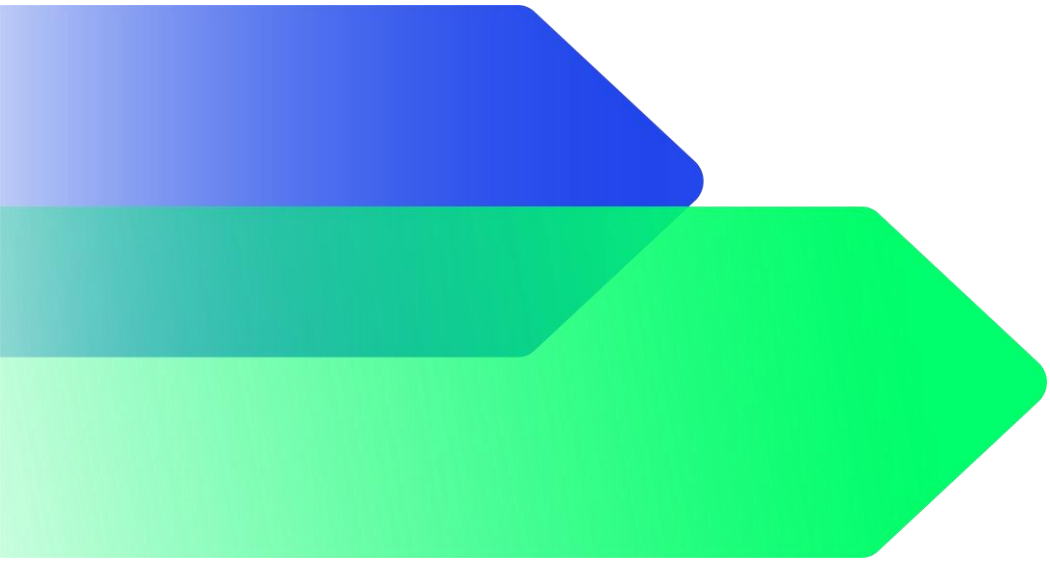
CARBON TRUST

REPORT

AIB Clean Transportation Impact Assessment Methodology

For eligible Clean Transportation projects.

November 2023



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Abbreviations and glossary

Avoided carbon emissions	The avoided carbon emissions of the underlying properties when comparing them against a baseline of the average property (by sector and geography), on an annual basis. The avoided emissions are a result of these properties being more efficient and less carbon intensive than the average property (by sector and geography)
Baseline	The assumed scenario used as the business as usual comparison against Eligible assets within the Eligible Green Project Portfolio
Eligible Green Project Portfolio	Eligible green bond use of proceeds as outlined in the Framework
Framework	AIB's green bond framework outlines its green bond processes and procedures for (1) Use of Proceeds, (2) Process for Project Evaluation and Selection, (3) Management of Proceeds, and (4) Reporting
BEV	Battery Electric Vehicle
ICE	Internal Combustion Engine
GHG	Greenhouse Gases
Well to Tank	Refers to all greenhouse gas emissions from the production, transportation, transformation and distribution of the fuel used to power the vehicle. Well to tank emissions exclude emissions from the manufacture of the vehicle
Tank to Wheel	Refers to the power source's emissions during operation, otherwise known as "tailpipe emissions"
Well to Wheel	Total emissions produced by a fuel from the point of extraction or generation to the point of use inside a vehicle

Introduction

Who we are

Our mission is to accelerate the move to a decarbonised future. We have been climate pioneers for more than 20 years, partnering with leading businesses, governments and financial institutions globally. From strategic planning and target setting to activation and communication - we are your expert guide to turn your climate ambition into impact.

We are one global network of 400 experts with offices in the UK, the Netherlands, South Africa, China, Singapore and Mexico. To date, we have helped set 200+ science-based targets and guided 3,000+ organisations in 70 countries on their route to Net Zero.

AIB Overview

Aligned with its sustainability strategy, Allied Irish Banks ("**AIB**") intends to issue green bonds to finance and / or refinance loans that meet the requirements as described in the AIB Green Bond Framework ("**Framework**")[1]. The objective of the Framework, and subsequent green bonds issued from it, is to fund projects or assets that mitigate climate change by reducing emissions, protect ecosystems, or otherwise have a positive environmental impact. The Framework has been aligned with the ICMA Green Bond Principles and has received a Second Party Opinion from Sustainalytics.

The ICMA Green Bond Principles are a set of voluntary guidelines that recommend transparency and disclosure and promote integrity in the development of the green bond market by clarifying the approach to issuing a green bond. The Framework, therefore, has four key components:

1. Use of Proceeds
2. Process for Project Evaluation and Selection
3. Management of Proceeds
4. Reporting

AIB, at its discretion but in accordance with the GBP, will allocate the net proceeds of the Green Bonds to an eligible loan portfolio of new and existing green loans ("**Eligible Green Project Portfolio**"). The Eligible Green Project Portfolio are to be financed and/or refinanced in whole or in part by an allocation of the bond proceeds.

The Eligible Green Project Portfolio for "Clean transportation" includes loans to finance or refinance, establishment, acquisition, expansion, upgrade, maintenance and operation of low carbon vehicles and related infrastructures; the criteria for which are set out below, as per the AIB's Green Bond Framework[1]:

[1] AIB Green Bond Framework (2023)

Zero emissions vehicles and supporting infrastructure:

- Fully electric, hydrogen or otherwise zero emissions vehicles for the transportation of passengers.
- Infrastructure to support zero emissions vehicles including but not limited to EV charging and hydrogen fuelling stations.

Methodology

Reporting Principles

Reporting of the environmental impacts of green bonds is evolving and is a relatively new concept. However, AIB is committed to reporting on the method used to calculate the avoided GHG emissions for its Green Bond Framework based on:

- *PCAF's The Global GHG Accounting and Reporting Standard Part A: Financed Emissions (2022)[2],*
- *IFI GHG Accounting for Grid Connected Renewable Energy Projects (April 2022)[3];*
- *Green Bond Principles, Voluntary Process Guidelines for Issuing Green Bonds (2021; June 2022 Appendix 1)[4];*
- *Climate Bonds Standard V3.0[5],*
- *Green Loan Principles (Feb 2021),*
- *ICMA Harmonised Framework for Impact Reporting (2023)[6], and,*
- *WBCSD Guidance on Avoided Emissions[7]*

AIB follows the key recommendations outlined in the Green Bond Principles, with external reviewers present across their reporting process. In addition, AIB is committed to reporting greenhouse gas emissions in accordance with the five principles contained within the Greenhouse Gas Protocol, namely relevance, completeness, consistency, transparency, and accuracy.

In accordance with the principles of reporting described above, AIB commits to transparent disclosure of any assumptions and estimations used in the calculation of its reporting framework.

Scope of Calculations and Reporting

AIB intends to report the expected or actual quantitative environmental impact of Light Commercial Rail projects it finances or co-finances through its green bond issuance. The reporting includes the estimated reduction or avoidance of greenhouse gases ("GHGs") estimated to have occurred from its loans. AIB also evaluates other indicators that are appropriate to report for environmental impact and performance, such as the number of electric vehicles deployed, the number of electric vehicles enabled and the number of passengers per year. At this stage, social and other economic indicators are not within the scope of the green bonds in question. Governance indicators are also not in scope.

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[2] PCAF (2022). The Global GHG Accounting and Reporting Standard for the Financial Industry. second edition

[3] AHSA-001 - IFI Approach to GHG Accounting for Renewable Energy Projects

[4] ICMA (2021 (with June 2022 Appendix I)), Green Bond Principles, Voluntary Process Guidelines for Issuing Green Bonds

[5] Climate Bonds Standard V3.0 | Climate Bonds Initiative

[6] Handbook Harmonised framework for impact reporting (June 2023)

[7] WBCSD Guidance on Avoided Emissions (Mar 2023)

AIB undertakes to report the environmental impact of projects it finances or co-finances through its green bonds based, where possible, on the actual environmental performance of the asset. Where this is not possible, expected performance is used. The reporting includes both green indicators and resulting emissions reductions or avoidance, both of which require assumptions and calculations. The reporting is based on the net-benefit resulting from the asset in a given period of operation, rather than the gross emissions change before or after the life of the asset or project.

Calculations include project-by-project impacts, as well as aggregated results across the portfolio of assets financed or co-financed with the proceeds of AIB's green bonds. Environmental indicators are attributed to AIB on a project-by-project basis, based on the current percentage share financed (where applicable) and disbursed by the bank. The reporting is undertaken on an annual basis, covering the previous 12-month period and considers any dynamic changes in the assets financed or co-financed that occur from one reporting period to another.

In accordance with the principles of reporting described above, AIB has, and continues to commit to transparent disclosure of any assumptions and estimations used in the calculation of its reporting framework.

Scope of BEV Impact Assessment

The impact of the deployment of battery electric vehicles is calculated by estimating the avoided emissions per vehicle. For BEVs, avoided emissions refer to the incremental difference in emissions that internal combustion engine or ICE vehicles (e.g., petrol, diesel, etc.) would have generated when driving a given distance (i.e., "the baseline" or Direct emissions, Scope 1), compared with the carbon emissions associated with generating electricity to charge BEVs to drive the same given distance (Indirect emissions, Scope 2). In other words, the estimated annual emissions are avoided because of driving a fully electrical vehicle instead of a vehicle with an internal combustion engine ("**ICE**") over a given distance.

The scope of the assessment is the 'Well to Tank' ("**WTT**") emissions for BEVs and 'Tank to Wheel' ("**TTW**") emissions for ICE vehicles, accounting for both Direct and Indirect emissions originating from the use phase of the respective vehicles. This does not include upstream (e.g., battery manufacturing, etc.) or downstream (e.g., end of life treatment) emissions (Scope 3).

Scope of Light Commercial Rail Impact Assessment

Light commercial rail systems generally use electrically powered rail guided vehicles and are a more environmentally friendly mode of transportation compared to traditional diesel-powered rail systems, with one of the key benefits being zero emissions at the point of use.[8] The impact of the investment into light commercial rail assets will be assessed by looking at the total electricity consumption required to operate the rolling stock, multiplied by the respective metrics when comparing against one of the two baselines below:

1) **Baseline option 1:** comparing the operation of light commercial rail against diesel-powered rail emissions for the equivalent rolling stock, multiplied by passenger per kilometre as the comparable metric;

[8] Leading Light: What Light Rail can do for City Regions (urbantransportgroup.org)

2) **Baseline option 2:** comparing the operation of light commercial rail against an average car, multiplied by vehicle per kilometre as the comparable metric. It is assumed that the car will be an ICE vehicle.

The baseline of the assessment will be selected based on a desktop assessment to determine the most appropriate alternative depending on the region where the light commercial rail is located. The selected baseline and the reasons behind its selection will be disclosed within the annual report.

In line with the EU Taxonomy's eligible activity, *Passenger Interurban Rail Transport,* light commercial rail is deemed eligible given that it complies with the criteria of zero direct (tailpipe) CO2, or TTW, emissions.[9] When assessing the full use phase emissions for light commercial rail, otherwise known as Well to Wheel ("**WTW"**), only WTT emissions will be considered for the indirect energy usage required to fuel the trains. For the comparable baselines, diesel trains and cars, the scope of emissions to be considered will be TTW, which focuses instead on the direct fuel used to power the vehicles.

The current energy mix of rail is split primarily between diesel and electricity at 53% and 45% respectively. Should the energy mix grow in line with the Net Zero Emissions by 2050 Scenario ("NZE Scenario"), electricity consumption is expected to make up 60% of energy demand for rail by 2030.[10] Similar to the above for BEVs, as the grid decarbonises, further benefits or avoided emissions are expected to be realized from the investment into light commercial rail/electric rail.

Exclusion of Scope 3 Emissions

Scope 3: Upstream and Downstream emissions

PCAF's guidance[11] on reporting emissions from motor vehicle loans clarifies that Scope 3 emissions related to the production of vehicles, delivery of vehicles to buyers, or decommissioning of vehicles after use do not need to be covered; as these emissions are difficult to obtain, and they can be considered marginal in terms of lifecycle emissions of a vehicle.

Also, PCAF recommends that if Scope 3 emissions were to be reported, they should only be accounted as a lump sum in the initial financing year and that this approach only holds for new vehicles, not used vehicles. Given that at the time of reporting data was not available on which of the financed projects were for new vehicles and which were for used vehicles, this would complicate the accounting of the production emissions.

Depending on data availability, the inclusion of Scope 3 emissions, particularly that of production emissions, may be revisited in future impact reports. Below, we set out how we are taking a conservative approach with the avoided emissions calculations, and that if all Scope 3 emissions were calculated, the avoided emissions of BEVs and light commercial rail would likely be even higher.

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[9] EU Taxonomy Compass (europa.eu)

[10] Rail - IEA

[11] PCAF (2022). The Global GHG Accounting and Reporting Standard for the Financial Industry. second edition

According to the latest literature[12], the difference in the combined lifecycle emissions of production and maintenance between ICE vehicles and BEVs is marginal. As BEVs have, in general, lower lifecycle GHG emissions associated with the production of the glider and powertrain, as well as with maintenance, but higher emissions associated with battery production, the combined lifecycle emissions from production and maintenance in only slightly higher for BEVs than for ICE vehicles. This difference is assumed to be similar for light commercial rail and diesel trains.

The latest literature on the lifecycle emissions from vehicles covers the following Scope 3 emissions:

- Production emissions:
    - Glider and powertrain (including raw material extraction, processing, component manufacture, assembly, and recycling): The lifetime GHG emissions associated with the production and recycling of the glider and powertrain for BEVs in Europe (6.5 tCO_2e/km) is around 9.7% less than for gasoline ICE vehicles (7.2 tCO_2e/km).
    - Battery: The estimated GHG emissions from producing the batteries for BEVs are only about a third of the total production emissions of BEVs. This is less than previous estimates, for which battery production makes up a larger share of a BEV's production (and therefore lifecycle) emissions. The new estimates are due to the use of more up-to-date data on battery production, accounting for carbon intensities of state-of-the-art battery chemistry, and accounting for regional battery production and import shares.
- Maintenance: Because BEVs use fewer consumables, they have lower maintenance GHG emissions than comparable gasoline or diesel-powered ICE vehicles. The lifecycle emissions associated with maintenance for BEVs (4 gCO_2e/km) are 20% less than that for gasoline ICE vehicles (5 gCO_2e/ km).

Upstream energy emissions

The Scope 3 upstream emissions associated with the fuel/electricity of the relevant vehicles are also not accounted for. In the case of the baseline ICE vehicles and diesel trains, this would entail the WTT emissions associated with extraction, refining and transportation of the raw fuel sources to the vehicles, prior to combustion. In the case of BEVs and light commercial rail, this would entail the transmission and distribution (T&D) losses associated with getting the electricity from the power plant to the BEVs.

Overall, the avoided emissions from upstream fuel production would outweigh both the emissions associated with T&D losses, as well as the marginal increase in production emissions for BEVs from the battery manufacturing process. Essentially, if all Scope 3 emissions were calculated, the benefits of BEVs would likely be even higher. Therefore, by not accounting for Scope 3 emissions, we are taking a conservative approach to the avoided emissions figures.

[12] Bieker (2021), A global comparison of the life-cycle greenhouse gas emissions of combustion engine and electric passenger vehicles, International Council on Clean Transportation (ICCT),

Environmental Impact Calculation and Methodology

Battery Electric Vehicles Impact Calculation and Methodology

Battery Electric Vehicles Emissions Calculation

The emissions from BEVs are calculated from generating electricity used to charge the BEVs to travel the distance driven. This is based on the average carbon intensity of Ireland's electricity grid, and the specific energy consumption of the financed BEVs. To account for data challenges, three options for footprinting the vehicles are provided. The first and most detailed option uses actual vehicle make and model energy intensity, along with actual distance driven. The second option uses a combination of actual vehicle make and model energy intensity, along with proxy figures for distance driven. The third option provides a high-level calculation using proxies for both BEV energy intensity and average distance driven in the absence of actual data.

Option 1 – Actual Vehicle Type Energy Intensity and Distance

$$\begin{aligned}&\boldsymbol{BEV\ Emissions}\ (\boldsymbol{tCO_2e})\\&\quad = Actual\ Vehicle\ Type\ Energy\ Intensity\ of\ BEV\ (kWh\ per\ km)\\&\quad \times Electricity\ emission\ factor\ in\ Ireland\ (kWh\ per\ tCO_2e)\\&\quad \times Actual\ Private\ car\ distance\ (km\ per\ year)\end{aligned}$$

Option 2 – Actual BEV Energy Intensity and Average Distance

$$\begin{aligned}&\boldsymbol{BEV\ Emissions}\ (\boldsymbol{tCO_2e})\\&\quad = Actual\ Vehicle\ Type\ Energy\ Intensity\ of\ BEV\ (kWh\ per\ km)\\&\quad \times Electricity\ emission\ factor\ in\ Ireland\ (kWh\ per\ tCO_2e)\\&\quad \times Average\ Private\ car\ distance\ (km\ per\ year)\end{aligned}$$

Option 3 – Average BEV Energy Intensity and Distance

$$\begin{aligned}&\boldsymbol{BEV\ Emissions}\ (\boldsymbol{tCO_2e})\\&\quad = Average\ BEV\ Energy\ Intensity\ of\ BEV\ (kWh\ per\ km)\\&\quad \times Electricity\ emission\ factor\ in\ Ireland\ (kWh\ per\ tCO_2e)\\&\quad \times Average\ Private\ car\ distance\ (km\ per\ year)\end{aligned}$$

Battery Electric Vehicles Avoided Emissions Calculation

A baseline was calculated to estimate the avoided emissions. The baseline can be considered as a hypothetical scenario in which BEVs financed by AIB were replaced with ICE vehicles. In other words, the baseline refers to what would have happened if AIB had not, in recent years, increased the share of BEVs in its total financed fleet, assuming that each BEV would otherwise be replaced by an ICE vehicle.

It calculates the emissions that would have occurred if the average private car distance covered in Ireland was driven by ICE vehicles instead of BEVs, using an emission factor derived from the carbon intensity of the average new ICE vehicle in Ireland.

$$\begin{aligned}&\boldsymbol{Baseline\ Emissions\ (tCO_2e)}\\&= Count\ of\ BEV\ in\ \ project\ portfolio\\&\times Average\ private\ car\ distance\ covered\ in\ Ireland\ per\ year\\&\times average\ CO_2\ emissions\ of\ new\ cars\ in\ Ireland, excluding\ BEVs\ for\ year\ of\ loan\end{aligned}$$

Once the total Direct emissions from ICE vehicles and Indirect emissions from BEVs were obtained, the avoided emissions were calculated by subtracting Indirect emissions from Direct emissions.

$$\boldsymbol{Avoided\ Emissions\ (tCO_2e)} = \sum_{v} BEV\ emissions_v - \ Baseline\ emissions_v$$

Light Commercial Rail Impact Calculation and Methodology

Light Commercial Rail Emissions Calculation

Fully electric Light Commercial Rail are footprinted based on the total electricity consumption to operate the rolling stock. This can be footprinted using either a supplier specific emissions factor or a grid average emissions factor. This is then multiplied against the passenger per kilometre metric to provide a comparable metric.

$$\begin{aligned}&\boldsymbol{Light\ Commercial\ Rail\ Emissions\ (tCO_2e/pkm)}\\&= Energy\ Consumption\ (kWh) \times Energy\ Emissions\ Factor\ (kWh/tCO_2e)\\&\times Passenger\ per\ km\ (pkm)\end{aligned}$$

Should actual project specific emissions factors or rail electricity consumption be available, this will be used in the calculation provided above as this gives the highest level of accuracy. In the absence of either (or both) figures, proxies regarding the estimated energy consumption and number of passengers will be used to estimate emissions.

Light Commercial Rail Avoided Emissions Calculation

To account for varying scenarios in which light commercial rail has been applied, two option baselines are provided for comparison. The first is the assumption that the train would instead be powered by diesel and all passengers would continue to use the train. This comparison is carried out using an emissions per passenger kilometre metric, using the intensity per individual taking the train as the comparable unit. The second baseline is the assumption that the distance travelled by the train would instead be carried out by a typical car. This comparison would be carried out using an emissions per passenger kilometre metric, for cars, it was assumed that the average car has 1.5 passengers per trip.

Baseline 1 – Diesel Train

$$\boldsymbol{Avoided\ Emissions}\ (\boldsymbol{tCO_2e/pkm}) = Light\ Commercial\ Rail\ Passenger\ per\ km\ Intensity\ (tCO_2e/pkm) - Diesel\ Train\ Passenger\ per\ km\ Intensity\ (tCO_2e/pkm)$$

Baseline 2 – Car

$$\boldsymbol{Avoided\ Emissions}\ (\boldsymbol{tCO_2e/pkm}) = Light\ Commercial\ Rail\ Passenger\ per\ km\ Intensity\ (tCO_2e/pkm) - Car\ Vehicle\ per\ km\ Intensity\ (tCO_2e/pkm)$$

Attribution

As per the guidance of the Partnership for Carbon Accounting Financials (PCAF), and in line with the ICMA Reporting Metric and Databases Harmonised Framework, it is recommended that AIB also report their attribution. The area of impact assessment related to green bonds and more widely the accounting of financed carbon emissions is developing rapidly. We aim to represent current best practices and where possible move that forward. To this end we have considered current market practice, recognised impact reporting standards including ICMA's Harmonised Framework for Impact Reporting, and from the related area of emissions reporting, the PCAF methodologies, specifically around attribution.

In some cases, AIB does not finance the entire project. As a result, the avoided emissions are adjusted by the share of financing attributable to AIB. This share is calculated by taking the amount outstanding on the deal and dividing by the project value.

$$\boldsymbol{Attribution\ Factor} = \frac{AIB\ Outstanding\ Amount\ (EUR)}{Vehicle\ Cost\ at\ Origination(EUR)}$$

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