°CICERO Shades of Green

Boliden AB
Green Finance Second Opinion

25 May 2022

Boliden AB ("Boliden") is a metal producer active in exploration, mining, smelting, and recycling. Boliden mines and processes non-ferrous base and precious metals, mainly zinc, copper, lead, nickel, gold and silver, with yearly production of 0.9 Mt base metal and 600 tonnes precious metal. The company operates five mines and five smelters in Sweden, Finland, Norway and Ireland.

Most green finance proceeds will finance the expansion of the low carbon zinc production facility in Norway (Odda), in addition to projects within Energy efficiency and Pollution prevention and control. The Odda facility has low emissions and is supplied with renewable energy. The energy efficiency category includes energy and heat recovery projects at all smelters and mines. The pollution prevention and control category may include process and mine electrification, water purification, technologies to clean process gases, waste reduction and extraction of more metal from residual materials and recycling. The framework also has project categories for R&D and Clean transportation. In the selection, the issuer will assess projects' contribution to its 2030 intensity target (-40% CO_2e/kg metal) and net zero 2050 target, seeking to avoid projects that lock-in high emissions. Some 80% of the proceeds are expected to finance new projects.

The framework allows for investments in all shades of Green, but most proceeds will be allocated to the parts of Boliden's activities with lower emissions (zinc). Direct emissions from Boliden's smelters, which are covered by the EU ETS, amount to some 400,000 tonnes CO_2e/year. The issuer expects these emissions to fall significantly towards 2030. Parts of the reduction process, mostly associated with recycling and circular processes, are currently dependent on coal or coke. Investors should be aware that while the issuer is investigating technologies to reduce those emissions and to capture the released CO_2, there is currently no clear pathway towards the 2050-solution for these emissions.

The excellent governance score reflects quantified targets, robust green finance procedures and policies with a climate focus towards all partners. Exposure to physical climate risk is considered in the company's standard risk and investment procedures. The issuer plans to report on several metrics for each project category and on how it considered lock-in risks, but will only report emission reductions for clean transportation projects.

Based on the overall assessment of the projects that will be financed under this framework, and governance and transparency considerations, Boliden's green finance framework receives a **CICERO Medium Green** shading and a governance score of **Excellent**. The shading reflects that the largest investment is the part of Boliden with lower emissions along with projects that replace fossil fuels in the production process. Meanwhile, lock-in risks exist for energy efficiency projects and there remains a risk that absolute emissions could increase as the target is based on intensity.

SHADES OF GREEN

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

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

GREEN BOND AND LOAN PRINCIPLES

Based on this review, this framework is found to be aligned with the principles.

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1 Terms and methodology

This note provides CICERO Shades of Green's (CICERO Green) second opinion of the client's framework dated May 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 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:

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

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 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.

2 Brief description of Boliden's green finance framework and related policies

Boliden AB ("Boliden") produces metals and is active in the entire value chain, from exploration and mining, to smelting and finally recycling. It produces non-ferrous base metals, with the main products being zinc, copper, lead and nickel, as well as gold and silver. Boliden operates five mining units and five smelters in Sweden, Finland, Norway and Ireland. Boliden is listed on NASDAQ Stockholm in the Large Cap segment.

In 2021, Boliden produced some 939,409 tonnes of base metals, with 50% of this being zinc, 40% copper, 8% lead and 2% nickel matte. Production of precious metals was 584,703 kg, with silver accounting for 97%. Some 35% of the copper production capacity is labelled "low carbon", and the same goes for 18% of the zinc production capacity. Boliden defines "low carbon" as those products having one of the lowest carbon footprints of comparable products produced globally, see details below. Boliden also produced some 1,685,394 tonnes of sulphuric acid, which is a by-product from the metals production. Additionally, Boliden recycles electronic waste and car batteries. Boliden's clients are primarily industrial clients in Northern Europe, with direct customers being steel producers, galvanizers, cable manufacturers, and battery producers.

Environmental Strategies and Policies

Boliden's vision is to be the world's most climate-friendly metal producer. The company has a target to reduce the CO_2 intensity of its products with 40% by 2030 (compared to a 2012 baseline), and to have net zero scope 1 and 2 greenhouse gas (GHG) emissions by 2050. In a 2050 perspective, the issuer may find bio-CCS/CCU technologies and potentially offsets relevant for the last small amounts of smelters scope 1 emissions, which come from carbon in concentrates and rest plastics in batteries. Looking to 2030, the issuer expects scope 1 emissions from the smelters to fall significantly from currently around 400,000 tonnes CO_2e/year, while electricity consumption will increase due to the replacement of fossil fuels. Meanwhile, Boliden expects scope 2 emissions (associated with the use of electricity) to somewhat decrease due to the use of greener electricity. Around 80% of Boliden's energy consumption is secured with long term contracts for fossil free energy and by 2024 these will only contain fossil free energy. The 2021 carbon intensity was 0.66 tonne CO_2e/tonne metal produced, compared to 0.77 in 2012, based on emissions in scope 1 and 2. In 2020, emissions from Boliden's mining were 282,000 tonnes CO_2e in scope 1 and 312,000 tonnes CO_2e in scope 2, while emissions from smelters amounted to 615,000 tonnes CO_2e (scope 1 and 2). All of Boliden's smelters have been covered by the EU Emissions Trading Scheme (EU ETS) since 2013, with the associated requirements on monitoring and reporting emissions, as well as compliance obligations in the form of surrendering emission allowances.

In the mining process, the main direct emissions come from the use of explosives and fossil fuel combustion. The main direct emissions from the smelting stem from the reduction process when recycling steel mill dust and spent lead acid batteries (chemical reactions), and recycling of electronics containing plastics, some from fossil fuel combustion, while significant indirect emissions relate to the use of electricity. In the reduction process, Boliden uses coal when recycling steel mill dust, coke when recycling spent lead acid batteries and coal when smelting Ni-slag in the nickel production. Diesel is used for transportation, in mining operations and for internal transportation. Smaller amounts of oil and gas are used for heating during the winter.

To reduce its emission intensity, Boliden works on electrification and energy efficiency in its mines (mining ventilation and heat recovery units), and with energy efficiency, climate friendly heating, low carbon fuming process when recycling steel mill dust, as well as R&D for its smelters. The smelters have an overall goal to

improve energy efficiency by 5% from 2019 to 2030, while a long-term action plan has been drawn up for each smelter. R&D focuses on innovative technologies to reduce CO_2 emissions, including alternative reducing agents (instead of coke and coal). Currently, Boliden views the availability of bioenergy and green hydrogen, as well as technology for alternative reduction and carbon capture as the main challenges on the path towards net zero. The company has environmental and energy management systems in accordance with ISO 14001 and ISO 50001 at all its large operational locations.

In addition to climate targets, Boliden has environmental targets for reduced air pollution and water use, biodiversity (contribute to increased biodiversity by 2030 in all regions where it operates) and for waste and resource use (tailings/slag management at its mines in line with the Global Industry Standard for Tailing Management by the set timelines).

The issuer reports on progress towards its targets in its combined annual and sustainability report, as well as in a detailed sustainability report (Sustainability Index). The reporting is in line with the GRI standards (Global Reporting Initiative), and since 2021, it discloses sustainability performance in line with the requirements of the International Council on Mining and Metals' (ICMM) Mining Principles as well as with the Sustainability Accounting Standards Board (SASB), specifically the Metals & Mining standard.

Boliden has a Business Partner Code of Conduct applicable to all suppliers, subcontractors, joint venture partners, agents, distributors, representatives and customers. In addition to requiring compliance with internationally recognized human and labour rights standards, and providing for safe and healthy work environments, the code has comprehensive environmental requirements. These include, among others, a requirement for any partner to set targets for greenhouse gas emissions in their own operations and value chain, have appropriate processes to mitigate climate risks in their supply chain and minimize negative local environmental impacts. Where there is a risk for significant negative environmental or climate impact, partners are required by Boliden, where relevant, to set targets towards net positive impact on biodiversity.

Specific requirements - compliance with the OECD Due Diligence Guidance for Responsible Supply Chain of Minerals from Conflict-Affected and High-Risk Areas - apply to partners extracting, sourcing, providing or handling minerals from conflict affected or high-risk areas. Suppliers' compliance with the guidance is annually reviewed by a third party. Non-compliance may ultimately lead to a discontinuation of the business relationship by Boliden. In 2021, the issuer had two one-off transactions of raw materials with countries labelled as "Conflict-affected & High Risk Area". The deliveries were followed up by Boliden through its due diligence program and no red flags were identified in relation to these deliveries, in accordance with the mentioned OECD Due Diligence Guidance. Any partners active in mineral extraction are required to disclose payments of taxes, fees and royalties to governments in line with the principles set forth under the Extractive Industry Transparency Initiative[1], a global standard for the good governance of oil, gas and mineral resources.

The Code of Conduct serves as the basis for evaluating a potential supplier's CSR performance and is used in supplier selection. Under the procurement policy, any equipment with a significant impact on Boliden's energy consumption is subject to a specific energy efficiency calculation. Boliden is making efforts to collect data directly from all raw materials suppliers with a significant footprint. The company's procurement team is working on strengthening the consideration of CO_2 emissions in the supplier evaluation process.

Boliden supports the recommendations of the TCFD and reports accordingly in its Sustainability Index. Boliden is well aware of the risks posed by a changing climate. According to an assessment done in 2020, Boliden's sites do not face severe physical risks due to climate change, but some sites are expected to be more exposed to water

[1] The EITI Principles | Extractive Industries Transparency Initiative

stress than others. Changes in precipitation might lead to heavier snowfall; flooding may affect open pit mining operations, or localized flooding and changes in groundwater levels could impact Boliden's operations. Physical climate change risk is part of the company's general risk assessment and investment process. The next step in the issuer's climate resilience work is to assess its supply chain from a physical climate risk perspective to identify potential hazards.

Life Cycle Assessment of Boliden's main products

Boliden has had an independent third party calculate the carbon footprints[2] of its main products in accordance with the Greenhouse Gas Protocol (Product Life Cycle Accounting and Reporting Standard), as well as a review in line with the principles in ISO 14064-3. Boliden sources raw material both from own mines and from external mines. The calculation covers cradle to gate, scope 1, 2 and extended scope 3 emissions, namely purchased and supplier transport, as well as emissions associated with the production of inputs to the smelters and raw material purchased externally. This means that emissions from external mines are included in Boliden's carbon footprint calculations. Meanwhile, no credits or offsets are included in the calculation. Downstream GHG emissions are excluded. In 2021, approximately half of the raw material for zinc and nickel, and 34% for copper, were sourced internally.

The carbon footprint of Boliden's low carbon copper (from mining to smelter gate) is less than 1.5 kg CO_2e/kg Cu (Copper cathode), which is less than half of the global average presented by the International Copper Association (ICA)[3], but Boliden produces copper with a footprint varying from 0.4 to 4.6 kg CO_2e/kg Cu, depending on the source of the materials and the smelter. According to Boliden, its zinc production has one of the lowest emissions intensities in the world, with at the lowest 0.7 kg of CO_2e/kg of SHG Zinc, significantly lower than the global average presented by the International Zinc Association (IZA) of 2.6 kg CO_2e/kg[4], while the footprint varies from 0.7 to 4.25 kg CO_2e/kg Zinc, also depending on the source of the materials and the smelter. The low-carbon SHG Zinc has a footprint lower than 1kg CO_2e/kg while the low-carbon recycled SHG Zinc is below 3.8 kg CO_2e/kg.

The main contributors to each metal's carbon footprint vary between the type of metal. The main contributor to the copper footprint is scope 3 emissions from external mines and from the production of explosives at Boliden's mines, while scope 1 emissions represent a third of the footprint. Similarly, for nickel matte, scope 3 emissions (external mines and production of explosives and coke at Boliden sites) are the main contributor and a third of the footprint are scope 1 emissions at Boliden's sites (fossil fuel based transport and the reduction process in the nickel smelter). Meanwhile, although scope 3 emissions from external raw material suppliers represent the largest contributor to the zinc carbon footprint, the second largest contributor is scope 2 (high electricity consumption). Specifically, in the electrolysis, large amounts of electricity are used, making refining the main contributor of emissions for zinc.

Use of proceeds

According to the issuer, an amount equal to the net proceeds raised under the green finance framework will finance or refinance, in whole or in part, investments that promote the transition towards a low carbon and sustainable economy. Specific projects are selected in accordance with the criteria in the Use of Proceeds section of the framework.

Only assets and projects that comply with the list of green projects (see table 1) are deemed eligible under the framework. Net proceeds can be used for the new projects (defined as ongoing green projects and those started less than 12 months prior to the issuance of the green finance instrument) as well as for refinancing purposes. Boliden will use a look-back period of no more than 24 months from the date of issuance. The issuer expects that

[2] The analysed GHG emissions covered in the inventory for this study are CO_2, CH_4, N_2O, and SF_6. PFC & HFC has been excluded as they are assumed to be insignificant.
[3] ICA Copper Environmental Profile, 2018
[4] A global life cycle assessment for primary zinc production | SpringerLink

80% of proceeds will be spent on new projects, and some 20% on re-financing. In principle, all of Boliden's sites may be eligible for financing, but the Sustainable Finance Committee will evaluate each investment individually with regards to lock in effects, energy efficiency and other relevant factors.

The issuer has explicitly excluded investments linked to fossil energy generation, nuclear energy generation, research and/or development within weapons and defense, potentially environmentally negative resource extraction (such as rare-earth elements and fossil fuels), gambling or tobacco. Additionality, the issuer has set specific exclusion criteria for each project category, see details in table 1.

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.

Boliden has established a Sustainable Finance Committee ("SFC"), which is responsible for the evaluation and selection of eligible green projects. This committee consists of the Director Group Sustainability, the Director Group Strategy & Business Development, the Director Smelters Sustainability, Technology and Strategy, the Director Mines Technology and Director Mines Sustainability, Director Group Control and Director Group Treasury, and all decisions will be made in consensus. The selection process is documented in a separate procedure, which also covers how lock-in risks will be considered. Other ESG risk factors will also be considered, in accordance with Boliden's general investment risk analysis.

Only assets and projects that comply with the project categories defined in the Use of Proceeds section of the green finance framework will receive green financing. The SFC will keep a register of all green projects, monitor the green project portfolio and be responsible for replacing investments that no longer meet the framework's green project criteria. The SFC can exclude any already funded green project, which is further described in the under Management of Proceeds section. All decisions made by the committee will be documented and filed.

The SFC will also monitor the sustainable finance market and oversee potential future updates of the green financing framework with the aim of aligning with best market practice.

Management of proceeds

CICERO Green finds the management of proceeds of Boliden to be in accordance with the Green Bond and Green Loan Principles (2021).

An amount equal to the net proceeds from issued green finance instruments will be earmarked for financing and refinancing of green projects as defined in Boliden's green financing framework and allocated to individual disbursements.

The treasury department of Boliden will ensure that the value of green projects at all times exceeds the total amount of green finance instruments outstanding. If a green project already funded by green financial instruments is sold, or for other reasons loses its eligibility in line with the criteria in the green financing framework, Boliden will replace such project with another green project meeting the framework's criteria.

Net proceeds from green finance instruments awaiting allocation to green projects will be managed according to Boliden's Group finance policy and held as cash.

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.

Boliden will annually publish a Sustainable Finance Report on its website, either as a standalone document or as part of Boliden's Annual and Sustainability Report, as long as there are green finance instruments outstanding. The report will be reviewed by an independent auditor (limited assurance). The SFC is responsible for reporting, and the first reporting is expected in connection with or included in the Annual and Sustainability Report 2022.

This report will cover both allocation and impact reporting, specifying where possible the environmental impact of the eligible green projects. It will include information on the distribution between new financing and refinancing, as well as between allocated/unallocated proceeds.

The allocation report will include the following information.

- Amounts invested in each of the green project categories defined in the green finance framework and the share of new financing versus refinancing.
- Examples of green projects that have been funded
- The nominal amount of green finance instruments outstanding, split into green bonds and green loans.
- The amount of net proceeds awaiting allocation to green projects (if any).

Boliden's impact report aims to disclose the environmental impact of the projects financed under its green financing framework. Impact reporting will, to some extent, be aggregated. Depending on data availability, calculations will be made on a best intention basis. The issuer has informed us that it plans to decide on relevant metrics for the specific investments during the selection process, to prepare the ground for good data collection. The impact assessment may, where applicable, be based on the metrics listed in the table below. In addition, the reporting will include information on the measurement methodologies, key assumptions, including emission factors, where relevant. In particular, the issuer has committed to reporting on how it considered lock-in risks.

Project category	Example metrics
Energy Efficiency	• Annual energy consumption (TWh) • Annual CO_2 intensity (tonnes of CO_2/tonne metal) • Annual consumption of fossil free energy (% of total consumption) • Electrical energy intensity (electrical energy consumption kWh/tonne metal produced)
Pollution Prevention and Control	• Annual intensity of metals to air (tonnes NCP[5] metal eq/Mtonne metal produced) • Annual intensity of metals to water (tonnes NCP metal eq/Mtonne metal produced) • Total quantity of recycled e-waste, plastic battery casing, lead-acid batteries (metric tonnes) • Total quantity of waste metals made into new metals (metric tonnes) • Annual reused secondary energy from processes (TWh) • Annual discharge of used water (million m^3) • Annual emissions to air of SOx (metric tonnes) • Annual emissions to water of NOx, (metric tonnes) • Waste intensity (tonne deposited waste / tonne metal produced)
Clean Transportation	• Number of vehicles, machines and/or charging infrastructure • Annual GHG emissions avoided (tonnes of CO_2)

[5] Natural Capital Protocol

3 Assessment of Boliden's green finance framework and policies

The framework and procedures for Boliden's green finance 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 Boliden 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 Boliden's green finance framework, we rate the framework **CICERO Medium Green.**

Eligible projects under Boliden's green finance framework

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

Category	Green Projects	Examples of eligible investments	Exclusions	Green Shading and some concerns
Energy efficiency and pollution and control 	Investments in Odda as outlined in this framework to increase production capacity of low carbon zinc while reducing the electrical energy intensity by 5% and waste intensity by 30%.	• New roaster, sulphuric acid plant and cellhouse applying best available technology and supplied with renewable energy • Expansion and modernisation of the leaching plant	• Any new fossil fuel infrastructure • New or expanded capacity of waste depository	**Medium Green** ✓ This category is expected to receive most of the financing under the framework. A major part of the total investment will be carried out during 2022 and 2023. ✓ Zinc is used in a wide range of areas such as infrastructure, consumer goods, batteries, and industrial products. Among other, zinc provides rust protection to installations such as wind and solar parks, but also in construction and automotive industries. ✓ This investment will expand the annual production capacity at the Boliden Odda zinc plant (Norway), from 200 kt to 350 kt of zinc. Yearly direct emissions are comparatively low, with approx. 6,000 tonnes CO_2e, with most coming from the coal released from the zinc concentrate, and some from the use of fossil fuels, used once a year for heating of the roaster to start the production process. The process (electrowinning) is energy intensive, underlining the importance of energy efficiency efforts and access to cleaner sources of energy. Electricity will

	continue to be fully supplied from hydro power (through long-term purchasing agreement). ✓ According to Boliden, its zinc production has one of the lowest emissions intensities in the world, with at the lowest 0.7 kg of CO_2e/kg of SHG Zinc. The increased production capacity, together with improved energy efficiency and the use of fossil-free electricity is expected to further reduce the carbon dioxide intensity of the zinc produced. ✓ Boliden has been granted some 341 million NOK by the governmental agency Enova for this expansion, due to its improved energy performance and digitization technology. The government grant has been approved under ESA's Guidelines on State Aid for Environmental Protection and Energy 2014-2020.

Energy efficiency 	Energy efficiency improvements with the aim of reducing energy consumption (in absolute or relative terms) by using best available technology and beyond in the targeted area, and in line with Boliden's roadmap to achieve the target of 40% reduction in CO_2 intensity by 2030 and long-term goal of net zero emissions in Scope 1 and 2 by 2050.	• Infrastructure and systems that recycle energy or recover waste heat that can be reused in the plant area or supplied to a local district heating system • R&D aimed at improving the energy efficiency of Boliden's operations in line with stated targets	• Any new fossil fuel infrastructure • As part of the evaluation and selection process, Boliden's Sustainable Finance Committee will assess and exclude any investments deemed to lock-in the use of fossil fuels	**Light to Medium Green** ✓ This category is also expected to receive significant financing and will likely finance energy efficiency projects across all smelters. ✓ It is positive that the issuer is committed to using best available technology and beyond, while making sure investments are in line with its 2030 intensity target and 2050 net zero target. Boliden has a target to improve the energy efficiency at its smelters by 5% in 2030 compared to 2019. ✓ In the reduction process, Boliden currently uses coal when recycling steel mill dust, coke when recycling spent lead acid batteries and coal when smelting Ni-slag in the nickel production. Diesel is used for internal transportation. ✓ In the selection process, Boliden will assess the risk of locking in the use of fossil fuel, with the aim of excluding such investments. The issuer has specific guidance on how such risks will be considered in the selection process and will also be transparent on its assessment of these in its impact reporting. ✓ In a 2050-perspective, improving energy efficiency of industrial

				processes is important, and in the context of Boliden's governance and long-term ambitions of being the most sustainable metals producer, some of the eligible investments likely represent significant steps towards the 2050 low-carbon vision. Meanwhile, other eligible projects may reduce emissions in the short term but not yet represent to the long-term vision. Given that the 2030-target is intensity based, energy efficiency improvements can allow for higher overall emissions, and the technologies to replace coke and coal in the reduction process (as described above) are not yet available.
Pollution prevention and control  	Facilities, equipment and systems that significantly reduce pollution to water and air, as well as the reduction, recycling, recovery and reuse of waste Any investments selected in this category will be assessed by Boliden's Sustainable Finance Committee to apply best available technologies and beyond and be in line with Boliden's roadmap to achieve the target of 40% reduction in CO_2 intensity by 2030 and long term goal of net zero carbon emissions in Scope 1 and 2 by 2050.	• Replacing fossil fuel systems and infrastructure with electric or low-carbon alternatives • Systems for cleaning of process gases and other air emissions such as SOx, NOx, metals and dust • Construction and/or expansion of leaching plants using best available technology to reduce waste and extract more metal from residual materials	• Any new fossil fuel infrastructure • New or expanded capacity of waste depository	**Light to Medium Green** ✓ The range of shades reflects the wide range of projects that could be eligible in this category. Replacement of fossil fuel systems and R&D are needed to move towards low-emission metal production. While other potentially eligible projects have environmental benefits, the extent to which they contribute to the 2050-vision appears more uncertain. ✓ Boliden has informed us that the company strives to achieve as much improvement of environmental

		• Water purification technology and systems for reducing water discharges • Recycling of electronic waste and batteries ensuring metals and minerals can be safely recovered and reused • R&D aimed at improving the carbon intensity and/or other emissions of Boliden's operations in line with the stated targets		performance as possible, with improvements in energy efficiency, emission reductions and energy recovery often going beyond the requirements of its environmental permits. ✓ In the process to melt electronic waste to recover metals, significant emissions from the plastic occur.
Energy Efficiency and Pollution Prevention and Control	Research and Development to improve the carbon intensity and/or reduce other emissions and waste of Boliden's operations	• Evaluation, piloting and testing of alternative reduction agents such as bio-coal and hydrogen • Carbon capture technology • Evaluation, piloting and testing of technologies reducing waste • Development and evaluation of novel water treatment technologies		**Medium to Dark Green** ✓ The projects that are likely to be financed in this category are important in a 2050 perspective, as they address the hard to abate emissions in Boliden's processes as well as improvements in water treatment and waste prevention.
Clean transportation	Low carbon machinery, transport and infrastructure	• Zero emission vehicles, including electric machines and related infrastructure such as charging stations • Conversion/electrification of existing trucks and installation of trolley lines	• New vehicles, or machinery that run on fossil fuel	**Medium Green** ✓ Electrification is a key avenue for reducing emissions from transport and machinery. Investments in this category would be spent on fully electric vehicles and related infrastructure. ✓ The criteria for this category in principle correspond to a Dark Green

	• Autonomous logistic solution for transportation by AGV's to replace diesel truck systems	shading. However, given that the reduction process for parts of Boliden's operations currently depend on fossil fuel inputs (coke and coal), these investments in new electric equipment and infrastructure, and the conversion of the existing fleet to electricity, only constitute a part of the solution to a full transition to low emission non-ferrous metals production.

Table 1. Eligible project categories

Background

The industrial sector has a vital role to play in achieving the net zero goal: its emissions must fall by 90% by 2050 to align with the IEA's net zero by 2050 scenario[6]. According to Nature Geoscience, "greenhouse gas emissions associated with primary mineral and metal production was equivalent to approximately 10% of the total global energy-related greenhouse gas emissions in 2018"[7].

At the same time, minerals and metals are needed in the clean energy transition that is necessary in a low carbon 2050 perspective[8]. According to the IEA, a typical electric car requires six times the mineral inputs of a conventional car, while an onshore wind plant requires nine times more mineral resources than a gas-fired plant. Demand for both minerals and metals is expected to increase, as the production of renewable energy and electrification across all sectors increases.

The importance of the different metals and minerals varies from technology to technology[9]. Copper is essential in all electricity-related technologies, with electricity networks needing large amounts of copper and aluminium. Due to its electric conductivity copper is essential for improving energy efficiency and electrification (renewable energy generation, electric vehicles). Nickel is particularly important in electric vehicles and geothermal electricity generation, while having some importance for nuclear power generation. Zinc is of high importance for windmills, while also relevant for other renewable energy technologies. Specifically, zinc provides rust protection to installations such as wind and solar parks at land and sea, but also in construction and automotive industries, including electric vehicles. Meanwhile, silver is crucial for solar photovoltaic electricity generation.

The metals produced by Boliden are used in transportation (11% of its zinc, 22% of the copper), construction (49% of the zinc, 22% of the copper), industrial machinery (11% of the copper), batteries (1% of the zinc, 85% of the lead) and electrical networks (27% of the copper)[10]. The main applications for Boliden's sulphuric acid are fertilizers, pulp and paper and mining.

In general, metal production is energy-intensive, with the associated indirect emissions from energy production, while direct carbon dioxide emissions primarily come from metallurgical processes, transportation and heating requirements. Both the mines and the smelters typically have local negative environmental impacts from the discharges associated with these activities and waste generation, while greenhouse gas emissions are associated with the explosives and fossil fuel machinery used in mining. In the European countries where Boliden operates, both mining operations and smelters must apply for an environmental permit from national authorities and are generally covered by comprehensive environmental regulations, with close scrutiny from environmental protection agencies.

Governance Assessment

Four aspects are studied when assessing Boliden's governance procedures: 1) the policies and goals of relevance to the green bond framework; 2) the selection process used to identify eligible projects under the framework; 3) the management of proceeds; and 4) the reporting on the projects to investors. Based on these aspects, an overall grading is given on governance strength falling into one of three classes: Fair, Good or Excellent. Please note this

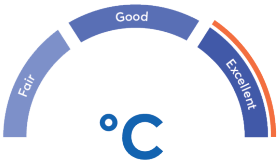
[6] Net Zero by 2050 - A Roadmap for the Global Energy Sector (windows.net)
[7] https://www.nature.com/articles/s41561-020-0531-3?proof=trueMay
[8] Executive summary – The Role of Critical Minerals in Clean Energy Transitions – Analysis - IEA
[9] The raw-materials challenge: How the metals and mining sector will be at the core of enabling the energy transition | McKinsey
[10] Estimated global averages, based on Cru, WoodMac and Boliden estimations.

is not a substitute for a full evaluation of the governance of the issuing institution, and does not cover, e.g., corruption.

Boliden has quantified climate and environmental targets and extensive emissions accounting. The issuer has comprehensive policies and environmental requirements applicable to all partners, with a particular focus on the suppliers of raw materials. The company works systematically with energy efficiency, life cycle emissions and conservation of biodiversity, and reports on exposure to physical climate change risk according to TCFD. Exposure to physical climate risks is part of its standard processes for risk and investments.

Environmental competence is well represented, and decisions are made by consensus. The selection process is well documented, including the process to remove any projects that no longer meet the eligibility criteria. While some of the selection criteria of the framework are high-level, allowing for a wide range of projects, the framework has specific exclusions for each project category and investments will be considered based on their contribution towards achieving Boliden's climate targets.

Reporting is in line with best practice, with adequate metrics for all project categories, external review of both allocation and impact reporting, as well as transparency on methodologies and assumptions used.



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

Strengths

It is positive that Boliden has taken a life cycle approach to the calculation of the carbon footprint of the metals produced, and that it is engaging actively with its raw material suppliers. Boliden's comprehensive policies towards both suppliers and customers represent a clear strength. The company has a focus on the risks in its upstream mining value chain, in particular those associated with high-risk countries, as well as with waste and tailings management, water and biodiversity conservation near the mines. We find encouraging that Boliden requires all its partners, including customers, to have climate targets, including for the supply chain.

Boliden has a separate project category for R&D projects. According to IEA's Net Zero by 2050 report[11], almost half of the emission reductions needed to reach net zero in 2050 come from technologies currently at the demonstration and prototype phase, underpinning the need for significant R&D investments. Meanwhile, the IEA expects most of the reductions in CO_2 emissions through 2030 to come from technologies already on the market today.

While the framework's main investment in the expansion of the zinc production facility in Norway (Odda), we consider it a strength that the framework could finance projects across all smelters and mines. The cross-category exclusion of new fossil fuel infrastructure is also positive, as well as the issuer's commitment to consider projects' contribution towards both the 2030 intensity target and the 2050 target, seeking to avoid lock-in of high emissions.

Weaknesses

We find no apparent weaknesses in Boliden's green financing framework.

[11] Net Zero by 2050, A Roadmap for the Global Energy Sector: Net Zero by 2050 – Analysis - IEA

Pitfalls

Since Boliden's 2030 target is intensity based, there is a risk that the company's overall emissions increase, as efficiency improvements allow for higher production and potentially associated additional emissions. Meanwhile, the issuer expects that the electrification of the heating process and energy efficiency will lead to significantly lower direct absolute emissions from its smelters by 2030. Boliden also expects electrification of machinery and vehicles used in mining to contribute to lower emissions from its open pit mines. Parts of the reduction process are currently dependent on coal and coke. While the issuer is investigating technologies to reduce those emissions and to capture the released CO_2, there is currently no clear pathway towards the 2050-solution for these emissions. Based on the current state of technology, the issuer expects CCS/CCU as well as potentially some offsets to be needed to reach its net zero 2050 target for scope 1 and scope 2 emissions.

While the issuer will consider projects' contribution towards its 2030 and 2050 climate targets in the selection process and aims to prioritize projects with the highest emission reductions relative to financial performance, this is no guarantee that the projects most aligned with 2050 will be prioritized.

Appendix 1:
Referenced Documents List

Document Number	Document Name	Description
1	Boliden – Green Finance Framework	Boliden's green finance framework, dated May 2022.
2	Annual and sustainability report 2021	Annual report and sustainability report for the year 2021
3	Boliden Sustainability Index 2020	Additional sustainability reporting for 2020
4	ICA-EnvironmentalProfileHESD-201803-FINAL-LOWRES-1	The International Copper Association (ICA): Copper environmental profile, See: https://copperalliance.org/wp-content/uploads/2021/07/ICA-EnvironmentalProfileHESD-201803-FINAL-LOWRES-1.pdf
5	Boliden Sustainability Index 2021	Additional sustainability reporting for 2021
6	Boliden interim report Q4 and year end 2021	
7	POLY-21246-v.2.0 Procurement Policy	Boliden Group's general procurement policy, dated October 2021
8	boliden-post-q4_21-general-presentation	General presentation of Boliden's business, dated Q4 2021
9	Odda 4.0 – General Presentation	General presentation of Boliden's plant in Odda (Norway) and the planned next steps for green zinc production

10	POLY-21012-v.5.0 Environmental policy	General environmental commitments
11	POLY-21505-v.2.0 Energy Policy	Internal energy policy
12	POLY-21514-v.3.0 Quality Policy	Internal procedure
13	POLY-44721-v.1.0 Biodiversity Commitment	Internal procedure
14	POLY-44722-v.1.0 Climate Commitment	Internal procedure with details on Boliden's Climate Commitment.
15	PRO-21010-v20.0 Environmental Management	Flow chart of Boliden's environmental management governance
16	POLY-2135-v.7.0 Code of Conduct	Code of Conduct for Boliden's employees
17	Carbon footprint of Boliden main metals	Calculation of carbon footprint of emissions from Boliden's main metals by independent third party
18	Low carbon Copper	Carbon footprint of Boliden's low carbon copper
19	Low carbon Zink	Carbon footprint of Boliden's low carbon zinc
20	POLY-21761-v.3.0 Business Partner Code of Conduct	Requirements applicable to all of Boliden's business partners (suppliers, clients, etc.)

°CICERO
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Green

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, the International Institute for Sustainable Development (IISD) and the School for Environment and Sustainability (SEAS) at the University of Michigan.