

Stockholm Exergi Green Bond Second Opinion

August 22, 2019

Stockholm Exergi, previously named Fortum Värme, is a local energy company serving Stockholm, owned by the City of Stockholm and Fortum. The company provides heating for more than 800 000 people in metropolitan Stockholm and cooling for more than 400 properties, hospitals, data centres and others. 700 employees are working in the company that has built an integrated system for energy and waste management. In 2018, 86 per cent of heat produced was based on renewable sources or recovered energy. The rest was based on fossil fuels, including coal. By 2022, coal should be completely replaced by sustainable sources.

The Stockholm Exergi green bond framework provides a clear and sound framework for investments into projects that align with the Green Bond Principles. Eligible projects include fully or partly financing or refinancing investments in renewable energy (bioenergy and thermal energy); waste management and pollution prevention; and transmission, distribution of renewable energy, energy recovery and energy storage. Green bond net proceeds will not be allocated to projects focused on fossil energy generation, nuclear energy generation, or potentially environmentally harmful resource extraction. Stockholm Exergi expects that most of the allocated funds (>50%) will go to the Renewable Energy category, followed by Waste management and pollution prevention (>20%) and Transmission, distribution of renewable energy may involve combustion of plastics, a fossil fuel. Waste as fuel will be counted as renewable energy provided it contains maximum 10% plastic by energy. The ambition is that the majority of net proceeds will go to new investments.

Stockholm Exergi's governance policies and procedures meet and, in cases, exceed the recommendations laid out in the Green Bond Principles. Stockholm Exergi has an impressive target of producing district heating only from renewables and recovered energy sources at the latest in 2030. There are also good procedures in place to identify and manage potential ESG risks associated with projects. The selection process for determining eligible projects is solid, as is the management of proceeds. The reporting is also very good and impact reporting will be at project level, including climate impacts from production, processing and transport.

Based on the overall assessment of the project types that will be financed by the green financing, governance and transparency considerations, Stockholm Exergi's green bond framework receives an overall **Dark** Green shading.

SHADES OF GREEN

Based on our review, we rate the Stockholm Exergi's green bond framework **CICERO Dark 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 Stockholm Exergi's framework to be **Excellent**.



GREEN BOND PRINCIPLES

Based on this review, this Framework is found in alignment with the Green Bond Principles.





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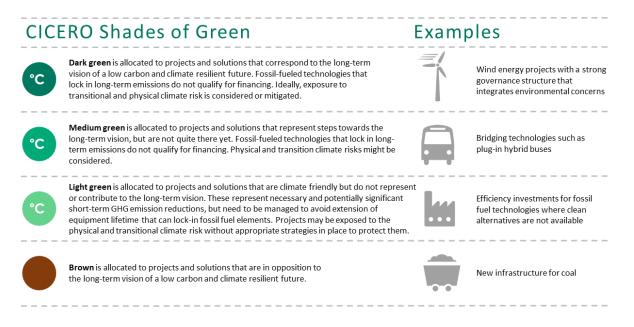
1 Terms and methodology

This note provides CICERO Shades of Green's (CICERO Green) second opinion of the client's framework dated June 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 client's policies and processes, as well as information gathered during meetings, teleconferences and email correspondence.

Expressing concerns with 'shades of green'

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



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 Stockholm Exergi's green bond framework and related policies

Stockholm Exergi, previously named Fortum Värme, is a local energy company serving Stockholm, owned by the City of Stockholm and Fortum. The company have operated since the 19th century. Today, it provides heating for more than 800 000 people in metropolitan Stockholm and cooling for more than 400 properties, hospitals, data centres and others. 700 employees are working in an integrated system for energy and waste management and treatment. In 2018, 86 per cent of heat produced was based on renewable sources or recovered energy. The rest was based on fossil fuels, including coal.

Environmental Strategies and Policies

The main sustainability target of Stockholm Exergi is to achieve climate and resource neutral energy production by 2030. On the way to this target, Stockholm Exergi aims at phasing out all use of coal by the end of 2022. They have developed an ambitious road map to reach this target and progress towards this goal is reported annually in the sustainability reporting. Stockholm Exergi has not implemented the TCFD recommendations.

The reporting on climate impacts, including from transport, is calculated from a life-cycle perspective. When it comes to adaptation Stockholm Exergi follows the guidelines and instructions that apply within the relevant municipalities. The planning is, for example, based on forecasts of increased frequency of extreme heat waves and extreme rain. New projects apply guidelines for the required height above sea etc. Specifically, Stockholm Exergi is actively taking risks to future fuel supply into account in their planning.

Stockholm Exergi is certified according to ISO 14001, ISO 9001 and OHSAS 18001:2007. Stockholm Exergi supports the ten principles for responsible corporation put forward by UN Global Compacts, respects the UN declaration on human rights and ILO's conventions. Stockholm Exergi further work actively for the UN Sustainable Development Goals.

Use of proceeds

Eligible projects under Stockholm Exergi's green bond framework are in the categories; renewable energy, waste management and pollution prevention, and transmission, distribution of renewable energy, energy recovery and energy storage. Net proceeds from the green bond can finance both existing and new green projects. New financing is defined as green projects under construction or green projects taken into operation less than 12 months prior to the approval by Stockholm Exergi's Green Bond Committee. The distribution between new financing and refinancing will be reported on in Stockholm Exergi's annual reporting. Stockholm Exergi expects that majority of the allocated funds (>50%) will go to the Renewable Energy category, followed by Waste management and pollution prevention (>20%). Lastly, the Transmission, distribution of renewable energy, energy recovery and energy storage category will have a share of less than 20%. Almost everything will go to investments. Some might be used to finance research and development on e.g. bioenergy with carbon capture and storage (BECCS).

Green bond net proceeds will not be allocated to projects focused on fossil energy generation or fossil fuel related infrastructure, nuclear energy generation, nor potentially environmentally harmful resource extraction (such as rare-earth elements or fossil fuels). Waste as fuel will be counted as renewable energy provided it contains maximum 10% plastic by energy.

Selection:

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

The process to evaluate, select and allocate green bond proceeds to eligible green projects under Stockholm Exergi's framework comprise the following steps:

- The responsible Project Manager evaluates the potential green project in cooperation with the Sustainability Department. If a project is eligible, it will be added to the green project prospect pool.
- The Green Bond Committee prioritizes and approves potential green projects from the prospect pool based on adherence to the green bond framework. If a project is approved, it will be added to the green project pool for allocation.
- The Green Bond Committee allocates proceeds from the issuance of green bonds to projects from the green project pool for allocation. Only projects which are chosen unanimously will be added to the list of allocated green projects.
- Selection and allocation decisions are documented and filed.

The Green Bond Committee is chaired by the Chief Financial Officer and comprises in addition the Head of Sustainability and Head of Treasury.

If the green project is sold, or for other reasons loses its eligibility, funds will then follow the procedure under Management of Proceeds until reallocated to other eligible green projects.

Management of proceeds

CICERO Green finds the management of proceeds of Stockholm Exergi to be in accordance with the Green Bond Principles.

An amount equal to the green bond net proceeds will be credited to a "Special Account". The use of the Special Account ensures that green bond net proceeds only support green projects or is used to repay green bonds. As long as the green bonds are outstanding and the Special Account has a positive balance, funds will be deducted when relevant or at least annually from the Special Account in an amount equal to all disbursements made during such year in respect of eligible green projects. All transfers from the Special Account will be documented to ensure a full audit trail and to simplify the green bond reporting. While any green bond net proceeds remain unallocated, Stockholm Exergi will temporarily place funds in the liquidity reserve and manage them accordingly. However, unallocated proceeds may not be invested in fossil fuel related assets. The maximum period that net proceeds may be unallocated is 12 months.

Reporting

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

Stockholm Exergi will annually, and until maturity of the green bonds issued, provide to investors on its website the following information on a portfolio basis, with likely impact reporting per project:

- A summary of green bond developments
- The outstanding amount of issued green bonds
- The balance of the Special Account (including any temporary investments and green bond repayments) and the available headroom in the value of the green projects (if any)
- The total proportion of green bond net proceeds used to finance new green projects (ongoing or taken into operation less than 12 months prior to the approval by Stockholm Exergi's Green Bond Committee) and the proportion of green bond net proceeds used to refinance green projects finalized earlier than that.
- The total aggregated proportion of green bond net proceeds used per green project category
- Impact reporting following the impact reporting principles stated in the "Nordic Public Sector Issuers: Position Paper on Green Bonds Impact Reporting". Metrics include energy generation, reuse and recovery, energy transmission and capacity, greenhouse gas savings covering CO₂, CH₄ and N₂O, quantity waste handled as well as pollution prevention indicators.

Use of proceeds and impact reporting will be given "limited assurance" from an external auditor.



3 Assessment of Stockholm Exergi's green bond framework and policies

The framework and procedures for Stockholm Exergi's green bond investments are assessed and their strengths and weaknesses are discussed in this section. The strengths of an investment framework with respect to environmental impact are areas where it clearly supports low-carbon projects; weaknesses are typically areas that are unclear or too general. Pitfalls are also raised in this section to note areas where Stockholm Exergi 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 Stockholm Exergi's green bond framework, we rate the framework **CICERO Dark Green.**

Eligible projects under the Stockholm Exergi's 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
Renewable energy	The financing or refinancing for the production, appliances, establishment, acquisition, expansions and/or upgrades/modifications of renewable energy, as well as related Research and Development programmes and/or the associated infrastructure including loading, harbour and rail capacity.	 Dark Green In the evaluation of all bioenergy projects, the environmental and social impact of supply chain elements are taken into account. All biofuels are purchased from sustainable sources, mostly in the
	 Bio energy Facilities producing biofuel, biogas, biochar and/or biomass such as biofuel preparation, pre- treatment, bio-refinery and pyrolysis facilities. Facilities for electricity generation or district heating/cooling, as well as the combination (CHP), that use biofuel or biomass as fuel. Facilities often use a mix of different sustainable energy sources such as 	Nordic region. The climate impact – including transportation – is calculated from a life-cycle perspective. Biomass/fuel deriving from sources of high biodiversity that competes with food sources is excluded. Peat is not classified as a renewable energy resource. Waste contains less than 10% fossil or plastic elements by energy.

biomass/fuel, waste¹, water-thermal and recovered energy from data centres and wastewater treatment.

- Rail and shipping related infrastructure needed for the transport, loading, off-loading and storage of biomass to our production plants.
- Thermal energy
- Water-thermal heating/cooling systems, including storage facilities in e.g. caverns.
- Stockholm Exergi's current mix of fuels is published in the Annual report. Waste and biomass will most likely be the main fuel in the future, but also other types of biofuel are possible. Fossil oil is currently used in existing plants to start and stop (1-2% of the energy use). Stockholm Exergi makes efforts to phase this out.
- The climate impacts of biochar depend on production method. Stockholm Exergi is aware of this issue.

The financing or refinancing of the establishment, Medium to Dark Green

Waste management and pollution prevention

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acquisition, expansion, and/or upgrades of; waste management and waste to energy facilities, solutions contributing to reducing pollution generated in the operations, as well as the associated infrastructure and related Research and Development programmes.

Waste management

 Recycling facilities and related infrastructure, including treatment and processing of all types of waste, with the purpose to minimize the amount of waste to landfill and bring back valuable raw material to the market.

Waste to energy

 Waste-based energy facilities, where energy recovery from waste follows a waste hierarchy to ensure that as much of the waste as possible is reused and recycled before being converted to energy. Life cycle aspects of waste transportation will also be considered.

Reduction of air and wastewater pollutants

• Investments in technologies and systems to reduce emissions to air, preventing pollutants to reach ground water and purification of wastewater, and emissions of nitrogen oxides, sulphur, particle pollution and other toxic pollutants.

- Good that the waste hierarchy is followed.
- Stockholm Exergi carries out investments in sorting plants that are expected to be able to sort out about 75% of the plastic in household waste. Stockholm Exergi measure the proportion of fossil CO₂ and it is expected to decrease according to company goals.
- Stockholm Exergi is carrying out exciting new projects on BECCS: a CCS pilot planned to be commissioned in autumn 2019², and a pilot for biochar together with Stockholm Vatten och Avlopp in Högdalen (up and running)³.

'Second Opinion' on Stockholm Exergi's Green Bond Framework

¹ Less than 10 per cent fossil or plastic in the mix by energy

² https://www.di.se/hallbart-naringsliv/teknik-for-att-fanga-in-koldioxid-testas-i-stockholm/

³ https://www.stockholmexergi.se/om-stockholm-exergi/miljo-och-hallbarhet/biokol-2/

Removal of Harmful Substances

Soil remediation and removal and replacement of harmful substances in products and materials.

Technologies to facilitate carbon sinks

Bio energy carbon capture and storage (BECCS) facilities to produce biochar or other carbon sinks.

Technologies to recover energy

Techniques and infrastructure to recover energy from e.g. data centres and wastewater treatment.

Transmission, The financing or refinancing of the establishment, Dark Green distribution of acquisition, expansion and upgrade of; district heating/cooling distribution, facilities for energy renewable energy, energy recovery and energy storage, technologies recovery and contributing to low-carbon and more efficient energy storage distribution systems, as well as the associated



infrastructure and related Research and Development programs.

- Distribution systems connecting end-users with district heating/cooling or to enable change in operations.
- Smart distribution systems, storage facilities, metering systems, fourth generation district heating networks based on lower temperature water distribution and a higher contribution from renewable energy and waste heat, and other intelligent energy systems managing the intermittency of renewable energy production.
- The goal is to phase out coal for district heating by 2022 and decrease the fossil share in the waste by 2020. In 2018 coal was less than 14% of the total used for heat production.

Table 1. Eligible project categories

Background

The energy supply sector is the largest contributor to global anthropogenic GHG emissions with a share of approximately 35%. Realizing the transformation towards a 1.5° C world requires a major shift in investment patterns. In 1.5° C compliant pathways, renewable energy generates on average 60% of primary energy supply in 2050, compared to 15% in 2020.

Recycling materials and developing a circular economy requires advanced capabilities and organizational structures but have advantages in terms of cost, health, governance and environment. With a continuously increasing number of business ideas turning waste to profits, the Nordic region has proved that the circular economy is no longer just a theory. As a consequence, Sweden has less than 1% of municipal waste to landfill. Approximately 50% of all household waste is turned into energy. When it comes to recycling rates, they were in °CICERO Shades of Green

2016: Glass 93%; plastics excluding PET: 47%; and paper: 82% (Source: Sweden EPA). Thus, Stockholm Exergi is operating in an advanced circular economy already.

While individual clean energy technologies are the building blocks of clean energy transitions, it is also necessary to employ energy integration systems to maximise their impact. Energy integration technologies such as smart meters, energy storage and demand response play a crucial role in increasing the flexibility of energy systems. The development of new district heating solutions such as advanced 4th generation district heating systems, increased involvement of end users, and growth in order to supply an increased building area, will be crucial in order to achieve higher efficiency and reduced emissions.

Governance Assessment

Four aspects are studied when assessing the Stockholm Exergi'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.

Stockholm Exergi has an impressive target of producing district heating only from renewables and recovered energy sources at the latest in 2030. In 2018, 86% of the produced heat was based on these types of sources. The last remaining use of coal is planned to be phased out by 2022.

There are good procedures in place to identify and manage potential ESG risks associated with projects, including resilience of fuel supply under future climate change. Planning is, for example, based on forecasts (scenarios) of increased frequency of extreme heat waves and increased frequency of extreme rain that affects the biofuel supply. New projects apply guidelines for the required height above sea.

The selection process for determining eligible projects is solid, as is the management of proceeds. The reporting is also very good at a portfolio level, including climate impacts from production, processing and transport.



The overall assessment of Stockholm Exergi's governance structure and processes gives it a rating of Excellent.

Strengths

Stockholm Exergi has developed an overarching sustainability policy focusing on economic efficiency, and environmental and social responsibility. This sustainability policy is well integrated in the company's business values and operational procedures.

The sustainability policy lays strong emphasis on climate and resource efficiency, but also broader environmental considerations are included. The company systematically assesses environmental impacts in all its decision-making processes, including when entering into contractual negotiations with third parties. Usually a life cycle perspective is employed in assessing potential impacts. The sustainability policy is incorporated in the organisation by detailed operational directions and procedures.

Biofuels are important in Stockholm Exergi's operation. It is therefore good that all biofuels are purchased from sustainable sources and that the climate impact is calculated from a lifecycle perspective. Stockholm Exergi takes a lifecycle approach in its sustainability policy, taking responsibility for all stages in the process including waste

deposition. It follows from the company's procedure that environmental impacts in all decision-making processes are systematically assessed, including when entering into contractual negotiations with third parties. Lifecycle analysis to ensure that only sustainable biofuel is used in the production and assessment of climate impacts of imported waste are such examples.

Weaknesses

We find no material weaknesses in the green bond framework of Stockholm Exergi.

Pitfalls

Waste incineration with energy recovery is a sound environmental and climate friendly option to divert waste away from landfilling. Impressively, less than one per cent of household waste now ends up at landfills in Sweden. Waste incineration is, however, best combined with ambitious recycling policies. When the capacity of waste incineration is high it might be an incentive to burn waste for energy purposes instead of material recycling. A Swedish study⁴ suggests that imports of waste for energy recovery in Sweden lead to a combination of reduced landfill of both treated and untreated waste and reduced domestic waste incineration in the exporting countries studied. The knowledge that emerged from this study and in previous studies suggests that the effects of Swedish waste imports on recycling are small in practice, but the knowledge still needs to be deepened. Hence there is a need to continue to recycle more fossil fuel waste such as plastic into new materials.

Stockholm Exergi will, to the extent possible, make every effort to follow the impact reporting principles stated in the "Nordic Public Sector Issuers: Position Paper on Green Bonds Impact Reporting". The European grid factor recommended by the Nordic Public Sector Issuers in their Position Paper on Green bond Impact Reporting based on the methodology outlined in the Harmonized Framework for Impact Reporting developed by a group of multilateral development banks. This grid factor is constructed by developing a Combined Margin, comprised of an Operating Margin that represents the marginal generating capacity in the existing dispatch hierarchy that will most likely be displaced by the project, and a Build Margin which represents future, less fossil-intensive, generating capacity. Investors should be aware that this factor is higher than the European average grid factor. There are harmonization reasons for presenting such a common European emission factor if applied to all European green bond projects, but in order not to overestimate the total benefit of European projects this presupposes that other European emisters also use similar emission factors based on interconnection between EU26+Norway, and not individual national production margin baselines that are higher than this average.

Another macro-level concern is the potential for rebound effects. For example, energy efficiency improvements that lower energy costs, inducing more energy use and partially offsetting energy savings. This can have the result of lower reduction in GHG emissions than anticipated. While these effects can never be entirely avoided, it is recommended to be aware of possible rebound effects and avoid investing in projects where the risk of such effects is particularly high.

⁴https://www.avfallsverige.se/kunskapsbanken/rapporter/rapportera/article/avfallsimport-och-materialatervinning/

^{&#}x27;Second Opinion' on Stockholm Exergi's Green Bond Framework

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Appendix 1: Referenced Documents List

Document Number	Document Name	Description
1	Stockholm Exergi Green Bond Framework – June 2019	
2	Stockholm Exergi Års- och hållbarhetsredovisning 2018	Annual report 2018
3	Stockholm Exergi Uppförande kod för anställda	Guidelines for employes
4	Stockholm Exergi Supplier code of conduct	
5	Visselblåsartjänst	Description of whistleblower guidelines and services
6	Stockholm Exergis riktlinjer för motpartsrisk	Definitions, principles, responsibilities and processes to manage counterpart risks
7	Stockholm Exergis Hållbarhetspolicy	Sustainability policy
8	Intyg certifikat ISO 14001	ISO 14001 certificate
9	Intyg certifikat ISO 9001	ISO 9001 certificate
10	Intyg certifikat OHSAS 18001:2007	OHSAS 18001:2007 certificate

11	Hållbarhetsbedömning och kriterier för gröna obligationer för komplexa investeringar inför TG1 och TG2	
12	Startmöte Projektstyrning - Miljöutredning för projekt - Mall	Template for environmental assessments of projects
13	Instruktion Projektstyrning- projektmiljöplan	Guidelines and instructions for project and environmental management
14	Beslutspresentation till IB	Power point template for presentations leading to investment decisions
15	Beslutspresentation till IB	Template for project planning and management
16	Vi jobbar säkert eller inte alls	Poster on responsibilities for secure working conditions
17	Systematiskt arbetsmiljöarbete	Description of organisation, responsibilities and processes securing safe working conditions
18	Riktlinjer för hantering av alkohol och droger	Guidelines for managing alcohol and drugs
19	Värdering av miljöaspekter samt förteckning över de betydande.	Spreadsheet used in environmental impact assessment of Stockholm Exergi's activities



Appendix 2: About CICERO Shades of Green

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

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

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



'Second Opinion' on Stockholm Exergi's Green Bond Framework