



# Hamburger Hochbahn AG Green Bond Second Opinion

August 21, 2020

**Hamburger Hochbahn AG ('Hochbahn')** is one of the largest local transport companies in Germany. Hochbahn is a company organized and managed according to private-sector principles and is wholly owned by the Free and Hanseatic City of Hamburg. With four subway lines, 114 bus lines and several ferry lines, it carries around 1.2 million passengers a day to their destinations, providing around half of all local transport services in the Hamburg Transport Association (HVV). In 2019, Hochbahn had 466,7 million users.

**Hochbahn's framework will finance the refurbishment of Hochbahn's existing metro network as well as the expansion and renewal of Hochbahn's zero-emission bus fleet as well as refurbishments and improvements of Hochbahn's service infrastructure (e.g., mobility hubs).** Currently, approximately 87% of Hochbahn's emissions are due to diesel consumption of its busses. Hochbahn commits to carbon neutrality by 2030 (Scope 1 and 2), has committed to 100% renewable electricity usage since 2019 and will only use hydrogen produced from electricity from northern German wind farms. The majority of proceeds (70-80%) will be used for refurbishment of the metro, mainly more efficient electric trains, tracks and depots. No new metro lines and expansions of the metro network (tracks and stations) will be financed under the framework.

**While Hochbahn excludes direct investments in fossil fuels (e.g., for heating of buildings and engines), some of Hochbahn's electric busses may include heating oil burners to maintain range of the busses (currently 180km-220km) on cold days.** However, Hochbahn expects only limited heating demand and reevaluates fossil heating components in the upcoming 2022 procurement process.

**It is a strength that Hochbahn aims to achieve a substantial modal shift by 2030: 30% of journeys in Hamburg shall be made by integrated public transport compared to 22% in 2017.** Currently, the mobility sector accounts for 28.3% of Hamburg's CO<sub>2</sub>-emissions. With this substantial shift toward zero-emission solutions and adapted public transport services Hochbahn aims to implement a role model of a 2050 urban transport solution.

**Hochbahn has an excellent governance structure that aligns with Hamburg's climate goals, takes into account life-cycle and Scope 3 emissions for building materials and evaluates, e.g., electric bus suppliers based on a sustainability questionnaire that covers production emissions.** Despite not having aligned with TCFD recommendations, Hochbahn has implemented some adaptation measures such as flood water retention systems and green roofs.

Based on an assessment of the framework's alignment with the Green Bond Principles, the project categories and Hochbahn's governance, Hochbahn's green bond framework receives the overall **CICERO Dark Green** shading and a governance score of **Excellent**. Hochbahn could improve by adopting a more systematic approach to climate risk assessments and scenario analysis aligned with TCFD as well as excluding fossil fuel heating of electrically powered busses and monitoring as well as minimizing construction emissions.

## SHADES OF GREEN

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

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



## GREEN BOND PRINCIPLES

Based on this review, this Framework is found in alignment with the principles.





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# 1 Terms and methodology

This note provides CICERO Shades of Green's (CICERO Green) second opinion of the client's framework dated August 2020. This second opinion remains relevant to all green bonds and/or loans issued under this framework for the duration of three years from publication of this second opinion, as long as the framework remains unchanged. Any amendments or updates to the framework require a revised second opinion. CICERO Green encourages the client to make this second opinion publicly available. If any part of the second opinion is quoted, the full report must be made available.

The second opinion is based on a review of the framework and documentation of the client's policies and processes, as well as information gathered during meetings, teleconferences and email correspondence.

## Expressing concerns with 'shades of green'

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

### CICERO Shades of Green



**Dark green** is allocated to projects and solutions that correspond to the long-term vision of a low carbon and climate resilient future. Fossil-fueled technologies that lock in long-term emissions do not qualify for financing. Ideally, exposure to transitional and physical climate risk is considered or mitigated.



**Medium green** is allocated to projects and solutions that represent steps towards the long-term vision, but are not quite there yet. Fossil-fueled technologies that lock in long-term emissions do not qualify for financing. Physical and transition climate risks might be considered.



**Light green** is allocated to projects and solutions that are climate friendly but do not represent or contribute to the long-term vision. These represent necessary and potentially significant short-term GHG emission reductions, but need to be managed to avoid extension of equipment lifetime that can lock-in fossil fuel elements. Projects may be exposed to the physical and transitional climate risk without appropriate strategies in place to protect them.



**Brown** is allocated to projects and solutions that are in opposition to the long-term vision of a low carbon and climate resilient future.

### Examples



Wind energy projects with a strong governance structure that integrates environmental concerns



Bridging technologies such as plug-in hybrid buses



Efficiency investments for fossil fuel technologies where clean alternatives are not available



New infrastructure for coal

Sound governance and transparency processes facilitate delivery of the client's climate and environmental ambitions laid out in the framework. Hence, key governance aspects that can influence the implementation of the green bond are carefully considered and reflected in the overall shading. CICERO Green considers four factors in its review of the client's governance processes: 1) the policies and goals of relevance to the green bond framework; 2) the selection process used to identify and approve eligible projects under the framework, 3) the management of proceeds and 4) the reporting on the projects to investors. Based on these factors, we assign an overall governance grade: Fair, Good or Excellent. Please note this is not a substitute for a full evaluation of the governance of the issuing institution, and does not cover, e.g., corruption.



## 2 Brief description of Hochbahn's green bond framework and related policies

Hamburger Hochbahn AG ('Hochbahn') is one of the largest local transport companies in Germany. Hochbahn is a company organized and managed according to private-sector principles and is wholly owned by the Free and Hanseatic City of Hamburg. With four subway lines, 114 bus lines and several ferry lines, it carries around 1.2 million passengers a day to their destinations, providing around half of all local transport services in the Hamburg Transport Association (HVV). In 2019, Hochbahn had 466,7 million users. Hochbahn has several subsidiaries focusing on, e.g., repairing of vehicles, tourism and administration.

### Environmental Strategies and Policies

The aim of Hochbahn is to reduce private car traffic and minimize environmental impact through sustainable mobility services. Hochbahn has a strategic target to achieve climate neutrality by 2030. Unavoidable emissions are expected to be around 3-5ktCO<sub>2</sub> mainly due to heating (natural gas and district heating). In addition, 30% (2017: 22%) of journeys in Hamburg have to be made by integrated public transport according to Hamburg's climate goal of -55% CO<sub>2</sub>-emissions by 2030 compared to 1990. According to Hochbahn, additional strategies and targets will be set in 2021, when Hochbahn will start the development of an updated Sustainability Program. In 2019, Hochbahn reported on its corporate carbon footprint for the first time with a total of 76.5kt (approximately 87% of which are through diesel consumption of the bus fleet). Since 2019, Hochbahn is exclusively using "high quality certified green electricity" based on renewable electricity generation facilities not older than 6 years. Currently, Scope 3 emissions are not included in Hochbahn's climate neutrality target and are not calculated.

Hochbahn has set a target to replace its entire current bus fleet with zero-emission busses by 2030 and will compensate remaining residual emissions (natural gas, district heating, refrigerants). In 2019, 64% of the heating energy provided by the municipal grid is based on coal.<sup>1</sup> However, the City of Hamburg has plans to phase out coal and to decrease emissions by about 50% by 2030 (emission factor of 175gCO<sub>2</sub>/kWh) according to the Hamburg Climate Plan. Currently, Hochbahn operates 1090 busses of which 3.2% are zero-emission (33 are battery powered, 2 fuel-cell based) and 37 hybrid busses. By 2025, Hochbahn expects to have 531 zero-emission busses in its bus fleet of which 28 are expected to be fuel-cell based.

Since 2019, Hochbahn has binding "Sustainability Standards for Suppliers and Business Partners" within Hochbahn's procurement transactions. Hochbahn also established a questionnaire on sustainability performance of the electric bus supplier. The criteria include e.g., suppliers' emissions reduction targets and carbon footprints of the busses, as well as a range of material sourcing, recycling and environmental criteria. During the tendering procedure for locally emission free busses in 2019, sustainability aspects were therefore defined as criteria relevant to the award of contracts in addition to technical and commercial requirements. As of 2020, Hochbahn will exclusively procure zero-emission busses. Other acquisitions beside battery buses which are currently screened according to a sustainability questionnaire are acquisitions of fuel-cell buses, charging infrastructure for electric busses, metro trains, signaling technique for automated metro lines and IT. In addition, current planning contracts include the calculation, analysis and optimization of energy demand and emissions of buildings along their entire life cycle. Hochbahn is currently piloting taking into account CO<sub>2</sub> footprints when evaluating planning options.

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<sup>1</sup> <https://waerme.hamburg/energiepark-hafen>



Hochbahn joined the UN Global Compact in 2017 and is a member of the Sustainable Development Commission of the International Association of Public Transport (UITP) since 2018. The company will implement the reporting standards of Global Reporting Initiative starting with the next annual report for the year 2020. An external study by Leuphana University of Lüneburg concluded that Hochbahn is providing a substantial contribution to solve urban transportation problems by providing sustainable transport solutions.

Hochbahn is aware of climate impacts in Hamburg and the company informed us that they are in the process of integrating risks in the internal risk management process. In this context, the TCFD recommendations will serve as an orientation and Hochbahn will consider the possibility to formally adopt them. In addition, the company informed us that a scientific study with a special focus on physical climate risks is currently planned to be conducted. Since 2017, the most significant alterations of Hochbahn's service were caused by tree fall due to storms, while other events such as flooded tunnels or stations were not reported. The German Environmental Agency has conducted a study on climate impacts and consequences in Hamburg. Hochbahn has implemented adaptation measures such as to generally screen for feasibility to install green roofs and facades and photovoltaic systems on their buildings. In addition, Hochbahn has installed storm water retention facilities at their bus depots.

### Use of proceeds

An amount equivalent to the net proceeds of Hochbahn's green bonds will be allocated to investments, located in Hamburg, Germany in order to finance, in whole or in part, new eligible green capital expenditures and/or to refinance existing Eligible Green Projects whose disbursements occurred no earlier than 36 months (i.e. 3 years) prior to the issue date of the green bond. The issuer informed us that 100% of proceeds are expected to be used for financing of new projects. All eligible projects focus on the Clean transportation category. According to Hochbahn, approximately 70-80% of proceeds will finance the refurbishment of their existing metro network, 15-20% will be allocated to the expansion and refurbishment of Hochbahn's bus network and transformation to a zero-emission bus fleet and 5-10% will be allocated to the refurbishment and improvements of stations, integration of new customer services and on-demand services contributing to increase the share of integrated public transport over individual car use. According to Hochbahn, the decisive selection-factor is the positive impact of the respective project on the achievement of the Hamburg-Takt (by 2030 all passengers should be offered an adequate public transport service within 5 minutes) and Hamburg's climate goals.

Hochbahn excludes from financing investments in fossil fuel based infrastructure such as fossil fuel based busses, fossil fuel based rail guided vehicles or fossil fuel based energy generation incl. heating.

### Selection

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

Eligible green projects will be selected by a dedicated Green Bond Committee set-up within Hochbahn consisting Finance and Control department, the department for Sustainable Development, Environment and Safety and the Legal department. The selection decisions are made in consensus. On an annual basis, the Green Bond Committee will review and approve the aggregated pool of green capital expenditures for alignment with the eligibility criteria. If for any reasons, a project is no longer eligible, or in case of any major controversy affecting a project in the portfolio of eligible green projects, the Green Bond Committee will substitute such projects with other eligible green projects for an amount at least equal to such projects. The company informed us that an organizational unit of Hochbahn (12 employees) oversees providing information and engaging citizens in relevant projects. According



to Hochbahn, at the moment there is a broad political consensus that all mentioned projects of the framework are necessary to reach Hamburg's climate goals.

### Management of proceeds

CICERO Green finds the management of proceeds of Hochbahn to be in accordance with the Green Bond Principles. Hochbahn intends to allocate the proceeds to its general cash pool and an amount equal to the net proceeds will be earmarked for allocation to Eligible Green Projects within the investments plan. Pending full allocation, the balance will be invested either in short-term liquid ESG instruments (e.g., short-term money market funds) managed by Hochbahn's treasury team or otherwise deposited on a Deutsche Bundesbank account by the Free and Hanseatic City of Hamburg.

The balance of the tracked proceeds will be periodically adjusted on a quarterly basis, in order to ensure allocation to Eligible Green Projects during this period. Hochbahn intends to allocate the full amount of proceeds within the next 24 months following the issuance of the Green Bonds.

Hochbahn's processes for management of proceeds are handled by the Finance and Control department and reviewed by the Green Bond Committee.

### Reporting

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

Hochbahn will publish an annual report on allocation and impacts on Hochbahn's website (<https://www.hochbahn.de>) until full allocation of the green bonds and in case of significant changes thereafter. The Green Bond Committee is responsible for facilitating the ongoing green bond reporting. The allocation reporting will obtain external third-party assurance which will be published together with the report.

The impact reporting will include impact indicators such as:

- Increased capacity (available seat km)
- Avoided emissions compared to cars (CO<sub>2</sub>, NOX, PM<sub>2,5</sub>)<sup>2</sup>
- Avoided emissions compared to observed calculated emissions based on diesel consumption of Hochbahn's EURO VI busses (CO<sub>2</sub>, NOX, PM<sub>2,5</sub>)<sup>2</sup>
- Energy savings (due to refurbishment of metro stations such as new lighting)
- Number of new services and mobility hubs
- Average number of users per day
- Customer satisfaction surveys (qualitative assessment of the projects' contribution to improve the overall usability and accessibility of the public transport system)

Hochbahn informed us that it is currently expected that all of the metrics mentioned above will be reported on together with the respective methodology used to obtain these metrics. Hochbahn informed us that the impact reporting will be externally reviewed.

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<sup>2</sup> Avoided carbon emissions = passenger-km with public transport (km) x Modal transfer rate (%) (based on surveys) x emission-factor cars (CO<sub>2e</sub>/km)



### 3 Assessment of Hochbahn's green bond framework and policies

The framework and procedures for Hochbahn's green bond investments are assessed and their strengths and weaknesses are discussed in this section. The strengths of an investment framework with respect to environmental impact are areas where it clearly supports low-carbon projects; weaknesses are typically areas that are unclear or too general. Pitfalls are also raised in this section to note areas where Hochbahn should be aware of potential macro-level impacts of investment projects.

#### Overall shading

Based on the project category shadings detailed below, and consideration of environmental ambitions and governance structure reflected in Hochbahn's green bond framework, we rate the framework **CICERO Dark Green**.

#### Eligible projects under the Hochbahn's green bond framework

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

Category	Eligible project types	Green Shading and some concerns
Clean transportation	Refurbishment of Hochbahn's existing metro network   (such as acquisition of rolling stock, refurbishment of existing metro infrastructure (tracks and depots))	<b>Dark Green</b> <ul style="list-style-type: none"><li>✓ Upgrading metro lines with more efficient zero-emission trains and refurbishment of metro tracks and depots constitute a Dark Green solution in clean urban transport.</li><li>✓ Construction and maintenance are emitting CO<sub>2</sub> and should be monitored and minimized.</li><li>✓ Investments in fossil fuel based heating systems or fossil fuel based infrastructure are excluded.</li><li>✓ According to Hochbahn, new metro lines and expansions of the metro network (tracks and stations) like U4 and U5 are financed by state subsidies and are not part of the framework.</li></ul>
Clean transportation	Expansion and refurbishment of Hochbahn's bus network; transformation to a zero-emission bus fleet	<b>Medium to Dark Green</b> <ul style="list-style-type: none"><li>✓ Zero-emission busses running on 100% renewable electricity are part of a 2050 solution.</li><li>✓ Hochbahn informed us that some electric busses might have the option to be heated by heating oil on cold days in order to avoid purchasing additional</li></ul>



(such as acquisition of electric busses (battery, fuel-cell), charging infrastructure, construction of new and refurbishment of existing bus depots for electric busses)



busses when low temperatures cause bus ranges to decline. Hochbahn expects only limited heating demand and reevaluate fossil heating components in the upcoming 2022 procurement process.

- ✓ For its zero-emission bus acquisitions, Hochbahn expects a share of 5% (28 busses) to be based on fuel-cells by 2025. Hochbahn confirmed that it will use green hydrogen based on renewable energy in northern Germany for operating new fuel-cell buses. Due to potentially high future demand for green hydrogen in Germany, Hochbahn should remain vigilant on climate benefits of hydrogen versus battery technology.
- ✓ The production of batteries and sourcing of raw materials can have substantial climate and environmental impact. Hochbahn is aware of these risks and is assessing the life cycle emissions of the busses that are procured (e.g., 45-65% of life cycle emissions of a particular non-articulated bus are due to the battery production if run on 100% renewable energy).
- ✓ Hochbahn works with external energy experts to examine and realize further energy and resource savings in new infrastructure buildings, but has no binding energy efficiency criteria.

Clean transportation



Refurbishment and improvements of stations, integration of new customer services and on-demand services contributing to increase the share of integrated public transport over individual car use

(such as ticketing, traffic information, passenger guidance systems, ticketing-terminals, service centers, and digital ticketing and service solution; integration of on-demand services and construction of mobility hubs)

**Dark Green**

- ✓ Improving public transport infrastructure with mobility hubs and other measures incentivizing increased use of public transport is part of a Dark Green solution.
- ✓ Hochbahn informed us that stations will not have major other usages, such as shopping malls.
- ✓ While Hochbahn considers some climate risks, stations and other physical assets might be exposed to physical climate risks.
- ✓ Investments in fossil fuel based heating systems or fossil fuel base infrastructure are excluded.
- ✓ Hochbahn works with external energy experts to examine and realize further energy and resource savings in new infrastructure buildings, but has no binding energy efficiency criteria.
- ✓ Hochbahn confirmed that parking spaces at mobility hubs are only provided for sharing vehicles like car-sharing and that no new parking spaces for private vehicles will be financed under this framework.

Table 1. Eligible project categories



## Background

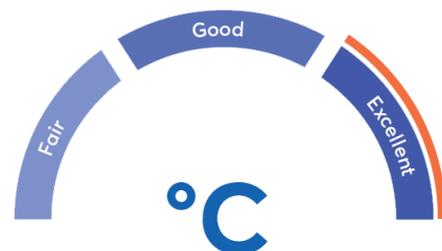
Global transport emissions grew by only 0.6% in 2017 (compared to 1.7% annually over the past decade), as efficiency improvements, electrification and biofuels helped limit the growth in energy demand. To meet the 2-degree C target goals, however, direct transport emissions must peak around 2020 and then fall by more than 9% by 2030.<sup>3</sup> The largest amount of carbon savings come from switching from inefficient modes of transport (e.g. private cars) to mass transit.<sup>4</sup> For projects aimed at like-for-like replacement of transport infrastructure, the improvements in environmental performance depend on the fuel type and efficiency. We consider public transport projects that include fossil fuel elements such as hybrid buses as bridging technologies, and not a long-term solution. While electric modes of transportation are preferable to those that directly use fossil fuels, we should nevertheless be aware of the indirect GHG emissions stemming from the production and use and strive to keep increasing their efficiency.

Hochbahn anchors their strategy in the Hamburg Senate's Climate Plan and Climate Protection Act. In February 2020, the Hamburg Climate Protection Law was passed as the binding legal framework for the climate action plan of Hamburg, which defines specific climate targets for the years 2030 and 2050. By 2030, carbon emissions should be reduced by 55% (compared to the base year 1990). Hamburg aims to be a zero-carbon city by 2050. Shared mobility and public transport are key to achieve these targets. Currently, the mobility sector amounts for around 28.3% of Hamburg's CO<sub>2</sub>-emissions. By 2030, the aim is to provide passengers with an adequate public transport service reachable within 5 minutes. Thus, increasing the share of public transport in total traffic (journeys) from 22% today to 30% in 2030 (denser network and more frequent services) and convincing the people of Hamburg to switch from private cars to public transport. In cities such as Zürich and Wien the model split is already at 41% and 38%, respectively.

## Governance Assessment

Four aspects are studied when assessing the Hochbahn's governance procedures: 1) the policies and goals of relevance to the green bond framework; 2) the selection process used to identify eligible projects under the framework; 3) the management of proceeds; and 4) the reporting on the projects to investors. Based on these aspects, an overall grading is given on governance strength falling into one of three classes: Fair, Good or Excellent. Please note this is not a substitute for a full evaluation of the governance of the issuing institution, and does not cover, e.g., corruption.

Hochbahn's business model is based on providing sustainable mobility services and has a climate neutrality target by 2030. The company's strategy is anchored in the Hamburg Senate's Climate Plan and Climate Protection Act, has a sustainability policy for suppliers and business partners as well as a sustainability questionnaire for some of its procurements. The company is committed to life cycle considerations on bus systems and buildings. While the company has adopted some climate adaptation measures, Hochbahn has not yet implemented TCFD recommendations and has not yet a fully systemized approach to climate risks. Hochbahn has established a Green Bond Committee that decides in consensus and has committed to report on a range of relevant impact indicators. In addition, Hochbahn will obtain an external review of its impact reporting. The overall assessment of Hochbahn's governance structure and processes gives it a rating of **Excellent**.



<sup>3</sup> <http://www.iea.org/tcep/transport/>

<sup>4</sup> [https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc\\_wg3\\_ar5\\_chapter8.pdf](https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_chapter8.pdf)



## EU Taxonomy

In 2020, the EU Taxonomy was released in a multi-lateral effort to standardise thresholds and metrics to aid the green transition. The Taxonomy provides signposting for investors and bond issuers to aid in their decision-making and project selection processes. Based on relevance and feasibility, Hochbahn aims to align with the EU Taxonomy on the following category: 'Public Transport'.

Since Hochbahn will only procure zero direct emission busses and rail guided vehicles and infrastructure, these investments would qualify according to the metrics and thresholds outlined by the EU taxonomy.

The EU Taxonomy also considers Do No Significant Harm (DNSH) criteria within five categories (which may or may not always be relevant): climate change adaptation, water, circular economy, pollution and ecosystems. Hochbahn confirmed in their framework that the eligible projects do not significantly harm on any of the five environmental objectives and comply with minimum safeguards. See the Taxonomy document for further details<sup>5</sup>.

## Strengths

It is a strength that Hochbahn aims to achieve a substantial modal shift away from fossil fuel based motorized individual transport mechanisms by 2030: 30% of journeys in Hamburg shall be made by integrated public transport compared to 22% in 2019. With its dedicated approach to replace individual modes of motorized transport, Hochbahn aims to implement a role model of a 2050 urban transport solution.

In addition to having detailed sustainability questionnaires for suppliers, e.g., for zero-emission busses, it is a strength that Hochbahn's current planning contracts include the calculation, analysis and optimization of energy demand and emissions of buildings along their entire life cycle incl. building materials. The company is aiming at also taking into account the CO<sub>2</sub> footprint and energy demand when evaluating various planning options. This approach will be piloted in the planning of a new bus depot for electric busses.

According to Hochbahn, during the procurement process of up to 530 battery busses (delivery 2021-2025), transparency regarding the CO<sub>2</sub> footprint of the bus and the battery was part of the supplier assessment in the qualification process. According to Hochbahn's internal calculations the footprint of the battery based on 146 kg CO<sub>2</sub>/kWh of battery capacity<sup>6</sup> results in a share of around 45-65% of emissions due to the battery in an LCA perspective (assumption: zero emissions in operating phase due to green electricity; non-articulated bus). Further assessments on the CO<sub>2</sub> footprint of the batteries will be conducted. Besides this, follow-up actions with bus suppliers are planned in order to gain further transparency and comparability regarding CO<sub>2</sub> emissions from manufacturing processes of the bus and the battery and enhance improvements along the supply chain.

## Weaknesses

We find no material weaknesses in Hochbahn's green bond framework.

## Pitfalls

Hochbahn informed us that some electric busses might have the option to be heated by heating oil on cold days in order to avoid purchasing additional busses when low temperatures cause busses' range to decline. Hochbahn expects only limited heating demand and reevaluate fossil heating components in the upcoming 2022 procurement

<sup>5</sup> [https://ec.europa.eu/info/sites/info/files/business\\_economy\\_euro/banking\\_and\\_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy-annexes\\_en.pdf](https://ec.europa.eu/info/sites/info/files/business_economy_euro/banking_and_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy-annexes_en.pdf)

<sup>6</sup> <https://www.agora-verkehrswende.de/veroeffentlichungen/klimabilanz-von-strombasierten-antrieben-und-kraftstoffen-1/>



process. The risk of lock-in is limited as the busses with fossil heating components will be able to operate entirely on electricity as well. In addition, fossil fuels could be replaced by sustainably sourced biofuels and expanded battery capacity in the future. Hochbahn informed us that replacement of fossil fuels by sustainably sourced biofuels is in principle a technical option for the future but it requires new and additional tank infrastructure. Therefore, Hochbahn is aiming on electric heating.

For its zero-emission bus acquisitions, Hochbahn expects a share of 5% (28 busses) to be based on fuel-cells by 2025. Hochbahn confirmed that it will use green hydrogen based on renewable energy in northern Germany for operating new fuel-cell buses. Due to potentially high future demand for green hydrogen in Germany, Hochbahn should remain vigilant on climate benefits of hydrogen versus battery technology.

As preventive measures against the consequences of heavy rainfall events, new infrastructure projects such as bus depots of Hochbahn are generally provided with green roofs and retention systems such as percolation trenches and cisterns. However, considering the expected increase in physical impacts CICERO Shades of Green encourages Hochbahn to systemize its climate risk screenings, to apply climate scenario analysis and to consider implementation of TCFD recommendations.



# Appendix 1: Referenced Documents List

Document Number	Document Name	Description
1	Hamburger Hochbahn's Green Bond Framework, September 2020	
2	Kick Off Slides, July 2020	Hochbahn's presentation for the Kick Off meeting
3	Corporate and Sustainability Report 2019	Hochbahn's annual corporate and sustainability report
4	Hamburgisches Gesetz zum Schutz des Klimas, February 2020	Hamburg's Climate Protection Law
5	Erste Fortschreibung des Hamburger Klimaplan	Hamburg's Climate Action Plan
6	Entwertungsnachweis, January 2019	Proof of devaluation of green electricity certificates
7	Energieaudit DIN 16247	Energy consumption audit for Hamburger Hochbahn
8	Umweltleistungen der Hochbahn	Leuphana University's presentation on Hochbahn's environmental benefits
9	Die Hochbahn als Problemlöser Die Verkehrsdienstleistungen der Hochbahn und ihr Beitrag zum Umwelt- und Klimaschutz der Freien und Hansestadt Hamburg	Leuphana University's study on Hochbahn's environmental benefits



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10	CO <sub>2</sub> -Monitoring – Messung der Umweltleistung des HVV in Hamburg	Presentation on Hochbahn's environmental impact
11	Concept Sustainable Procurement	Presentation summarizing Hochbahn's sustainable procurement concept
12	Grundsätzliche Fragen der Hochbahn im Rahmen von Ausschreibungen von E-Fahrzeugen (Straße)	Hochbahn's procurement questionnaire for sustainable procurement for electrified transport
13	Nachhaltigkeitsstandards für Lieferanten und Geschäftspartner der Hochbahn	Code of Conduct for Suppliers and Business Partners
14	Klimaänderung und Klimafolgen in Hamburg	Study ordered by the Hamburg administration on climate impacts and consequences in Hamburg
15	Anpassungsmaßnahmen an den Klimawandel – Eine umweltfachliche Übersicht zu Gründächern, Fassadenbegrünung und Photovoltaik-Kombinationssystemen	Hochbahn's adaptation measures
16	Bericht über die Aktivitäten der Hochbahn zum Umwelt- und Klimaschutz	Report on Hochbahn's activities regarding climate impact and CO <sub>2</sub> reductions
17	Öffentliche Unternehmen als Klima-Partner	Report by Hamburg on climate cooperation with

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## Appendix 2: About CICERO Shades of Green

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

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

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

