (Scope 2)	Estimated annual reduced emissions (tons of CO_2/year)	% of fishery stocks with biomass at or above sustainable levels	Other qualitative relevant KPIs
a/	**b/**	**c/**	**d/**	**e/**	**f/**	**f/**	f/	f/	**f/**	**f/**	**f/**
Green Buildings	Residential	8,187	45%	100%	75	-	-	-	8,305	-	-
	Commercial	4,532	25%	100%	18	-	-	-	2,049	-	-
Renewable Energy	-	1,324	7%	100%	-	661	-	-	83,806	-	-
Clean Transportation	-	490	3%	100%	-	-	1,653	-599	1,054	-	-
Environmentally Sustainable Management Of Living Natural Resources And Land Use	Fisheries (MSC Certification)	861	5%	100%	-	-	-	-	N/A	+23.5% vs Norway	See appendix
	Aquaculture (ASC Certification and GlobalG.A.P.)	2,800	15%	100%	-	-	-	-	0.28 (vs chicken) 0.7 (vs Pork) 5.32 (vs beef)[4]	-	See appendix
Total		**18,194**	**100%**	**100%**	**93**	**661**	**1,653**	**-599**	**95,214[5]**	**+23.5% vs Norway**	

Portfolio based Green Bond report prepared taking into account the ICMA Handbook Harmonized Framework for Impact Reporting (version June 2022)

a/ Eligible category under the ICMA Green Bond Principles and LMA Green Loan Principles
b/ Eligible sub-category
c/ Signed amount represents the amount legally committed by the issuer for the portfolio or portfolio components eligible for Green Bond financing
d/ This is the share of the total portfolio that is financed by the issuer
e/ This is the share of the total portfolio costs that is Green Bond eligible
f/ Impact indicators:

- Estimated reduced energy (in GWh/year)
- Estimated renewable energy produced (GWh/year)
- Direct and indirect emissions avoided in tons of CO_2/year (Clean Transportation only)
- Estimated annual reduced emissions in tons of CO_2/year
- % of fishery stocks with biomass at or above sustainable levels

Note: for certification schemes, the impact is shown at certification level rather than SNN portfolio level due to data availability

[4] CO2 intensity avoided for fish farming compared to other protein sources (g CO2eq per typical serving (40g))
[5] Value does not include CO2 intensity avoided for fish farming compared to other animal protein sources

i. Green Buildings

Methodology note

Energy efficiency of this part of the portfolio is estimated based on calculated energy demand dependent on building code and EPC labels

To calculate the impact on climate gas emissions the trajectory is applied to all electricity consumption in all buildings. Electricity is the dominant energy carrier to Norwegian buildings but the energy mix includes also bio energy and district heating, resulting in a total specific emission factor of 111 gCO2eq/kWh. A proportional relationship is expected between energy consumption and emissions.

All buildings-related impact figures have been calculated by specialist consultant Multiconsult – see SNN's Green Bond website for the fulll methodology report, available here.

Green Residential Buildings

Impact is calculated based on the following number of objects and total area:

Category	Number of units	Area qualifying buildings in portfolio [m²]
Apartments	1,491	195,130
Small residential houses	2,574	382,390
Total	**4,065**	**577,520**

The table below indicates how much more energy efficient the eligible part of the portfolio is compared to the average residential Norwegian building stock. It also presents how much the calculated reduction in energy demand constitutes in CO_2-emissions:

Category	Area total [m²]	Reduced energy vs baseline	Reduced CO_2 emissions	Contribution to SDG
Eligible portfolio of residential buildings	577,520	75 GWh/year	**8,305tons/year**	

Green Commercial Buildings

Impact is calculated based on the following number of objects and total area:

Category	Area total [m²]
Office buildings	15,380
Retail/Commercial buildings	58,348
Hotel and restaurant buildings	21,457
Industry and small warehouse buildings	44,400
Other commercial buildings	26,177
Total	**165,762**

The table below indicates how much more energy efficient the eligible part of the portfolio is compared to the average commercial Norwegian building stock. It also presents how much the calculated reduction in energy demand constitutes in CO_2-emissions:

Category	Area total [m²]	Reduced energy vs baseline	Reduced CO_2 emissions	Contribution to SDG
Eligible portfolio of residential buildings	165,762	18GWh/year	**2,049 tons/year**	

ii. Renewable Energy

Methodology note

All power produced by renewable energy power stations in the portfolio are in hydropower stations with capacities in the range of 0.7-25 MW (small hydropower plants) and wind power plant with capacity of 45 MW

For the type of assets in the portfolio, with many run-of-river and small hydropower assets, the AIB (the Association of Issuing Bodies) emission factor is regarded as conservative in an impact assessment setting. The positive impact of the hydropower assets is 116gCO2/kWh compared to the baseline of 136 gCO2/kWh.

All energy-related impact figures have been calculated by specialist consultant Multiconsult – see SNN's Green Bond website for the fulll methodology report, available here.

The eligible plants in SNN's portfolio is estimated to have the capacity to produce about 719 GWh per year. In the impact assessment this has been adjusted to an expected 661 GWh. The table below shows the capacity and production of eligible hydropower plants (HPP), estimated and expected production:

Category	Capacity [MW]	Total capacity [MW]	Estimated production [GWh/year]	Expected production [GWh/year]
Small hydropower	0.7-25	140	566	508
Wind	45	45	153	153
Total		**185**	**719**	**661**

The table below summarises the expected renewable energy produced by the eligible assets in the portfolio in an average year, and the resulting avoided CO_2-emissions the energy production results in:

Category	Produced power compared to baseline (GWh/year)	Reduced CO_2-emissions compared to baseline (tons CO_2/year)	Contribution to SDG
Eligible wind power and hydropower plants in portfolio	661	**83,806**	

iii. Clean Transportation

Methodology note

The impact of electric vehicles in Norway on climate gas emissions is assessed in the following manner. The bank's portfolio is assessed regarding direct emissions (Scope 1) and indirect emissions related to electric power production (Scope 2). A baseline is established as the emission of the average vehicle of the total new vehicle introduced to the market, EV's excluded.

All transportation-related impact figures have been calculated by specialist consultant Multiconsult – see SNN's Green Bond website for the fulll methodology report, available here.

Passenger and light duty vehicles are included in the Clean Transportation category. The number of eligible vehicles as well as the expected yearly mileage can be found below:

Category	Number of vehicles	Sum km/year	Sum person km/year
Passenger vehicles	1,682	17.8 million	30.2 million
Light duty vehicles	28	0.4 million	0.5 million
Total	**1,710**	**18.1million**	**30.8 million**

The table below summarises the reduced CO_2-emissions compared to baseline for the eligible assets in the portfolio in an average year in the lifetime of the vehicles in the portfolio, presented as reductions in direct emissions and indirect emissions:

Category	Reduced CO_2-emissions compared to baseline (tons CO_2/year)	Contribution to SDG
Total Direct emissions only (Scope 1)	1,653	
Total Indirect emissions EV's only (Scope 2)	-599	
Total Avoided emissions	**1,054**	

The reduction in direct emissions corresponds to 0.5 million litre gasoline saved per year.

iv. Impact of Environmental Certification Schemes

Fisheries - MSC

Comment

The impact description and data for the MSC certification were delivered by MSC. A combination of quantitative and qualitative (through case studies) impact assessment is provided in this section.

Context and background on MSC certification

Fisheries and associated business represent work and income for an estimated 260m people, 2.4 billion people are dependent on seafood as their prime source of animal protein. Simultaneously the UN food and Agricultural Organisation (FAO) estimates that 34.2% of stocks for which data is available in abundance is in an overfished state[6]. The proportion of overfished stocks is growing over-time. Ecosystem and fish stock collapse has profound impacts on global food security, jobs and trade.

Root causes for the dire situation of many fisheries are poor fisheries management, where public authorities legally allow more fishing than scientifically recommended; poorly controlled fisheries leading to Illegal, Unreported, Unregulated (IUU) activities; and/or failure to effectively share marine resources across borders when stocks migrate internationally.

Overcapacity in global fishing fleets relative to the ability of stocks to replenish themselves remains one of the biggest drivers of this problematic situation.

The MSC

The Marine Stewardship Council (MSC) is a global, mission driven not for profit organisation aiming to contribute to the health and recovery of marine resources, for all that depends on it. The MSC is the world leading standard setter for sustainable wild capture seafood, and is a public education charity registered in the UK and active in 22 countries via its branch offices, with projects in 100 countries.

The MSC developed, owns and maintains the worlds most recognised and credible global sustainability standard for wild capture fisheries[7]. It also developed, owns and maintains a Chain of Custody standard to assure that MSC certified seafood can be traced back to the certified source. Finally, the MSC owns an eco-label which retailers and brands can use at a voluntary basis on seafood products.

The MSC program is the world's most used independent credible verification of sustainability of wild caught seafood. It was recognised as a key indicator by the UN convention on Biological Diversity[8], as well as in the preparatory papers for the UN Sustainable Development Goal (SDG) nr 14 'Life Below Water' as a credible benchmark which governments and companies could use to measure and track sustainability performance.

[6] See here and here
[7] See here
[8] See here

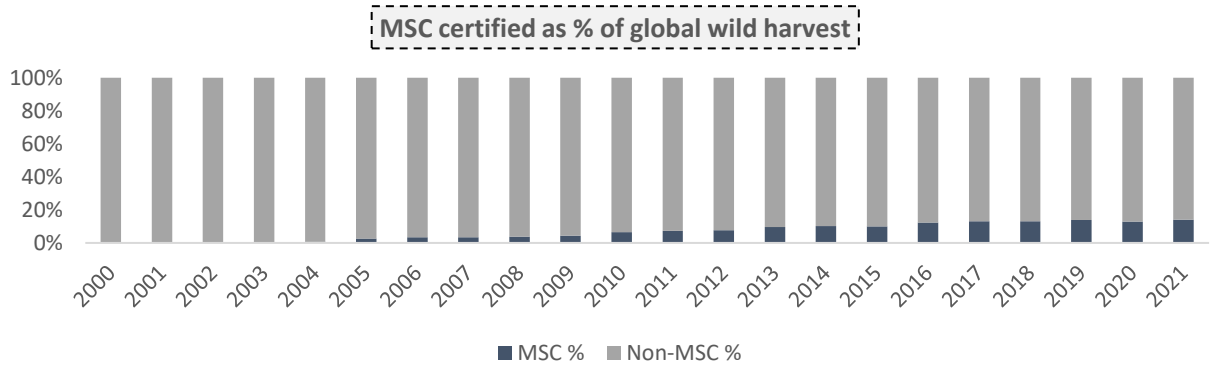
The global fisheries sustainability challenge and finance

Capital is a key driver of capacity to fish, process and trade seafood. Ideally, access to capital and financial services is cheaper and easier for companies operating in sustainably well managed fisheries, or trading seafood from sustainable fisheries. Capital and financial services for entities engaged in fishing, processing or selling seafood from origins which is not demonstrably sustainable, should only be available under strict, independently verified and time-bound, recovery conditions.

The first Green Bond that used certification against the MSC sustainable fishing standard as an indicator of sustainability for investors, was issued in 2019 by SpareBank 1 Midt-Norge (SMN)[9]. In August 2021 SpareBank 1 Nord-Norge (SNN) issued its inaugural Green Bond, using the same criterions. These were both important milestones for the sustainability of fisheries. These initiatives do not just deliver added value in Norway for companies demonstrably harvesting, processing and selling sustainable seafood, they also set a pathway for the finance industry. It shows that the finance community starts recognizing its responsibility, and that it has a fundamental role to play to drive a turnaround of what today is an unsustainable production and consumption system of seafood.

MSC in Norway and the world

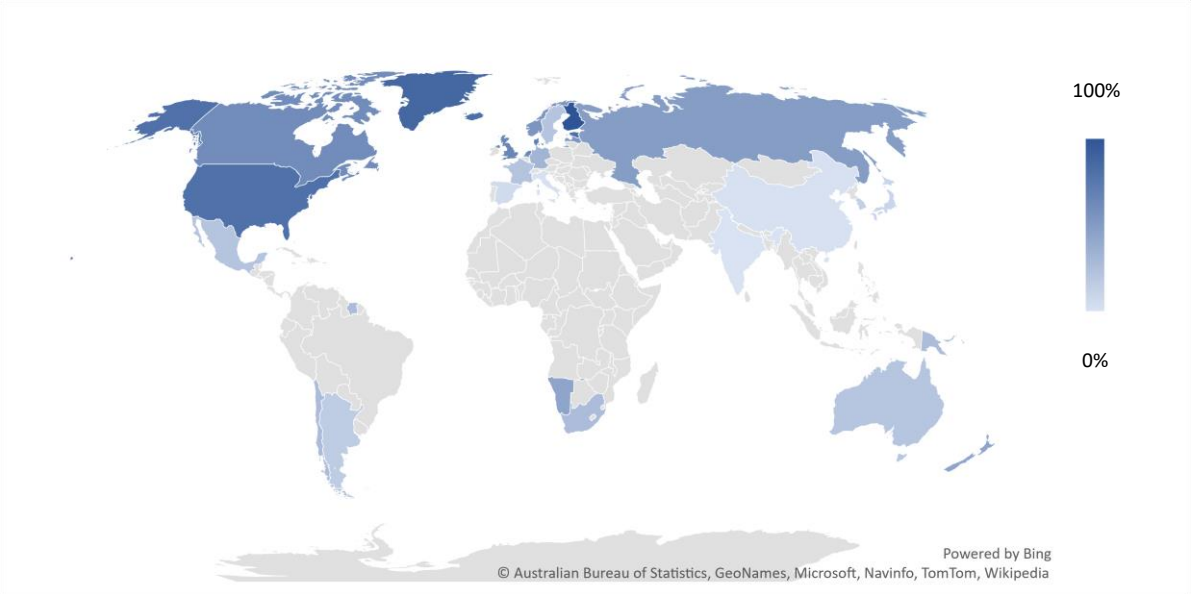
Globally wild-capture fisheries legally harvested an estimated 92 million metric tons in 2019[10]. A minority, ca. 15% (dependent on annual quota and catch fluctuation), of global catch is certified against the MSC standards for sustainable fishing.



[9] See here and here

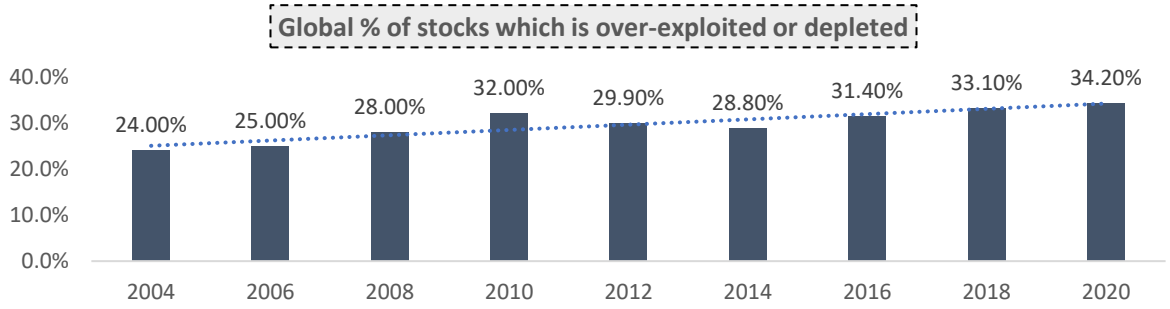
[10] FAO data, extracted from FAO Figis database for last year available (2019). Illegal Unreported and Unregulated fishing not counted in. Marine mammal catch not included, and neither Miscellaneous aquatic animals or plants.. See here and here

The fisheries making up this 15%, represent the best managed part of the global fishing industry. Looking at engagement in the MSC program from a worldwide perspective, the below figure shows there is a long way to go in the majority of the world (estimated MSC Certified % per country in 2021):



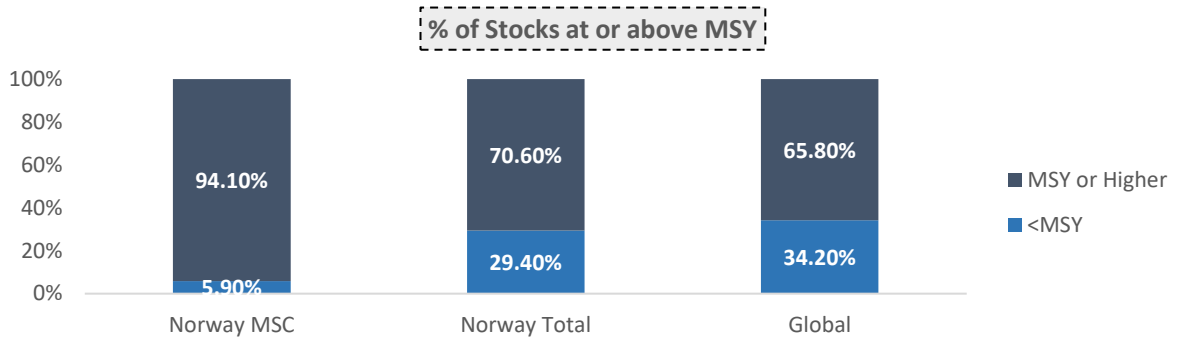
Stocks targeted by MSC certified fisheries have full reproductive capacity, impacts of operations on the ecosystems are well understood and minimised, and the management system for such fisheries is ensuring it stays that way.

In terms of stock status, data from the UN FAO shows a worrying trend over the past decade and a half. An increasing % of fish stocks for which data is available is in an overfished state or depleted. In its latest global update in 2020, the FAO reported that 34,2% of stocks was over-exploited or depleted[11].



[11] Extracted from FAO Sofia publications for consecutive years at FAO webpages. See here

Comparison between stocks for which biomass estimates are available in Norway (based on ICES reports 2021), the world (based on FAO SOFIA 2020) and MSC Certified stocks in Norway as subset from Norway (ICES 2021 and MSC data 2021), shows that stocks of MSC certified fisheries in Norway are in good shape, compared to the world and all key stocks fished in Norway in 2021.



94.1% of stocks of MSC certified fisheries in Norway have sustainable biomass[12], just under 70% of stocks are estimated to have sustainable biomass in Norway in total. 65,8% of stocks have sustainable biomass worldwide. Norway is thus doing better than the rest of the world, and stocks of its most important commercial species certified against the MSC standards are overwhelmingly in good condition. It is important to note that for some stocks where biomass is currently estimated as low by science, management has set lower quota, or even closed the fisheries to enable stock recovery.

What is also important is that sustainable fishing entails much more than just high biomass. Impacts of the fishery on the wider environment, the amount of fish taken from a stock, compliance with regulation (legality) and the capacity – and acting – of authorities to manage the fisheries' impacts, all play a key role too. MSC certification covers all these aspects, and annually tests through its 3rd party assurance system if performance is (and has remained) sound.

Use of MSC in Norway

The MSC standards are effectively used by fisheries in Norway to demonstrate sustainability. Table below shows that Norway is ahead of the global performance, in terms of being able to demonstrate independently that fisheries are meeting the MSC standards. MSC certification signifies high sustainability performance. Table 2 shows the assumed 'certification benefit', based on the likelihood that a randomly picked fish stock in Norway was at sustainable level (MSY or higher) in 2021. The % of healthy stocks was significantly higher for stocks covered by MSC certification (94,1%) vs 'all key stocks in Norway' (70,6%) or the 'world' (65,8%). That implies a 23,5% difference between MSC Norway and non MSC Norway, and a 28.3% difference between MSC Norway and the world.

Category / Subcategory	Indicator	Norway (SNN proxy)	World ex-Norway	World
Eco-efficient and circular economy adapted products, production technologies	Seafood volume covered by MSC certification in 2021 (tons)	1,293,991	11,370,499	12,664,490

[12] Stocks are characterized by the FAO in different categories, to give more information about the production potential of a fish stock in relation to its current scientifically estimated status. Stocks in the overfished category have abundance levels lower than the level that can produce Maximum Sustainable Yield (MSY). The MSC requires stocks to be at levels where MSY can be produced as an 'unconditional pass level' for MSC certification. Under strict rebuilding criteria, fisheries which target stocks which have abundance scientifically estimated below levels where MSY can be produced, but which have full reproductive capacity, may still obtain conditional MSC certification. The 6% for MSC refers to 1 out of 17 stocks certified, which is currently at low level and which anticipate recovery in 2022. See case studies.

and processes / Fisheries	% of seafood volume (wild catch) covered by MSC certification in 2021, out of the total volume of seafood (wild catch) produced	50.4 %	13.7 %	15.0 %
	Number of fisheries covered by MSC certification in a particular year out of the total number of fisheries in the MSC program (2021)[13]	49	977	1,026

	Norway MSC	Norway Total	World	MSC certification benefit
% of stocks with biomass at or above sustainable levels	94.1 %	70.6 %	65.8 %	**+23.5% vs. Norway** **+28.3% vs. World**

Key Performance Indicators for SNN

The following Key Performance Indicators (KPIs) will be used to assess SNN's contribution to responsible wild-capture fisheries:

Category / Subcategory	Indicator	Benefit vs. Norway	Benefit vs. World	Contribution to SDG
Eco-efficient and circular economy adapted products, production technologies and processes / Fisheries	**% of fishery stocks with biomass at or above sustainable levels**	**+23.5% vs. Norway**	**+28.3% vs. World**	

[13] Extracted from MSC Fisheriesdatahub 01-06-2022, based on year end data 2021, global Cert and Susp.

Impacts with MSC in Norway in 2021

In a global context, fisheries management in Norway is functioning comparatively well. Yet, even in a well-off state like Norway improvements are needed in fisheries management. Operationally, fisheries can on many occasions reduce impacts to assure sustainability thresholds are not exceeded.

The MSC standards are used as a tool to identify where such improvements are needed. Recognition of Norwegian fisheries as MSC certified, delivers value from the market to these fisheries, and creates incentives to make improvements. This is MSC's Theory of Change (ToC) 'in practice[14]'.

Certified fisheries in Norway have 25 'open' conditions for improvement in the MSC program (medio 2022), and in 2021 10 conditions for improvement were closed [15].

Challenges in Norway in 2021

While the overarching MSC ToC works, and the Norwegian fishing industry addressed conditions to deliver sustainability improvements, during 2021 the MSC also witnessed concerning developments in Norway's fisheries (management) performance.

In 2021, the combined individual quotas for mackerel, Atlanto-Scandian herring and blue whiting exceeded ICES advice by 41%, 35% and 25% respectively. This is not compatible with best practice fisheries management, nor sustainable. As a consequence, some of Norway's pelagic fisheries lost their MSC certificates.

These stocks are contracting, and if this problem is not addressed soon, it can create major risks for the ability of these stocks to remain productive in the years ahead. Reduced productivity and associated reduced catching opportunities would inevitably affect the business of many seafood companies in Norway.

Companies involved in catching, processing and exporting these pelagic species in Norway, will also face increasing risks for their reputation and may experience serious impacts in the market . A broad group of retailers and brands in Europe have made it clear that if the problems are not resolved, and sustainable management is not delivered in specified timeframes, these actors would reconsider their purchasing decisions of herring-mackerel and blue whiting. They may have no choice but to delist these species from their shelves, with great commercial consequences for catchers, processors, exporters in Norway.

Another major challenge persisted in the fisheries for Northeast arctic cod in the coastal zone. Bycatch of cod from coastal populations deemed in a fragile state is high, and recovery measures do not seem to work yet. That lead to the expiry of the certification for the inshore fisheries of cod in Norway in 2021.

[14] See here

[15] Extracted from MSC Fisheries data hub 31-05-2022

Aquaculture - ASC

Comment

Due to lack of quantitative data, the impact of ASC certified salmon farming is prepared in a qualitative manner. The Environmental non-conformity analysis provided by ASC in its first Impact Report is the first step in collecting and disclosing actual measurements of indicator performance data, for certified farms.

This section is curated based on the data delivered by the Aquaculture Stewardship Council and ASC website.

Context and background on ASC certification

Fish happens to be one of the most efficient converters of feed into high quality food, it has a lower carbon footprint and uses fewer resources than other animal production systems[16].

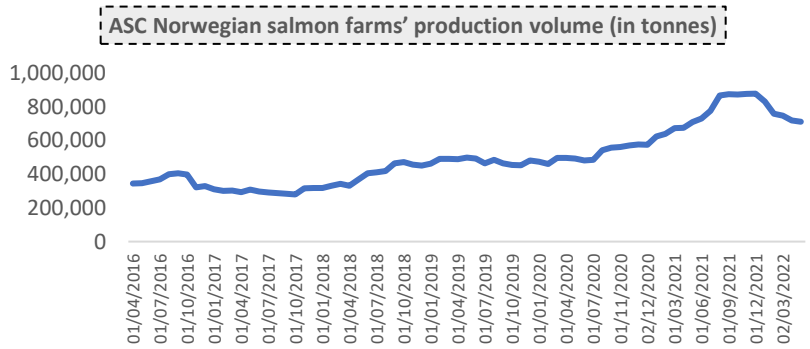
However, traditional methods of wild capture fishing can't possibly meet the demand. Fishing resources are finite and 86%[17] of marine fish stocks are either fully exploited or overfished. Even with sustainable practices, marine fishing has reached the limit of its supply.

The Aquaculture Stewardship Council (ASC) is an independent non-profit labelling organisation that establishes protocols on farmed seafood while ensuring sustainable aquaculture. The ASC provides sustainable and responsible aquaculture producers with a stringent certification and labelling scheme guaranteeing to consumers that the seafood they are purchasing is sustainable for the environment, and socially responsible.

ASC in Norway for salmon farming

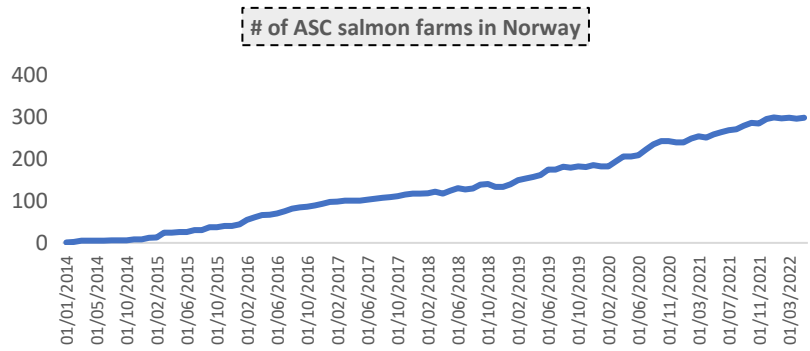
ASC certified Norwegian salmon yearly production volume production as per May 20221 stood at 711,310 tonnes. The production volumes are derived from when the farm is third

party audited, and takes into account factors such as the current



biomass, the last harvest volume, and the hectare area of the cages.

The number of ASC certified salmon farms in Norway amounted to 297. Certified farms in Norway can be found on ASC website[18].



[16] Source: Béné, C., Barange, M., Subasinghe, R. et al. Feeding 9 billion by 2050 – Putting fish back on the menu. Food Sec. 7, 261–274 (2015), see here
[17] Source: FAO Fisheries and Aquaculture Circular No. 1089
[18] Map ASC certified farms, see here

Use of ASC in Norway for salmon farming

Salmon farming has been associated with a number of environmental impacts, such as fish escapes, negative impact on wild salmon, birds and sea mammals, the use of wild fish as ingredient in feed, introduction of diseases and parasites, use of antibiotics and impact of pollution on water quality and the seabed.

Below, an overview of the areas ASC certification targets for responsible salmon farming can be found below[19]:

- **Biodiversity**

  ASC certified salmon farms minimise impacts on the local ecosystem in a number of ways, such as the development and implementation of an impact assessment to protect birds, marine mammals and sensitive habitats, protection of the ecological quality of the seabed, ensuring farms are not sited in High Conservation Value Areas (HCVA) and minimising fish escapes to an absolute minimum. All lethal incidents with wildlife must be made publicly available.

- **Feed**

  ASC certification requires salmon farms to adhere to strict limits to minimise the use of wild fish as an ingredient for feed. In addition, the standard requires farms to ensure full traceability back to a responsibly managed source, preferably certified, both for wild fish and soy.

- **Pollution**

  ASC certified salmon farms are required to measure various water parameters (phosphorus, oxygen levels, etc.) at regular intervals and remain within set limits. Responsible farming can only take place in water bodies that are classified as 'good' or 'very good' (e.g. by the EU Water Framework Directive). Copper release into the water must be minimised and monitored.

- **Diseases**

  ASC certified salmon farms are required to adhere to rigorous requirements to minimise disease outbreaks. In doing so, they must also cooperate with other farmers operating in the same area. A Fish Health Management Plan detailing steps for biosecurity management must be developed under supervision of a veterinarian and implemented on the farm. In addition, the farms need to adhere to low levels of parasites (especially sea lice) and can only use certain medicines under very strict conditions. The use of medicine before a disease is diagnosed (prophylactic use), is prohibited. Producers need to manage farms in such a way that salmon survival rate is high. Instances of unexplained increased mortality, as well as sea lice counts are required to be publicly available.

- **Social**

  ASC certification imposes strict requirements based on the core principles of the International Labour Organisation (ILO), these include prohibiting the use of child labour or any form of forced labour. All ASC certified farms are safe and equitable working environments where employees earn a decent wage and have regulated working hours. Producers also need to consult (indigenous) communities, inform them about health risks and provide access to vital resources. Similar requirements apply for suppliers of small salmons that are supplied to the ASC certified salmon farm.

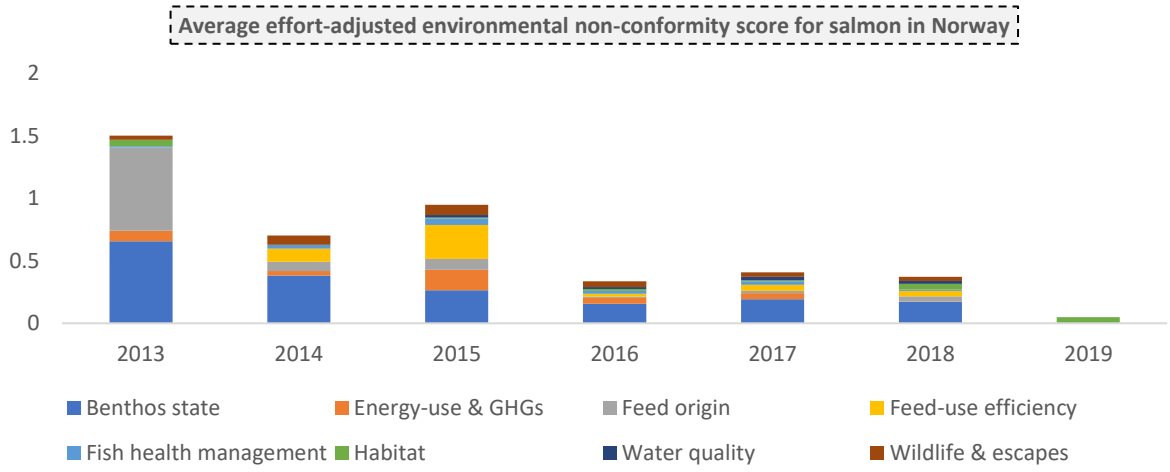
[19] Information retrieved from the ASC website, see webpage here.

Environmental non-conformity scores for salmon farming in Norway

In its first Monitoring and Evaluation report[20], ASC provides an analysis on "non-conformity" (NC), i.e. shortcoming, of salmon farming in Norway. Depending on the severity of the issue detected, a NC can be either "major" or "minor". A minor NC is for smaller, isolated incidences that are unlikely to seriously jeopardise the integrity of the certified product, whereas a major NC is for more systemic failures that may result in a failure of a farm to achieve the objectives of the ASC standard[21]. This analysis is particularly useful to show the improvement of conformity with the ASC standard and the Certification and Accreditation Requirements (CAR) involving salmon farmers in Norway. This analysis does not compare the impact of ASC certified salmon farming with non-ASC certified farming, nevertheless the implication is that conformity with the ASC standard will present environmental benefits. The environmental indicators used to assess non-conformity are as follows:

Impact area	Indicator topics
Benthos state	Diversity indices; sulphide levels; cage proximity to benthos; copper net management
Receiving water quality	Effluent quality; sludge disposal; dissolved oxygen
Wildlife and escapes	Genetically modified (GM) stock; sea lice management; predator control; escapes; non-native introductions; protected species
Fish health management	Therapeutant use; diagnostics and health care
Habitat	Environmental impact assessments (EIA); salinization; waste management; protected areas
Feed-use efficiency	Feed conversion ratio (FCR); Forage fish dependency ratio for fishmeal and fish oil (FFDRm/FFDRo)
Feed origins and traceability	Sources of fishmeal and fish oil; disclosure of GM ingredients
Energy use and greenhouse gases (GHGs)	Record keeping; equipment maintenance, plans for increasing efficiency

Looking to the environmental non-conformity scores for salmon farming in Norway, one can see clearly an improving trend (between the start of the ASC programme and March 2019). Furthermore, this trend of improvement across environmental indicators seems to be one of the strongest when compared with the other species standards (shrimp, tilapia and bivalve). This may in part be due to the relative maturity and consolidation of the global salmon sector, with fewer companies operating many farms, often in more than one country or region, enabling greater consistency in practices. The lessons learnt during the certification of a company's first few sites can be applied to those sites that apply for certification at a later date. This seems to be supported by the data collected for this study: of 21 companies which had new sites certified in subsequent years, 14 achieved lower NC scores for the farms that entered certification later.



[20] See here

[21] For full methodology overview on NC assessment, please refer to pages 35-38 of the ASC 2020 Monitoring and Evaluation report

Aquaculture – GLOBALG.A.P.

Methodology note

Due to lack of quantitative data, the impact of GLOBALG.A.P. certified salmon farming is prepared in a qualitative manner.

Context and background on GLOBALG.A.P. certification

GLOBALG.A.P. is an internationally recognized standard for farm production which demands greater efficiency in agricultural production across 3 scopes: Crops, Livestock, and Aquaculture. GLOBALG.A.P. relies on independent third-party certification bodies to perform producer audits and issue certificates, and is currently working with more than 2,000 trained inspectors and auditors from around 159 accredited certification bodies.

GLOBALG.A.P. certification covers:

- Food safety and traceability
- Environmental aspects (including biodiversity)
- Workers' health, safety, and welfare
- Animal welfare
- Integrated Crop Management (ICM) and Integrated Pest Control (IPC)
- Quality Management Systems (QMS) and Hazard Analysis and Critical Control Points (HACCP)

GLOBALG.A.P.'s products/standards are the result of intensive research and collaboration with industry experts, producers, and retailers around the globe. They help to improve business performance and reduce the waste of vital resources. Attaining GLOBALG.A.P. certification also requires a general approach to farming that develops and expands on best practices for generations to come. This helps GLOBALG.A.P. work towards the goal of "safe and sustainable agricultural production to benefit farmers, retailers, and consumers throughout the world."

The GLOBALG.A.P. Aquaculture Standard

In operation since 2004, the GLOBALG.A.P. Aquaculture Standard brings the market a complete solution for buyers and suppliers, based on current market demands. It covers full production chain verification of feed, broodstock, seedlings, farming and post-harvest activities up to the point of sale for final consumers, including the key sustainability aspects that animal production for human consumption is required to achieve.

Aspects covered in the standard are those stipulated by the FAO Technical Guidelines on Aquaculture certification. But what sets the GLOBALG.A.P. Aquaculture standard aside from others is its high levels of transparency and reliability, thanks to its inclusion in the robust GLOBALG.A.P. Integrity Program. This pioneering program is the first of its kind in food certification and is designed to ensure consistent delivery and implementation of the standard worldwide. It acts as a feedback mechanism that serves the ongoing improvement of the GLOBALG.A.P. system in all its aspects. Feedback from certified farms also reports that this certification scheme has effectively become a practical guide to their operations, through its detailed criteria written in a clear and accessible manner.

Key benefits and recognition of GLOBALG.A.P. Aquaculture

- **Food safety**: GLOBALG.A.P. Aquaculture is the only certification scheme recognized by the Global Food Safety Initiative (GFSI) for the farming of fish
- **Environment**: GLOBALG.A.P. Aquaculture is recognized by the Global Seafood Sustainability Initiative (GSSI)
- **Animal Health**: Animal health is ensured at all stages by a comprehensive veterinarian animal health plan which covers broodstock, seedlings, farmed fish, and harvesting and slaughter stages. The GLOBALG.A.P. Aquaculture standard covers the OIE (The World Organisation for Animal Health) Aquatic Animal Health Code criteria for farms
- **Animal Welfare**: On top of animal health, GLOBALG.A.P. Aquaculture has been recognized as the only international private standard outside the United Kingdom that covers animal welfare practices at harvest and slaughter. Further animal welfare innovative criteria are applied for all production stages
- **Workers Occupational Health & Safety**: Workers are key to efficient operations; appropriate training is included in the requirements
- **Workers Welfare**: GLOBALG.A.P. Risk Assessment on Social Practices is a compulsory assessment

GLOBALG.A.P. Impact in Norway

GLOBALG.A.P. now certifies a large volume of Norwegian salmon production. In 2020, GLOBALG.A.P. certified a total volume of 1,393,129 MT of Norwegian salmon production[22]. 117 companies producing salmon were certified of which 49 are grow-out and 68 are either hatcheries or nurseries.

GLOBALG.A.P. Aquaculture has a number of requirements to ensure sustainability of the full chain of fish production that goes above and beyond the already robust Norwegian legislative system. These requirements include but are by no means limited to the examples below:

- **Genetic modification** – e.g. requirement that producers shall be able to show traceability to broodstock that are not from a genetically modified origin
- **Environmental impact –** e.g. requirement of a biodiversity-inclusive environmental impact assessment and environmental risk assessment
- **Greenhouse gas emissions –** e.g. biodiversity-inclusive environmental impact assessment to be done to consider emissions and energy from fossil fuels
- **Feed composition and origin –** e.g. documentation shall be presented on the percentage of the supply of fishmeal/fish oil which originates from fisheries managed in accordance with and adhering to the FAO Code of Conduct for Responsible Fisheries, e.g. IFFO, MSC and equivalent others
- **Use of pharmaceuticals –** e.g. a veterinary health plan (VHP) to be established
- **Disease** – e.g. producers must have a documented biosecurity plan, which includes site hygiene, risk of introduction of pathogens and diseases and systems to prevent and disinfect
- **Salmon lice** – e.g. the VHP must have control over parasites
- **Occupational injuries** – e.g. producers must have a written risk assessment to assess hazards to workers' health and safety
- **Societal contributions, taxes, and charges** – e.g. producers must fulfil the GLOBALG.A.P. Risk Assessment on Social Practices (GRASP)

[22] To be found here

Aquaculture – CO_2 Impact

The Global Salmon Initiative (GSI) published scientific findings on its website with regards to the carbon footprint of farmed salmon in comparison to on-land livestock. The carbon footprint measures the total greenhouse gas emissions caused directly and indirectly by the production of a product. Carbon footprint is measured in grams of carbon dioxide equivalent (g CO_2eq) per typical serving (40 g) of edible protein of the product. Data are median values.

The conclusion of this study suggested that the farming of salmon is significantly lower in carbon impact compared to other on-land livestock. CO_2e for salmon farming amounted to 0.6 whilst this ranged from 0.88 (chicken) to 5.92 (beef) for the on-land livestock[23].

Key Performance Indicators for SNN

The following Key Performance Indicators (KPIs) will be used to assess SNN's contribution to responsible fish farming:

Category / Subcategory	Indicator	CO_2 intensity avoided vs. chicken	CO_2 intensity avoided vs. pork	CO_2 intensity avoided vs. beef	Contribution to SDG
Eco-efficient and circular economy adapted products, production technologies and processes / Fish Farming	**CO_2 intensity of protein avoided** (g CO_2eq per typical serving (40g))	0.28	0.7	5.32	

[23] Source: The environmental cost of animal source foods, see here

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