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Second Party Opinion

Stockholm Exergi Green Bond Framework

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Location: Sweden

Sector: Power generator and utility networks

Alignment With Principles

Aligned = ✔ Conceptually aligned = ○ Not aligned = ✘

✔ Green Bond Principles, ICMA, 2021 (with June 2022 Appendix 1)

See Alignment Assessment for more detail.

Dark green

Activities that correspond to the long-term vision of a low-carbon climate resilient future.

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Strengths

Stockholm Exergi has transitioned away from fossil fuels-based energy to focus mostly on residual biomass generation, following circular economy principles. Today, 97% of the energy it supplies is made from renewables (bioenergy from waste and residues) or recovered sources (primarily waste incineration). It has cut coal from its mix, from 50% of its scope 1 emissions in 2018 to zero in 2021.

It aims to become Europe's largest permanent negative emitter by 2027 and achieve net zero operations by 2032. Implementing carbon capture technology at its bioenergy and waste-to-energy (WtE) plants will be pivotal to achieving these targets.

Weaknesses

No weaknesses to report.

Areas to watch

The company has started to develop the processes needed to implement biocarbon capture and storage (BECCS) at its bioenergy plants and carbon capture and storage (CCS) at its WtE plants. If successful, this could reduce its exposure to climate risks.

The use of carbon capture and utilization (CCU) could result in value-chain emissions. We understand that Stockholm Exergi has yet to determine how it will use this system.

Stockholm Exergi has yet to disclose its emissions reduction targets. While it used 97% renewable or recovered sources in 2022, it is still developing strategies to further reduce its emissions beyond carbon capture, especially for scope 3.

The use of WtE plants exposes the company to significant carbon emissions and air pollution. It may be able to address this by using CCS and best-available-technologies.

Eligible Green Projects Assessment Summary

Eligible projects under the issuer's green finance framework are assessed based on their environmental benefits and risks, using Shades of Green methodology.

Renewable Energy	**Dark green**
Facilities that produce heat/cool or co-generate heat/cool powered exclusively from biomass, biogas, or bioliquids, and comply with the EU Renewable Energy Directive	
Facilities that produce heat/cool using waste heat	

Energy Efficiency	**Dark to Medium green**
Pipelines and associated infrastructure for distributing heating and cooling; system modification to lower temperature regimes or advanced pilot systems; electric heat pumps that meet the refrigerant threshold of global warming potential (GWP) 675	
Facilities that store electricity and facilities that store thermal energy	
Infrastructure required for zero tailpipe CO_2 vessels or port operations	

Pollution Prevention and Control	**Dark to Medium green**
Facilities dedicated to waste incineration to product heat/cool and power that follow a waste hierarchy	
Facilities that store and process separately collected non-hazardous waste streams and at least 50% secondary raw materials in terms of weight, using mechanical reprocessing	
Facilities for CCS associated with bioenergy plants (BECCS) and waste-to-energy plants (CCS); facilities for CCU; transportation of captured carbon with minimum leaks to permanent underground storage units; research and experimental development of solutions and technologies for the reduction, avoidance, removal, or reuse of greenhouse gas emissions	

Sustainable Water and Wastewater Management Green	**Medium green**
Facilities to treat and reuse wastewater	

Climate Change Adaption	**Dark green**
Investments to strengthen assets or activities to withstand identified physical climate risks	

See Analysis Of Eligible Projects for more detail.

Issuer Sustainability Context

This section provides an analysis of the issuer's sustainability management and the embeddedness of the financing framework within its overall strategy.

Company Description

Stockholm Exergi is a local energy company that provides heating and cooling and waste management services. More than 800,000 people in Metropolitan Stockholm and 400 private and public properties are connected to its district heating network. It also provides electricity. With 700 employees, its ownership is split 50:50 between the City of Stockholm and Ankhiale, a consortium of investors led by Dutch pension fund APG.

Material Sustainability Factors

Climate transition risk

Power generation is the largest direct source of greenhouse gas emissions globally, making this sector, and that of electric grids, highly susceptible to the growing public, political, legal, and regulatory pressure to accelerate climate goals. Public awareness of the urgency for climate action has reached a turning point. In turn, policymakers and regulators are more often pushing for faster transition to lower-carbon energy, especially as these technologies become more mature and cost competitive. With no direct emissions, renewable energy technologies have a vital role to play in reducing emissions associated with power and heat, it will be vital for limiting global temperature rise to 1.5C. WtE technologies are exposed to the incineration of waste materials containing high percentages of carbon, such as plastic, which are major sources of emissions. Electric grids are also materially exposed to risks related to the modernization of electric power infrastructure. European climate and environmental regulations are ambitious, with a strong push toward low-carbon and clean-energy sources.

Physical climate risk

Given fixed assets, generators and utilities networks are relatively more exposed to physical climate risks compared to other sectors. For stakeholders, extreme weather--including wildfires, hurricanes, and storms--are becoming more frequent and severe and can result in power outages for large populations of users. Regulatory pressure to preserve security of supply is driving players to enhance the resilience of assets. The physical climate risks generally involve significant financial losses for operators due to repairs but more importantly, from exposure to extreme power price spikes or claims due to business disruption. We expect these dynamics to continue but vary regionally depending on regulatory responses. Key risks in Sweden relate to increased extreme heat events and heightened risk of flooding.

Pollution

Under applicable environmental laws and regulations, entities in the waste management value chain could be liable if their operations cause environmental damage, in particular to air, water, or soil contamination. In Sweden, pollution is heavily regulated.

Access and affordability

The affordability and reliability of networks are under pressure from climate-related risks, exacerbating the materiality for stakeholders. Energy is an essential service supporting human health and well-being and global economic development. Service disruptions or steep price increases are likely to be amplified by the energy transition and physical climate risks. These dynamics can affect households' purchasing power and the competitive strengths of local industries, which make this highly material for stakeholders. Moreover, while utility bills are rising, they tend to rise at a rate lower than inflation. Additionally, regulators continue to allow utilities to use mechanisms to smooth volatility and to offer income assistance programs, which underpins a more moderate impact.

Issuer And Context Analysis

All of the project categories included in the financing framework address sustainability factors that we consider material for Stockholm Exergi. The renewable energy, energy efficiency, pollution prevention and control, and sustainable water and wastewater project categories aim to address climate transition risk. The climate change adaption category will also seek to address physical transition risk, and the renewable energy, pollution prevention and control, and sustainable water and wastewater management categories will reduce pollution risks.

Stockholm Exergi is well placed to enable the transition to a low-carbon energy sector and is developing a formal climate strategy in line with national ambitions. In 2022, around 97% of the energy it produced and supplied came from renewables (biomass and bio-oils) or recovered sources (waste incineration and heat recovery), demonstrating its successful transition away from fossil-based primary generation. In 2021 it cut to zero its scope 1 emissions from the production of coal-based energy, from around 50% in 2018 With this transition, the company is contributing to Sweden's national 2045 carbon neutrality target. That said, in 2022 about 29% of its energy was produced using waste, including non-recyclable plastic. In turn, its scope 1 emissions increased because the proportion of plastic increased. The company has stated that if successful the implementation of BECCS and CCS, included in this framework, will reduce emissions further. This could promote the adoption of such technologies across the industry, in our view. It will also support the company's target to become Europe's largest permanent negative emitter by 2027 and achieve net zero operations by 2032. Furthermore, it is developing strategies to reduce emissions not covered by carbon capture (scope 3) and is committed to phasing out fossil fuels and modernizing its networks and systems to improve efficiency.

Stockholm Exergi will address its exposure to physical climate risks through projects issued under this framework. The company has identified its key physical climate risks in its direct and supply chain operations as part of its assessment of climate risks and opportunities, required for TCFD alignment. It has also conducted a physical risk assessment of the facility where it intends to apply BECCS. And while it does not have a formal publicly-disclosed strategy to mitigate these risks, as part of the climate-change-adaption project category it will invest to strengthen its assets and activities against physical climate risks, including wetlands and rainwater drainage.

The company has implemented mechanisms and technologies that mitigate its exposure to risks introduced by the financed projects--pollution, waste and recycling, biodiversity, and resource use. We view positively that its WtE plants only use waste that can no longer be recycled and that it is working to advance recycling by investing in sorting facilities. Stockholm Exergi is exposed to potential air pollution risks arising from the incineration of materials made using fossil fuels. That said, being subject to EU and national regulation, namely the Industrial Emissions Directive (IED), it is required to implement processes and best-available-technologies to address air pollution. We note its ability to quickly adapt its systems in cases of environmental incidents, as shown by its target to limit environmental incidents to five per year and its work to reduce leakages in its network. Though indirect, there is a risk to biodiversity from the use of forestry waste products. We understand that the company will adapt its processes to comply with the stricter requirements of the Renewable Energy Directive III (RED).

Stockholm Exergi is subject to national regulations that seek to reduce the risk of negative impacts on communities. To obtain environmental permits for facilities located near residential areas, the company is required to prove a lack of cause of disturbances. It consults with local residents and informs them of risks of temporary disruptions. Even so, the company has faced some local community opposition due to concerns related to noise, air pollution, and potential leaks caused by its plants. We note that this has not caused the company any financial damage.

Alignment Assessment

This section provides an analysis of the framework's alignment to Green Bond principles.

Alignment With Principles

Aligned = ✔ Conceptually aligned = ○ Not aligned = ✘

✔ Green Bond Principles, ICMA, 2021 (with June 2022 Appendix 1)

✔ Use of proceeds

All the framework's green project categories are shaded in green, and the issuer commits to allocate the net proceeds issued under the framework exclusively to eligible green projects. Please refer to Analysis of Eligible Projects section for more information on our analysis of the environmental benefits of the expected use of proceeds.

Stockholm Exergi will allocate an amount equal to the net proceeds from instruments issued under its green bond framework to finance or refinance eligible green projects to promote the transition to a low-carbon economy, focusing on bioenergy and BECCS. The maximum lookback period for operating expenditure is three years before issuance, in line with standard market practice. We view positively that the framework connects Stockholm Exergi's projects to activities covered by the EU Taxonomy Technical Screening Criteria (TSC), except for CCU, WtE, and wastewater management projects, which are currently not in scope of the TSC.

✔ Process for project evaluation and selection

The framework sets out project evaluation and selection processes. Stockholm Exergi has established a Green Bond Committee (GBC) comprising the Chief Financial Officer, Sustainability head, and Treasury head. The GBC is responsible for assessing the potential projects against the framework's eligibility criteria and its internal ESG standards and policies. The committee prioritizes and selects eligible projects for allocation and removes them from the portfolio if they no longer meet the eligibility criteria. Stockholm Exergi has processes in place to address the environmental and social risks associated with the financed projects including adherence to EU's RED, the use of certifications for biofuel traceability, and a suppliers' code of conduct to mitigate supply chain risks including human rights risks. The framework also outlines a project exclusion list that includes, for example, fossil energy production and resource extraction with negative environmental impacts.

✔ Management of proceeds

Stockholm Exergi will track the allocation of net proceeds to ensure they finance only eligible green projects, under a portfolio approach, via a green register. If a project no longer meets the criteria, the issuer, through the GBC, will remove it and replace it with another project from the portfolio. Unallocated proceeds will go to the liquidity reserve managed according to the project exclusions list; this includes prohibiting temporary investment in fossil energy production. The framework includes a 12-month deadline for the issuer to allocate all proceeds after issuance, which we view as strong practice.

✔ Reporting

Stockholm Exergi commits to annual reporting, until full allocation and in the event of material changes, on the allocation of proceeds and the actual environmental impact of the green financing issued under this framework. The report will be published on its website and include: a description of the projects by category; the share of eligible projects funded by the green bonds and the amount of debt outstanding; the remaining balance of any unallocated funds; the share of financing versus refinancing; and the share of green projects the issuer considers align with EU Taxonomy Climate Delegated Act. In our view, the issuer's alignment with the impact reporting principles stated in "*Nordic Public Sector Issuers: Position Paper on Green Bonds Impact Reporting"* increases transparency in the Nordic context, and we view as a strong practice its commitment to annually--and in the event of material changes to third-party verification of its allocation--reporting post-issuance until full allocation.

Analysis Of Eligible Projects

This section provides details of our analysis of eligible projects, based on their environmental benefits and risks, using the Shades of Green methodology.

Over the three years following issuance of the financing, Stockholm Exergi expects to allocate the majority of proceeds to pollution prevention and control to fund its projected BECCS plants in Stockholm, pending approval from the relevant authorities. The rest of the proceeds will mostly be for refinancing a bioenergy plant, with a minor portion shared across remaining categories--energy efficiency, other non-BECCS projects in the pollution prevention and control category, sustainable water and wastewater management, and climate change adaption.

Dark green

Activities that correspond to the long-term vision of a low-carbon climate resilient future.

Our Shades of Green Analytical Approach >

Overall Shades of Green assessment

Our overall Dark green shading is based on the company's expectation that its carbon capture projects will obtain regulatory approval and will represent the vast majority of the funding raised under the framework. It also factors in the other project category shades of green detailed below.

Green project categories

Renewable energy

Assessment	Description
Dark green	**Bioenergy** (*Eligible EU Taxonomy categories: 4.20. "Cogeneration of heat/cool and power from bioenergy" and 4.24. "Production of heat/cool from bioenergy")* • The construction, modernization, operation, and maintenance of facilities that produce heat/cool or co-generate heat/cool and power exclusively (some fossil oil is needed at start and stop [in 2022, <1% of total input]) from biomass, biogas, or bioliquids, based on sustainably sourced biomaterials that are in compliance with the EU Renewable Energy Directive (RED and its requirements on GHG emission reductions. **Waste heat** (*Eligible EU Taxonomy category: 4.25. "Production of heat/cool using waste heat")* • The construction, modernization, operation, and maintenance of facilities that produce heat/cool using waste heat, such as waste heat from district cooling, sea/lake water, and treated wastewater.

Analytical considerations

- Investments in this category will be aimed at facilities that are powered exclusively by bioenergy (biomass, biogas, and bioliquids). Bioenergy is seen as a renewable energy source if the feedstock is waste from other industrial processes such as forestry. This is because, as more biomass is produced, an amount equivalent to the carbon released during combustion is absorbed if accompanied by sustainable forestry practices. We therefore we assess this project category as Dark green.
- Stockholm Exergi is subject to EU RED requirements, which entail emission savings of 70% from district installations built in 2021-2025, and 80% from those built after 2026, via the use of non-fossil-based inputs. We view positively that one of the projects in the pollution prevention and control category is the implementation of BECCS. If successful, this will allow the issuer's bioenergy plants to become a long-term/2050 solution by permanently storing the carbon absorbed by plants during

their lifecycle instead of releasing it during combustion. If connected to strictly biogenic sources, this will generate negative emissions.

- Though the issuer sources more than half its solid biofuel within Sweden, where there are strong regulations, it is also exposed to transport emissions from the import of biofuel and bio-oils mostly from countries in the EU (such as Spain) and smaller volumes from Argentina and Tunisia. We understand that it imports its feedstocks using conventional vessels. We view positively that, as part of the energy efficiency category in this framework, the company aims to enable its logistics suppliers to transition toward zero tailpipe solutions.
- The biomass Stockholm Exergi uses is primarily forestry residues (sawdust, fuel wood, branches, pulp wood), as well as bio-oils (mixed fatty acids and tail oil) and agricultural residues (from thinning, cropping, harvesting). The use of forest waste residues indirectly exposes the company to the risk of biodiversity loss and land-use change, which it aims to mitigate by adhering to EU RED III, with risk assessments for its biofuel suppliers and use of forest fuels that meet the certification requirements (for example FSC Controlled Wood Standard or equivalent).
- Its bioenergy facilities are exposed to physical climate risks, namely floods and storms. The company aims to make its assets and activities more resilient via projects in the climate-change-adaption category in this framework. Physical climate risk will also impact its biomass supply chain, especially that of forestry residues. This risk is partly addressed by using diversified fuel stocks.
- We assess the use of waste heat from district cooling, sea/lake water, and treated wastewater as Dark green because it is a useful technology for the development of a low-carbon energy system. In 2022, waste heat accounted for about 20% of energy supplied by the company.
- The issuer is indirectly exposed to pollution from the sources of waste heat, in particular wastewater treatment plants. Given its extensive district heating and cooling network, there is a risk of pipeline leakages--noting, however, that the framework criteria also includes the modernization of facilities.
- The exposure of its waste-heat-recovery process to physical climate risk is lower than its plants' exposure because the pipelines are underground in urban areas.
- The construction of new bioenergy and waste-heat-recovery facilities will generate additional emissions and construction waste, which, if not disposed of correctly, could result in soil and water pollution.

Energy efficiency

Assessment	Description
Dark to Medium green	**Efficient district heating and cooling network** (*Eligible EU Taxonomy categories: 4.15. "District heating/cooling distribution" and "4.16. Installation and operation of electric heat pumps")* • The construction, modernization, operation, and maintenance of pipelines and associated infrastructure for distribution of heating and cooling that complies with the EU Eco Design Framework directive and the EU Energy Efficiency Directive (compliance implies that the system uses at least 50% renewable energy or 50% waste heat or 75% cogenerated heat or 50% of a combination of such energy and heat). • System modifications to lower temperature regimes or advanced pilot systems (such as control and energy management systems and Internet of Things solutions). • Installation and operation of electric heat pumps that meet the refrigerant threshold (GWP) of 675. **Energy storage**

(*Eligible EU Taxonomy categories: 4.10 "Storage of electricity" and 4.11 "Storage of thermal energy")*

- The construction, modernization, operation, and maintenance of facilities that store electricity and return it later in the form of electricity.
- The construction, modernization, operation, and maintenance of facilities that store thermal energy and return it later in the form of thermal energy or other energy vectors.

Low carbon water transport infrastructure

(*Eligible EU Taxonomy category: 6.16. "Infrastructure enabling low carbon water transport)*

Construction, modernization, operation, and maintenance of infrastructure required for zero tailpipe CO_2 operation of vessels or the port's own operations, as well as infrastructure dedicated to transhipment. Stockholm Exergi does not own any ships; these projects are limited to infrastructure serving its operations such as biofuel input and captured CO_2 for permanent storage.

- Infrastructure dedicated to the operation of vessels with zero direct (tailpipe) CO_2 emissions: electricity charging, hydrogen-based refuelling.
- Infrastructure dedicated to the provision of shore-side electrical power to vessels at berth.
- Infrastructure dedicated to the performance of the port's own operations with zero direct (tailpipe) CO_2 emissions.
- Infrastructure and installations dedicated to transhipping freight between the modes: terminal infrastructure and superstructures for loading, unloading, and transhipment of goods

Analytical considerations

- We assess investments in the issuer's efficient district heating and cooling network as Medium green. This attests to its potential as a key technology for a low carbon future if connected to renewable sources, and reflects the network's exposure to emissions generated from waste incineration (WtE). That said, the network itself is not locked into using the energy, and therefore the associated emissions, from the WtE plants. In addition, if successful, the investment in CCS technology at its WtE plants outlined in this framework will address these emissions.
- Modernization and improvements to Stockholm Exergi's district network could be tied to mandatory improvements required by EU regulation. Although biomaterials constitute a substantial feedstock for its energy production, the issuer currently also uses residual waste (about 29% of total feedstock in 2022). This waste could be indirectly fossil based (plastics, for example), though we acknowledge that Stockholm Exergi abides by the waste hierarchy.
- Stockholm Exergi will invest in batteries as energy storage systems connected to the grid. These are necessary to improve intermittent supply from volatile renewable sources, and therefore facilitate the shift away from fossil fuels. That said, there are considerable supply-chain exposures due to the use of metals (aluminum and steel) and sensitive materials (lithium, cobalt) as well as end-of-life considerations related to the creation of hazardous waste. Operating in Sweden, this is addressed by EU regulation such as the new EU Batteries Regulation (2023/1542). As such, we assess this battery technology as Dark green.
- We assess zero tailpipe CO2 infrastructure as Dark green because it aligns with the Paris 2050 vision. Investments related to these projects will have wider reaching climate benefits for the local shipping industry.
- Although Stockholm Exergi does not have targets to reduce its transport emissions, it has an indirect incentive to reduce these emissions once it has implemented CCS and BECCS technology at its plants, to maximize the emissions it will be able to trade on the voluntary carbon market.

- We note that, though included in the framework, the use of hydrogen-based refueling is still in its early stages. And while cold ironing--whereby electricity is used to power a ship's systems instead of its engines while docked--helps reduce emissions, investments in this technology will be servicing fossil-fuel-powered vessels.
- Energy storage and port infrastructure will be exposed to physical climate risks. The risk to the former may be mitigated under the climate-change-adaption project category included in this framework, but it is unclear how the latter will be addressed. As the district network is formed mostly of underground pipes, its exposure to physical climate events is less material.

Pollution prevention and control

Assessment	Description
Dark to Medium green	**Waste -to-energy** • The construction, modernization, operation, and maintenance of facilities dedicated to waste incineration to produce heat/cool and power that follow a waste hierarchy to ensure that as much of the waste as possible is reused and recycled before being converted to energy. Lifecycle aspects of waste transportation are also assessed. **Material recovery** *(Eligible EU Taxonomy category: 5.9. "Material recovery from non-hazardous waste")* • The construction and operation of facilities for the sorting and processing separately collected non-hazardous waste streams into secondary raw materials involving mechanical reprocessing. At least 50%, in terms of weight, of the processed waste should be converted into secondary raw materials that are suitable for substituting virgin materials in production processes. **Carbon Capture and Storage** • *Carbon Capture* The construction, modernization, operation, and maintenance of CCS facilities dedicated to the reduction, avoidance, or removal of greenhouse gas emissions associated with bioenergy plants (BEECS) and waste-to-energy plants (CCS). • *Carbon capture and utilization* The construction, modernization, operation, and maintenance of CCU facilities processing separated CO_2 into new secondary raw material, creating sustainable carbon cycles. • *Transport of captured CO_2* *(Eligible EU Taxonomy category: 5.11. "Transport of CO_2")* Transport of captured CO_2 via all modes that meet all of the following criteria: (i) no leakages above 0.5% of the mass of CO_2 transported, (ii) CO_2 is delivered to a permanent CO_2 storage unit, (iii) appropriate leak detection systems are applied and a monitoring plan is in place, with the report verified by an independent third party, and (iv) the activity may include the installation of assets that increase the flexibility and improve the management of an existing network. • *Carbon storage* *(Eligible EU Taxonomy category: 5.12. "Underground permanent geological storage of CO_2")* Permanent storage of captured CO_2 in appropriate underground geological formations that comply with both of the following criteria: (i) meeting the relevant EU directives related to

assessment, exploration, and operation of storage sites and surrounding area and (ii) appropriate leakage detective systems are implemented and a monitoring plan is in place.

Research & Development for CCS and CCU technologies

(Eligible EU Taxonomy category: 9.1 "Close to market research, development and innovation")

Research, applied research, and experimental development of solutions, processes, technologies, business models, and other products dedicated to the reduction, avoidance, removal or reuse of greenhouse gas emissions associated with bioenergy plants, waste-to-energy plants, or for the production of biochar.

Analytical considerations

- We assess Stockholm Exergi's investments in WtE facilities as Medium green because, while WtE provides a disposal solution for waste that cannot be recycled, reused, or avoided, it currently allows for the release of carbon contained in the waste materials and products. In 2022, the combustion of fossil fuels and recovered fuels accounted for 81% of its scope 1 emissions, and WtE provided around 29% of the energy the issuer supplied. As such, we view as positive that this project category also includes the introduction of CCS technology to its WtE plants, because, if successful, it will capture the generated emissions.
- We view as a strength that Stockholm Exergi abides by the waste hierarchy by prioritizing material recycling over incineration, which we consider a minimum requirement for a green shade. This is supported by its investments under this framework in facilities that sort and process non-hazardous waste. We assess these investments as Dark green because they aim to recover at least 50% of the weight of the processed materials using low carbon energy.
- A further source of emissions stems from importing waste from abroad (about 10% of waste came from the U.K. in 2022). WtE plants can also lead to severe environmental and human health impacts if adequate safeguards are not in place, though we note that the company is subject to the EU IED (2010/75/EU) and therefore applies best-available-technologies to mitigate these risks. Finally, effective waste management streams could inhibit the transition to low carbon materials and products if not combined with behaviour change, but we acknowledge that this may be beyond the issuer's mandate.
- We assess Stockholm Exergi's CCS plans as Dark green because we view it as a necessary technology to achieve a net-zero future. This is because its successful implementation will involve the removal and permanent storage of emissions from the atmosphere. Once operational, the addition of this technology to Stockholm Exergi's energy production facilities will contribute to national and EU climate ambitions.
- The main risks associated with CCS that could affect Stockholm Exergi are leakages during transportation and storage and the use of fossil-fuel-powered vehicles for transport. As such, we view as a strength that the framework includes criteria for low leakage carbon transport and monitoring and leak detection systems. That said, the framework also includes CCU, which could result in the downstream release of emissions. We understand that the issuer has yet to determine how it will implement this system, but that it will nonetheless select solutions that will result in emissions savings.
- All facilities will be exposed to physical climate risks, primarily from floods and storms. The company aims to mitigate these risks with projects included in the climate change adaption category in the framework.

Sustainable water and wastewater management

Assessment	Description
Medium green	**Water collection, water treatment and water supply systems** Construction, modernization, operation, and maintenance of facilities, systems, and technologies designed to treat and reuse wastewater, such as water purification processes, water loss prevention, increased water use efficiency, and energy efficiency investments that reduce energy consumption or environmental impacts.

Analytical considerations

- Projects in this category will relate to the process water Stockholm Exergi uses in its district heating systems. While wastewater management and treatment are important from a climate perspective, both to reduce emissions and improve resiliency, and

reduce negative local environmental impacts, the issuer does not rigorously consider scope 3 emissions. While we recognize that district heating using bioenergy is a required technology for a low carbon future, the feedstock still relies somewhat on indirect fossil-based waste. Further investment is therefore needed for bioenergy to be consistent with a climate resilient future. We therefore assign a Medium green shade to this project category given its significant connection with the district heating network, which we also assess as Medium green.

- This project category is supported by Sweden's robust regulations on wastewater management. The issuer is subject to regulatory requirements mainly via environmental permits that control the emissions it can release into water, hazardous sludge disposal, and reporting under the EU's IED. We understand from the issuer that water and wastewater management processes are powered by fossil fuel-free sources and that methane emissions controls are not relevant given the types of projects. We note, however, that the issuer has not committed to reduce embodied emissions from construction materials and equipment. That said, it partly considers scope 3 emissions under EU REACH (registration, evaluation, authorization, and restriction of chemicals) in relation to compliant chemicals for wastewater treatment.
- We view the issuer's practice of recycling flue gas condensate water and using it for district heating and cooling systems as positive because it reduces stress on municipal water sources.
- As part of the regular maintenance of the district heating network, the issuer annually conducts 2,000-3,000 spot checks for water leaks from pipes. Stockholm Exergi spends about SEK200 million per year on network renewal, replacing about 0.5%-1.0% of the total network, which we view as positive. Combined, these activities may result in increased capacity and reduced energy losses. In 2022, the issuer also introduced measures to ensure energy efficiency in the network by identifying older and faulty sub-stations.
- The issuer has identified physical climate risks for its facilities and commits to ongoing monitoring. We also foresee it mitigating physical risks via the climate change adaptation projects included in this framework.

Climate change adaption

Assessment	Description
Dark green	**Adaptation measures** Investments to strengthen an asset or activity to withstand identified physical climate risks over its lifetime, such as adaptation measures aimed at reducing flood risks, for instance by creating wetlands and rainwater drainage systems.

Analytical considerations

- We assess climate change adaptation as Dark green given that it is key to the long-life infrastructure needed for the Paris-aligned 2050 vision, such as district heating facilities. For Nordic countries, expected changes are, among others, heavy rain and floods. Planning for and mitigating such risks is pivotal to reducing the financial and environmental impacts of these events.
- We believe the issuer has identified climate adaptation projects pertaining to reducing flood risk by creating wetlands and rainwater drainage systems, which are well placed within Sweden's climate adaptation strategy.
- We view as positive that all major investments, including its planned bio-CCS plant in Värtaverket, are subject to climate-related scenario analysis to identify long-term physical climate risks. Stockholm Exergi is conducting in depth physical climate risk analyses at its production facilities and is developing adaptation solutions. We understand that the issuer deems the identified physical climate risks for its two facilities to be manageable.
- We understand that the issuer's climate adaptation projects will be primarily engineering solutions, but may also entail nature-based ecosystem solutions depending on several factors, including the requirements of the asset, potential environmental challenges, and the availability of resources. We note the risk of lifecycle emissions in the construction of stormwater management systems, which the issuer aims to address by sourcing climate adaptable cement and setting sustainability targets for contractors. We expect that once in operation the stormwater management system will be emissions free.

S&P Global Ratings' Shades of Green

Assessments	Dark green	Medium green	Light green	Yellow	Orange	Red
Description	Activities that correspond to the long-term vision of an LCCR future.	Activities that represent significant steps toward an LCCR future but will require further improvements to be long-term LCCR solutions.	Activities representing transition steps in the near-term that avoid emissions lock-in but do not represent long-term LCCR solutions.	Activities that do not have a material impact on the transition to an LCCR future, or, Activities that have some potential inconsistency with the transition to an LCCR future, albeit tempered by existing transition measures.	Activities that are not currently consistent with the transition to an LCCR future. These include activities with moderate potential for emissions lock-in and risk of stranded assets.	Activities that are inconsistent with, and likely to impede, the transition required to achieve the long-term LCCR future. These activities have the highest emissions intensity, with the most potential for emissions lock-in and risk of stranded assets.
Example projects	Solar power plants	Energy efficient buildings	Hybrid road vehicles	Health care services	Conventional steel production	New oil exploration

Note: For us to consider use of proceeds aligned with ICMA Principles for a green project, we require project categories directly funded by the financing to be assigned one of the three green Shades.

LCCR--Low-carbon climate resilient. An LCCR future is a future aligned with the Paris Agreement; where the global average temperature increase is held below 2 degrees Celsius (2 C), with efforts to limit it to 1.5 C, above pre-industrial levels, while building resilience to the adverse impact of climate change and achieving sustainable outcomes across both climate and non-climate environmental objectives. Long term and near term--For the purpose of this analysis, we consider the long term to be beyond the middle of the 21st century and the near term to be within the next decade. Emissions lock-in--Where an activity delays or prevents the transition to low-carbon alternatives by perpetuating assets or processes (often fossil fuel use and its corresponding greenhouse gas emissions) that are not aligned with, or cannot adapt to, an LCCR future. Stranded assets--Assets that have suffered from unanticipated or premature write-downs, devaluations, or conversion to liabilities (as defined by the University of Oxford).

Related Research

- Analytical Approach: Second Party Opinions: Use of Proceeds, July 27, 2023
- FAQ: Applying Our Integrated Analytical Approach for Use-of-Proceeds Second Party Opinions, July 27, 2023
- Analytical Approach: Shades of Green Assessments, July 27, 2023
- S&P Global Ratings ESG Materiality Maps, Power Generators, 2022
- S&P Global Ratings ESG Materiality Maps, Utilities Networks, 2022

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