



Hamburger Hochbahn AG Green Finance Second Opinion

14 March 2023

Executive Summary

Hamburger Hochbahn AG ('Hochbahn') is one of Germany's largest local transport companies. Owned by the City of Hamburg, it operates four metro lines and 116 bus routes in Hamburg, Germany, transporting around 424 million passengers in 2022.

Hochbahn expects to allocate the majority of net proceeds from the initial transaction under the framework to the refurbishment of its existing metro network. Smaller shares are expected to finance its bus network and growing zero direct (tailpipe) emission fleet, as well as investments into stations, equipment, and installations, dedicated to public transport. This is an update of Hochbahn's framework dated September 2020. While the eligible projects remain materially the same, among other changes, the framework is expanded to include green financing instruments as well as green bonds, and to include information on the alignment of eligible projects with the EU Taxonomy.

We rate the framework **CICERO Dark Green** and give it a governance score of **Excellent**. The Dark Green shading reflects that the increased use of zero direct emission (tailpipe) public transport is crucial in a 2050 future. In respect of governance, Hochbahn has developed important elements since its last framework (e.g. publishing its first report in accordance with Global Reporting Initiative principles and increasingly rigorous consideration of environmental and climate factors in procurement).

Strengths

The framework focuses on zero direct (tailpipe) emissions public transportation. A 2050 future requires a large modal shift from individual transportation modes, particularly fossil-based modes, to zero direct (tailpipe) emissions public transportation. Rolling stock and vehicle investments under the framework are limited to zero direct (tailpipe) emission forms, and such investments will be undertaken in the context of Hochbahn's targets, including climate neutrality by 2030 (Scope 1 and 2) and a full zero direct (tailpipe) emission bus fleet by the early 2030s.

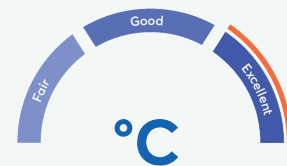
Hochbahn continues to develop the incorporation of climate and environmental factors in its procurement practices. This can play a role in reducing Scope 3 and embedded emissions associated with investments under the framework. In 2021, sustainability criteria were applied in tenders for around 8% of procurement volume. As part of its previous procurement of zero direct (tailpipe) emissions buses, for example, Hochbahn informed us that it included sustainability criteria, among other things, on the use of recycled materials and recyclability, and that it sought and relied upon supplier emissions data, where available and possible. The production of batteries and

SHADES OF GREEN



°CICERO
Dark Green

GOVERNANCE ASSESSMENT



GREEN BOND AND LOAN PRINCIPLES

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



the sourcing of their raw materials can, in particular, have substantial climate and environmental impacts, and Hochbahn should emphasise such considerations in procurement.

Pitfalls

Electric buses purchased under the framework may have the option to be heated by heating oil on cold days.

This is to avoid purchasing additional buses when low temperatures cause electric bus ranges to decline. Hochbahn informed us that its goal is to phase out such heating. It will therefore evaluate whether electric buses without such components meet operational requirements and, if so, reflect this in upcoming procurement processes. This process is expected to happen later in 2023.

Hochbahn will transform its bus fleet principally through electric buses but will also maintain a small fleet of hydrogen fuel cell buses.

According to Hochbahn, it intends to use hydrogen produced from renewable sources in its buses ('green hydrogen', in Hochbahn's case utilizing certificates of origin in respect of the electricity used for water electrolysis). The climate risks and impacts of hydrogen use in transportation depends on its production method, with green hydrogen considered most aligned with the 2050 solution. Hydrogen produced from natural gas, including with insufficient carbon capture rates, is not considered part of the 2050 solution. Uncertainty also remains around the climatic and environmental impacts of hydrogen leakage, given hydrogen reacts with other greenhouse gases in the environment.

EU Taxonomy

CICERO Shades of Green has carried out a full EU Taxonomy assessment, assessing alignment of financed taxonomy activities against the technical screening criteria for mitigation and 'Do No Significant Harm', as well as Hochbahn's likely fulfilment of the minimum safeguards.

In respect of mitigation criteria, the framework is considered likely aligned. In respect of the Do No Significant Harm criteria, Hochbahn is deemed likely aligned, except in two cases. Firstly, for *Sustainable use and protection of water and marine resources (water management)*, Hochbahn is considered likely partially aligned because, in cases where the relevant competent authority considers an environmental impact assessment unnecessary, we understand that water use and protection management plans are not developed. Secondly, we do not have enough information to conclude on alignment for *Transition to a circular economy*, because Hochbahn does not measure or otherwise have data that at least 70% (by weight) of the non-hazardous construction and demolition waste generated on the construction site is prepared for re-use, recycling, and other material recovery. We consider Hochbahn likely fulfils the minimum safeguards.



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1 Hamburger Hochbahn's environmental management and green finance framework

Company description

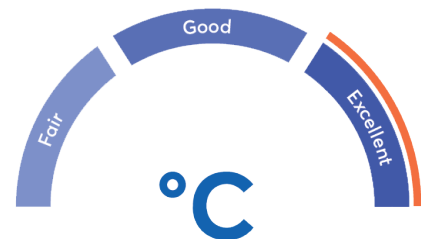
Hamburger Hochbahn AG ('Hochbahn') is one of Germany's largest local transport companies. Owned by the City of Hamburg, it operates four metro lines and 116 bus routes in Hamburg, Germany, transporting around 424 million passengers in 2022.

This is an update of Hochbahn's framework dated September 2020. Per its allocation report published in 2022, Hochbahn has issued one EUR 500 million green bond under its previous framework, with around 75% of allocated proceeds invested into refurbishment of its metro lines.

Governance assessment

Since its last framework, Hochbahn has improved elements of its issuer-level governance. Among other things, it now publishes an annual report in accordance with the Global Reporting Initiative, including emissions reporting for Scope 1 and 2 emissions, and has undertaken an assessment of physical risk exposure, utilizing climate scenarios. Hochbahn continues to develop the incorporation of climate and environmental factors in its procurement practices. An intention to report publicly on Scope 3 emissions in the coming years, and to report in accordance with TCFD recommendations by 2025, is welcome.

Hochbahn's selection process remains solid, particularly the validation of the green finance committee's decisions by its management board. In an improvement from its last framework, Hochbahn now commits to annual impact reporting.



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



Sector risk exposure

Physical climate risks. Extreme weather events are expected to increase in intensity and frequency. In northern Europe, more extreme precipitation (and associated flooding), as well as increased extreme heat, are likely. These threaten transportation infrastructure, with potential effects including traffic disruptions and road diversions, overheating engines, increased fire risks associated with the trains and related infrastructure, and distortion of steel rails.

Transition risks. Due to the profound changes needed to limit global warming to well-below 2°C, transition risk affects all sectors. Despite the efficiency of public transport compared to private transport, fossil fuel powered buses, for example, are exposed to transition risks from increasingly ambitious policies and tighter regulations, such as stricter rules for transportation emissions and implementation of zero-emissions urban environments. Transition risks could also impact the use of emissions-intensive construction materials such as cement and steel.

Environmental risks. Transport infrastructure can cause disturbance from noise, resource use, and pollution, and fragment ecosystems and disrupt wildlife movement. Modifications, upgrades, and expansions of transport infrastructure can also lead to waste, which should be managed in accordance with the waste hierarchy, while environmental risks also arise in supply chains.

Social risks. The most apparent social risks arising from infrastructure projects and investments concern working conditions, such as health and safety. There are, however, also risks linked to supply chains, for example in the production of equipment and building materials. For battery powered vehicles, social risks in supply chains are linked to mining, smelting, and refining of raw materials, with these activities often taking place in regions where the risk for serious human rights violations is high.

Environmental strategies and policies

Hochbahn reports publicly on its Scope 1 and Scope 2 emissions. In 2021, Scope 1 emissions totalled 75,053.3 tCO₂e and Scope 2 emissions totalled 3,028.4 tCO₂e. Around 88.5% of Scope 1 emissions were from diesel consumption in buses, while other sources included heating oil and refrigerant use in buses and natural gas heating in buildings. Almost the entirety of Scope 2 emissions (>99.8%) were from district heating. In 2021, Hochbahn consumed around 162 GWh of electricity: around 71% for metro operations, around 3.5% for its electric buses, and the remainder at locations such as stations, administrative buildings, depots, and workshops. Hochbahn reports no emissions in respect of its electricity use because, since 2019, it has exclusively purchased certified electricity from renewable sources.

Though Scope 3 emissions are not yet reported, in 2022, Hochbahn assessed such emissions for 2020. Scope 3 emissions were calculated at around 203 tCO₂e, with upstream emissions from purchased goods and services (e.g. related to construction works and the purchase of construction materials) and capital goods (e.g. buses and metro vehicles) as the main sources. According to Hochbahn, it intends to report publicly on Scope 3 emissions in the coming years.



The City of Hamburg aims to reduce emissions by 55% by 2030 from a 1990 baseline and achieve carbon neutrality by 2050. Given that, in 2020, the mobility sector accounted for around 28% of the City of Hamburg's carbon emissions, a prominent and efficient public transport system is necessary to achieve this target. To this end, Hochbahn aims to increase the market share of local public transport to 30% by 2030, compared to 22% in 2017.

Hochbahn targets carbon neutrality by 2030 (Scope 1 and 2 emissions). While it will reduce emissions 'as much as possible', some unavoidable emissions (mainly from heating) are expected and will be offset using compensation measures. As well as the purchase of certified electricity from renewable sources, a key measure is the procurement of zero direct (tailpipe) emission buses. Hochbahn will only procure such buses from 2020 and intends to operate its entire bus fleet on a zero direct (tailpipe) emission basis by the early 2030s. In 2021, Hochbahn had a fleet of 1106 buses, of which 101 were battery- or hydrogen fuel cell powered. Hochbahn has awarded contracts for the delivery of up to 530 zero-emission buses between 2021 and 2025. Of these, up to up to 50 will be hydrogen fuel cell powered, with the rest battery powered.

Since 2019, Hochbahn has binding sustainability standards for suppliers and business partners. In 2021, sustainability criteria were applied in tenders for around 8% of procurement volume (award criteria, mandatory requirements, or performance conditions), for example in its tenders for electric bus charging technology. Sustainability targets were also set in connection with the procurement of 530 zero-emissions buses and construction of the U5 metro line. For the procurement of the buses, for example, Hochbahn informed us that this included sustainability criteria, among other things, on the use of recycled materials and recyclability, and that it sought and relied upon supplier emission data, where available and possible. An environmental and social risk screening is undertaken to determine the scope and content of sustainability criteria.

In respect of physical risk, Hochbahn has, in cooperation with the Climate Service Centre GERICS, prepared a physical risk 'outlook' for its operations. This utilizes three IPCC RCP scenarios to consider the possible effects of climate related hazards on its operations. River flooding and increased rainfall and storms are identified as the most material risks, and Hochbahn informs us of adaptation measures that have been put in place, for example floodgates and the implementation of a flooding emergency plan.

Hochbahn publishes an annual corporate and sustainability report, and a separate report in accordance with the Global Reporting Initiative. It does not currently report in accordance with TCFD recommendations, though it intends to do so by 2025 at the latest.

Green finance framework

Based on this review, the framework is found to be aligned with the Green Bond Principles and Green Loan Principles. For details on the issue's framework, please refer to the green finance framework dated March 2023.

Use of proceeds

For a description of the framework's use of proceeds criteria, and an assessment of the categories' environmental impacts and risks, please refer to section 2.

Selection

Hochbahn has a green finance committee chaired by the executive board member responsible for finance and sustainability, and consisting of the heads of finance and control, sustainability management, and legal. The green finance committee meets on an annual basis, or more frequently as required, and, by consensus, prepares a list of eligible green projects. This list is then validated by Hochbahn's management board.

Management of proceeds



Hochbahn intends to allocate proceeds to its general cash pool and earmark an equal amount for allocation to eligible green projects. The balance of tracked proceeds will be adjusted on a quarterly basis.

Hochbahn expects to allocate proceeds within 36 months of issuance. Until allocation, proceeds will be invested in marketable instruments, preferably ESG instruments, or otherwise deposited in a Deutsche Bundesbank account.

Reporting

Hochbahn will publish an annual allocation and impact report until full allocation of proceeds or in case of significant changes. Reporting will be on a portfolio basis. Where possible, it intends to align its reporting with ICMA's Handbook – Harmonized Framework for Impact Reporting (June 2022). According to Hochbahn, the report will be externally reviewed.

In respect of allocation, the report will include:

- Information on the green debt instrument (ISIN, currency, amount, etc.)
- Breakdown of allocated amounts (or reallocated amount, as the case may be) to eligible green projects by category
- A description of eligible green projects at category level
- Share of financing vs refinancing
- Breakdown of the type of eligible green projects (capital expenditures)
- Balance of unallocated proceeds (if any)

In respect of impacts, the framework includes the following example metrics:

- Increased capacity (available seat kilometres)
- Avoided carbon emissions compared to cars
- Avoided emissions compared to diesel buses
- Energy savings
- Number of new services and mobility hubs
- Average number of users per day
- Customer satisfaction surveys

Hochbahn intends to disclose pro-rated impacts reflecting the share of green financing used to finance investments and will disclose methodologies and assumptions used to calculate such impacts.

Following its debut issuance in February 2021, Hochbahn published its first allocation report in 2022, as well as a third party limited assurance report on allocation. In its previous framework, Hochbahn committed to publishing an impact report at least once during the lifetime of the bond, after full allocation.



2 Assessment of Hamburger Hochbahn's green finance framework

The eligible projects under Hamburger Hochbahn's green finance framework are shaded based on their environmental impacts and risks, based on the "Shades of Green" methodology.

Shading of eligible projects under Hamburger Hochbahn's green finance framework

- Eligible projects under the framework can include capital expenditures disbursed no earlier than 36 months prior to issuance. Hochbahn expects net proceeds from the initial transaction under the framework to be used for new financing.
- Of initial proceeds raised under the framework, Hochbahn expects to allocate around 60-70% to the category relating to the existing metro network, around 25-35% to the category relating to the bus network and zero direct (tailpipe) emission fleet, and 5-10% to the category relating to stations, equipment, and installations.
- Per its allocation report published in 2022, Hochbahn has allocated around 57% of its existing green bond financing, with full allocation expected in 2023. Of this, around 75% was allocated to the refurbishment of the existing metro network, with smaller amounts invested in bus routes and zero direct (tailpipe) emission fleet and services such as refurbishments and integration of customer services.
- The framework does not include any express exclusions.



Category	Eligible project types	Green Shading and considerations
Clean Transportation	<p>Refurbishment of our existing metro network</p> <p>Acquisition of rolling stock that have zero direct tailpipe CO₂ emissions, or</p> <p>Construction and modernization of subways infrastructure that are dedicated to urban and suburban public passenger transport or the transfer of passengers from rail to rail or from other modes to rail (such as acquisition of rolling stock, refurbishment of existing metro infrastructure (tracks and depots))</p>	<p>Dark Green</p> <ul style="list-style-type: none"> ✓ The increased use of electrified or otherwise zero direct tailpipe emission public transport is crucial element in the 2050 vision. Acquisition of electric powered rolling stock, and construction and modernization of related infrastructure, is therefore considered Dark Green. ✓ Hochbahn’s metro operations accounted for 71% of its electricity consumption in 2021. While Hochbahn purchases certified renewable electricity, note that guarantees of origin and similar certifications do not influence the emissions from electricity used. ✓ Construction and maintenance works can be emissions intensive - in this respect, we note, for example, Hochbahn’s incorporation of sustainability criteria in tenders for construction works. ✓ According to Hochbahn, new metro lines (such as the U5 project) will not be financed under this project category or the framework. Moreover, no fossil fuel-based heating or other fossil fuel infrastructure can be financed under this project category. ✓ While the framework contains no express environmental criteria for depots or other such buildings, Hochbahn informed us that, because of its aim to reduce its Scope 3 emissions and achieve climate-neutral planning, the use of solutions such as the use of solar PVs, heat pumps, and waste heat, are part of the planning process.



Clean
Transportation **Expansion and refurbishment of our bus network; Medium Green to Dark Green transformation to a zero-emission bus fleet**



Acquisition of busses with zero direct tailpipe CO₂ emissions (battery, fuel cell)



Construction, modernization and maintenance of the infrastructure required for the electrified bus network including charging stations and depot dedicated to electric busses (such as acquisition of electric busses (battery, fuel-cell), charging infrastructure, construction of new and refurbishment of existing bus depots for electric busses)

- ✓ Zero direct (tailpipe) emission public transport is essential in a 2050 future.
- ✓ Hochbahn will transform its bus fleet principally through electric buses but will also maintain a small fleet of hydrogen fuel cell buses. For context, of the 530 zero direct (tailpipe) emission buses Hochbahn has procured for delivery between 2021 and 2025, up to 50 will be hydrogen fuel cell powered.
- ✓ Electric buses purchased under this project category might have the option to be heated by heating oil on cold days. This is to avoid purchasing additional buses when low temperatures cause electric bus ranges to decline. Hochbahn informed us that its goal is to phase out such heating. It will therefore evaluate whether electric buses without such components meet operational requirements and, if so, reflect this in upcoming procurement processes. This process is expected to happen later in 2023.
- ✓ The production of batteries and the sourcing of their raw materials can have substantial climate and environmental impacts. In this respect, we note that transparency regarding the CO₂ footprint of buses and batteries was part of the supplier assessment in the tender process.
- ✓ According to Hochbahn, for its small fleet of hydrogen fuel cell buses, it intends to use hydrogen produced from renewable sources in its buses ('green hydrogen', in Hochbahn's case utilizing certificates of origin in respect of the electricity used for water electrolysis). The climate risks and impacts of hydrogen use in transportation depends on its production method, with green hydrogen considered most aligned with the 2050 solution. Hydrogen produced from natural gas, including with insufficient carbon capture rates, is not considered part of the 2050 solution. Uncertainty also remains around the climatic and environmental impacts of hydrogen leakage, given hydrogen reacts with other greenhouse gases in the environment.¹

¹ E.g. [Hauglustaine et al \(2022\)](#).



- ✓ Hochbahn does not currently have depots dedicated exclusively to zero direct (tailpipe) emission buses. According to Hochbahn, this is because it does not consider constructing such depots an efficient use of resources, given there would be a ‘surplus’ of such depots once its bus fleet is fully decarbonized. As such, while we understand that infrastructure investments under this project category will target investments dedicated to such electric buses, such as chargers, more general investments in depots may indirectly service existing fossil fuel buses. Such investments should be viewed in light of Hochbahn’s fleet decarbonization strategy. Hochbahn has confirmed that proceeds cannot be invested in new or existing fossil fuel-specific infrastructure.
- ✓ See above regarding construction emissions and environmental criteria for depots or other such buildings.

Clean
Transportation



Refurbishment and improvements of stations, equipment and installations dedicated to urban public passenger transport, and contributing to increase the share of integrated public and low-carbon transport over individual car use

(such as ticketing, traffic information, passenger guidance systems, ticketing-terminals, service centers, and digital ticketing and service solutions (e.g. hvv switch); integration of on-demand services and construction of mobility hubs)

Dark Green

- ✓ In the context of Hochbahn’s targets and efforts to decarbonize its transport offerings, refurbishments and improvements of public transport stations, equipment, and installations, are part of the 2050 solution.
- ✓ Hochbahn informed us that investments could not include shopping malls/areas or parking spaces for private vehicles.

Table 1. Eligible project categories



EU Taxonomy

The EU Taxonomy Regulation is a classification system setting criteria for economic activities to be defined as environmentally sustainable.² The regulation defines six environmental objectives. To be considered sustainable, an activity must substantially contribute to at least one of the six environmental objectives without harming the other objectives (“Do No Significant Harm”), while complying with minimum social safeguards.^{3,4}

CICERO Shades of Green considers the following EU Taxonomy activities to Hamburger Hochbahn’s framework: 6.3 – Urban, suburban and road passenger transport; 6.15 – Infrastructure enabling low carbon road transport and public transport. Subject to the gaps listed below and more fully in Appendix 2, CICERO Shades of Green assesses that the framework activities are likely aligned with the relevant mitigation and Do No Significant Harm criteria.

Main gaps

Activity 6.15 – Do No Significant Harm, Sustainable use and protection of water and marine resources (water management). Hochbahn is considered likely partially aligned with this requirement because, in cases where the relevant competent authority considers an environmental impact assessment unnecessary, we understand that water use and protection management plans are not developed.

Activity 6.15 – Do No Significant Harm, Transition to a circular economy. Hochbahn does not measure or otherwise have data that ‘at least 70% (by weight) of the non-hazardous construction and demolition waste [...] generated on the construction site is prepared for re-use, recycling and other material recovery [...]’. As such, we do not have enough information to conclude on alignment.

Minimum safeguards

To qualify as a sustainable activity under the EU regulation certain minimum safeguards must be complied with. CICERO Shades of Green has assessed Hochbahn’s policies and processes in the social area, with a focus on human rights and labour rights. On the basis on information provided by the company, we take the sectoral, regional, and judicial context into account and focus on the risks likely to be the most material social risks.

CICERO Shades of Green considers that Hochbahn appears to likely fulfil the minimum social safeguards of the EU Taxonomy. Hochbahn is a heavily regulated State-owned entity and focuses on fulfilling its legal requirements in respect of social risks, such as those prescribed in the German Supply Chain Due Diligence Act.⁵

Hochbahn has developed a supplier code of conduct that sets out baseline commitments for all its suppliers, while it is introducing a new supplier risk management system with increased screening of potential and existing suppliers and has integrated sustainability criteria in its procurement process.

In respect of social risks for electric bus procurement, Hochbahn has undertaken a risk analysis and identified material risks such as child labour, forced labour, collective bargaining, occupational health and safety, discrimination, wages, and community risks. With regard to construction activities, where the use of subcontractors can give rise to social risks, Hochbahn emphasizes its use of German contractors and the inclusion of legal requirements in contracts with them. While such measures can to some extent mitigate these risks, Hochbahn furthermore undertakes active contractor screening, engagement, and follow up.

² Regulation EU 2020/852 <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020R0852&from=EN>

³ The six environmental objectives as defined in the proposed Regulation are: (1) climate change mitigation; (2) climate change adaptation; (3) sustainable use and protection of water and marine resources; (4) transition to a circular economy, waste prevention and recycling; (5) pollution prevention and control; (6) protection of healthy ecosystems.

⁴ Alignment with the OECD Guidelines for Multinational Enterprises and UN Guiding Principles on Business and Human Rights, including the International Labour Organisation’s (‘ILO’) declaration on Fundamental Rights and Principles at Work, the eight ILO core conventions and the International Bill of Human Rights.

⁵ *Lieferkettensorgfaltspflichtengesetz*, entering into force in 2023.









3 Terms and methodology

This note provides CICERO Shades of Green’s second opinion of the client’s framework dated March 2023. 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 Shades of 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.

‘Shades of Green’ methodology

CICERO Shades of 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

The “Shades of Green” methodology considers the strengths, weaknesses and pitfalls of the project categories and their criteria. 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, including potential macro-level impacts of investment projects.

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 Shades of 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.



Assessment of alignment with Green Bond Principles

CICERO Shades of Green assesses alignment with the International Capital Markets' Association's (ICMA) Green Bond Principles. We review whether the framework is in line with the four core components of the GBP (use of proceeds, selection, management of proceeds and reporting). We assess whether project categories have clear environmental benefits with defined eligibility criteria. The Green Bonds Principles (GBP) state that the "overall environmental profile" of a project should be assessed. The selection process is a key governance factor to consider in CICERO Shads of Green's assessment. CICERO Shades of 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 Shades of Green places on the selection process. CICERO Shades of Green assesses whether net proceeds or an equivalent amount are tracked by the issuer in an appropriate manner and provides transparency on the intended types of temporary placement for unallocated proceeds. Transparency, reporting, and verification of impacts are key to enable investors to follow the implementation of green finance programs.

EU taxonomy assessment

CICERO Shades of Green has assessed the activities against the EU Taxonomy's technical screening criteria, including the do-no-significant-harm (DNSH) criteria. In addition, we have assessed alignment with the minimum safeguards, as described in article 18 of the EU taxonomy. To assess activities' taxonomy alignment, CICERO Green has reviewed the issuer's green bond framework, other supporting documents provided by the issuer, and written responses to questions on each asset's taxonomy alignment.



Appendix 1: Referenced Documents List

Document Number	Document Name	Description
1	Green Finance Framework (March 2023)	
2	Management Report and Annual Financial Statements 2021	
3	GRI Report 2021	
4	Emissions Report – Scope 3 (April 2022)	Report prepared by DFGE on Hochbahn’s Scope 3 emissions in 2020
5	Physical climate risk analysis	
6	Green Bond Allocation Report (as of 31 December 2021)	



Appendix 2: EU Taxonomy criteria and alignment

Complete details of the EU taxonomy criteria are given in [taxonomy-regulation-delegated-act-2021-2800-annex-1_en.pdf \(europa.eu\)](https://eur-lex.europa.eu/eli/reg/2021/2800/annex_1_en.pdf)

Urban, suburban and road passenger transport

Framework activity	Clean transportation		
Taxonomy activity	6.3 Urban, suburban and road passenger transport (NACE Code H49.31, H49.3.9 and N77.11)		
	EU Technical mitigation criteria	Comments on alignment	Alignment
Mitigation criteria	<ul style="list-style-type: none"> The activity provides urban or suburban passenger transport and its direct (tailpipe) CO₂ emissions are zero;⁶ and/or Until 31 December 2025, the activity provides interurban passenger road transport using vehicles designated as categories M2 and M3⁷ that have a type of bodywork classified as ‘CA’ (single-deck vehicle), ‘CB’ (double-deck vehicle), ‘CC’ (single-deck articulated vehicle) or ‘CD’ (double-deck articulated vehicle)⁸, and comply with the latest EURO VI standard, i.e. both with the requirements of Regulation (EC) No 595/2009 and, from the time of 	All metro / underground trains and buses purchased under the framework will have zero direct (tailpipe) emissions.	Likely aligned.

⁶ This includes Motor buses with type of bodywork classified as ‘CE’ (low-floor single-deck vehicle), ‘CF’ (low-floor double-deck vehicle), ‘CG’ (Articulated low-floor single-deck vehicle), ‘CH’ (Articulated low-floor double-deck vehicle), ‘CI’ (open top single deck vehicle) or ‘CJ’ (open top double deck vehicle), as set out in point 3 of part C of Annex I to Regulation (EU) 2018/858.

⁷ As referred to in Article 4(1), point (a)(i), of Regulation (EU) 2018/858.

⁸ As set out in point 3 of part C of Annex I to Regulation (EU) 2018/858.



	<p>the entry into force of amendments to that Regulation, in those amending acts, even before they become applicable, and with the latest step of the Euro VI standard set out in Table 1 of Appendix 9 to Annex I to Regulation (EU) No 582/2011 where the provisions governing that step have entered into force but have not yet become applicable for this type of vehicle.⁹ Where such standard is not available, the direct CO₂ emissions of the vehicles are zero.</p>		
	EU Taxonomy DNSH-criteria	Comments on alignment	Alignment
Climate change adaptation	<p>The physical climate risks that are material to the activity have been identified (chronic and acute, related to temperature, wind, water, and soil) by performing a robust climate risk and vulnerability assessment with the following steps¹⁰:</p> <p>(a) screening of the activity to identify which physical climate risks from the list in Section II of this Appendix may affect the performance of the economic activity during its expected lifetime;</p> <p>(b) where the activity is assessed to be exposed to physical climate risks, a climate risk and vulnerability assessment to assess the materiality of</p>	<p>Information provided by the issuer</p> <p>In cooperation with Climate Service Center GERICS, Hochbahn has undertaken a physical risk analysis of its operations, utilizing three IPCC scenarios (RCP 2.6, RCP 4.5, and RCP 8.5) to mid-century. Possible risks were identified based on literature review and discussions with internal experts. River flooding, heavy rainfall, and heavy storms are considered the most relevant climate risks. Active measures in place, for existing and new assets, include:</p> <ul style="list-style-type: none"> • Monitoring of tree fall related damages in Hochbahn’s company risk management system; • Flood protection measures (e.g., flood gates in tunnels and flooding emergency plans); and • Monitoring of heavy rain projections with regards to the protection of metro entry points. 	Likely aligned.

⁹ Until 31/12/2021, the EURO VI, step E as set out in Regulation (EC) No 595/2009

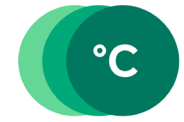
¹⁰ The Taxonomy is referring to Appendix A in the Taxonomy Annex 1.



	<p>the physical climate risks on the economic activity;</p> <p>(c) an assessment of adaptation solutions that can reduce the identified physical climate risk.</p> <p>The climate projections and assessment of impacts are based on best practice and available guidance and take into account the state-of-the-art science for vulnerability and risk analysis and related methodologies in line with the most recent Intergovernmental Panel on Climate Change reports, scientific peer-reviewed publications, and open source or paying models.</p> <p>For existing activities and new activities using existing physical assets, the economic operator implements physical and non-physical solutions ('adaptation solutions'), over a period of time of up to five years, that reduce the most important identified physical climate risks that are material to that activity. An adaptation plan for the implementation of those solutions is drawn up accordingly.</p> <p>For new activities and existing activities using newly built physical assets, the economic operator integrates the adaptation solutions that reduce the most important identified physical climate risks that are material to that activity at the time of design</p>	<p>Given its position as a city-owned company, Hochbahn is also embedded in the City of Hamburg's adaptation activities and 'transformation path', participating in the process to update the 'Hamburger Strategie zur Anpassung an den Klimawandel'. This widens the perspective on interrelated impacts, such as water retention, heavy rain provisions, and critical infrastructure.</p>	
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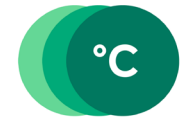


	<p>and construction and has implemented them before the start of operations.</p> <p>The adaptation solutions implemented do not adversely affect the adaptation efforts or the level of resilience to physical climate risks of other people, of nature, of cultural heritage, of assets and of other economic activities; are consistent with local, sectoral, regional or national adaptation strategies and plans; and consider the use of nature-based solutions or rely on blue or green infrastructure to the extent possible.</p>		
Sustainable use and protection of water and marine resources (water management)	N/A	N/A	N/A
Transition to circular economy	Measures are in place to manage waste, in accordance with the waste hierarchy, both in the use phase (maintenance) and the end-of-life of the fleet, including through reuse and recycling of batteries and electronics (in particular critical raw materials therein).	<p><u>Information provided by the issuer</u></p> <p>Compliance with Kreislaufwirtschaftsgesetz, which requires implementation of the waste hierarch. Additionally:</p> <ul style="list-style-type: none"> • Implementation of sustainability criteria in procurement, including on recyclability and recycled materials. Current metro trains are around 90% recyclable; • For repairability and useful life, conducting of market exploration discussions with manufacturers on wear and tear, smallest replaceable unit, factory refurbished parts and availability, and battery recycling (among other things); • Appropriate repair and maintenance, including establishing a dedicated workshop area for large component repair; and • 10-year warranty for electric buses, meaning batteries are taken back by manufacturers. 	Likely aligned.



<p>Pollution prevention and control</p>	<ul style="list-style-type: none"> • For road vehicles of categories M, tyres comply with external rolling noise requirements in the highest populated class and with Rolling Resistance Coefficient (influencing the vehicle energy efficiency) in the two highest populated classes as set out in Regulation (EU) 2020/740 of the European Parliament and of the Council¹¹ and as can be verified from the European Product Registry for Energy Labelling (EPREL). • Where applicable, vehicles comply with the requirements of the most recent applicable stage of the Euro VI heavy duty emission type approval set out in accordance with Regulation (EC) No 595/2009 	<p><u>Information provided by the issuer</u></p> <p>New buses will be equipped with compliant tyres.</p> <p>Start of phase out of non-compliant tyres in existing fleet; for new tyres, conformity criteria are implemented in procurement process.</p>	<p>Likely aligned.</p>
<p>Protection and restoration of biodiversity and ecosystems</p>	<p>N/A</p>	<p>N/A</p>	<p>N/A</p>

¹¹ Regulation (EU) 2020/740 of the European Parliament and of the Council of 25 May 2020 on the labelling of tyres with respect to fuel efficiency and other parameters, amending Regulation (EU) 2017/1369 and repealing Regulation (EC) No 1222/2009 (OJ L 177, 5.6.2020, p. 1).



Infrastructure enabling low-carbon road passenger transport and public transport

Framework activity	Clean transportation		
Taxonomy activity	6.15 Infrastructure enabling low-carbon road transport (NACE Code F42.11; F42.13; F71.1 and F71.20)		
Taxonomy version	EU Technical mitigation criteria	Comments on alignment	Alignment
Mitigation criteria	<ul style="list-style-type: none"> The activity complies with one or more of the following criteria: <ul style="list-style-type: none"> (a) the infrastructure is dedicated to the operation of vehicles with zero tailpipe CO2 emissions: electric charging points, electricity grid connection upgrades, hydrogen fueling stations or electric road systems (ERS); (b) the infrastructure and installations are dedicated to transshipping freight between the modes: terminal infrastructure and superstructures for loading, unloading and transshipment of goods; (c) the infrastructure and installations are dedicated to urban and suburban public passenger transport, including associated signalling systems for metro, tram and rail systems. The infrastructure is not dedicated to the transport of fossil fuels. 	Infrastructure investments under the framework will likely satisfy criterion (a) or (c). Infrastructure is dedicated to passenger transport (not the transportation of fossil fuels).	Likely aligned.
	EU Taxonomy DNSH-criteria	Comments on alignment	Alignment
Climate change adaptation	Please see under “Urban, suburban and road passenger transport”.		Likely aligned.



<p>Sustainable use and protection of water and marine resources (water management)</p>	<p>Environmental degradation risks related to preserving water quality and avoiding water stress are identified and addressed with the aim of achieving good water status and good ecological potential as defined in Article 2, points (22) and (23), of Regulation (EU) 2020/852, in accordance with Directive 2000/60/EC of the European Parliament and of the Council, and a water use and protection management plan, developed thereunder for the potentially affected water body or bodies, in consultation with relevant stakeholders. Where an Environmental Impact Assessment is carried out in accordance with Directive 2011/92/EU of the European Parliament and of the Council, and includes an assessment of the impact on water in accordance with Directive 2000/60/EC, no additional assessment of impact on water is required, provided the risks identified have been addressed.</p>	<p><u>Relevant background information</u></p> <p>Germany adopted the Water Framework Directive into law via the Federal Water Act and relevant state-level legislation.</p> <p><u>Information provided by the Issuer</u></p> <p>EIAs are carried out in accordance with German legislation, unless an EIA is not considered necessary following a preliminary screening by the relevant competent authority. Water is a factor considered in such assessments. Measures are in place to prevent and mitigate harmful impacts (e.g. through spills, etc.)</p>	<p>Likely partially aligned.</p>
<p>Transition to circular economy</p>	<p>At least 70 % (by weight) of the non-hazardous construction and demolition waste (excluding naturally occurring material defined in category 17 05 04 in the European List of Waste established by Commission Decision 2000/532/EC) generated on the construction site is prepared for re-use, recycling and other material recovery, including backfilling operations using waste to substitute other materials, in accordance with the waste hierarchy and the EU</p>	<p><u>Information provided by the issuer</u></p> <p>Compliance with Kreislaufwirtschaftsgesetz (KrWG) and Abfallwirtschaftsgesetz (HmbAbfG) Gemeinsamer Abfallbewirtschaftungsplan für Bau-und Abbruchabfälle for Hamburg and Schleswig Holstein. Hochbahn. The KrWG sets out the 70% target of the Waste Framework Directive, directed at the entire waste management industry rather than individual actors. According to Germany's Federal Statistical Office, in 2020 the recovery and recycling rates for non-hazardous construction and demolition waste were both 89%. As Hochbahn considers that such obligations and monitoring do not rest with the building-owner,</p>	<p>Not enough information to conclude.</p>



	<p>Construction and Demolition Waste Management Protocol¹². Operators limit waste generation in processes related construction and demolition, in accordance with the EU Construction and Demolition Waste Management Protocol and taking into account best available techniques and using selective demolition to enable removal and safe handling of hazardous substances and facilitate re-use and high-quality recycling by selective removal of materials, using available sorting systems for construction and demolition waste.</p>	<p>it does not measure the rates itself. Hochbahn also includes various waste-related obligations in its construction contracts.</p>	
Pollution prevention and control	<ul style="list-style-type: none"> Where relevant, noise and vibrations from use of infrastructure are mitigated by introducing open trenches, wall barriers or other measures and comply with Directive 2002/49/EC. Measures are taken to reduce noise, dust and pollutant emissions during construction or maintenance works. 	<p><u>Relevant background information</u></p> <p>Germany adopted Directive 2002/49/EC into law via the Federal Immission Control Act.</p> <p><u>Information provided by the Issuer</u></p> <p>Noise is limited through a variety of measures, including monitoring of noise in line with Lärmaktionsplan; construction works which may disturb the peace require a special permit.</p>	Likely aligned.
Protection and restoration of	<ul style="list-style-type: none"> As per Appendix D of the Annex: - An Environmental Impact Assessment (EIA) or screening¹³ has been 	<p><u>Information provided by the issuer</u></p>	Likely aligned.

¹² Available at <https://ec.europa.eu/growth/content/eu-construction-and-d>.

¹³ The procedure through which the competent authority determines whether projects listed in Annex II to Directive 2011/92/EU is to be made subject to an environmental impact assessment (as referred to in Article4(2) of that Directive).



<p>biodiversity and ecosystems</p>	<p>completed, for activities within the Union, in accordance with Directive 2011/92/EU. For activities in third countries, an EIA has been completed in accordance with equivalent national provisions or international standards.¹⁴</p> <ul style="list-style-type: none"> - Where an EIA has been carried out, the required mitigation and compensation measures for protecting the environment are implemented. - For sites/operations located in or near biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas, as well as other protected areas), an appropriate assessment¹⁵, where applicable, has been conducted and based on its conclusions the necessary mitigation measures¹⁶ are implemented. • Where relevant, maintenance of vegetation along road transport infrastructure ensures that invasive species do not spread. • Mitigation measures have been implemented to avoid wildlife collisions. 	<p>EIAs are carried out in accordance with German legislation, unless an EIA is not considered necessary following a preliminary screening by the relevant competent authority.</p>	
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¹⁴ For example, IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks.

¹⁵ In accordance with Directives 2009/147/EC and 92/43/EEC, or, for activities located in third countries, in accordance with equivalent national provisions or international standards, for example IFC Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.

¹⁶ Those measures have been identified to ensure that the project, plan or activity will not have any significant effects on the conservation objectives of the protected area.



Appendix 3: About CICERO Shades of Green

CICERO Shades of Green, now a part of S&P Global, provides independent, research-based second party opinions (SPOs) of green financing frameworks as well as climate risk and impact reporting reviews of companies. At the heart of all our SPOs is the multi-award-winning Shades of Green methodology, which assigns shadings to investments and activities to reflect the extent to which they contribute to the transition to a low carbon and climate resilient future.

CICERO Shades of Green is internationally recognized as a leading provider of independent reviews of green bonds, since the market's inception in 2008. CICERO Shades of 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 Shades of Green operates independently from the financial sector and other stakeholders to preserve the unbiased nature and high quality of second opinions

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- ★ **2021 Largest External Reviewer**, Climate Bonds Initiative Awards
 - ★ **2020 External Assessment Provider Of The Year**, Environmental Finance Green Bond Awards
 - ★ **2020 Largest External Review Provider In Number Of Deals**, Climate Bonds Initiative Awards
 - ★ **2019 External Assessment Provider Of The Year**, Environmental Finance Green Bond Awards
 - ★ **2019 Largest Green Bond SPO Provider**, Climate Bonds Initiative Awards
 - ★ **2018 External Assessment Provider Of The Year**, Environmental Finance Green Bond Awards
 - ★ **2018 Largest External Reviewer**, Climate Bonds Initiative Awards
 - ★ **2017 Best External Assessment Provider**, Environmental Finance Green Bond Awards
 - ★ **2016 Most Second Opinions**, Climate Bonds Initiative Awards