



Linköpingsgruppen Green Bond Second Opinion

20 December 2022

Executive Summary

Linköpingsgruppen is a group which was established by the Municipality of Linköping and four municipal companies (Tekniska verken in Linköping, Linköping Stadshus, Stångåstaden and Lejonfastigheter) in 2017 to increase cooperation on financial issues and to establish a common green bond framework. The four municipal companies are wholly owned by the municipality, and some have their own subsidiaries. Each member of Linköpingsgruppen plans to issue bonds individually. The main change since the previous framework is a clearer commitment to impact reporting.

For Linköping Stadshus, Stångåstaden and Lejonfastigheter the biggest share of financing is expected to be allocated to real estate projects (e.g., residential properties, elderly homes or schools). It will be a mix of refinancing and new financing; however, the majority of the proceeds will be allocated to new projects. The Municipality of Linköping has no planned green investments for 2023, although that may change. It may refinance a sports arena. It expects to issue the smallest amount of bonds within the group. For Tekniska verken, expected projects to be financed are solar and wind projects, liquid biogas production and a sorting centre to limit emissions from waste-to-energy facilities.

We rate the framework **CICERO Medium Green** and give it a governance score of **Good**. The five members of the Linköping group perform their bond issuance, selection and management of proceeds individually, where projects financed by the individual member will have different environmental benefits and risks. Not all the companies will finance projects across all project categories. We encourage further cooperation in the selection process for each member to learn from each other and ensure the quality of projects. While Linköpingsgruppen has a broad framework that covers projects that are allocated all shades of green, the biggest share of financing will go to green buildings, leading to the Medium Green shading. The framework criteria for green buildings cover energy use and environmental certifications, while the real estate companies' environmental governance covers important considerations such as screening for physical climate risks and looking at embodied emissions. The investment plans of Tekniska verken further strengthen the framework, especially with the planned investments in solar, wind and better recycling.

Strengths

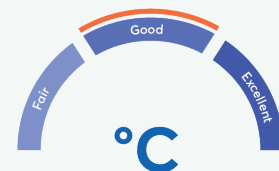
The municipality and its subsidiaries work actively with climate adaptation. Climate adaptation plans are important to mitigate physical climate risks, it is therefore positive that the Municipality has developed a climate adaptation programme, where scenarios RCP 4.5 and RCP 8.5 have been considered. The subsidiaries themselves work strategically and operationally with climate adaptation.

SHADES OF GREEN



°CICERO
Medium Green

GOVERNANCE ASSESSMENT



GREEN BOND AND LOAN PRINCIPLES

Based on this review, this framework is found aligned with the principles. The framework will apply identically to the five entities of the Linköping Group.



The real estate subsidiaries Lejonfastigheter and Stångåstaden are developing procedures to reduce embodied emissions for construction projects. Lejonfastigheter is working to improve the design phase of its projects so that construction materials' global warming potential can weigh more heavily in decision making processes. Reducing embodied emissions is also part of its overall strategy towards where its 2030 emission reduction target. In Stångåstaden's tendering process, contractors need to propose at least five measures to improve the environmental profile of the project. Measures implemented so far have primarily been replacing standard concrete with concrete that has a reduced global warming potential.

Innovation projects, such as Ebbepark, provide an arena to test new solutions and potential technologies that can be essential in decarbonizing the real estate sector. Ebbepark is a neighbourhood that is being developed in the Municipality, that works as an innovation hub for the three real estate companies (Lejonfastigheter, Stångåstaden, and Sankt Kors.) They inform us that this gives them the chance to test new solutions and technology before introducing it to other projects.

It is encouraging that Tekniska verken is looking at innovative solutions, such as converting the residual stream of carbon dioxide from biogas production into liquid form. Tekniska verken has received funding from Klimaklivet to fund the liquification of CO₂ from biogas production for use in other applications. Klimaklivet¹ is a reputable state aid programme that gives grants to projects that reduce greenhouse gas emissions. Carbon dioxide in liquid form can be used in several types of industrial processes, such as in food production and carbonic fire extinguishers. Today carbon dioxide in liquid form is primarily produced by fossil fuels, therefore such technology has the potential to convert a residual current into a useful product with a better climate performance compared to normal production.

Pitfalls

The five members of Linköpingsgruppen have their own selection processes and issue bonds individually, regardless they have decided to have one shared framework. All members of Linköpingsgruppen are individually responsible for their own selection process, where each member has their own investment routines and manages their own proceeds. As the different members have different policies and procedures, projects will have different environmental benefits and risks. The framework could benefit from formal procedures for selection processes that all five members would have to follow, as well as having a joint selection process. Additional environmental considerations (e.g. life-cycle assessments, rebound effects, and proximity to public transport.) would ensure that the complexity of sustainability is considered for all projects financed under the framework.

While waste-to-energy can be an environmentally sound way of disposing of waste, as it diverts waste away from landfilling, it entails climate risks including high emissions. Waste incineration is best combined with ambitious recycling policies. It is positive that the framework supports investments to improve the sorting and recycling of waste to reduce these risks.

When reporting on avoided emissions, it is important to have developed a solid methodology that does not overestimate impacts. Tekniska verken calculates avoided emissions differently from the other companies. All members of Linköpingsgruppen have committed to transparency on methodologies; we encourage them to choose conservative assumptions when calculating impacts to avoid overestimations.

¹ [Regler för Klimatklivet \(naturvardsverket.se\)](https://naturvardsverket.se/regler-for-klimatklivet)



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1 Linköpingsgruppen's environmental management and green bond framework

Company description

Linköpingsgruppen is a financial group which was established by the Municipality of Linköping and four municipal companies (Tekniska verken in Linköping, Linköping Stadshus, Stångåstaden and Lejonfastigheter) in 2017 to increase cooperation and to establish a common green bond framework. The four municipal companies are wholly owned by the municipality, and some have their own subsidiaries.

- **The Municipality of Linköping** is Sweden's fifth largest municipality, with near 166,000 residents. Sweden's municipalities are responsible by law for several areas that are vital to the public good. Responsibilities include healthcare, schooling, social care, public transport, waste and water, energy supply, environmental protection and so on.
- **Tekniska verken** is the parent company in a group that offers goods and services in the areas of electricity grid and trading, waste, biogas, efficient energy solutions, water and drainage, district heating, district cooling, broadband, lighting and charging solutions
- **Linköping Stadshus AB** is wholly owned by the municipality through Linköping Stadshus and eight subsidiaries. Of these eight subsidiaries, Linköping lends to one subsidiary, Sankt Kors Fastighets AB. Sankt Kors Fastigheter AB's mission is to create conditions for development and growth in the community with a focus on Linköping, primarily, by providing creative business environments for new businesses and businesses in transition.
- **AB Stångåstaden** is the largest housing company in Linköping owning and managing 17,880 apartments. In total, Stångåstaden owns approximately 25% of the housing in Linköping municipality.
- **Lejonfastigheter**, owned by the Municipality, owns, manages and develops community properties where tens of thousands of Linköping residents visit and work. It focuses on properties for schools, care facilities, sports, culture and other forms of community service buildings. In total it owns almost 240 properties.

In 2019, the group developed a joint green framework to enable the members of the group to borrow money under a joint bond program (MTN program) with a green project and investment focus, while the Municipality of Linköping offers a loan guarantee for its subsidiaries.

Governance assessment

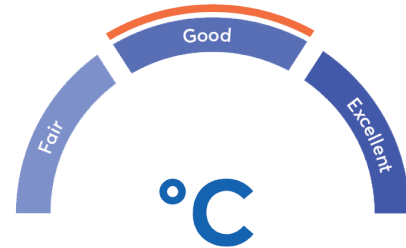
The five members of Linköpingsgruppen have their own selection processes and issue bonds individually, regardless they have decided to have one shared framework. All members of Linköpingsgruppen are individually responsible for their own selection process, where each member has their own investment routines and manages their own investments. As the different members have different policies and procedures, projects will have different environmental benefits and risks. Environmental experts are represented in each selection committee however they do not have veto power. The framework could benefit from formal procedures for selection processes that all five members would have to follow, as well as having a joint selection committee.

When considering Linköpingsgruppen's climate and environmental policies and goals, our focus is on the Municipality of Linköping's strategy as the other four members are owned by the Municipality and therefore covered by its sustainability strategy. The Municipality has a solid environmental strategy that includes both short term targets (being climate neutral by 2025), and long term targets (net zero by 2045). The strategy is further



strengthened by policies and action plans that sets out a pathway to accomplish its set targets. The other members of Linköpingsgruppen have additional targets and policies that support the Municipality's overarching targets.

Under the previous framework the five members reported together in an annual public investor report. The plan is to continue to report together, where reporting will be done on a project-by-project basis. We welcome the introduction of additional impact indicators; in previous reporting, Linköpingsgruppen has primarily focused on allocation reporting as well as being transparent on why assets and projects are eligible. The different members may use different methodologies for how to calculate avoided emissions, therefore it is particularly important that the report is transparent on methodologies.



The overall assessment of Linköpingsgruppen's governance structure and processes gives it a rating of **Good**.

Sector risk exposure

Physical climate risks. For the Nordics, the most severe physical climate impacts will likely be increased flooding, changing snow/ice patterns, and urban overflow, as well as increased storms and extreme weather. For any municipality and activities within the municipality, mitigation and adaption measures should be mapped for its current building stock and activities, to limit damages and consequently potential financial impacts from damage costs.

Transition risks. The Swedish government is targeting climate neutrality by 2045, a strategy that includes coping with environmental issues that concerns multiple of Linköpingsgruppen's responsibilities, such as minimizing the carbon footprint of the real estate sector and energy production. Therefore, the group is exposed to transition risks from stricter climate policies e.g., reducing its GHG emissions, upgrading the energy efficiency of its industries, buildings, etc.

Environmental risks. The group is responsible for several vital areas; therefore, it is associated with heavily emitting sectors such as industrial processes and the real estate sector. Consequently, Linköpingsgruppen is at risk of polluting the local environment for example during the erection of the properties, e.g., from poor waste handling and so on.



Environmental strategies and policies

Linköpingsgruppen represents different activities and sectors within the Municipality of Linköping. As its other four members are owned by the municipality they are covered by its sustainability and environmental policies as well as by its Climate Adaptation Programme and the Chemical Programme. The Municipality of Linköping supports the UN Sustainable Development Goals (Agenda 2030) and the Paris Agreement. According to the environmental policy of Linköping, environmentally sustainable developments will focus on pollution prevention and reduction of natural resource use, energy consumption reduction and increasing use of renewable energy, and biodiversity preservation.

The Municipality of Linköping has a target to become climate neutral by 2025. To achieve this target the municipality needs to reduce its CO₂ emissions by 85% compared to 1990 levels, as well as implement supplementary measures to decrease CO₂ emissions by an additional 15%. A long-term target is to achieve net zero emissions by 2045, where it will focus on eliminating not only CO₂ emissions but all emissions. It also has a focus on a climate adaptation programme, where scenarios RCP 4.5 and RCP 8.5² have been considered. The municipality runs flood risk mapping for new buildings which includes scenario analysis. A current focus is to adapt its action plan to meet the recently adopted climate and energy programme goals which complement the existing goal of becoming a carbon-neutral municipality by 2025.

Following up on the Municipality of Linköping's overall targets, its subsidiaries and members of Linköpingsgruppen's have set targets for their own activities:

- **Tekniska verken i Linköping.** Tekniska verken has a long-term ambition to be fossil-free by 2045 at the latest. It reports on sustainability in line with the GRI standard. Total direct greenhouse gases from its activities amounted to approximately 273,275 tons CO₂e in 2021, where the biggest source of emissions was waste incineration from waste-to-energy. In 2022, it targets to: i) reduce greenhouse gases, ii) become more circular, iii) avoid power peaks, control the grid using smart systems, and iv) develop services and products that are driven by data. It works both strategically and operationally with climate adaptation. For example, it performs scenario analysis of its electricity grid, have measures for fuel storage in case of heat waves or heavy rain and work on adaptation of water and sewage systems for new residential areas. When working with its suppliers, Tekniska verken sets criteria within climate and resource efficiency where it follows-up to ensure that the criteria are met.
- **Linköping Stadshus & Sankt Kors Fastigheter** abide by the municipality's sustainability and environmental policies as well as the climate adaptation programme and the chemical programme.
- **Stångåstaden's** has implemented a sustainability policy that describes its sustainability strategy towards 2025. It has a target to decrease the amount of energy bought per square meter, in form of electricity and district cooling, with 25% from 2011 until 2025. In 2021, it had achieved an 18% reduction compared to 2011. Furthermore, Stångåstaden targets to have a renewable energy capacity that covers its assets electricity use by 2025. In 2021, it had a renewable energy production that covered 56% of its energy use. For its suppliers, it has demands on its suppliers regarding climate, resource efficiency and non-toxic materials. It conducts audits of its suppliers, and they are required to act according to its sustainability policy.

² RCP 4.5 and RCP 8.5 are two potential climate scenarios described by the Intergovernmental Panel on Climate Change (IPCC) where RCP 4.5 is described as a moderate scenario and RCP 8.5 is the highest baseline emissions scenario.



- In 2021, **Lejonfastigheter** developed a climate and energy strategy that guides its work towards its longer-term 2030 targets. Lejonfastigheter's new energy goal includes a reduced energy consumption of 38% per square metre, when comparing 2030 to 2015 as the base year. Since 2015, the energy performance has been improved by 20%. It is also targeting to reduce the climate impact in its entire value chain for all scopes, which includes emissions from construction materials, by 40% by 2030, when compared to 2019. One of the most recent initiatives to reduce emissions was to create a recycling hub for the reuse of building materials from its own buildings. It will introduce training for its project leaders to better understand how to reduce embodied emissions for its construction projects. New buildings are certified with Miljöbyggnad Silver. For its suppliers, it has environmental demands regarding climate, resource efficiency and non-toxic materials

Green bond framework

Based on this review, this framework is found to be aligned with the Green Bond Principles. For details on the issuer's framework, please refer to the green bond framework dated December 2022.

Use of proceeds

For a description of the framework's use of proceeds criteria, and an assessment of the categories' environmental impacts and risks, please refer to section 2.

Selection

The members of Linköpingsgruppen are individually responsible for ensuring that approved green projects meet the requirement of the framework. The members have their own decision-making processes to evaluate potential green projects based on the member's organizational structure and working methods. The decision-making unit within each member of Linköpingsgruppen includes environmental and financial representatives who are responsible for evaluating and approving projects that meet the green criteria. The environmental representatives do not have veto power.

Only projects with a high likelihood of positive, long-term environmental effects will be approved. Projects will, on a best-effort basis, not be approved where there is a high risk of causing significant harm to environmental and social objectives. The decision-making unit for each respective member in Linköpingsgruppen is responsible for documenting the decisions.

The Municipality is responsible for requesting which type of projects that are needed in the Municipality, where the other members select the projects that are eligible for green financing. For the real estate companies (Sankt Kors, AB Stångåstaden, and Lejonfastigheter), the selection process entails identifying which projects are eligible when considered against the framework criteria where it does not consider additional environmental considerations.

Tekniska verken has incorporated environmental impact assessments in its selection process. It also conducts climate calculations for different alternatives to support decision-making.

Management of proceeds

An amount equal to the proceeds of any green bonds will be entered in a separate register kept for the pool of green projects in each company. This register will be continuously monitored and based on the outstanding financing need for the pool of green projects, the accrued costs in these and the outstanding green bonds.



The decision-making unit within each member of Linköpingsgruppen is responsible for the allocation of proceeds. If, for any reason, a green project ceases to comply with the requirements set out in the framework, such projects will be removed from the separate register. Proceeds yet to be allocated towards green projects will be placed in the general liquidity reserves of the relevant subsidiary and managed as such. It has been confirmed that there will be no temporary investments in oil and gas.

Reporting

Linköpingsgruppen will provide an annual green bond investor report including allocation and impact reporting. The internal tracking method, the allocation of funds from green bond proceeds and the green bond investor report will be reviewed annually by the external auditor of each member of Linköpingsgruppen. The reports will be made available on Linköpingsgruppen's website. Reporting will follow ICMA guidelines and the Nordic Public Sector Issuers' Position Paper on green bonds impact reporting³. The reporting will include:

Allocation reporting

- Total amounts allocated and disbursed
- A description of all projects and their main environmental benefits
- Information about the split of green bond proceeds between the financing of new projects and re-financing

Impact reporting

Impact reporting will include indicators such as the amount of installed renewable energy production capacity, energy efficiency gains expected /achieved, certifications and expected/ actual energy use per green building as well as estimated saved/avoided greenhouse gas emissions when relevant and possible. The different members may use different methodologies for how to calculate avoided emissions. Tekniska verken is the only member that currently has quantified avoided emissions. It uses Klimatbokslutet⁴ where calculations are done by a third party. According to Tekniska verken this method is used by most Swedish energy companies. Methodologies on how impacts are calculated will be included in reporting.

Linköpingsgruppen has provided an investor report for 2019, 2020 and 2021. Green bond proceeds have been allocated to two out of nine project categories. The biggest share of proceeds has previously gone to the green building category. One renewable energy project has also been financed. The reporting includes a description for each project, allocated proceeds, and the eligibility criteria it qualifies by, but does not contain estimated environmental impacts of the financed projects.

³ [NPSI_Position_paper_2020_final.pdf \(kuntarahoitus.fi\)](#)

⁴ [Kartlägg och hantera er klimatpåverkan | Klimatbokslut med EMC \(klimatbokslutet.com\)](#)




2 Assessment of Linköpingsgruppen’s

green bond framework

The eligible projects under Linköpingsgruppen’s green bond framework are shaded based on their environmental impacts and risks, based on the “Shades of Green” methodology.

Shading of eligible projects under Linköpingsgruppen’s green bond framework

- For Stångåstaden, Linköpings Stadshus and Lejonfastigheter the construction of new buildings will receive most financing. The Municipality of Linköping informs us that its only expected investment is the refinancing of one project (the construction of a swimming pool). For Tekniska verken, expected projects are solar and wind projects, liquid biogas production and a sorting centre to increase recycling and limit emissions from waste-to-energy facilities.
- The majority of financing will be new financing.
- In 2021, all members of Linköpingsgruppen issued green bonds, where projects such as a swimming pool, commercial buildings, offices, schools and wind power were financed.
- Nuclear power and fossil fuel energy generation cannot be financed

Category	Member	Eligible project types	Green Shading and considerations
 Renewable energy	Tekniska verken, Stångåstaden	Renewable energy Wind power, solar power, hydro power ⁵ , bioenergy ⁶ , and geothermal energy ⁷ .	Dark Green <ul style="list-style-type: none"> ✓ Renewable energy is key to the low carbon transition and represents a Dark Green solution. ✓ Planned investments are in wind- and solar parks. Life cycle emissions will be considered before potential investments. Tekniska verken conducts

⁵ defined as a facility that comply with one of the following criteria, the facility is a run-of-river plant and does not have an artificial reservoir, the power density of the facility is above 5W/m² or the life-cycle GHG emissions are lower than 100 gCO₂e/kWh.

⁶ defined as energy crops, biofuels or waste from forest and agriculture, food waste including but not limited from household or industries. For the avoidance, all input will be fossil free.

⁷ Where life-cycle emissions are lower than 100 gCO₂e/kWh.



an environmental assessment report for its wind and solar projects where it consults with nearby residents, land owners and concerned authorities.

- ✓ Other planned investments are in the production of liquified biogas from different waste streams.
 - ✓ Tekniska verken informed us that for bioenergy projects would be a facility for energy recovery of bioenergy. Inputs are waste streams such as reclaimed wood, pressure-treated wood, roots, chips, pellets and bark. Tekniska verken only produce biogas from food waste, residual product from the food industry and sludge from waste water treatment.
 - ✓ For biofuels and bioenergy, countries of origin would be Sweden or Norway.
 - ✓ Biofuels comply with EU Renewable Energy Directive (RED)
 - ✓ Although biogas can cut emissions relative to fossil fuels, concerns remain regarding lifecycle emissions benefits, risks of deforestation, and biodiversity loss.
 - ✓ It confirms that if hydro projects would be financed, there are considerations to downstream and upstream migration and ecological flow.
 - ✓ If one of the real estate members will invest in this project category, it will be investments in solar parks.
-



Energy efficiency



Tekniska verken, Stångåstaden
District heating/cooling, energy recovery, energy storage and smart grids as well as other measures to introduce and promote energy efficient solutions.

Light to Medium Green

- ✓ The shading reflects that the main investment is expenditures for district heating, while capturing that other investments such as energy storage also can be financed. While district heating can be an environmentally sound way to distribute and produce heating and cooling, it entails climate risks including high emissions. Other eligible projects, such as energy storage, play an important role in improving energy distribution systems and decreasing peak energy times.
- ✓ District heating expenditures could be new connections and renewal of the heating grid. 90% of the households in Linköping are heated by district heating. In 2021, 62% of the fuel mix that supplies the district heating network was waste, 22.1% was recycled wood and 12.6% was forest residues. Normally, all facilities are fossil-free, however for peak cold days the oil boilers are used as a reserve. In 2021, 1.4% of the fuel mix was fossil oil. Be aware that the waste also contains fossil fractions.
- ✓ Tekniska verken is working to improve the operations of its district heating system, and in 2021, it investigated the potential of lowering the temperature in networks temporarily to reduce overall energy use. It conducted a pilot project with nine assets, where the results showed good potential for energy savings.
- ✓ Energy storage projects could be geothermal storage, batteries, and an accumulator tank for storage of warm water from district heating.
- ✓ The accumulator tank for storage of warm water is connected to the district heating system, to supply the system with hot water for peak hours and cold days. This creates a more efficient system that has the potential of reducing emissions.



Pollution prevention and control



Tekniska verken



Waste management, including but not limited recycling, waste prevention, waste minimisation, recycling, re-use and other resource efficiency improvements such as reduction of air emissions and rehabilitation of contaminated land and leachate management and Carbon Capture and Storage technology/Utilization (CCS/CCU).

- ✓ If investing in geothermal projects Tekniska verken will comply with the criteria in the Taxonomy (to keep GHG emissions below 100gCO₂e/kWh), the delegated act (EU 2021/2139) and article 4.11.
- ✓ Battery storage requires high volumes of environmentally sensitive materials, including lithium, manganese, and cobalt. The supply chains for these materials need to be appropriately managed, to avoid creating new adverse social and environmental impacts. Responsible sourcing and recycling should be part of any project developer's strategy.

Dark Green

- ✓ The shading reflects that the main investment is to support better sorting of waste so that more is recycled and projects within CCS/CCU. More recycling is a key part of a 2050 solutions and CCS is a critical component of a sustainable low carbon future.
- ✓ Planned investments are a facility for sorting out plastic, carbon, metal and organic waste for household waste energy recovery. This is to ensure that less plastic goes to incineration. There could be other measures to reduce emissions/pollution from waste to energy. While waste-to-energy can be an environmentally sound way of to dispose of waste it can entail climate risks including high emissions. Tekniska verken is not planning to invest in any new waste-to-energy facilities. It is positive that planned projects are to improve existing facilities by improving sorting systems.
- ✓ CCS projects can be associated with waste-to-energy facilities as well as the production of biogas.



		<ul style="list-style-type: none"> ✓ Tekniska verken has received funding from Klimatklivet to fund the liquification of CO₂ from biogas production for use in other applications. Klimatklivet⁸ is a reputable state aid programme that gives out grants for projects that reduce greenhouse gas emissions. There are multiple criteria an investment needs to adhere to before providing funding. Those projects are likely to contribute to innovation within energy and climate technologies. ✓ Fossil fuel powered trucks cannot be financed.
<p>Clean transportation</p> 	<p>Tekniska verken, Fossil free public transportation, pedestrian and bicycle paths, hydrogen, biogas and electrical vehicles and logistics solutions and supportive infrastructure leading to reduced climate footprints from transportation of people and goods.</p>	<p>Medium Green</p> <ul style="list-style-type: none"> ✓ Transport with zero tailpipe CO₂ emissions is vital to decarbonize the transport sector ✓ There are no planned investments under this project category for the moment. ✓ For projects that require construction and the use of vessels, emission intensity and resilience of materials and equipment should be considered.
<p>Sustainable water and wastewater management</p> 	<p>Tekniska verken Management of water and wastewater including, but not limited to water supply and wastewater collection, treatment and supply systems, improved water efficiency through reduced leakage, plants, water purification, water saving, water conservation and re-use of water.</p>	<p>Medium Green</p> <ul style="list-style-type: none"> ✓ Maintenance of the existing water and wastewater sector is generally positive both for public health and climate resilience reasons. Based on the broad scope of eligible activities, it is however difficult to assess how ambitious financed projects will be, especially because of the lack of quantified criteria. ✓ Tekniska verken has confirmed that it takes leakage levels, water savings and energy consumption in consideration when assessing projects.

⁸ [Regler för Klimatklivet \(naturvardsverket.se\)](https://naturvardsverket.se/regler-for-klimatklivet)



- ✓ Energy consumption and limiting leakages are important factors in the sustainability of such projects. It is therefore a strength that the framework criteria support improved water efficiency measures.
- ✓ According to Tekniska Verken, mechanical, biological and chemical water treatment could be used.
- ✓ The production of chemicals for use in water and wastewater treatment accounts for a substantial greenhouse gas footprint.
- ✓ Projects should seek to minimize emissions from the construction phase and supply chain (e.g., from cement production).

Climate adaption



The Municipality of Linköping, Efforts to make buildings, infrastructure and sensitive habitats more resilient to impacts of climate change.

Lejonfastigheter,



Stångåstaden

Medium to Dark Green

- ✓ Climate scientists are clear when communicating that some level of climate change is unavoidable even in the most optimistic climate scenarios. It is therefore crucial to plan and mitigate potential risks to reduce the potential financial and environmental impact of such events.
- ✓ According to the issuer, potential investments are resilience measures against heavy rain or flooding. Other investments could be installing cooling systems to mitigate against heat waves.
- ✓ Traditional air condition systems can generate 50-70% of the peak electricity demand for buildings.⁹ The choice of cooling systems is therefore important to limit energy use. Other important considerations

⁹ [District Cooling System - an overview | ScienceDirect Topics](#)



when choosing cooling systems are the use of harmful chemicals and the energy source of the cooling systems.

- ✓ For measures that require construction and the use of vessels, emission intensity and resilience of materials and equipment should be considered. There should also be considerations on how measures impact the local environment.

Circular economy



Tekniska verken

Promotion of resource efficiency and the transition towards a less fossil dependent society, for instance replacing fossil-based plastics with bioplastics and recycled plastic waste.

Light to Medium Green

- ✓ The Light to Medium shading reflects a lack of specificity in the eligibility criteria. The overall climatic effects and benefits of these types of measures are uncertain. Tekniska verken has no investment plans within this criteria for the moment.

Green buildings



Lejonfastigheter,
Stångåstaden,

Linköpings
Stadshus,

The Municipality
of Linköping

Commercial and residential buildings shall meet, at the time of approval, one of the following requirements:

- Primary Energy Demand (PED) is, or will be, at least 10% lower than the threshold for nearly zero-energy buildings (NZEB) requirements in national measures and has a certification according to one of the below systems:
- Miljöbyggnad silver
- Svanen
- BREEAM very good
- LEED gold

OR

- have an energy use that at least meets the requirements for the level silver

Medium Green

- ✓ The project category is allocated a Medium Green shading because of framework criteria that focus on energy use and green building certifications, and the members' internal procedures. Lejonfastigheter and Stångåstaden have started to implement measures to reduce embodied emissions for construction projects. The members could further strengthen their work on embodied emissions by structuring their use of life cycle assessment, data collection, and introducing emission reduction targets for each project.
- ✓ The Global Warming Potential (GWP) will be calculated for each project as required by Swedish law. The Municipality has set a target that all contractors need to have fossil-free operations from 2025. This target will apply to all its subsidiaries.



for energy use (indicator 3) in Miljöbyggnad.

Major renovations leading at least to compliance with Miljöbyggnad silver or that lead to a reduction in the Primary Energy Demand (PED) of at least 30%.

- ✓ The four members that can finance projects under the green building category have informed us that they all use Miljöbyggnad Silver for their construction projects. Miljöbyggnad Silver means that energy use has to be 20% lower than that required by BBR (Swedish Building regulations) for residential buildings, and 30% lower for other buildings.
- ✓ Projects can also be financed without the Miljöbyggnad Silver certification, however it will still need to adhere to the energy criteria of the certification (20% lower than that required by BBR (Swedish Building regulations) for residential buildings, and 30% lower for other buildings.)
- ✓ Green building certification standards cover a broad set of issues that are important to sustainable development. At the same time, they differ considerably in their requirements for energy efficiency, embodied emissions of construction materials, related transportation emissions, and consideration of resilience
- ✓ All members have confirmed that they use the municipality climate adaptation plan when planning projects, where a worst-case scenario from the IPCC has been used in the risk mapping. Lejonfastigheter and Stångåstaden have made a vulnerability analysis on its properties where its next step is to create an action plan to mitigate risks for floods and high temperatures. These risks are considered for new construction.
- ✓ All members work with circularity, which can be an important contribution to a low carbon construction sector. Stångåstaden will start keeping an inventory for its buildings that maps what can be reused. Lejonfastigheter has also tested circularity measures for its projects, wherein in one of its latest renovation projects a mapping was performed



and the result was that fire staircases and bricks will be reused in another project.

- ✓ Lejonfastigheter is looking at how to improve the design phase of its projects so that construction materials' global warming potential can be included in decision making processes. In the beginning of 2023, project leaders will receive training in how to work to reduce embodied emissions in the design phase of projects.
- ✓ Stångåstaden has made it a part of its tendering processes that contractors need to propose at least five measures to improve the environmental profile of the project. These measures have primarily been associated with replacing standard concrete with concrete that has a reduced global warming potential.
- ✓ From a climate perspective, it is beneficial to renovate existing buildings rather than build new assets, therefore the inclusion of renovation projects with a 30% PED reduction is encouraging.

Table 1. Eligible project categories









3 Terms and methodologies

This note provides CICERO Shades of Green’s second opinion of the client’s framework dated October 2022. 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 Shades of 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.

‘Shades of Green’ methodology

CICERO Shades of 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:

Shading	Examples
 Dark Green is allocated to projects and solutions that correspond to the long-term vision of a low-carbon and climate resilient future.	 Solar power plants
 Medium Green is allocated to projects and solutions that represent significant steps towards the long-term vision but are not quite there yet.	 Energy efficient buildings
 Light Green is allocated to transition activities that do not lock in emissions. These projects reduce emissions or have other environmental benefits in the near term rather than representing low carbon and climate resilient long-term solutions.	 Hybrid road vehicles

The “Shades of Green” methodology considers the strengths, weaknesses and pitfalls of the project categories and their criteria. 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, including potential macro-level impacts of investment projects.

Sound governance and transparency processes facilitate delivery of the client’s climate and environmental ambitions laid out in the framework. Hence, key governance aspects that can influence the implementation of the green bond are carefully considered and reflected in the overall shading. CICERO Shades of 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. 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.



Assessment of alignment with Green Bond Principles

CICERO Shades of Green assesses alignment with the International Capital Markets' Association's (ICMA) Green Bond Principles. We review whether the framework is in line with the four core components of the GBP (use of proceeds, selection, management of proceeds and reporting). We assess whether project categories have clear environmental benefits with defined eligibility criteria. The Green Bonds Principles (GBP) state that the "overall environmental profile" of a project should be assessed. The selection process is a key governance factor to consider in CICERO Shads of Green's assessment. CICERO Shades of 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 Shades of Green places on the selection process. CICERO Shades of Green assesses whether net proceeds or an equivalent amount are tracked by the issuer in an appropriate manner and provides transparency on the intended types of temporary placement for unallocated proceeds. Transparency, reporting, and verification of impacts are key to enable investors to follow the implementation of green finance programs.



Appendix 1: Referenced Documents List

Document Number	Document Name	Description
1	Linköpingsgruppen – green bond framework	
2	Tekniska verkens hållbarhetsredovisning 2021	Sustainability report for Tekniska verken https://www.tekniskaverken.se/siteassets/tekniska-verken/aret-som-gatt/hallbarhetsredovisningen_2021.pdf
3	Hållbarhetsredovisning Stångåstaden	Sustainability report for Stångåstaden (https://2021.stangastaden.se/hallbarhetsredovisning/)
4	Årsredovisning Lejonfastigheter	Annual financial and sustainability report for Lejonfastigheter (https://2021.lejonfastigheter.se/)
5	Investerarrapport-2019	Impact and allocation reporting for 2019 (https://www.linkoping.se/contentassets/560ef4122d4a481c82630e417cb2d452/20201104_investerarrapport-1.pdf?4ae21d)
6	Investerarrapport-2020	Impact and allocation reporting for 2020 (https://www.linkoping.se/contentassets/9caf3318137044659fa12647ecc65b50/investerarrapport-2020.pdf?49e9ec)
7	Investerarrapport-2021	Impact and allocation reporting for 2021 (https://www.linkoping.se/contentassets/481d9539a7f64a0bae88f0b28ba8e9c1/investerarrapport_2021.pdf?49c3f9)
6	Hållbarhetsrapport 2021	Sustainability report for the Municipality of Linköping



Appendix 2: About CICERO Shades of Green

CICERO Shades of 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 Shades of Green.

CICERO Shades of Green provides second opinions on institutions' frameworks and guidance for assessing and selecting eligible projects for green bond investments. CICERO Shades of Green is internationally recognized as a leading provider of independent reviews of green bonds, since the market's inception in 2008. CICERO Shades of 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 Shades of 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, the International Institute for Sustainable Development (IISD) and the School for Environment and Sustainability (SEAS) at the University of Michigan.

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- ★ **2021 Largest External Reviewer**, Climate Bonds Initiative Awards
 - ★ **2020 External Assessment Provider Of The Year**, Environmental Finance Green Bond Awards
 - ★ **2020 Largest External Review Provider In Number Of Deals**, Climate Bonds Initiative Awards
 - ★ **2019 External Assessment Provider Of The Year**, Environmental Finance Green Bond Awards
 - ★ **2019 Largest Green Bond SPO Provider**, Climate Bonds Initiative Awards
 - ★ **2018 External Assessment Provider Of The Year**, Environmental Finance Green Bond Awards
 - ★ **2018 Largest External Reviewer**, Climate Bonds Initiative Awards
 - ★ **2017 Best External Assessment Provider**, Environmental Finance Green Bond Awards
 - ★ **2016 Most Second Opinions**, Climate Bonds Initiative Awards