°CICERO Shades of Green

Vattenfall AB
Green Financing Second Opinion

May 30, 2022

Vattenfall is one of Europe's major retailers and producers of electricity and heat. Its parent company, Vattenfall AB, is fully owned by the Swedish state and is headquartered in Solna, Sweden. The Group has approximately 19,000 employees and around 13 million customers. Vattenfall's main markets are Sweden, Germany, the Netherlands, Denmark, the UK, and France. In 2021, 83% of Vattenfall's electricity generation was fossil-free (including nuclear). The remaining 17% of its electricity generation was from fossil fuels, and Vattenfall also operates two coal-fired district heating facilities in Berlin, Germany. Vattenfall has committed to the phase out of coal in its operations by 2030.

The framework considered in this second opinion is an update of Vattenfall's previous framework from 2019. While the project categories remain by and large the same (renewable energy, transmission and distribution of electricity, energy efficiency, and clean transportation), the eligibility criteria have been developed to broadly align with the substantial contribution to climate change mitigation criteria of the EU Taxonomy. In the coming year, approximately two-thirds of new financing will go into wind power and a significant portion into distribution of electricity. The regional use of proceeds is aligned with Vattenfall's main markets.

Vattenfall has clear, ambitious and timebound climate targets, including scope 3 elements. The overarching target is that Vattenfall shall reduce all CO_2e emissions along the value chain by around 95% by 2040 compared to 2017 levels. In the selection of eligible projects, Vattenfall is conscious of increasing local opposition to many energy infrastructure projects and aware of many of the pitfalls associated with the eligible projects. LCAs are used in general for decision making and reporting on climate risks is TCFD aligned. We note, that some eligible projects such as use of waste heat and construction of transmission lines may directly or indirectly support fossil intensive industries.

Based on the overall assessment of the projects that will be financed under this framework, and governance and transparency considerations, Vattenfall's green financing framework receives a **CICERO Dark Green** shading and a governance score of **Excellent.**

SHADES OF GREEN

Based on our review, we rate the Vattenfall's green financing framework **CICERO Dark Green.**

Included in the overall shading is an assessment of the governance structure of the green financing framework. CICERO Shades of Green finds the governance procedures in Vattenfall'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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Contents

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:

CICERO Shades of Green	Examples
Dark green is allocated to projects and solutions that correspond to the long-term vision of a low carbon and climate resilient future. Fossil-fueled technologies that lock in long-term emissions do not qualify for financing. Ideally, exposure to transitional and physical climate risk is considered or mitigated.	Wind energy projects with a strong governance structure that integrates environmental concerns
Medium green is allocated to projects and solutions that represent steps towards the long-term vision, but are not quite there yet. Fossil-fueled technologies that lock in long-term emissions do not qualify for financing. Physical and transition climate risks might be considered.	Bridging technologies such as plug-in hybrid buses
Light green is allocated to projects and solutions that are climate friendly but do not represent or contribute to the long-term vision. These represent necessary and potentially significant short-term GHG emission reductions, but need to be managed to avoid extension of equipment lifetime that can lock-in fossil fuel elements. Projects may be exposed to the physical and transitional climate risk without appropriate strategies in place to protect them.	Efficiency investments for fossil fuel technologies where clean alternatives are not available

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 financing 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 Vattenfall's green financing framework and related policies

Vattenfall AB (Vattenfall) is one of Europe's major retailers and producers of electricity and heat. Its parent company, Vattenfall AB, is fully owned by the Swedish state and is headquartered in Solna, Sweden. The Group has approximately 19,000 employees and around 13 million customers. Vattenfall's main markets are Sweden, Germany, the Netherlands, Denmark, the UK, and France.

In 2021, Vattenfall's fossil-free electricity generation (including nuclear) was around 93 TWh, out of a total of 111.4 TWh (i.e., around 83% non-fossil electricity generation). The remaining 17% of its electricity generation was from fossil fuels. Currently, Vattenfall has two remaining coal-fired assets in their district heating operations in Berlin, the Moabit and Reuter West plants. According to the issuer, generating heat from hard coal will be phased out in the CHP plant Moabit in the early second-half of the 2020s and at Reuter West in the late 2020s and will be replaced by a likely combination of biomass, waste heat from the Berlin-owned waste incineration operations, hydrogen-ready natural gas, power-to-heat, large heat pumps, and heat storage. Recently, Vattenfall informs us that it is exploring whether to divest from these facilities.[1] In the Netherlands, Vattenfall continues to work with local stakeholders on mutually agreeable solutions to accelerate a phase-out of natural gas. As in Berlin, all options are being investigated, including biomass, power-to-heat, integration of waste heat and heat pumps. In all geographies, Vattenfall is continuously exploring opportunities to integrate excess industrial heat into their district heating networks. Vattenfall has committed to the phase out of coal in its operations by 2030.

The framework considered in this second opinion is an update of Vattenfall's previous framework from 2019. While the project categories remain by and large the same, the eligibility criteria have been developed to broadly align with the substantial contribution to climate change mitigation criteria of the EU Taxonomy.

Environmental Strategies and Policies

Vattenfall's Environmental Action Plan (EAP) outlines the direction forward for three focus areas: i) reduce climate impact, ii) protect nature and biodiversity, and iii) sustainable use of resources. The EAP defines the 2030 ambitions and targets, which are followed-up annually in an environmental management review together with Vattenfall's CEO.

Regarding climate change, Vattenfall commits to reduce all CO_2e emissions along the value chain by around 95% by the years 2040 compared to 2017 levels.

Vattenfall has a target of reaching a CO_2 intensity below 86 gCO_2/kWh before 2025, validated by the Science Based Targets initiative as aligning with a 1.5 degree warming scenario. Emission intensities continued to decrease progressively in 2021, declining from 97 gCO_2e/kWh in 2020 to 81.5 gCO_2e/kWh (see figure 1 copied from their 2021 Annual and Sustainability Report). In other words, Vattenfall is already well below its 2025 intensity target. The reduction was primarily due to the final closure of the hard coal-fired power plant Moorburg which eliminated approximately 1.5 $MtCO_2$. Own emissions in 2021 were 10.3 $MtCO_2e$ from Scope 1[2] and 0.1 $MtCO_2e$ from Scope 2, representing a 55% decrease in Scope 1 + 2 CO_2 emissions since 2017. In 2021, Scope 3 emissions from suppliers represented 4.8 $MtCO_2e$ due to capital goods, goods, and services, in addition to fuel use and wastes. A very minor share (0.002 $MtCO_2e$) was due to business travel. The targets for the suppliers are a 50% reduction

[1] Vattenfall explores strategic options for its Berlin heat business - Vattenfall
[2] Of the total greenhouse emissions 0.1 Mt CO_2e consist of SF_6, CH_4 and N_2O emissions.

from business travels by 2025 compared to 2019 level and a 50% reduction in emissions from capital goods, goods, and services by 2030 compared to 2020. Emission from business travels was in 2021 well below 50% of the 2019 level. Emissions from capital goods, goods, and services saw a small reduction from 1.1 to 1.0 $MtCO_2e$ the last year. Scope 3 emissions from customers represented 12.9 $MtCO_2e$ in 2021, mainly due to sales of natural gas. The target is to reduce this by 33% by 2030 compared to 2017 level. In 2021, the reduction was 9%.

Besides CO_2, Vattenfall focuses on reducing emissions of sulphur dioxide (SO_2), nitrogen oxides (NOx) and particulate matter (PM) resulting from the combustion in its power plants. Thus, NOx emissions were 5 kt in 2021, down from 9.8 kt in 2017; SO_2 emissions was 1.3 kt, down from 4.1 kt; and particulate matter was down to 0.06 kt in 2021 from a level of 0.3 kt in 2017.

Vattenfall has published EPDs[3] for electricity from the full wind portfolio, Nordic hydro power and Swedish nuclear power generation. The declarations are based on lifecycle assessments, follow set rules for electricity as a product, are reviewed by independent verifiers and are approved by a third party. EPD calculations correspond to 80% of the total electricity generated by Vattenfall. Furthermore, Vattenfall has as a target that by 2025, 50% of the wind power blades should be recycled, and by 2030 Vattenfall aims for a 100% recycling rate. Landfill is banned already from now on. The waste hierarchy is applied when decommissioning solar panels. The volumes of recycling have not been large yet due to the long life span and being a relatively young business in Vattenfall.

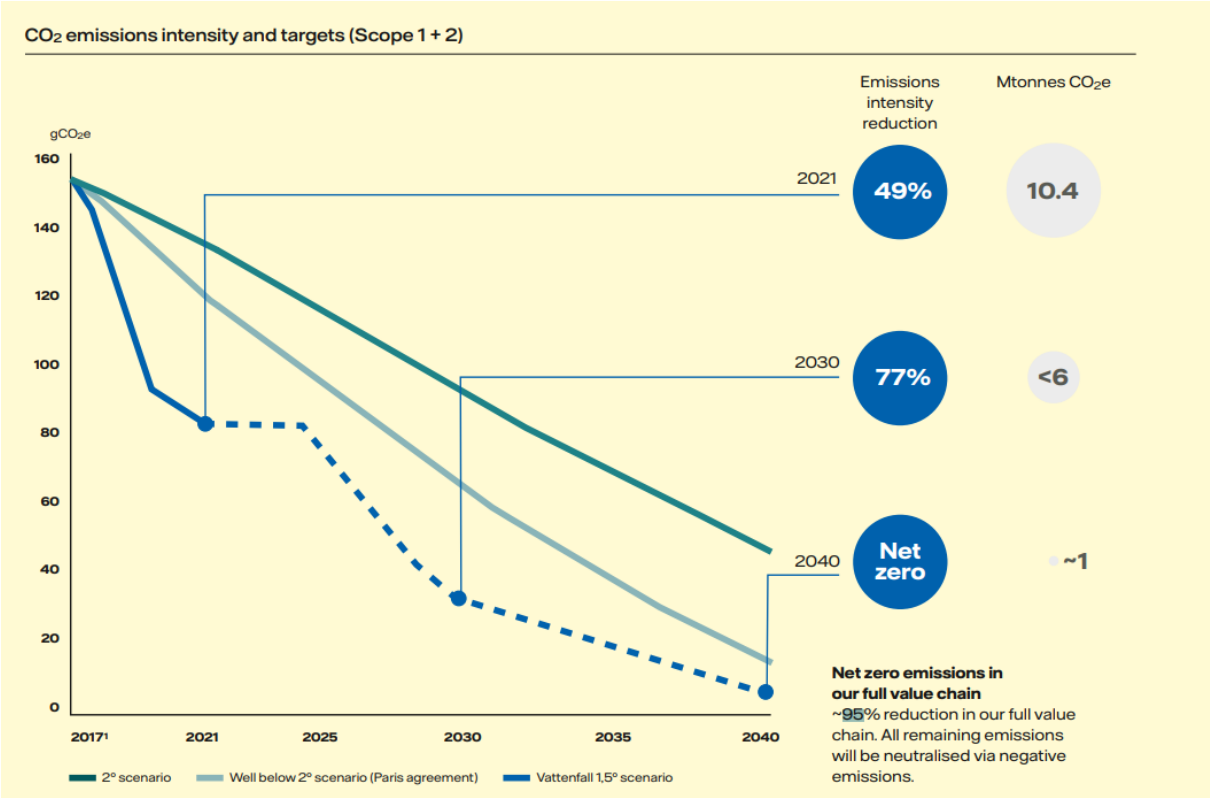


Figure 1: CO_2 emissions intensity and targets (Scope 1 + 2). Source: Vattenfall's 2021 Annual and Sustainability Report, p12.

As part of the EAP, Vattenfall has set a 2030 ambition to be a recognised leader in biodiversity management. A core component of this work is to adopt a Net Positive Impact approach. This means Vattenfall will further

[3] When developing an EPD (Environmental product declaration), the environmental performance of the product shall be described from a life cycle perspective by carrying out a life cycle assessment (LCA) of the product. The results of the LCA study and other information mandated by the reference PCR and General Programme Instructions shall be compiled in the EPD reporting format. The EPD shall then be verified by an approved independent verifier before being registered and published at the International EPD System. See: https://www.environdec.com/home

safeguard biodiversity by going beyond the "no net loss" approach and implementing biodiversity-enhancing measures. Thus, Vattenfall assesses biodiversity impacts throughout their entire value chain and has integrated these assessments into its business processes.

Vattenfall is increasing its focus on climate-related risks and opportunities in projects and processes. Climate change risks are explicitly included in the Enterprise Risk Management (ERM) process as well as in investment decisions for large projects. In 2020 and 2021, an analysis of how key climate parameters are projected to change according to different climate scenarios (RCP4.5 and RCP8.5) was conducted, to further strengthen work with scenario analyses for Vattenfall's activities and markets. Vattenfall therefore supports the disclosure of climate-related risks and opportunities in accordance with recommendations of the Task Force on Climate related Financial Disclosures (TCFD).

Vattenfall is a signatory of UN Global Compact (since 2008) and report sustainability performance according to the Global Reporting Initiative's standards. Electricity and heat production are almost 100% certified facilities according to ISO 14001 or EMAS.[4]

Use of proceeds

Vattenfall has established the framework to issue green finance securities for which the proceeds will be exclusively allocated to finance, or refinance, in whole or in part, eligible assets made by Vattenfall, its subsidiaries and partner entities such as HYBRIT.[5]

Eligible assets promote the transition towards a low-carbon and environmentally sustainable society, as determined by Vattenfall in accordance with the following categories: i) renewable energy, ii) transmission and distribution of electricity, iii) energy efficiency, and iv) clean transportation (see table 1 below). Proceeds will be allocated to capital expenditures and R&D and are expected to align with Vattenfall's main markets. In the coming year, approximately two-thirds of new financing will go into wind power and a significant portion into distribution of electricity.

Vattenfall can finance new eligible assets and refinance existing eligible assets. The issuer informs us that there are no plans for refinancing as of today. New financing is defined as eligible assets that were finalised and taken into operation up to one year before the approval by the Green Finance Committee. Eligible assets that were finalised and taken into operation more than one year and maximum three years before the approval in the Committee are defined, monitored, and reported as refinancing.

Proceeds from green finance securities will not be allocated to assets for which the purpose is fossil energy production, nuclear energy generation or environmentally harmful resource extraction (such as rare-earth elements or fossil fuels).

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.

[4] The EU Eco-Management and Audit Scheme (EMAS) is a premium management instrument developed by the European Commission for companies and other organisations to evaluate, report, and improve their environmental performance. Non-certified installations are mainly for back-up purposes.
[5] https://www.hybritdevelopment.se/en/

Vattenfall has an established process for evaluating and selecting investment projects that can be funded by the company's green securities. The Green Finance Committee (formerly the Green Bond Committee) consists of representatives from the Sustainability team, Strategy & Business Development and Group Finance. The committee meets on a regular basis and at least once a year. Decisions are made in consensus. The responsibilities of the committee are, among other things, to evaluate the compliance of the proposed eligibility assets with the eligibility criteria outlined in the framework as well as applicable laws and regulations and Vattenfall's policies and long-term goals for social and environmental sustainability.

The Green Finance Committee is also responsible for replacing investments that no longer meet the eligibility criteria (following divestment, liquidation, concerns regarding alignment of underlying activity with eligibility criteria etc.). The Committee will review and update the green financing framework to reflect relevant changes in Vattenfall's corporate strategy, technology and market developments such as the EU classification of environmentally sustainable economic activities – the EU Taxonomy.

Management of proceeds

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

An amount equal to the proceeds of any green finance securities raised under the framework will be credited to a separate register that will support Vattenfall's financing of eligible assets. As long as green finance securities are outstanding and the separate register has a positive balance, funds may be deducted from the separate register and added to Vattenfall's lending pool in an amount up to all disbursements from that pool made in respect of eligible assets. Vattenfall's Treasury team is responsible for the allocation of proceeds. If, for any reason, an eligible asset ceases to comply with the requirements set out in the framework, such an asset will be removed from the earmarked pool. Proceeds yet to be allocated towards eligible assets will be placed in the liquidity reserves and managed as such.

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.

Vattenfall will provide a Green Financing Impact Report on at least an annual basis with a first report in the Annual and Sustainability report for 2022. The Green Finance Committee is responsible for the reporting which will be reporting on the green bonds as an aggregate.

Vattenfall intends to report on quantitative impact indicators where feasible and provided relevant data information is available. The Green Financing Investor Report will include allocation reporting covering:

- A description of the portfolio of eligible assets;
- Type of financing securities utilised and respective outstanding amounts;
- Information on the split between new financing and re-financing;
- A list of all eligible assets (some projects may be grouped if they are small and of similar nature) including the amounts allocated, including allocated and disbursed amounts per category and geographical distribution.

The impact reporting aims to disclose the environmental impact of the eligible assets financed under the framework, based on Vattenfall's financing share of each asset. As Vattenfall can finance large and small eligible assets, impact reporting may, to some extent, be aggregated. The impact reporting may also be aggregated due to confidentiality agreements or competitive considerations. The impact assessment is provided with the reservation that not all related data can be covered and that calculations therefore will be on a best effort basis e.g., if an eligible asset is under development but not yet operational, Vattenfall will provide best estimates of future environmental impacts. The impact assessment will, if applicable, be based on the Key Performance Indicators (KPIs) as follows:

- Renewable energy: Energy source with actual production[6] and estimated CO_2 reduction (ktonnes)
- Transmission and distribution of electricity: Distribution cables installed (in km)
- Energy efficiency: Smart Grids – Number of installed units
- District Heating – Estimated CO_2 reduction (ktonnes)
- Power to Heat: Estimated CO_2 reduction (ktonnes)
- Clean transportation: Infrastructure for clean transportation – Number of installed units

Vattenfall will appointed an external, independent auditor to annually assure that the selection process for the financing of eligible assets, the allocation of the net proceeds of the green financing securities and the impact reporting are done in accordance with Vattenfall's green financing framework. The green financing framework, this second party opinion and the investor report will be publicly available on Vattenfall's website.

[6] On a country and production source level.

3 Assessment of Vattenfall's green financing framework and policies

The framework and procedures for Vattenfall's green financing 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 Vattenfall 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 Vattenfall's green financing framework, we rate the framework **CICERO Dark Green.**

Eligible projects under the Vattenfall's green financing 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 financings 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 	Solar Power: Electricity generation and related infrastructure using solar photovoltaic technology and concentrated solar-thermal power (CSP) technology. Wind Power: Electricity generation and related infrastructure from wind power. Hydro Power: Electricity generation and related infrastructure from hydro power and electricity generation and related infrastructure from ocean energy technologies that comply with one of the following: • the facility is a run-of-river plant and does not have an artificial reservoir, or • if the power density of the facility is above 5W/m², the life-cycle GHG emissions are lower than 100 gCO_2e/kWh.	**Dark Green** ✓ Renewable energy is key to the green transition. Vattenfall operates in European countries where environmental impact assessments are mandatory. ✓ Vattenfall has plans for waste handling with a high degree of recycling during decommissioning of wind and solar power plant. ✓ Investments can include access roads and fossil fuels can be used in construction machinery used by contractors. We note, however, that Vattenfall has a target to reduce and limit Scope 3 emissions. They also state that when designing access roads considerations are taken to avoid sensitive zones. ✓ Hydro power plants are all in Northern Europe. Landscape impacts could be an

	Geothermal Power: Electricity and heat generation and related infrastructure where the geothermal energy is produced with life-cycle GHG emissions lower than 100 gCO_2e/kWh. Bio Power: Electricity generation and related infrastructure from bioenergy. A project needs to fulfil all Substantial contribution criteria of the EU taxonomy as defined in the version decided December 2021. Hydrogen: Manufacture and related infrastructure of fossil-free hydrogen and hydrogen-based synthetic fuels, including but not limited to partner entities such as HYBRIT. Heat/Cool Using Waste Heat: Production of heating/cooling and related infrastructure using waste heat.	issue for upgrades of large hydro power projects. No new hydro power plants are foreseen. Life cycle GHG emissions of existing plants are estimated to 7 gCO_2e/kWh. ✓ Large scale geothermal projects could pose pollution risks. ✓ For use of biomass such as wood, bark and pine oil, Vattenfall often use locally sourced fuels like wood chips, forest residues and sawmill by-products, landscape conservation material and compost residues. Beware of potential issues with other types of biomass. ✓ The issuer informs us that the production of hydrogen will be based on electricity and meet the life-cycle GHG emissions saving requirements in the EU Taxonomy. The source of carbon shall not be an energy source but a true by-product such as CO_2. ✓ The issuer further informs us that this category will include the partnership HYBRIT, a joint venture project that endeavors to revolutionize steel-making by replacing coking coal, traditionally needed for ore-based steel making, with hydrogen produced by electrolysis. ✓ Waste heat will preferably come from sources close to urban district heating centrals but may theoretically come from fossil intensive industries. ✓ The issuer states that waste incineration is not in scope for waste heat.
Transmission and distribution of electricity	Construction, reconstruction and upgrades of transmission and distribution systems that transport low carbon electricity generation on average below the threshold of 100 gCO_2e/kWh over high-voltage, medium-voltage and low-voltage distribution systems.[7]	**Dark Green** ✓ This category includes financing of transmission and distribution systems that transport electricity and related infrastructure. Fossil fuel generated electricity cannot be excluded. However, Vattenfall only have grid operations in Sweden where grid mix

[7] The average system grid emissions factor, calculated as the total annual emissions from power generation connected to the system, divided by the total annual net electricity production in that system, is below the threshold value of 100 gCO_2e/kWh measured on a life cycle basis in accordance with electricity generation criteria, over a rolling five-year period.

		emission levels are rather low (supplier mix 5g CO_2/kWh in 2020 according to AIB). ✓ Vattenfall does not exclude the provision of lines to high emitting customers. ✓ The issuer further states that fossil machinery is not any material part of the investments in Transmission and distribution.
Energy efficiency	Smart Grids: Installation of instruments and devices for measuring, regulate and control energy performance. District Heating: District heating/cooling where the system is using at least 50% renewable energy, 50% waste heat, 75% cogenerated heat or 50% of a combination of such energy and heat and related infrastructure distribution. Power to heat: Production of heat in heat pumps.	**Medium to Dark Green** ✓ Smart grids are a necessary technology to manage and increase the share of intermittent and decentralized renewable energy. ✓ District heating may involve fossil fuel fractions, e.g., plastics. ✓ Efficiency improvements may lead to rebound effects. When the cost of an activity is reduced there will be incentives to do more of the same activity. Vattenfall should be aware of such effects and possibly avoid green funding of projects where the risk of rebound effects is particularly high.
Clean transportation	Infrastructure for clean transportation: Construction, re-construction and upgrades of infrastructure that is required for zero tailpipe CO_2 transport solutions including electric charging points, electricity grid connection and upgrades as well as, hydrogen fuelling stations.	**Dark Green** ✓ Charging stations may be used by hybrid vehicles, involving fossil fuels. ✓ Charging infrastructure is crucial for the adoption of electric vehicles, and therefore contributes to the transition to a low carbon transition. The benefits of electric vehicles depend on the electricity mix used in charging: charging infrastructure needs to be developed in parallel to greening the grid. ✓ The production of batteries in charging infrastructure (and the sourcing of their raw materials) can have substantial climate and environmental impacts. These should be mitigated through suitable supply chain considerations.

Table 1. Eligible project categories

Background

Global energy demand is set to increase by 4.6% in 2021 - more than offsetting a 4% contraction in 2020 - and pushing demand 0.5% above 2019 levels. Demand for all fossil fuels is set to grow significantly in 2021, with coal demand alone projected to increase by 60% more than all renewables combined. In 2021, demand for renewables is expected to increase across all key sectors, while renewables are set to provide more than half of the increase in global electricity supply. Despite this increase in renewable energy generation, renewable power still needs to expand significantly to meet the IEA's net zero by 2050 scenario, which aims for almost 90% of electricity generation to come from renewable sources.

To align with the EU Taxonomy, most renewable projects must demonstrate a life cycle impact of below 100gCO_2e/kWh. Solar and wind projects are excluded from this criterion. Relevant Do-No-Significant-Harm criteria focus on climate change adaptation, materials sourcing, circular economy, and limiting environmental impacts on local ecosystems and biodiversity.

Best Practices

- ✓ Considering and seeking to minimize environmental impacts e.g., on biodiversity and landscape, and life cycle emissions from manufacturing, construction and operation.
- ✓ Undertaking extra efforts to ensure local support for renewable projects, such as large hydropower plants or wind farms, which can be controversial and/or negatively affect local communities.
- ✓ Considering climate mitigation alongside resiliency for the built environment.
- ✓ For bioenergy, considering the type and source of feedstocks. In general biofuels should not be produced from feedstocks that compete with food production, negatively impact soil carbon (e.g., peat), or are linked with deforestation and conversion.
- ✓ For large-scale geothermal projects, asking for emissions data as well as considering broader impacts, such as the potential for heavy metal pollution.

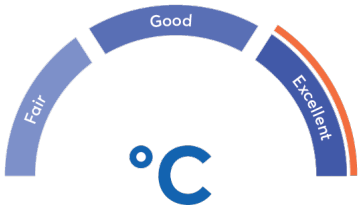
Governance Assessment

Four aspects are studied when assessing the Vattenfall's governance procedures: 1) the policies and goals of relevance to the green financing 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 is not a substitute for a full evaluation of the governance of the issuing institution, and does not cover, e.g., corruption.

Vattenfall has clear, ambitious and timebound climate targets, including scope 3 elements. In the selection process, Vattenfall is conscious of increasing local opposition to many energy infrastructure projects. The central element of early dialogue and a strong relationship building with the local communities, landowners and authorities is emphasised in this regard. LCAs are used in general for decision making and is also a basis for the taxonomy thresholds the framework is based on. Climate change risks are explicitly included in Vattenfall's Enterprise Risk Management (ERM) process as well as in investment decisions for large projects. Reporting on climate risks is TCFD aligned.

We note, however, that the impact reporting may be aggregated due to confidentiality agreements or competitive considerations. The impact assessment is furthermore provided with the reservation that not all related data can be covered and that calculations therefore will be on a best effort basis. Estimated CO_2 reductions for pure electricity production are based on the assumption that the new production will replace an equal amount of the existing production mix in the respective country. Country-specific emission factors for the production mix from the

Association of Issuing Bodiesare used.[8] For new heat-producing assets, the CO_2 reduction is estimated based on the assets replaced in each individual case. Only direct emissions are considered. The calculations are based on the project's full capacity, independent of Vattenfall's ownership share. Vattenfall is transparently disclosing the methodology used to estimate impacts and reporting of impacts is independently verified.



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

Strengths

Vattenfall has a clear strategic commitment to become fossil free within a generation with clear, timebound quantitative targets for greenhouse gas emission intensities validated by the Science Based Targets initiative as aligning with a 1.5 degree C warming scenario. The long-term goal is to become carbon neutral by 2040 with a 95% reduction of today's emissions along the full supply and customer chain. The remaining emissions will be compensated.

The exclusion of fossil-based heat and electricity generation is a strength of the framework.

Weaknesses

We find no substantial weaknesses in Vattenfall's Green Financing Framework.

Pitfalls

Vattenfall's heat and transmission projects may involve fossil intensive industries. Use of waste heat from such industries may increase their competitiveness and lead to lock-in of technologies that does not promote a green transition. However, the issuer informs us that waste heat will preferably come from sources close to district heating centrals in urban areas. In respect of transmission, Vattenfall does not exclude the provision of lines to high emitting customers.

District heating projects may involve fossil fuel fractions, e.g., plastics, even when fulfilling the eligibility criteria.

Proceeds can also be used by Vattenfall's partner entities such as HYBRIT. It is not a given that these companies consider climate and environmental risks in the same manner as Vattenfall.

[8] https://www.aib-net.org/facts/european-residual-mix European Residual Mixes 2018, Version 1.2, 2019-07-11, Figure 5.

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Appendix 1: Referenced Documents List

Document Number	Document Name	Description
1	Vattenfall - Green Financing Framework - Version sent to Cicero	Vattenfall's Green Financing Framework, dated April 2022
2	vattenfall-annual-and-sustainability-report2021	Vattenfall's Annual and Sustainability Report 2021
3	green_bond_investor_report_2021	Vattenfall's Green Bond Investor Report 2021
4	environmental_policy_june_2021	Vattenfall's Environmental Policy, dated June 2021
5	sustainability_policy_2021	Vattenfall's Sustainability Policy, 2021

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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.