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Second Party Opinion

Vattenfall Green Finance Framework

June 12, 2025

Location: Sweden **Sector:** Utility

Alignment Summary

Aligned = ✓ Conceptually aligned = ○ Not aligned = ✗

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

✓ Green Loan Principles, LMA/LSTA/APLMA, 2025

See Alignment Assessment for more detail.

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Dark green

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

Our Shades of Green Analytical Approach >

Strengths

Vattenfall's investments support the deployment and integration of renewable energy technologies. Renewable energy and related infrastructure will play a key role in a net-zero future aligned with the 2050 Paris Agreement objectives. Additionally, the company is identifying opportunities to transform hard-to-abate industries by targeting projects where it can manage the energy component.

Vattenfall is committed to achieving net-zero emissions across its entire value chain by 2040. To achieve this objective, the company is adding new fossil-free generation capacity, investing in related infrastructure and collaborating with its value chain partners.

The majority of financing will be directed toward new projects, which we understand indicates additional benefits in climate and environmental impacts.

Weaknesses

No weakness in the report.

Areas to watch

Although the majority of financing will be allocated toward Dark green activities, there are some eligible categories such as industrial projects, which we assess as Medium green, and we have limited visibility on the potential environmental benefits and risks of the projects that could be financed. We understand that the issuer expects to select the exact projects in accordance with its policies and local regulations and will have more details once the specific project is in the pipeline.

Shades of Green Projects Assessment Summary

Over the three years following issuance of the financing, Vattenfall expects to allocate the majority of proceeds (more than 90%) to the renewable energy category.

The issuer expects most proceeds to be allocated to finance new projects.

Based on the project categories' Shades of Green detailed below, the expected allocation of proceeds, and consideration of environmental ambitions reflected in Vattenfall's Green Finance Framework, we assess the framework Dark green.

Renewable Energy	**Dark green**
Solar power	
Wind power	
Hydro power	
Manufacture of hydrogen	
Storage of hydrogen	
Manufacture of biomethane	
Transmission and distribution of electricity	
Storage of electricity	
Storage of thermal energy	

Energy efficiency	**Medium green**
District heating and cooling distribution	
Electric heat pumps	
Production of heat/cool from bioenergy	
Industrial projects	

Clean transportation	**Dark green**
Charging stations for electrical vehicles	

See Analysis Of Eligible Projects for more detail.

Issuer Sustainability Context

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

Company Description

Vattenfall is one of the largest electricity and heat producers in Europe. The company is fully owned by the Swedish state. The majority of its earning are derived from electricity generation, but other activities include regulated distribution system operator (DSO) and heat activities, and customer solutions including retail. The group has approximately 21,000 employees and around 12.7 million customers. Vattenfall's main markets are Sweden, Germany, the Netherlands, Denmark and the U.K. In 2024, total underlying operating profit amounted to Swedish krona (SEK) 19.8 billion (about €1.73 billion), with Sweden contributing 78.15%, the U.K. 14.57%, Germany 12.47%, Denmark 3.19%, and other countries 0.83%.

The company generates electricity using a diversified mix of energy sources such as hydro, nuclear, wind, natural gas, solar, biomass, and waste. In addition to electricity generation and retail, the company is involved in the production, distribution, and supply of district heating to households and industries in metropolitan areas. Vattenfall also offers a wide range of energy services, including battery storage, electric vehicle charging, solar panels, heat pumps, smart meters, network solutions, and market services.

Material Sustainability Factors

Climate transition risk

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

Physical climate risk

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

Waste and pollution

Waste and pollution are key environmental considerations in the power generation sector, particularly for operators of thermal and nuclear assets. While nuclear power produces low operational emissions, it generates hazardous radioactive waste that has a long half-life (the time it takes for half of the radioactive atoms to decay and become more stable and less radioactive) and lacks viable disposal options, which can prompt community resistance for disposal sites. Additionally, end-of-life management--

dismantling, and recycling or processing waste--exposes companies to financial, reputational, or litigation risks if not properly planned and provisioned.

Biodiversity and resource use

Renewable power generation, which is increasing to meet climate goals, requires large areas of land that often encompass sensitive habitats, where it can alter ecosystems, harm threatened species, and compete with other valuable land uses (for example, agriculture). This is especially pertinent for hydropower plants, which, if not properly managed, may pose biodiversity risks, such as habitat disruption, modified water flow, and hindrances to fish migration.

Social considerations

For the owners and operators of nuclear plants, maintaining the safety of a nuclear fleet is paramount. While robust industry and regulatory protocols keep serious incidents rare, events like Fukushima continue to influence public perception and policy. The risk of weapons proliferation from nuclear power generation is considered low due to strong regulatory frameworks and international agreements, which are well implemented in Sweden. Beyond safety, nuclear operations significantly impact local communities, offering economic benefits alongside potential environmental concerns, requiring open engagement. Regarding affordability, nuclear power offers stable long-term generation costs, although substantial initial investments and waste management expenses--particularly relevant in Sweden given its advanced nuclear waste storage program--are crucial considerations. Additionally, the need for renewable power development relating to climate goals intensifies the materiality for stakeholders. Moreover, sites with high renewable potential are often in or near communities including indigenous groups, which can prompt strong local opposition.

Issuer And Context Analysis

The framework's project categories aim to address Vattenfall's most material sustainability factors. Investments in renewable energy generation and distribution are essential for addressing climate transition risks and significantly contribute to enhancing Sweden's clean energy supply. Biodiversity factors are also relevant for renewable energy generation and distribution networks, and these are mitigated by regulatory requirements and the issuer's efforts to minimize negative effects in both the planning and operation of projects. Furthermore, we believe physical climate risks, pollution prevention and control and impact on communities are relevant to most of the project categories listed in the framework.

Vattenfall adopts a comprehensive and integrated approach to managing climate transition risk, positioning its climate strategy at the core of its business model. The company aims to achieve net-zero emissions across Scope 1, 2, and 3 by 2040, with interim science-based targets validated by the Science Based Targets initiative (SBTi), including a 2030 absolute emissions target of 18.2 million tonnes of carbon dioxide equivalent (Mt CO_2e). As of 2024, Vattenfall had already reduced emissions by 53% compared with its 2017 baseline and achieved 90% fossil-free electricity generation. Vattenfall's climate mitigation targets are supported by clearly defined and measurable actions, including a planned investment of SEK170 billion (about €14.8 billion) between 2025 and 2029. 61% of this amount is expected to be allocated to expanding wind, hydro, nuclear, and grid infrastructure.

Vattenfall identifies physical climate risks through enterprise risk management and annual resilience analyses, using IPCC's moderate- and high-emissions scenarios (RCP 4.5 and RCP 8.5). These assessments cover Vattenfall's operations and broader value chain, although supply chain data is less detailed. Key risks include extreme rainfall, storm damage, and disruptions from flooding or droughts, which are rated low to moderate due to mitigation measures. To enhance resilience, Vattenfall employs hard engineering solutions such as dam capacity adjustments, grid weather-proofing, and improved infrastructure cooling, alongside investments in forecasting and emergency preparedness. While insurance details are limited, physical risks are factored into investment planning and environmental permits, in accordance with the EU Taxonomy's technical screening criteria.

Vattenfall manages pollution through emission controls and regulatory compliance. It uses environmental management systems such as ISO 14001 across most operations and prioritizes reducing air pollutants like sulfur dioxide (SO_2) and nitrogen oxides (NOx), and particulate matter through emission controls and technology upgrades. Soil contamination risks from oil or chemical leakage are monitored and addressed using precautionary measures. Given that approximately 40% of Vattenfall's power generation is from nuclear energy, radioactive waste management is particularly material for the company, and Vattenfall manages this in line with regulatory requirements. The company meets EU Taxonomy criteria for pollution prevention and conducts environmental impact assessments as part of its project planning.

Vattenfall follows "do not significant harm" requirements of the EU taxonomy to manage biodiversity risks across its operations. Using tools like IBAT (for biodiversity risk screening) and ENCORE (for understanding nature-related financial risks), it assesses impacts on sensitive areas and implements site-specific mitigation measures, such as tailored maintenance and fish migration solutions. For example, the company has restored 1,500 hectares of peatland in Wales and engages in voluntary projects to protect species and habitats. Vattenfall tracks biodiversity impacts through key performance indicators (KPIs) and aligns its efforts with frameworks like Task Force on Nature-related Financial Disclosures (TNFD), Science Based Targets Network (SBTN), and the EU Biodiversity Strategy.

Vattenfall has a stakeholder management strategy that includes local communities, customers, suppliers, employees, and authorities. It engages local communities through dialogue, environmental impact assessments, and collaboration with municipalities, especially during project planning. For example, Vattenfall's Klaverspoor wind farm in the Netherlands offers 25% ownership to the Energietransitie Fonds Brabant, aiming to channel profits toward local energy transition efforts.

Alignment Assessment

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

Alignment Summary

Aligned = ✓ Conceptually aligned = o Not aligned = ✕

- ✓ Green Bond Principles, ICMA, 2021 (with June 2022 Appendix 1)
- ✓ Green Loan Principles, LMA/LSTA/APLMA, 2025

✓ Use of proceeds

We assess all the framework's green project categories as having a green shade. Please refer to "Analysis of Eligible Projects" section for more information on our analysis of the environmental benefits of the expected use of proceeds.

The issuer commits to allocate the net proceeds from the instruments issued under the framework exclusively to eligible green projects. In addition, the company will disclose the share of financing versus refinancing in its allocation of proceeds and has set a maximum look-back period for the refinancing of operating expenditure of three years. Hybrid securities (dated subordinated debt instruments) are eligible under the framework. The issuer has confirmed that it does not plan to issue convertible bonds or perpetual instruments under this framework.

✓ Process for project evaluation and selection

The framework outlines a process that Vattenfall has developed to evaluate and select potential projects. Vattenfall's Green Finance Committee (GFC) is responsible for evaluating and selecting potential projects. The GFC comprises members from Controlling, Treasury, Strategy and the representatives from Sustainability departments who hold a veto.

Vattenfall identifies and manages potential environmental and social risks associated with projects through its sustainability, environment, and human rights policy, and its approach toward indigenous people in Sweden. These and other relevant guidelines and instructions are available on the company's website.

The framework outlines an exclusion list, which includes investments directly related to activities associated with environmentally or socially harmful activities, such as use or generation of any form of fossil energy.

✓ Management of proceeds

The allocation of the net proceeds will be tracked to ensure that they exclusively finance eligible projects, with the companies establishing a green financing register. Vattenfall will ensure that the value of the green asset portfolio exceeds the value of outstanding green bonds for the whole duration of the bond. Furthermore, the company commits to allocate the net proceeds from issuances under the framework within 24 months from issuance date, on a best-effort basis. Unallocated proceeds may be temporarily placed in line with the liquidity reserves, taking the exclusion criteria into account. This is managed by the Treasury department.

For any green loans falling under the scope of the framework, the issuer seeks to align with the 2025 update of the Green Loan Principles. With respect to the additional requirements of the Green Loan Principles , we understand that Vattenfall will not issue a facility that includes non-green tranches.

✓ Reporting

Vattenfall commits to disclosing the allocation and impact of proceeds annually within its Green Finance Investor Report until full allocation of the proceeds. The allocation report will include a description of the portfolio of eligible assets, the type of financing instruments used and respective outstanding amounts, information on the split between new financing and

refinancing, and a list of eligible assets with the geographical distribution. The Impact report will include the KPIs such as estimated CO_2 reduction and installed fossil free production capacity. Vattenfall's Green Finance Investor Report will be verified by an independent third party.

Analysis Of Eligible Projects

This section provides details of our analysis of eligible projects, based on their environmental benefits and risks, using the "Analytical Approach: Shades Of Green Assessments".

Overall Shades of Green assessment

Based on the project category shades of green detailed below, the expected allocation of proceeds, and consideration of environmental ambitions reflected in Vattenfall's Green Finance Framework, we assess the framework as Dark green.

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

Our Shades of Green Analytical Approach >

Green project categories

Renewable energy

Assessment	Description
Dark green	Proceeds will be used to finance new and existing capital expenditures, replacements and upgrades, research and development (R&D) and selective maintenance and operational expenditures that either increase the lifetime or value of assets, as well as supportive infrastructure. • Solar power Financing electricity generation facilities that produce electricity from solar power. • Wind power Financing electricity generation facilities that produce electricity from wind power. • Hydro power Financing electricity generation from existing hydro power. The life-cycle greenhouse gas emissions from the generation of electricity from hydropower are lower than 100 grams of carbon dioxide equivalent per kilowatt hour (gCO2e/kWh). • Manufacture of hydrogen Financing manufacture of hydrogen and hydrogen-based synthetic fuels where the activity complies with a life-cycle greenhouse gas emissions savings requirement of 73.4% for

hydrogen, and 70% for hydrogen-based synthetic fuels relative to a fossil fuel comparator of 94 gCO2e per megajoule (MJ).

- Manufacture of biomethane

Financing manufacture of biomethane through anaerobic digestion of bio-waste or sewage sludge with the resulting production and use of biogas and digestate and/or chemicals. The produced biogas is used directly for the generation of electricity or heat, or upgraded to biomethane for injection into the natural gas grid. Biomethane can also be used as vehicle fuel or as feedstock in the chemical industry. In the dedicated bio-waste treatment plants, the share of food and feed crops used as input feedstock, measured in weight, as an annual average, is less than or equal to 10% of the input feedstock.

- Storage of hydrogen

Financing storage of hydrogen including construction of facilities that store hydrogen with a life-cycle greenhouse gas emissions savings requirement of 73.4% for hydrogen, and 70% for hydrogen-based synthetic fuels relative to a fossil fuel comparator of 94 gCO2e/MJ.

The activity is one of the following:

a. Construction of hydrogen storage facilities;

b. Conversion of existing underground gas storage facilities into storage facilities dedicated to hydrogen-storage.

- Transmission and distribution of electricity

Financing transmission systems that transport electricity on the extra-high-voltage and high-voltage interconnected system and distribution systems that transport electricity via high-voltage, medium-voltage, and low-voltage networks.

Proceeds will finance Green Eligible Projects and Assets that align with one of the following scenarios:

a. Interconnected to the European system, or

b. More than 67% of newly enabled generation capacity in the system is below the generation threshold value of 100 gCO2e/kWh, or

c. 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 gCO2e/kWh measured on a life-cycle basis in accordance with electricity generation criteria, over a rolling five-year period.

- Storage of electricity

Financing construction and operation of facilities that store electricity and return it at a later time in the form of electricity. The activity includes pumped hydropower storage.

- Storage of thermal energy

Financing construction and operation of facilities that store thermal energy and return it at a later time.

Analytical considerations

- Renewable energy sources such as solar photovoltaics, wind, and hydroelectric power are key elements in limiting global warming to well below 2°C. Still, these projects may cause land use change and adversely affect local biodiversity and are exposed to physical risks. Reliable and efficient electricity transmission and distribution networks are important in supporting electrification and achieving a low-carbon economy. Manufacture of green hydrogen is important in the transition to a low-carbon future due to its low emissions and potential applications in otherwise difficult-to-decarbonize industrial processes and transportation. Biomethane from upgraded biogas can play a role in the transition from fossil-based energy

and transport fuels. That said, risks and impacts depend on the type of feedstock; lifecycle emissions, including consideration of direct and indirect land use changes; degrees of water stress; and levels of biodiversity threat.

- We understand that the issuer expects to allocate at least 50% of proceeds within this category to wind projects, around 25% to transmission and distribution networks for electricity, and the remaining 25% to be distributed over the other categories. Vattenfall operates in European countries, mainly Sweden, the Netherlands, Germany, U.K., Denmark, and Finland, where environmental impact assessments are mandatory.
- Renewable energy assets are exposed to physical climate risks and can harm biodiversity. Vattenfall has performed a climate scenario analysis to pinpoint the most significant physical climate risks, considering both moderate and high emission scenarios (RCP 4.5 and RCP 8.5, respectively). Examples of adaptation measures implemented to enhance resilience include maintaining adequate margins in the construction and operation of hydropower assets (which encompasses ongoing investments in dam safety) and factoring in sea level rise when constructing in offshore environments. The company manages its biodiversity risk through investments in R&D and research programs to mitigate impacts from wind and hydropower. For example, the company has established protected areas around hydro plants and is working on innovations for safe fish passage; it also participates in the offshore bat studies and seabird studies that help to assess the potential impacts of new offshore wind farms. Additionally, the framework states that only plants that meet the EU Taxonomy substantial contribution criteria (including the requirement for life-cycle emissions) will be eligible for financing. These factors contribute to our assessment of solar, wind, and hydropower as Dark green.
- With respect to the end-of-life treatment of financed assets, Vattenfall has developed a circular economy framework for 2030. For example, it set circular targets for its wind assets. It aims to achieve a 100% circular outflow of permanent magnets and composite materials from wind turbines (including blades, nacelle canopies, and nose cones) from decommissioned wind farms from 2030. This furthers enhances our Dark green assessment.
- Biomethane is considered a viable alternative to natural gas that does not require significant changes to distribution infrastructure and is compatible with natural-gas-powered vehicles. Vattenfall is planning to use bio-waste or sewage in the production of biomethane. The issuer informed us it will use residues and manure as a feedstock for biowaste. As manufacture of biomethane is a future investment, the company cannot provide a detailed breakdown of type of residues used, but it confirmed it will meet the EU Renewable Energy Directive (RED). Additionally, even though the share of food and feed crops used as input feedstock is less than or equal to 10%, this can carry some inherited risks such as land use competition. These factors lead to a Medium green assessment of this subcategory.
- Manufacture and storage of hydrogen is important for the transition to a low-carbon future. The issuer informed us that it does not currently have any major investments in this technology, but it plans to in the future. Our understanding is that projects under this subcategory will involve manufacture and storage of green hydrogen. One of the future projects is Zeevonk wind farm in the Netherlands. This 2 gigawatt (GW) offshore wind project plans to feature a 50 megawatt peak (MWp) floating offshore solar farm on-site, along with a new electrolyzer that will convert a part the electricity generated into green hydrogen. This type of project complies with the EU Taxonomy substantial contribution criteria. However, since green hydrogen relies on electrolysis, water consumption needs to be carefully managed, while other environmental risks include potential end uses that are polluting and impacts of leaked hydrogen on the atmosphere. As it is a nascent technology, such risks are not yet fully understood. Vattenfall confirmed that the resources will be used in the most efficient way and leakage detection will be part of future investments. Therefore, these projects are seen as Dark green.
- Through transmission and distribution of electricity projects, the issuer will invest in the expansion, enhancement, and maintenance of electricity distribution systems. The majority of grid operations are in Sweden, which is well-positioned in this regard because most of its electricity production is from renewable sources, which results in a low grid emission factor, i.e. way below the EU Taxonomy threshold of 100 gCO2e/kWh. According to 2023 data from the IEA, renewables (hydropower, wind, solar) accounted for 62% of electricity generation in Sweden, with nuclear contributing 29%, biofuels and waste 8%, and fossil fuels (natural gas, oil, and coal) only 1%. The company will additionally screen any potential investments to meet the life-cycle emission threshold of below 100 gCO2e/kWh. We access this type of investment as Dark green.
- Energy/electricity storage plays a key role in net-zero energy systems by providing flexibility and adaptability by balancing the intermittency of most renewable energy sources. The issuer is planning to use pumped hydropower storage and/or battery storage systems. The battery storage systems can be connected to renewable energy units or stand-alone facilities linked to electricity grids. We assess the development of these projects for renewable energy as Dark green because these systems will improve intermittent supply from renewable sources and thereby increase the integration of renewables into electricity networks. That said, there are considerable supply-chain exposures from metals (aluminum) and sensitive materials (lithium, cobalt), as well as end-of-life considerations related to the use of hazardous chemicals. The issuer confirmed that it will follow strict European regulation regarding recycling and end-of life management for batteries.

Regarding pumped hydropower storage, all investments will be assessed from a biodiversity perspective and comply with the relevant regulation.

Energy efficiency

Assessment	Description
Medium green	Proceeds will be used to finance new and existing capital expenditures, replacements and upgrades, R&D and selective maintenance and operational expenditures that either increase the lifetime or value of assets, as well as supportive infrastructure. • District heating and cooling distribution Financing of pipelines and associated infrastructure for distribution of heating and cooling, ending at the sub-station or heat exchanger. The activity complies with one of the following criteria: a) For construction and operation of pipelines and associated infrastructure for distributing heating and cooling, the system meets the following criteria, at least 50% renewable energy, 50% waste heat, 75% cogenerated heat or 50% of a combination of such energy and heat in alignment with the energy efficiency directive; b) For refurbishment of pipelines and associated infrastructure for distributing heating and cooling, the investment that makes the system meet the following: a district heating or cooling system using at least 50% renewable energy, 50% waste heat, 75% cogenerated heat or 50% of a combination of such energy and heat starts within a three year period as underpinned by a contractual obligation or an equivalent in case of operators in charge of both generation and the network or; c) Modification to lower temperature regimes; advanced pilot systems (control and energy management systems, Internet of Things). • Electric heat pumps Financing of electric heat pumps where the economic activity is an integral element of renewable energy technologies. The installation and operation of electric heat pumps complies with both of the following criteria: a) Refrigerant threshold: Global Warming Potential (GWP) does not exceed 675; b) Energy efficiency performance and requirements in line with the EU Ecodesign Directive (2009/125/EC). • Production of heat/cool from bioenergy Financing facilities that produce heat/cool exclusively from biomass, biogas, or bioliquids, and excluding production of heat/cool from blending of renewable fuels with biogas or bioliquids. The activity complies with applicable sustainability and greenhouse gas emissions saving criteria for biofuels, bioliquids, and biomass as set out in the EU Renewable Energy Directive (EU 2018/2001) including a greenhouse gas emission savings from the use of biomass of at least 80%. • Industrial projects Financing industrial collaboration such as Hybrit to support direct and indirect electrification in hard-to-abate sectors. Project ensure he following: - High absolute estimated reduction of greenhouse gas emissions in the targeted area,

- Minimized long-term negative environmental impacts and potential rebound.

Analytical considerations

- Investments aimed at enhancing energy efficiency are essential for achieving a low-carbon future, as they can lower overall energy consumption and, in turn, reduce emissions. Sustainability benefits vary depending on the feedstock used and the management of value-chain risks, namely land-use change, biodiversity, and greenhouse gas emissions. We assign a Medium green shade to this category to reflect their role in reducing the consumption of fossil fuels and electricity for heating purposes and in transforming hard to abate industries. We understand from the issuer that it does not currently intend to allocate a material proportion of the proceeds to this category.
- For district heating and cooling systems, the issuer aims to finance initiatives that incorporate at least 50% renewable energy, 50% waste heat, 75% cogenerated heat, or a combination of these sources in line with EU Taxonomy requirements. We acknowledge the fact that the investment is directed on the grid itself rather than on the production of heat. However, these kinds of projects still carry inherited risks linked to remaining sources of energy. The issuer informed us that in the case of investments in existing grids, there is a possibility of the presence of fossil energy sources. This will be accepted only if they comply with EU taxonomy requirements on greenhouse gas performance. This leads to a Medium green assessment.
- We consider it a positive aspect that the bioenergy facilities eligible for financing will meet the EU Taxonomy requirement of achieving greenhouse gas emissions savings of at least 80% compared with the relevant fossil fuel benchmarks. Bioenergy production will use feedstock (forest residues, biowaste, and industrial biogenic residues) that comply with requirements of the Renewable Energy Directive (2023/2413) and related sustainability requirements.
- We consider the issuer's investments in the installation of electric heat pumps to be Dark green because these measures will reduce energy consumption, and subsequently emissions. The issuer's criteria for this subcategory are in line with the EU Taxonomy substantial contribution criteria, including a refrigerant threshold (global warming potential that does not exceed 675) and requirements related to equipment design (durable and recyclable) and adequate waste management.
- Due to their fixed characteristics and relatively extended lifespan, eligible assets could be vulnerable to physical climate risks. Vattenfall employs moderate and high IPCC climate scenarios (RCP 4.5 and RCP 8.5, respectively) to evaluate the risk to its assets.
- Vattenfall is planning to finance projects aiming to support direct and indirect electrification in hard-to-abate such as steel making, cement, fuel, for example. Decarbonization of hard-to-abate sectors is essential for low carbon future. Vattenfall's role in this kind of project is focused primarily on the energy aspect. Specifically, this would involve activities such as producing hydrogen near industrial facilities or storing and using hydrogen directly at those locations, rather than engaging in the industrial processes themselves. For example, the ongoing project HYBRIT is aiming to produce low carbon steel by replacing coking coal, traditionally needed for ore-based steel making, with hydrogen produced by electrolysis. In this case, Vattenfall is responsible for producing green hydrogen and its partner SSAB for the steel making process. We access these projects as Medium green, as we do not have full visibility on the type of projects financed and the thresholds applied. The company commits to comply with the significant contribution criteria of the EU Taxonomy regulation for its financed projects on a best effort basis where it is permitted. We note that the issuer commits to provide a significant amount of information including management of related environmental and social risks for investors for any industrial project that may be wholly or partially financed with green debt instruments.

Clean transportation

Assessment	Description
Dark green	Proceeds will be used to finance new and existing capital expenditures, replacements and upgrades, R&D and selective maintenance and operational expenditures that either increase the lifetime or value of assets, as well as supportive infrastructure. • Charging stations for electric vehicles (EVs) Financing of charging stations and infrastructure for EVs.

Analytical considerations

- Reducing the use of vehicles and switching to EVs are central to addressing road transport emissions and transitioning to a low-carbon future in accordance with the Paris Agreement. To reflect the role of the activities financed under this category in contributing to these aims, we assign a Dark green shade to this category.
- EVs offer substantial reductions in life-cycle emissions compared with internal combustion engine vehicles, particularly when they are manufactured and powered by renewable electricity. Therefore, by increasing the availability of charging stations, the company will improve the accessibility of EVs and encourage their adoption. Vattenfall operates around 66,000 e-mobility charging points in Sweden, Germany, and the Netherlands, including 35,000 that are publicly accessible.
- The degree of life-cycle savings from EVs depends on the energy mix of the grid that powers them. Sweden is well-positioned in this regard because most of its electricity production is from renewable sources, which results in a low grid emission factor. In contrast, Germany and the Netherlands have a fair proportion of electricity coming from fossil fuel, with the grid emission factors being above 100 gCO2e/kWh.
- Charging technology and other types of infrastructure might be exposed to supply-chain environmental and social risks, which are sufficiently managed by Vattenfall.

S&P Global Ratings' Shades of Green

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

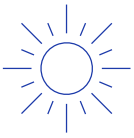
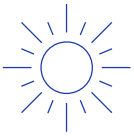
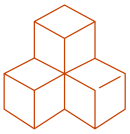
Note: For us to consider use of proceeds aligned with ICMA Principles for a green project, we require project categories directly funded by the financing to be assigned one of the three green Shades.

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

Mapping To The U.N.'s Sustainable Development Goals

Where the financing documentation references the Sustainable Development Goals (SDGs), we consider which SDGs it contributes to. We compare the activities funded by the financing to the International Capital Markets Association (ICMA) SDG mapping and outline the intended linkages within our SPO analysis. Our assessment of SDG mapping does not affect our alignment opinion.

This framework intends to contribute to the following SDGs:

Use of proceeds	SDGs	
Renewable energy	 **7. Affordable and clean energy***	 **9. Industry, innovation and infrastructure***
Energy efficiency	 **7. Affordable and clean energy***	 **9. Industry, innovation and infrastructure***
Clean transportation	 **7. Affordable and clean energy**	 **11. Sustainable cities and communities***

*The eligible project categories link to these SDGs in the ICMA mapping.

Related Research

- Analytical Approach: Second Party Opinions, March 6, 2025
- FAQ: Applying Our Integrated Analytical Approach For Second Party Opinions, March 6, 2025
- Analytical Approach: Shades Of Green Assessments, July 27, 2023
- Analytical Approach: EU Taxonomy Assessment, Oct. 31, 2024
- Analytical Approach: European Green Bond External Reviews, Oct. 31, 2024
- FAQ: Applying Our Analytical Approach For European Green Bond External Reviews, Oct. 31, 2024

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