



# Swedavia

## Green Bond Second Opinion

September 26, 2019

**Swedavia is a fully state-owned company headquartered at Stockholm Arlanda Airport and 100% owned by the Swedish state.** It is owning, operating and developing ten airports in Sweden and conducts real estate operations.

**CICERO Green views efficiency improvements of the airport and aviation industry as necessary step to reach the well below 2°C target,** in addition to alternative fuels, electrification, and alternative transport modes. Proceeds can be used for investments in the project categories **green buildings, energy efficiency, renewable energy, pollution prevention and control and clean transportation.** These investments support Swedavia's goal of zero-emissions from own operations by 2020. Swedavia is member of several research projects with the objective to move toward zero-carbon air travel. By providing biofuels already now (currently only provided by very few airports globally), a 5% goal for its biofuel supply share in 2025 and by investing into a zero-carbon fleet including heavy on-road transport and machinery under this framework, Swedavia acts as a role model for other airports globally.

**Investors should, however, be aware that this green bond framework allows for direct investments into capacity increasing airport infrastructure, including a new pier at Stockholm Arlanda Airport.** According to the issuer, total emissions of the airport as well as of all domestic and international flights excluding uptake of biofuel and electrification will remain constant or decrease slightly by 2038 due to fuel efficiency improvements. Investors should be aware of the significant risk of lock-in of emissions due to potential under-supply of biofuels in the future as well as rebound-effects due to under-performing fuel-efficiency improvements or a larger passenger increase. Due to these risks the building category is rated Light Green. While the building-specific criteria (such as certification, resilience and energy efficiency etc.) would qualify in isolation for a Medium Green rating, the buildings will support increased air travel. In particular long-haul flights generate significant emissions. Depending on the methodology used, a round-trip flight from London to New York could generate a higher climate impact than annual average per person heating emissions in the EU. The climate impact estimations vary due to other climate effects such as radiative forcing that could lead to multiple times of the CO<sub>2</sub> effect.

After an overall assessment of all project categories as well as governance, Swedavia's green bond framework receives a **CICERO Light Green** shading and a governance score of **Excellent**. The framework would benefit from excluding direct investments in capacity increasing infrastructure of the airport. In addition, Swedavia could systematically address total emissions from international and national flights to and from its airports. Swedavia could also implement specific targets regarding low-carbon transportation to and from the airport (e.g., parking, charging infrastructure etc.) and more rigorous long-term biofuel strategies.

### SHADES OF GREEN

Based on our review, we rate Swedavia's green bond framework **CICERO Light Green**.

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



### GREEN BOND 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, 2019**. 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 issuer's policies and processes, as well as information gathered during meetings, teleconferences and email correspondence with the issuer. Second opinions are restricted to an evaluation of the mechanisms or framework for selecting eligible projects at a general level. CICERO Green is not responsible for an institution's implementation of a framework, nor does it guarantee or certify the climate effects of investments in eligible projects.

## 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 bond 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 bond 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 Swedavia's Green Bond Framework and related policies

Swedavia is a fully state-owned company headquartered at Stockholm Arlanda Airport and 100% owned by the Swedish state. It is owning, operating and developing ten airports in Sweden and conducts real estate operations. With more than 3,200 employees it served 42 million customers in 2018 alone. The company is currently investing SEK 35.1 billion between 2016 and 2025 in airport development, mainly in capacity improvements at Stockholm Arlanda Airport.

### **Environmental Strategies and Policies:**

The issuer aims to achieve zero emissions from own operations in 2020. In terms of overall emissions associated with the airport, Swedavia's emissions from own operations are less than 1% of the emissions of ground transport to and from the airport and less than 0.5% of emissions caused by landing and take-off at the airports. Currently, 95% of Swedavia's emissions from own operations are caused by Swedavia's vehicle fleet. Swedavia also purchases clean development mechanism (CDM) certificates for Scope 1 and Scope 2 emissions and for business trips. Emission accounting is reviewed by an external auditor. According to Swedavia, in 2018, CDM certificates equivalent to 3ktCO<sub>2</sub> have been purchased – this is expected to decrease in the future. In 2018, emissions have decreased by 31% compared to 2017 and by 84% compared to 2005.

In 2018, Swedavia set a target of 5% sustainable aviation fuel (SAF) that is used at all Swedish airports in 2025. This is to support the Swedish goal to have Swedish domestic air transport to be fossil-free by 2030 and all Swedish domestic and international air travel to be fossil free by 2045. Swedavia does not have any own specific reduction targets regarding amount of total emissions of flights from and to Swedavia airports but is in the process of developing these targets according to the issuer. Currently, Swedavia supplies 450t of jet biofuel annually. According to Swedavia, the jet biofuel is currently sourced from cooking oil from the USA and Finland. Swedavia is a member of the 2030 Secretariat, which works toward a fossil-free vehicle fleet in 2030 and co-initiator of an innovation cluster "Fossil-free Aviation 2045" in collaboration with SAS and RISE. In addition, Swedavia is member of the research project ELISE for electrical air transport in Sweden.

The company's development program requires new buildings' energy performance to be at least 25% better than current regulations, wood products only from certified forest and construction materials according to criteria of the Building Materials Assessment. For Swedavia's two biggest airports, assessment of climate change effects such as the impact of temperature, precipitation and wind changes on water flow, icing and maintenance are conducted. Swedavia informed us it currently does not comply with TCFD, but are following some of the recommendations.

Swedavia has an environmental and energy policy in place that is reviewed annually in conjunction with the management's review of Swedavia's environmental work and decided by the board of directors. In addition, Swedavia's Code of Conduct sets environmental requirements for suppliers. According to the issuer, all rental/leases/security agreements are required to contribute to Swedavia's overall environmental targets. Swedavia supports the responsible business principles of UN's Global compact, complies with the environmental management system standard ISO 14001:2015, the energy management system standard ISO 50001:2011 and achieved the highest level of Airport Carbon Accreditation standard for climate work.



### Use of proceeds:

According to the green bond framework, proceeds will be used to finance or refinance assets that fall in the environmental areas included in Swedavia's green bond framework. Eligible green assets are included in the following Green Bond Principles' categories: green buildings; energy efficiency; renewable energy; pollution prevention and control; and clean transportation. At the first transaction the main share of the investments will likely consist of green buildings and smaller shares will be in the other categories.

Swedavia estimates the majority of the first transaction to be allocated to financing of new projects. New projects are defined as projects that have been taken into use during the previous 12 months at the time of the approval by the Green Bond Committee.

Green buildings can be financed at airports as well as within Swedavia's real estate activities. New airport buildings such as new terminals/piers are eligible under this framework as long as they achieve a certain building certification level (see Table 1 for details). These new terminals/piers can be for domestic and international flights. Swedavia informed us that except for the new pier at Stockholm Arlanda Airport no other capacity increasing infrastructure is currently planned. In case of potential capacity increasing infrastructure investments that can lead to more than 350,000 additional aircraft movements, Swedavia is obliged to obtain third party calculations for permissions applications to the Environmental Court.

According to the issuer, direct investments in fossil fuel infrastructure are excluded under this framework. In addition, Swedavia does not operate airplanes.

According to Swedavia, green bond proceeds will be allocated to electrify Swedavia's vehicle fleet which currently is responsible for most of Swedavia's emissions from operations. This fleet includes all modes of transport at the airport, such as cars, busses, tractors, trucks and snowplows.

### 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 bond funding. The broader the project categories, the more importance CICERO Green places on the governance process.

Eligible green assets will be selected by a dedicated selection group consisting of senior management members including CEO, CFO and sustainability experts. Decisions will be made in consensus. The in-house sustainability experts set policy guidelines and function as advisors and to some extent monitoring and controlling. The Treasury Department keeps a list of eligible green assets. The list is reviewed at least annually during the term of the green bond to ensure allocation of proceeds. Swedavia monitors each asset individually when the list is reviewed. If Swedavia finds that an approved project no longer qualifies, it will be removed from the list.

According to the issuer, the selection process includes an energy- and environmental assessment. External experts are included in in-depth analysis for projects that require an environmental permit or application.

The issuer confirmed, that Swedavia has its own environment/sustainability building guidelines, requirements towards suppliers and some climate resilience considerations.



### **Management of proceeds:**

CICERO Green finds the management of proceeds of Swedavia to be in accordance with the Green Bond Principles. Net proceeds will be credited to a dedicated sub-account and tracked in an appropriate manner. The green bond will not be linked directly to one or more pre-determined eligible green assets. Swedavia will ensure that the portfolio of eligible green assets exceeds the amount of net proceeds.

Any unallocated proceeds will be held in Swedavia's liquidity reserve and managed according to Swedavia's treasury policy which allows for treasury bills, commercial papers and bank deposits.

### **Reporting:**

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

Swedavia will report to investors and other market stakeholders on an annual basis as long as green bonds are outstanding. This report will be made public on Swedavia's website and includes reporting on use of proceeds and impact reporting. The issuer informed us that impact reporting will be conducted on portfolio basis and on asset level depending on the assets. The treasury department will be responsible for the reporting in close cooperation with the environmental department and other internal stakeholders according to the issuer.

The use of proceeds reporting will include total amount of green bonds issued, total amount of unallocated proceeds, share of proceeds used for financing/refinancing as well as share of proceeds allocated to respective categories (see table 1) and a list of eligible green assets incl. allocated and disbursed amounts.

The impact reporting will include indicators for all categories, such as reduced/avoided emissions, energy performance, energy savings, renewable energy generation, amounts of waste reduced/avoided/recycled/sourced sustainably or number of clean vehicles deployed or share of renewable fuel. Swedavia will report at least on one of the impact indicators per category and on more or all if possible. The methodology of calculating impacts will be disclosed in the reporting.

The use of proceeds reporting will be subject to external review.



### 3 Assessment of Swedavia’s Green Bond Framework and policies

The framework and procedures for Swedavia 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 issuers 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 Swedavia’s Green Bond Framework, we rate the framework **CICERO Light Green**.

#### Eligible projects under the Swedavia Green Bond 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
Green buildings and infrastructure	<p>All new, refurbished, acquired or existing buildings or investments in infrastructure that either have or will receive at least one ✓ of the following criteria:</p> <p>Green Buildings:</p> <ul style="list-style-type: none"> <li>• BREEAM Very Good, BREEAM-In-Use Very Good, LEED Gold, Miljöbyggnad Silver or Passive House (Sw. Passivhus)</li> <li>• Energy performance certificate (EPC) of class A or B ✓</li> <li>• Where refurbishments have been or will be made reducing energy consumption by at least 25%</li> </ul> <p>Green Infrastructure:</p>	<p>All criteria for this category (such as certification, resilience and energy efficiency etc.) comply with a Medium Green rating. However, new buildings at airports can lead to capacity increase of passengers and associated significant risks of rebound effects in total emission increase through air travel. Due to these rebound effects this category is rated Light Green.</p> <p>Voluntary environmental certifications can measure or estimate the environmental footprint of buildings and raise awareness of environmental issues. However, they fall short of guaranteeing an environmentally-friendly</p>





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- CEEQUAL certification Excellent
    - building, reduction in GHG emissions and considerations of resiliency
    - ✓ Swedavia requires new buildings to be at least 25% more energy efficient than regulations
    - ✓ According to the IEA, new buildings should already now be constructed with passive and plus house technologies
    - ✓ According to the IEA at least 30% energy efficiency improvement are necessary for refurbishments
    - ✓ Parking infrastructure for cars is excluded according to the issuer
    - ✓ Construction projects can have potential negative local environmental impacts.
    - ✓ According to the issuer, no fossil fuels are used and requirements regarding building materials are in place.
    - ✓ Green infrastructure can include maintenance areas which can include security control, garage and staff buildings.

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Energy efficiency Energy retrofits such as the usage of LED **Dark Green**



lighting, switching to more energy-efficient ventilation units, extension of district heating and cooling systems etc.

- ✓ Energy efficiency investments are key to reducing emissions.
- ✓ Swedavia confirmed district heating is fossil free
- ✓ Fossil fuel efficiency improvements are excluded
- ✓ Should consider the potential of rebound effects for energy consumption

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Renewable energy Onsite renewable energy such as solar panels that generate electricity or geothermal energy installations



**Dark Green**

- ✓ Solar is key to a low-carbon transition
- ✓ Land-use issues may arise from building solar plants and negative impacts on biodiversity might arise
- ✓ Potential concerns regarding supply-chain emissions of energy generation technology (e.g., solar panels)
- ✓ Consider potential emissions and climate resilience for geothermal projects



		✓ All construction projects can have adverse local environmental impacts
Pollution prevention and control	Investments in waste recycling, waste minimization and energy/emission efficient waste management	<b>Dark Green</b> <ul style="list-style-type: none"> <li>✓ Waste and waste water recycling is key for a climate resilient future and a circular economy</li> <li>✓ This category includes treatment facilities of wastewater that contains monopropylene glycol, which is used for de-icing of airplanes</li> <li>✓ Swedavia has a zero-landfill policy</li> </ul>
Clean transportation	<ul style="list-style-type: none"> <li>• Investments in vehicles that run on renewable fuels, such as electricity, biofuel and synthetic diesel (HVO)</li> <li>• Investments in infrastructure enabling clean transportation, such as charging stations for electric vehicles</li> </ul>	<b>Dark Green</b> <ul style="list-style-type: none"> <li>✓ Electric vehicles and other zero emission solutions qualify as dark green</li> <li>✓ Electric cars contribute to the transition to a low-carbon society. However, be aware of the electricity grid emissions.</li> <li>✓ Heavy vehicles running on HVO are considered dark green if biofuel is sourced sustainably. Be aware of life cycle emissions and broader impacts on biodiversity and the environment</li> <li>✓ Hybrid vehicles are excluded</li> </ul>

Table 1. Eligible project categories

## Background

Sweden aims to be fossil-free by 2045 – including the aviation industry. The aviation industry accounts for more than 2% of the global and 3% of the EU's<sup>1</sup> and 5% of Sweden's total GHG emissions. The International Air Transport Association (IATA) has committed to the target to reduce net aviation CO<sub>2</sub> emissions by 50% by 2050, compared to 2005, and carbon-neutral growth from 2020<sup>2</sup>. In particular long haul flights generate significant emissions. Depending on the methodology used (e.g., 0.67tCO<sub>2</sub>e<sup>3</sup>, 1.8tCO<sub>2</sub>e<sup>4</sup> or 2.7tCO<sub>2</sub>e<sup>5</sup>), a round-trip flight from London to New York could generate more climate impact than annual average per person heating emissions in the EU (1.77tCO<sub>2</sub>e<sup>6</sup>). The climate impact estimations vary due to other climate effects such as radiative forcing and could lead to multiple times of the CO<sub>2</sub> effect.<sup>7,8</sup> Sustainable Aviation Fuels (SAF), e.g., biofuels, are urgently

<sup>1</sup> [https://ec.europa.eu/clima/policies/transport/aviation\\_en](https://ec.europa.eu/clima/policies/transport/aviation_en)

<sup>2</sup> <https://www.iata.org/publications/tracker/june-2018/Pages/corsia.aspx>

<sup>3</sup> <https://www.icao.int/environmental-protection/carbonoffset/pages/default.aspx>

<sup>4</sup> [https://co2.myclimate.org/en/portfolios?calculation\\_id=2427756](https://co2.myclimate.org/en/portfolios?calculation_id=2427756)

<sup>5</sup> <https://www.atmosfair.de/en/offset/flight>

<sup>6</sup> <https://ec.europa.eu/eurostat/statistics-explained/pdfscache/30599.pdf>

<sup>7</sup> [https://ec.europa.eu/clima/policies/transport/aviation\\_en](https://ec.europa.eu/clima/policies/transport/aviation_en)

<sup>8</sup> <https://www.carbonbrief.org/explainer-challenge-tackling-aviations-non-co2-emissions>



needed to reduce the industry's carbon emissions. According to the IEA's data, aviation biofuel accounted for only 0.1% of total aviation fuel consumption in 2018. In order to provide 2% of annual jet fuel with sustainable aviation fuel (SAF), about USD 10 billion for approximately 20 refineries would be needed compared to currently USD 60 billion in fossil fuel refineries only in 2017<sup>9</sup>. The IEA's Sustainable Development Scenario (SDS)<sup>10</sup> sees the share of aviation biofuel rise to 10% by 2030 and to 20% by 2040<sup>9</sup>. A recent report submitted to the Swedish government<sup>11</sup> suggests reductions in emissions in the aviation industry with gradually increasing annual reduction level from 0.8% in 2021 to 27% in 2030 and 100% sustainable aviation fuel by 2045. Currently, only very few airports offer biofuel regularly, e.g., Bergen, Oslo and Swedavia's Stockholm Arlanda Airport.

The IEA's Sustainable Development Scenario (SDS) requires an energy efficiency improvement of more than 3% per year to 2040 compared to an average annual improvement rate of 3.2% between 2000 and 2014 and less than 1% between 2014 and 2016.<sup>12</sup> At the same time, global aviation activity grew by 140% since 2000 and by 6.1% in 2018.

Emissions from airports itself are much lower than from aviation in general, but crucial activities to be decarbonized include transport and the buildings. Global transport emissions grew by 0.6% in 2017 (compared to 1.7% annually over the past decade), as efficiency improvements, electrification helped limit the growth in energy demand. To meet the 2°C target goals, however, direct transport emissions must peak around 2020 and then fall by more than 9% by 2030.<sup>13</sup> The largest amount of carbon savings come from switching from inefficient modes of transport (e.g., private cars) to mass transit.<sup>14</sup> However, over the last ten years, emissions from airports have been relatively stable while passenger number increased by 40%.<sup>15</sup>

CICERO Green's Light Green shading is allocated to vital efficiency improvements in the fossil fuel related infrastructure particularly in sectors that are difficult to decarbonize. Despite the fact that the projects might be exposed to the risk of lock-in of emissions, CICERO Green views efficiency improvements as necessary to reach the well below 2°C target. The aviation industry including its supporting infrastructure is an example where no alternatives yet have proven to be commercially viable on full scale. Investments into efficiency and infrastructure increasing airport capacity on a carbon neutral growth pathway or slight decrease in emissions pathway can therefore constitute a short-term solution, but is not sufficient to move to a low-carbon and climate resilient future in 2050.

### Governance Assessment

Four aspects are studied when assessing Swedavia'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.

<sup>9</sup> <https://www.iea.org/newsroom/news/2019/march/are-aviation-biofuels-ready-for-take-off.html>

<sup>10</sup> <https://www.iea.org/weo2018/>

<sup>11</sup> <https://www.regeringen.se/493238/contentassets/6d591e58fd9b4cad8171af2cd7e59f6f/biojet-for-flyget-sou-201911>

<sup>12</sup> <https://www.iea.org/tcep/transport/aviation/>

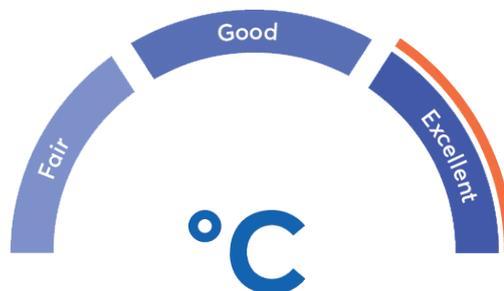
<sup>13</sup> <http://www.iea.org/tcep/transport/>

<sup>14</sup> [https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc\\_wg3\\_ar5\\_chapter8.pdf](https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_chapter8.pdf)

<sup>15</sup> [https://www.transportstyrelsen.se/globalassets/global/luftfart/statistik\\_och\\_analys/prognoser-luftfart/prognos-hosten-2018-002.pdf](https://www.transportstyrelsen.se/globalassets/global/luftfart/statistik_och_analys/prognoser-luftfart/prognos-hosten-2018-002.pdf)



Swedavia has in place a sound management and governance structure as well as regular and transparent reporting about green bond project achievements to investors and the public including external verification of the impact reporting. Swedavia has a zero-emission target by 2020 and a target to supply 5% of fuels as biofuels in 2025. In addition, it has policies regarding environmental impact of suppliers and supports the overall targets of the government. However, Swedavia has no emission accounting from international and national flights or targets on transportation to and from the airport. Swedavia has a consensus based project selection process that includes veto-power by environmental experts and some considerations regarding resilience. Swedavia's annual impact reporting includes relevant key indicators. The use of proceeds reporting externally reviewed by an auditor. The overall assessment of the governance structure of Swedavia gives it a rating of **Excellent**.



### Strengths

Swedavia is on track to achieve its zero-emission goal from own operations by 2020. In addition, Swedavia is aware of its role in the aviation industry and is committed to support the goals of the Swedish aviation industry within the framework Fossil-Free Sweden that has developed these goals on behalf of the Swedish government. This includes achieving zero emission ground transportation by 2030 and fossil free domestic and international flying in Sweden by 2045. It is a strength that Swedavia is moving ambitiously toward zero emissions from own operations considering the aviation industry's overall climate impact, incl. moving toward decarbonizing the fleet.

Improving energy efficiency of airport buildings and building new energy efficient airport buildings is a crucial improvement under this framework and the major objective under the first green bond transactions. According to the issuer, the current average value for energy used for all Swedavia's airports is 267 kWh/m<sup>2</sup>. The usage includes Swedavia's own properties and terminal spaces as well as electricity for bridges, ground handling companies, outdoor lighting and ground heating among others.

Considering the difficulty to decarbonize the aviation industry, it is a clear strength that Swedavia is member of several research projects with the objective to move toward zero-carbon air travel. By providing biofuels already now and by investing into a zero-carbon fleet including heavy on-road transport and machinery under this framework, Swedavia effectively acts as a role model for other airports globally.

### Weaknesses

This framework includes direct investments in infrastructure such as new piers or terminals increasing capacity of Swedavia airports. Investors should be aware that these investments can lead to significant passenger increase and associated rebound and lock-in risks through investments into fossil fuel dependent infrastructure.

### Pitfalls

Through this framework, new buildings and a new pier at Stockholm Arlanda Airport can be financed. Based on data from the Swedish Transport Agency<sup>16</sup> and a Chalmers Tekniska Högskola report<sup>17</sup>, Swedavia estimates that the number of domestic and international passengers will increase by 24% to approximately 36 million passengers

<sup>16</sup> [https://www.transportstyrelsen.se/globalassets/global/luftfart/miljo/miljo-o-halsa/sammanstallning-av--gallande-miljovillkor-for-svenska-flygplatser\\_2018ny.pdf](https://www.transportstyrelsen.se/globalassets/global/luftfart/miljo/miljo-o-halsa/sammanstallning-av--gallande-miljovillkor-for-svenska-flygplatser_2018ny.pdf)

<sup>17</sup> <https://research.chalmers.se/en/publication/506796>



in 2038 at Stockholm Arlanda Airport. By extrapolating historic fuel efficiency improvements according to the transport agency, Swedavia estimates that the total carbon dioxide emissions incl. landing and take-off (LTO) for all domestic and international flights from and to Stockholm Arlanda Airport would decrease by 2.9% compared to 2024 estimates and by 0.1% compared to 2019 estimates to approximately 3.05Mt in 2038. This estimate does not include the positive effect of increased uptake of biofuel and electrification. However, it bears a significant risk of rebound effect by investing into capacity increase of the airport. It is a pitfall, that through investments into capacity increasing infrastructure emissions might actually not decrease or even increase if improvement assumptions in the study do not materialize.

Despite the fact that use of biofuel can substantially cut emissions, major concerns regarding actual positive environmental impact arise from transport emissions of biofuels (e.g., imported waste cooking oil based biofuel from California for the Oslo airport<sup>18</sup>) or unsustainable sourcing (e.g., monocultures and associated deforestation, replacement of food crops, palm oil plantations etc.). This pitfall is mitigated according to Swedavia as bio jet fuel reduces the climate impact by 80-85% in an LCA perspective and must be sourced according to REDII standard. Palm oil or PFAD is not accepted by Swedavia.

In addition, in a low carbon 2050 perspective, the energy performance of buildings is expected to be improved, with passive house technology becoming mainstream and the energy performance of existing buildings greatly improved through refurbishments. Efficiency of building envelopes needs to improve by 30% by 2025 to keep pace with increased building size and energy demand – in addition to improvements in lighting and appliances and increased renewable heat sources. Energy efficiency improvements in buildings are thus important building blocks towards reaching the 2°C goal. In addition to energy efficiency, CICERO Green assess if there is any screening for potential impacts from more extreme weather events, such as flooding. Swedavia's building ambitions fall short regarding energy efficiency.

The framework would benefit from excluding direct investments in capacity increasing infrastructure of the airport. In addition, Swedavia could systematically address total emissions from international and national flights to and from its airports. Swedavia could also implement specific targets regarding low-carbon transportation to and from the airport (e.g., parking strategy, charging infrastructure etc.) as well as more rigorous long-term biofuel strategies.

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<sup>18</sup> <https://www.reuters.com/article/us-environment-biofuels/oslo-airport-imports-biofuels-from-california-greens-doubt-benefit-idUSKBN195259>



# Appendix 1: Referenced Documents List

Document Number	Document Name	Description
0	Swedavia Green Bond Framework, 2019	Swedavia's Green Bond Framework
1	Annual and Sustainability Report 2017 and 2018	Swedavia Airports annual and sustainability report, 2017
2	Environmental and Energy Policy	Swedavia's policy document with fundamental rules for environmental and energy issues
3	<a href="https://www.swedavia.com/about-swedavia/our-environmental-work/">https://www.swedavia.com/about-swedavia/our-environmental-work/</a>	Website describing Swedavia's environmental work
4	<a href="https://www.swedavia.com/about-swedavia/environmental-governance/">https://www.swedavia.com/about-swedavia/environmental-governance/</a>	Website describing Swedavia's environmental governance
5	<a href="https://www.swedavia.com/about-swedavia/the-environmental-impact-of-air-transport/">https://www.swedavia.com/about-swedavia/the-environmental-impact-of-air-transport/</a>	Website describing the environmental impact of air transport
6	<a href="https://www.swedavia.com/about-swedavia/social-and-economic-sustainability/">https://www.swedavia.com/about-swedavia/social-and-economic-sustainability/</a>	Website describing Swedavia's social and economic sustainability
7	<a href="https://www.swedavia.com/about-swedavia/role-and-mission/">https://www.swedavia.com/about-swedavia/role-and-mission/</a>	Website describing Swedavia's role and mission
8	Miljökonsekvensbeskrivning för ansökan om nytt tillstånd enligt miljöbalken	Environmental impact statement to obtain a new permit according to the Environmental regulations
9	Klimatpåverkan från svenska befolkningens flygresor 1990 – 2017	Climate impact from the Swedish population from 1990 to 2017
10	Estimate for carbon dioxide emissions for new pier at Arlanda Airport up to 2038 incl. domestic and international flights	Projected emission for a new pier at Arlanda Airport up to 2038
11	Fly Green Fund Sustainability Report 2017	Sustainability report 2017 of the Fly Green Fund
12	Code of Conduct	Swedavia's Code of Conduct document
13	PM om flygets förutsättningar 181004	Press release on air travel situation



## Appendix 2: About CICERO Shades of Green

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).

