



# Atlantic Sapphire ASA Green Finance Second Opinion

October 15, 2020

**Atlantic Sapphire is a salmon aquaculture company with production entirely in closed systems on land.** It owns and operates salmon farms in Denmark and Florida. Proceeds from this framework will be directed to the Florida facilities, which are currently in its first production cycle, and will be scaled up in the coming years.

**Atlantic Sapphire's production in Florida is designed to have no negative impact on the ocean except through the marine ingredients in the feed.** This contrasts with traditional open net-pen farming at sea, which is associated with a range of negative impacts on wild salmon and the local marine environment.

**Land-based salmon farming requires more energy than open net-pen farming.** Given that the majority of electricity supply in Florida is from natural gas, this likely translates into a higher carbon footprint at harvest than for open net-pen farming.

**Airfreight can more than double farmed salmon's carbon footprint of salmon from open net-pens.** Atlantic Sapphire's production in Florida will serve the fast-growing North American market without airfreight. Its product will have a lower carbon footprint at retailer than salmon airfreighted from open net-pen production in Europe or Chile.

**A major part of the carbon footprint of farmed salmon is embodied in the feed.** Atlantic Sapphire limits this impact through a high feed efficiency, low soy content, and innovation regarding the use of novel feed ingredients with the goal of eliminating marine ingredients.

**The company incorporates environmental considerations exhaustively,** also into water use and discharge, processing, packaging, and waste handling.

Based on an assessment of the framework's alignment with the Green Bond and Loan Principles, the project categories and Atlantic Sapphire's governance, Atlantic Sapphire's Green Finance framework receives overall a strong **CICERO Medium Green** shading and a governance score of **Excellent**. The framework contains some Dark Green categories. Atlantic Sapphire's core business concept of land-based production could constitute part of an overall Dark Green solution for the industry if combined with renewable energy used efficiently and fully sustainable feed.

## SHADES OF GREEN

Based on our review, we rate the Atlantic Sapphire's green finance framework **CICERO Medium Green**.

Included in the overall shading is an assessment of the governance structure of the green finance framework. CICERO Shades of Green finds the governance procedures in Atlantic Sapphire's framework to be Excellent.



## GREEN BOND and GREEN LOAN PRINCIPLES

Based on this review, this Framework is found in alignment with the principles.





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# 1 Terms and methodology

This note provides CICERO Shades of Green's (CICERO Green) second opinion of the client's framework dated September 2020. This second opinion remains relevant to all green bonds and/or loans issued under this framework for the duration of three years from publication of this second opinion, as long as the framework remains unchanged. Any amendments or updates to the framework require a revised second opinion. CICERO Green encourages the client to make this second opinion publicly available. If any part of the second opinion is quoted, the full report must be made available.

The second opinion is based on a review of the framework and documentation of the client's policies and processes, as well as information gathered during meetings, teleconferences and email correspondence.

## Expressing concerns with 'shades of green'

CICERO Green second opinions are graded dark green, medium green or light green, reflecting a broad, qualitative review of the climate and environmental risks and ambitions. The shading methodology aims to provide transparency to investors that seek to understand and act upon potential exposure to climate risks and impacts. Investments in all shades of green projects are necessary in order to successfully implement the ambition of the Paris agreement. The shades are intended to communicate the following:

### CICERO Shades of Green



**Dark green** is allocated to projects and solutions that correspond to the long-term vision of a low carbon and climate resilient future. Fossil-fueled technologies that lock in long-term emissions do not qualify for financing. Ideally, exposure to transitional and physical climate risk is considered or mitigated.



**Medium green** is allocated to projects and solutions that represent steps towards the long-term vision, but are not quite there yet. Fossil-fueled technologies that lock in long-term emissions do not qualify for financing. Physical and transition climate risks might be considered.



**Light green** is allocated to projects and solutions that are climate friendly but do not represent or contribute to the long-term vision. These represent necessary and potentially significant short-term GHG emission reductions, but need to be managed to avoid extension of equipment lifetime that can lock-in fossil fuel elements. Projects may be exposed to the physical and transitional climate risk without appropriate strategies in place to protect them.



**Brown** is allocated to projects and solutions that are in opposition to the long-term vision of a low carbon and climate resilient future.

### Examples



Wind energy projects with a strong governance structure that integrates environmental concerns



Bridging technologies such as plug-in hybrid buses



Efficiency investments for fossil fuel technologies where clean alternatives are not available



New infrastructure for coal

Sound governance and transparency processes facilitate delivery of the client's climate and environmental ambitions laid out in the framework. Hence, the governance aspects are carefully considered and reflected in the overall shading of the green finance framework. CICERO Green considers four factors in its review of the client's governance processes: 1) the policies and goals of relevance to the green finance framework; 2) the selection process used to identify and approve eligible projects under the framework, 3) the management of proceeds and 4) the reporting on the projects to investors. Based on these factors, we assign an overall governance grade: Fair, Good or Excellent.



## 2 Brief description of Atlantic Sapphire's green finance framework and related policies

Atlantic Sapphire is pioneering land-based salmon farming. It was founded in 2010 on the idea of transforming salmon farming and bringing the entire value chain of salmon production closer to consumer end-markets. Atlantic Sapphire currently owns and operates land-based Atlantic salmon farms in Hvide Sande, Denmark, and Miami, Florida, USA, and the company has been listed on the Oslo Stock Exchange since May 2020.

The salmon farm in Denmark was the first of its kind when built in 2011 and has since produced over 30 batches of Atlantic salmon. This commercial pilot facility demonstrated the ability to raise Atlantic salmon without the use of net pens in open water, but will not be scaled up. The salmon farm in Miami, Florida, USA is a larger scale farm with an annual production capacity of approximately 9,500 tonnes (HOG) with plans to scale up to 220,000 tonnes (HOG). The first harvest was in September 2020. The location was chosen due to proximity to the market and access to naturally purified water. The US is the world's largest market for salmon. Around 80% of salmon supply in the USA is imported from outside North America, see Table 1.

*Atlantic salmon - supply to US by region*

'000 WFE	2015	2016	2017	2018	2019	2020E
Chile	224	217	220	267	292	296
Canada	93	101	92	91	92	98
Norway	51	56	68	67	67	70
USA	14	8	13	7	9	12
UK	16	13	18	16	22	22
Faroe Islands	15	17	15	13	18	18
Other	15	16	20	21	27	27
<b>Total</b>	<b>428</b>	<b>428</b>	<b>446</b>	<b>483</b>	<b>527</b>	<b>543</b>

Source: [Kontali](#)

Table 1: Salmon supply to the USA by country of origin

### Environmental Strategies and Policies

The company is farming salmon using a technology similar to a greenhouse. The Bluehouse facility is proprietary production technology developed in cooperation with a wide range of supply chain partners to optimize growing conditions for Atlantic salmon. Each Bluehouse contains the facilities needed for a salmon's full growth cycle, from egg hatchery to grow-out tanks to harvest processing. Consolidated operations enable the company to control the entire production cycle without having to transport salmon to and from sea-based net pens. The strategy is to produce near customers, thereby reducing the environmental impacts and costs associated with airfreight transportation.



Atlantic Sapphire's farming operations in Florida will have zero harmful impact on the ocean and its biodiversity except for the utilization of marine feed ingredients. Inside the Bluehouse, the water is continuously purified. The company recycles over 99% of the water. The remainder is discharged as non-toxic wastewater deep into the Floridan aquifer, where it is naturally filtered over thousands of years before returning to the ocean. Of all the water used, under 5% is freshwater and over 95% is saline water, which is not suitable for irrigation or human consumption. There is no risk of water scarcity in either of the locations. The sludge collected is pumped to a sludge treatment system and is then transported to a local waste management facility. According to the company, the fish are free to swim against strong currents, as they do in the wild. Atlantic Sapphire collects data, in collaboration with leading information and biotechnology companies, to analyze fish welfare parameters. Atlantic Sapphire salmon will never have contact with sea lice or be exposed to wild fish diseases. This allows them to grow strong and healthy in a humane way. The company experiences a mortality rate of only around 1% (measured in % of biomass) in their Danish operations when adjusting for one extraordinary mortality event. In comparison, the average mortality rate in Norwegian salmon farming was 16% (measured in no. of fish) in 2019<sup>1</sup>. Reduced mortality and morbidity improve the feed efficiency, thus lowering the carbon footprint of the product. The company has a budget economic feed conversion ratio (eFCR) of 1.05. The historic rate in its Denmark operations has been around 1.2 for a single batch. In comparison, the average for Norwegian aquaculture was 1.32 in 2017<sup>2</sup>. Improving feed efficiency is a priority for the company. Furthermore, by 2024, the target is to process 100% of off-cuts from farmed fish onsite in the US into value-added products to achieve zero waste.

The company works with feed suppliers that source their marine ingredients from producers which fulfill the requirements of MarinTrust (formerly known as IFFO RS) – the international program for marine ingredient certification, in line with the FAO Code of Conduct for Responsible Fisheries. All the soy-based ingredients in the feed have a Proterra or RTRS certification and fully segregated. The company states that it is actively looking into the development of alternative raw materials. They are engaged with feed suppliers and ingredient manufacturers to explore opportunities for using ingredients such as algal oil, insect meal and single cell protein with the goal of eliminating fish oil and fishmeal in the feed. Feed from US operations are sourced from Skretting North America, while feed for Denmark operations are sourced mainly from Skretting Norway, with a smaller and declining share from BioMar. The company states that one reason for choosing Skretting is that this supplier is proactive in taking responsibility for its supply chain.

Excluding transportation, Atlantic Sapphire's Bluehouse production environment requires a higher energy consumption than the production of salmon at sea, and it is one of the company's main priorities to explore, develop and implement solutions to reduce the energy consumption of its operations. Recirculating units and heat exchangers enable the company to maintain steady temperatures in the aquaculture systems. Removing the need for airfreight brings substantial reductions in GHG emissions. The company is currently working with an external consultant on building a GHG footprint model to be able to determine the GHG footprint per kilo of salmon produced.

Atlantic Sapphire adheres to relevant certification schemes and quality standards. Furthermore, Atlantic salmon grown in indoor recirculating tanks worldwide such as its Bluehouses are rated Green – Best Choice by Seafood Watch, and Atlantic Sapphire's Danish salmon is recommended by Ocean Wise.

<sup>1</sup> Norwegian Veterinary Institute, 2020: [https://www.vetinst.no/arrangementer/lansering-av-fiskehelse rapporten-2019/\\_attachment/download/1b341e07-c291-4454-8372-fc3be0584333:c387e4f0db69a3897c2cde8f68f274bafcbf32d2/2%20-%20Bang%20Jensen\\_D%C3%B8delighet.pdf](https://www.vetinst.no/arrangementer/lansering-av-fiskehelse rapporten-2019/_attachment/download/1b341e07-c291-4454-8372-fc3be0584333:c387e4f0db69a3897c2cde8f68f274bafcbf32d2/2%20-%20Bang%20Jensen_D%C3%B8delighet.pdf)

<sup>2</sup> Winther, U., Hognes, E.S., Jafarzadeh, S. & Ziegler, F. (2020). Greenhouse gas emissions of Norwegian seafood production in 2017. SINTEF Ocean AS.



Atlantic Sapphire has plans to begin packaging its salmon in biodegradable packaging as early as this year. By 2021, the outlook increases to about 50% of the projected harvest to be packaged in biodegradable packaging. The long-term goal is to use biodegradable packaging for all its salmon produced in the USA.

Providing an environmental and social solution is central to Atlantic Sapphire's business. In 2019, Atlantic Sapphire joined the UN Global Compact. As a signatory of the UN Global Compact, Atlantic Sapphire commits to implementing the 10 UN Global Compact principles in the areas of human rights, labor, environment and anti-corruption throughout their operations. The company strongly supports the UN Sustainable Development Goals (SDGs). The company has identified eight SDGs, highlighted in its Green Finance Framework, as highest priorities and the areas in which the company is best placed to drive positive change. The company published its first ESG report for 2019, prepared in accordance with the Global Reporting Initiative (GRI) Standards (Core option). It intends to publish ESG reports annually. The company believes ESG factors have material impact on its long-term financial performance. In 2019, it undertook an assessment to determine its key stakeholders and its ESG priorities, disclosure topics, and risk factors. The assessment was guided by GRI Standards, the UN SDGs, the UN Global Compact, and the Sustainability Accounting Standards Board. The company's Environmental and Social Management System aims to ensure that all employees and subcontractors act responsibly regarding climate and environment. In 2019, the company was the first seafood company to receive a green label on its loan from DNB. The corporate offices in Miami are in a certified LEED Gold building.

Atlantic Sapphire has assessed and prepared for the risk of wind and water-related extreme events for its production facilities. The Florida facility is not on a flood zone, as it is located 20 miles from the coast and the site is also locally elevated. The building is designed to withstand high winds. In case of electricity black-out, the facilities have emergency generators. To secure the vital supply of oxygen, this is stored in a highly reinforced compartment. The emergency and response plan also includes procedures in case of disruption to the work force. The temperature of intake water is stable and will not be affected by a heat wave. Cooling needs are designed for the worst-case scenario heat and humidity. The company engaged several consultants on physical climate risk.

### Use of proceeds

An amount equal to net proceeds from Atlantic Sapphire's Green Finance Instruments will be used to finance climate-resilient and resource efficient development in the seafood sector, while also improving fish welfare and reducing negative impact on biodiversity. Net proceeds may be used for the financing of new assets and projects as well as for refinancing purposes, but the company expects 100% of the proceeds in the first transaction to go towards new investments in Bluehouse facilities in the United States.

Green Finance Instruments will not be used to finance investments linked to fossil energy generation, nuclear energy generation, research and/or development within weapons and defense, potentially environmentally negative resource extraction, gambling or tobacco. The company owns emergency diesel generators and some fossil fuel vehicles, but such equipment will not be financed with Green Finance Instruments.

### Selection:

The selection process is a key governance factor to consider in CICERO Green's assessment. CICERO Green typically looks at how climate and environmental considerations are considered when evaluating whether projects can qualify for green finance funding. The broader the project categories, the more importance CICERO Green places on the governance process.

To ensure transparency and accountability around the selection of Green Projects, Atlantic Sapphire has established an internal Green Finance Committee, being responsible for the evaluation and selection process.



The Green Finance Committee consists of its CFO/Finance Director, CTO, Head of People and Sustainability Manager (TBD, if hired) and all decisions will be made in consensus.

Only such assets and projects that comply with the Green Project criteria defined in the Use of Proceeds section of the Framework are eligible to be financed with Green Finance Instruments. The Green Finance Committee will keep a register of all Green Projects, and to ensure transparency and traceability, all decisions made by the committee will be documented and filed.

The Green Finance Committee holds the right to exclude any Green Project already funded by Green Finance Instruments, which is further described below under Management of Proceeds. The committee is also in charge of potential future oversight and updates of this Framework.

The company reports strong local support for its investments in Florida, and the risk of local opposition to projects under this framework appears low.

### Management of proceeds

An amount equal to the net proceeds from issued Green Finance Instruments will be earmarked for eligible projects under the Green Finance Framework. The first transaction is expected to be fully dedicated to Bluehouse facilities, as individual disbursements.

The Finance department of Atlantic Sapphire will endeavor to ensure that the amount of Green Projects at all times exceed the total amount of Green Finance Instruments outstanding. If a Green Project already funded by Green Finance Instruments is sold, or for other reasons loses its eligibility in line with the criteria in this Framework, it will be replaced by another qualifying Green Project if deemed necessary.

An amount equal to net proceeds from Green Finance Instruments awaiting allocation to Green Projects will be managed according to the overall liquidity management policy of Atlantic Sapphire and may be invested in short term money market instruments or held as cash.

The company aims to have the management of proceeds reviewed by an auditor.

### Reporting

Transparency, reporting, and verification of impacts are key to enable investors to follow the implementation of green finance programs. Procedures for reporting and disclosure of green finance investments are also vital to build confidence that green finance is contributing towards a sustainable and climate-friendly future, both among investors and society.

To enable investors and other stakeholders to follow the development of Atlantic Sapphire's issuance of Green Finance Instruments and the Green Projects being funded, a Green Finance Report will be made available on our website. The Green Finance Report will include an Allocation Report and an Impact Report and be published annually as long as there are Green Finance Instruments outstanding. The Finance Department will be in charge of the reporting and they will engage with relevant internal resources with sustainability and reporting responsibilities to compile the report. The plan is to publish the first report together with the next ESG Report in Q2 2021.

The allocation report will include the following information:

- Amounts invested in each of the Green Project categories defined in this Green Finance Framework and the share of new financing versus refinancing.
- Examples of Green Projects that have been funded by Green Finance Instruments.
- The nominal amount of Green Finance Instruments outstanding, split into Green Bonds and Green Loans.
- The amount of net proceeds awaiting allocation to Green Projects (if any).



The company aims to have the allocation report reviewed by an external auditor.

The impact reporting aims to disclose the environmental impact of the Green Projects financed under this Green Finance Framework. Impact reporting will, to some extent, be aggregated and depending on data availability, calculations will be made on a best intention basis. The impact assessment will, where applicable and feasible, be based on the metrics listed below.

#### *Environmentally Sustainable Aquaculture*

- CO<sub>2</sub>e emissions per kilo of salmon produced in our Bluehouse facilities, provided by an external consultant
- Share of packaging based on recycled and biodegradable material.
- Number of escape, disease and parasite events.
- Mortality rate.
- Protein yield per acre of land.
- Feed conversion ratio.

#### *Renewable Energy*

- Share of renewable energy used at our Bluehouse facilities.
- Renewable energy generation capacity.
- Actual energy generation from renewable energy sources.

#### *Energy Efficiency*

- Annual reduction in energy consumption.

#### *Waste Management*

- Volume of sludge converted into resources such as agriculture fertilizers, soil amendment and biogas energy.
- Share of by-products being converted into value-added products for human (and animal) consumption.



### 3 Assessment of Atlantic Sapphire’s green finance framework and policies

The framework and procedures for Atlantic Sapphire’s green bond investments are assessed and their strengths and weaknesses are discussed in this section. The strengths of an investment framework with respect to environmental impact are areas where it clearly supports low-carbon projects; weaknesses are typically areas that are unclear or too general. Pitfalls are also raised in this section to note areas where Atlantic Sapphire should be aware of potential macro-level impacts of investment projects.

#### Overall shading

Based on the project category shadings detailed below, and consideration of environmental ambitions and governance structure reflected in Atlantic Sapphire’s green finance framework, we rate the framework **CICERO Medium Green**.

#### Eligible projects under the Atlantic Sapphire’s green finance framework

At the basic level, the selection of eligible project categories is the primary mechanism to ensure that projects deliver environmental benefits. Through selection of project categories with clear environmental benefits, green bonds aim to provide investors with certainty that their investments deliver environmental returns as well as financial returns. The Green Bonds Principles (GBP) state that the “overall environmental profile” of a project should be assessed and that the selection process should be “well defined”.

Category	Eligible project types	Green Shading and some concerns
Environmentally sustainable aquaculture  	<ul style="list-style-type: none"> <li>• <b>Bluehouse facilities:</b> Construction, development, maintenance and improvements of Bluehouse salmon farming facilities using RAS technology with over 99% recirculation of the intake water.</li> <li>• <b>Feed procurement:</b> Procurement of feed where 100% of marine ingredients are certified under the MarinTrust standard and where 100% of soy ingredients are certified according to the sustainability standards Proterra or Round Table on Responsible Soy, using the segregation model to ensure segregation of certified and non-certified soy.</li> <li>• <b>Packaging:</b> Packaging based on recycled or biodegradable material.</li> <li>• <b>Research and development:</b> R&amp;D aimed at improving fish welfare, more efficient production and lower use of scarce</li> </ul>	<p><b>Medium to Dark Green</b></p> <p><b>Bluehouse facilities</b></p> <ul style="list-style-type: none"> <li>✓ Open net-pen salmon farming is associated with several environmental problems that the Bluehouse facilities avoid (see Strengths).</li> <li>✓ The technology also allows production to take place close to the market, eliminating the need for airfreight.</li> <li>✓ The Florida aquifers facilitate a sustainable water supply and discharge.</li> <li>✓ Electricity intensity is much higher than for open net-pen production, and</li> </ul>



resources, utilizing all by-products optimally (sludge, guts and off-cuts), finding new sustainable feed ingredients, improved resource efficiency through feed customized for RAS and new sustainable packaging solutions.

accounts for the majority of the final product's carbon footprint.

- ✓ The carbon footprint *at harvest* is expected to be higher than for salmon produced in open net-pens, but *at wholesaler*, it is expected to be lower than that of salmon from open net-pens in Europe or Chile that is airfreighted to the USA. See Background.
- ✓ The Bluehouse facilities would be considered a Dark Green solution if powered by renewable energy.

#### **Feed**

- ✓ MarineTrust is an independent audit and certification body for marine ingredients. They require whole fish inputs to come from well-managed fisheries. By-products must not come from threatened species or illegal, unreported or unregulated fisheries.
- ✓ There is a climate risk regarding aquaculture in that soy used for feed may drive up demand for deforestation.
- ✓ The criterion for ProTerra or equivalent certification ensures that the soy is not grown on recently deforested areas.
- ✓ A problem with all certification schemes is that major soy producers currently only certify a small share of their production, while the rest may contribute to deforestation.
- ✓ We note that the Atlantic Sapphire uses a low proportion of soy protein concentrate (currently around 5%) compared with the average for Norwegian aquaculture (20.5% in 2017). Feed efficiency is also higher than in open net-pen production. See Background.
- ✓ The R&D activities aimed at finding new sustainable feed ingredients and improving feed efficiency will further contribute to reducing the environmental and climate footprint



of the company's feed use.

Renewable  
energy



- Construction, installation, maintenance, acquisition or improvements of renewable energy installations, such as wind and solar, as well as other solutions to increase the use of renewable energy sources such as battery packs.

**Dark Green**

- ✓ Increasing the share of renewable energy production is effective in reducing the total GHG emissions associated with Atlantic Sapphire's production, and are part of a long-term low-carbon solution.

Energy efficiency



Energy-efficiency improvements in e.g. heating, cooling, lighting, appliances, equipment and building design, with a minimum of 30% improvement in energy use or carbon emissions in the targeted area.

**Medium Green**

- ✓ Improving energy efficiency is effective in reducing the total GHG emissions associated with Atlantic Sapphire's production.

Waste  
Management



- Technology and solutions to convert sludge generated in Bluehouse facilities into resources such as agriculture fertilizers, soil amendment and biogas energy.
- Waste management solutions that enable the reduction, recycle and reuse of waste, including but not limited to, biological waste and plastics, promoting a high recycling rate and a reduced need for virgin raw materials.
- Develop a solution to fully utilize all by-products from the salmon processing to produce value-added products for human consumption and closing the loop on creating zero waste from production.

**Dark Green**

- ✓ Converting waste to resources and reducing the need for virgin raw materials are important elements of a low-carbon future-

Table 2. Eligible project categories

**Background**

**GHG emissions from the Bluehouse facilities in Florida vs. open net-pen farming**

The carbon footprint of farmed salmon is largely made up of three components: feed ingredients, energy use in production, and transport of the final product. Compared with open net-pen aquaculture, land-based production reduces emissions embodied in feed ingredients and transport, while increasing energy consumption. Whether land-based production has a lower carbon footprint than that of land-based open-net pen aquaculture is thus largely determined by the following factors:



- Whether the land-based product replaces an airfreighted product
- The improvement in feed conversion ratio
- The proportion of soy in the feed used in the two alternatives
- Electricity intensity
- GHG emissions factor of electricity

A recent study by SINTEF<sup>3</sup> estimates that the average carbon footprint *at harvest* of salmon farmed in Norway is approximately 7 kg CO<sub>2e</sub>/kg edible salmon. Feed ingredients account for around 90% of this figure, and land-use change alone accounts for 28%, the vast majority due to soy from Brazil which is linked to deforestation. Energy use is thus a minor contributor. The estimate is based on an eFCR of 1.32 and feed containing 20.5% soy protein concentrate from Brazil, which were average figures in Norway in 2017.

For land-based production, the same report estimates a carbon footprint at harvest of 13 kg CO<sub>2e</sub>/kg edible salmon, of which energy use constitutes the majority. This estimate is based on an eFCR of 1, electricity intensity of 10 kWh/kg liveweight salmon, a grid factor of 0.42 kg CO<sub>2e</sub>/kWh (average European production), and the same soy content as above. By comparing these assumptions with information provided by Atlantic Sapphire, we expect that the carbon footprint *at harvest* in their production in the USA will be slightly lower than this estimate, while higher than the estimate for salmon from open net-pens in Norway. The company informs us that its electricity intensity in Florida is around 8 kWh/kg. Based on information provided by its electricity supplier (see Table 3), we estimate the grid factor for 2020 to be 0.36 kg CO<sub>2e</sub>/kWh. These figures are both slightly below the assumptions used by SINTEF (see above). The company informs us that the target eFCR in Florida is 1.05. The soy content of its feed is significantly lower than the average in Norwegian aquaculture: the company informs us that the weighted average so far this year has been 5.2%. Fish feed in North America contains less soy than in Europe because by-products from poultry production are used as a protein source. While we have not seen estimates of the GHG emissions embodied in this product, we assume it is lower than that of soy protein concentrate.

Electricity source	2020 Forecasted Electricity Generation Mix (Florida Power and Light)	CO <sub>2e</sub> /kWh
Natural Gas	72%	0.483 (IPCC 2018) <sup>4</sup>
Nuclear	23%	0
Solar	4%	0
Coal	1%	0.961 (IPCC 2018)

Table 3: GHG intensity of electricity supply in Florida

Airfreight of salmon from Norway to New York is estimated to result in 7.5kg CO<sub>2</sub>/kg salmon, thus more than doubling the final product’s footprint. Airfreight from Chile to New York gives an even higher figure close to 11 kg<sup>5</sup> (Nordea 2019). There has been a large increase in airfreight of Norwegian salmon in recent years, particularly to the USA and Asia. Transport by road or sea is much less emissions intense, typically adding only around 1 kg to the product’s footprint.

<sup>3</sup> Winther et al. 2020. Greenhouse gas emissions of Norwegian seafood production in 2017. SINTEF Ocean AS.

<sup>4</sup> IPCC 2018. [https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc\\_wg3\\_ar5\\_annex-ii.pdf](https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_annex-ii.pdf)

<sup>5</sup> Nordea Markets, Sector Report Seafood 17 October 2019



Land-based production involves higher emissions from construction of production facilities than open-net pen farming. A study<sup>6</sup> finds that this adds 0.39kg CO<sub>2</sub> to the carbon footprint of salmon farmed on land and 0.02kg CO<sub>2</sub> in the case of open net-pen farming. In both cases, this is a minor part of the total footprint.

To sum up these different elements of the carbon footprint, we see Atlantic Sapphire's product as a low-carbon option compared with salmon farmed in open net pens in Europe or Chile and airfreighted to the US. However, the increased energy requirement translates into a higher carbon footprint than for salmon from open net-pens in North America, and for frozen salmon from Europe transported by ship to the US (although frozen salmon is not a perfect substitute for fresh salmon).

### **GHG emissions of farmed salmon vs. meat**

The carbon footprint of salmon farmed in open net-pens is around 80% lower than that of beef, slightly lower than that of pork, but higher than that of chicken, according to a recent report by the Norwegian research institute SINTEF (Winther et al 2020). Its footprint is higher than that of all other Norwegian seafood products assessed in the report. Notably, these comparisons exclude emissions from land-use change (deforestation).

### **Certification of soy protein concentrate**

Soy purchased under this framework must be certified by the Roundtable for Responsible Soy (RTRS) or ProTerra. For a property to be RTRS certified, no native forests have been cleared or converted later than May 2009. Stricter rules apply for land conversions later than June 2016, after which no conversion of natural land can have taken place. RTRS offers two alternative soy certificates. The strictest alternative (Segregation), which is required under this framework, ensures that the soy from certified properties is kept physically separate from soy from non-certified properties. For ProTerra certification, areas of native vegetation cannot have been cleared or converted after 2008. A comparison with RTRS finds that it has stricter criteria in many areas, but is weaker on transparency<sup>7</sup>. ProTerra does not allow physical mixing. Most SPC imported to Norway is ProTerra certified. A problem with all certification schemes is that major soy producers currently only certify a small share of their production, while the rest may contribute to deforestation. Demand for soy from Brazil, even if certified, risks displacing non-certified production to new agricultural areas. The SINTEF report does not distinguish between certified and non-certified soy, because it is currently not possible to quantify the differences in a reliable way.

### **Governance Assessment**

Four aspects are studied when assessing the Atlantic Sapphire's governance procedures: 1) the policies and goals of relevance to the green bond framework; 2) the selection process used to identify eligible projects under the framework; 3) the management of proceeds; and 4) the reporting on the projects to investors. Based on these aspects, an overall grading is given on governance strength falling into one of three classes: Fair, Good or Excellent. Please note this is not a substitute for a full evaluation of the governance of the issuing institution, and does not cover, e.g., corruption.

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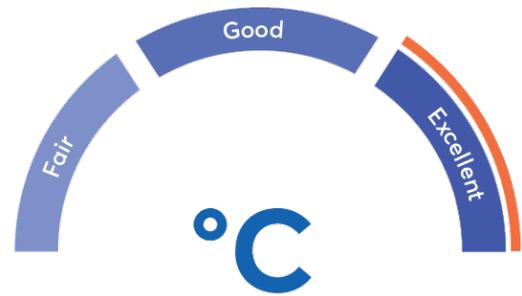
<sup>6</sup> Liu, Y. et al 2016. Comparative economic performance and carbon footprint of two farming models for producing Atlantic salmon (*Salmo salar*): Land-based closed containment system in freshwater and open net pen in seawater. *Aquacultural Engineering* 71: 1-12.

<sup>7</sup> Regnskogsfondet og Framtiden i Våre Hender 2017. Fra brasiliansk jord til norske middagsbord. En rapport om soya i norsk laksefôr.



As a pioneering company in land-based salmon aquaculture, Atlantic Sapphire's core business directly addresses two of the main environmental concerns about salmon farming: the impacts on the local marine environment and the use of airfreight. Environmental considerations seem well integrated into core operations. The company is proactive in limiting its environmental impact in terms of water use and discharge, feed use, packaging, transport, and waste handling. It has recently become a member of the UN Global Compact and started reporting in accordance with GRI Standards. It conducted an ESG assessment in 2019 has commissioned an assessment of its GHG emissions expected later this year.

Atlantic Sapphire has established a green finance committee that consists of members from our CFO/Finance Director, CTO, Head of People and Sustainability Manager (TBD, if hired) and that decides by consensus. The company commits to report on several indicators, on a project-by-project level. GHG emissions reporting will be based on an assessment by an external consultant. The overall assessment of Atlantic Sapphire's governance structure and processes gives it a rating of Excellent.



### Strengths

Open net-pen aquaculture causes a range of local environmental problems, which the Bluehouse technology will avoid:

- Fish escapes pose a serious threat to wild salmon stocks, as the farmed fish modify the gene pool and outcompete local species.
- The high concentration of salmon in open net-pens allows sea lice to thrive, which also pose a threat to wild salmon stocks.
- Chemicals used for delousing may negatively affect wild species such as cod and shrimp, and thus coastal fisheries.
- Effluents and waste negatively affect life on the seabed around fish farms.
- Medicines can kill shrimp and other crustaceans.
- Copper used in antifouling paint for fish farm installations is a toxin polluting the local marine environment.

Atlantic Sapphire will serve the growing North American market without the need for airfreight. This implies a lower total carbon footprint than salmon airfreighted from open net-pen production in Europe or Chile.

The shelf-life of salmon produced in the Danish Bluehouse facilities has been documented to be 26 days by an external consultant, compared to an industry average of around 14 days, the company informs. Longer shelf life is expected to reduce food waste among retailers and consumers, which is an important element in limiting GHG emissions in food supply chains.

Avoiding airfreight also reduces the need for packaging during transport, the company informs. In addition, the company is beginning to use biodegradable packaging in its Florida facilities, with the long-term goal of using only biodegradable packaging.

Atlantic Sapphire has chosen a main feed supplier – Skretting – who is committed to contribute to the development of an industry-based solution to reduce deforestation associated with the primary production of



crops. It is a member of the ‘Aquaculture Dialogue on Sustainable Soy Sourcing from Brazil’, a roundtable created to address the increased scrutiny around Brazilian agriculture practices and deforestation.

### **Weaknesses**

The drawback to land-based salmon aquaculture relative to open net-pen farming is the increase in energy use. The electricity supply in Florida is predominantly natural gas. This implies that, measured at harvest, the product has a higher carbon footprint than salmon from open net-pens (see Background).

Regarding other environmental issues, we see no weaknesses in this Framework.

### **Pitfalls**

As the technology is novel and the Florida Bluehouse facilities are to be significantly scaled up, there is a risk that electricity and feed efficiency will not meet the company’s targets, which would imply higher total GHG emissions than expected.



# Appendix 1: Referenced Documents List

Document Number	Document Name	Description
1	Green Finance Framework 03102020	
2	Presentation Carnegie Virtual Landbased Fishfarming Seminar – 24 September 2020	
3	Atlantic Sapphire ESG Report 2019	
4		
5		
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## Appendix 2: About CICERO Shades of Green

CICERO Green is a subsidiary of the climate research institute CICERO. CICERO is Norway's foremost institute for interdisciplinary climate research. We deliver new insight that helps solve the climate challenge and strengthen international cooperation. CICERO has garnered attention for its work on the effects of manmade emissions on the climate and has played an active role in the UN's IPCC since 1995. CICERO staff provide quality control and methodological development for CICERO Green.

CICERO Green provides second opinions on institutions' frameworks and guidance for assessing and selecting eligible projects for green bond investments. CICERO Green is internationally recognized as a leading provider of independent reviews of green bonds, since the market's inception in 2008. CICERO Green is independent of the entity issuing the bond, its directors, senior management and advisers, and is remunerated in a way that prevents any conflicts of interests arising as a result of the fee structure. CICERO Green operates independently from the financial sector and other stakeholders to preserve the unbiased nature and high quality of second opinions.

We work with both international and domestic issuers, drawing on the global expertise of the Expert Network on Second Opinions (ENSO). Led by CICERO Green, ENSO contributes expertise to the second opinions, and is comprised of a network of trusted, independent research institutions and reputable experts on climate change and other environmental issues, including the Basque Center for Climate Change (BC3), the Stockholm Environment Institute, the Institute of Energy, Environment and Economy at Tsinghua University and the International Institute for Sustainable Development (IISD).

