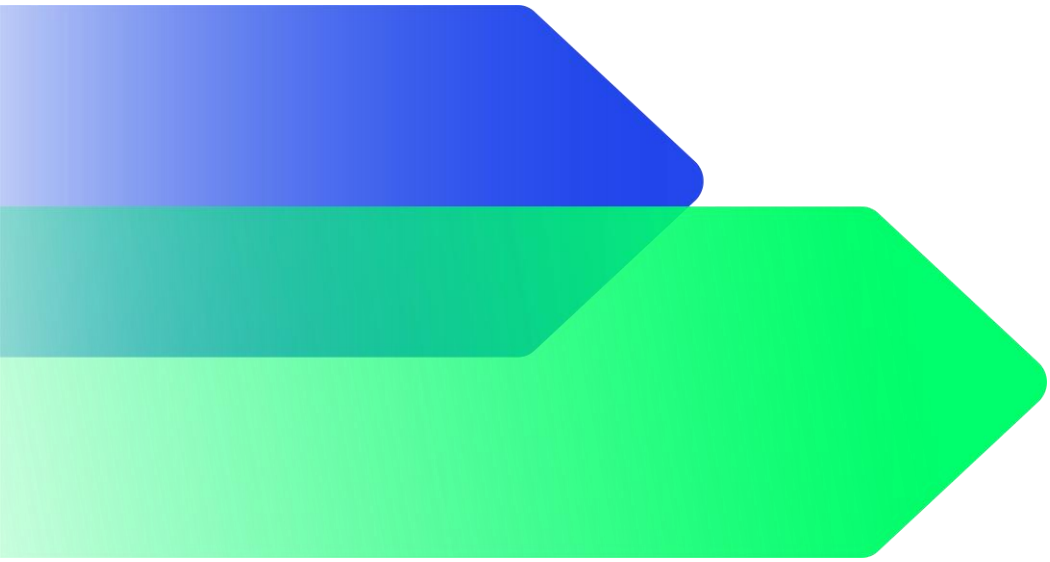
CARBON TRUST

REPORT

LeasePlan's 2023 green bond impact assessment report

February 2024



WHO WE ARE:

We are a trusted, expert guide to Net Zero, bringing purpose led, vital expertise from the climate change frontline. We have been pioneering decarbonisation for more than 20 years for businesses, governments and organisations around the world.

We draw on the experience of over 300 experts internationally, accelerating progress and providing solutions to this existential crisis. We have supported over 3,000 organisations in 50 countries with their climate action planning, collaborating with 150+ partners in setting science-based targets, and supporting cities across 5 continents on the journey to Net Zero.

LeasePlan is a global leader in Car-as-a-Service, with approximately 1.6 million vehicles under management in 25 countries. LeasePlan purchases, funds and manages new vehicles for its customers, providing a complete end-to-end service for a typical contract duration of three to four years. With over 60 years' experience, LeasePlan's mission is to provide what's next in sustainable mobility so our customers can focus on what's next for them. In May 2023, Leaseplan became part of ALD Automotive within the Société Générale Group.

Authors:

Maria Fernanda Velez

Senior Associate

maria.fernandavelez@carbontrust.com

Marc Mohajer

Associate

Marc.mohajer@carbontrust.com

Julian Faber

Associate

julian.faber@carbontrust.com

Contents

Tables

Figures

Abbreviations

BEV(s)	Battery electric vehicle(s). Only BEVs are included within the scope of LeasePlan's Green Finance Framework.
CO_2(e)	Carbon dioxide (equivalent).
CT	Carbon Trust
EU	European Union
EV(s)	Electric vehicle(s). EVs include BEVs and Plug-in Hybrids (PHEVs).
kg or tCO_2(e)	Kilogram or tonne of CO_2 (equivalent)
HEV(s)	Hybrid Electric Vehicle(s)
ICE	Internal Combustion Engine
ICMA	International Capital Markets Association
IEA	International Energy Agency
LCV(s)	Light Commercial Vehicle(s)
LP	LeasePlan
OEM	Original Equipment Manufacturer
PHEV(s)	Plug-in hybrid electric vehicle(s)
SDGs	Sustainable Development Goals
TEG	Technical Expert Group
UN	United Nations

Executive Summary

Context

LeasePlan ("**LP**"), a global fleet management company, has established a Green Finance Framework ("**Framework**")[1] dated March 2020 and updated in September 2022, under which it can issue Green Bonds to finance and/or refinance 'Eligible Projects' within the 'Eligible Category' of Clean Transportation[2]. Eligible Projects are defined as eligible vehicles meaning battery electric vehicles ("**BEVs**"). The issuance of Green Bonds is aligned with LP's ambition to achieve net-zero tailpipe emissions from its total funded fleet by 2030, as outlined in the LP Sustainability Strategy. In accordance with the Framework, LeasePlan has committed to report, based on the availability of suitable data, on metrics regarding the Eligible Projects' environmental impact. LP commissioned the Carbon Trust ("**CT**") to produce the environmental impact metrics calculation. CT has provided technical advisory support to:

1. Develop a methodology to calculate the estimated avoided emissions originating from LP's BEV funded fleet, considering both Direct and Indirect emissions; and
2. Understand the average carbon intensity of LP's passenger car funded fleet.

Definitions: fleets, avoided emissions, baseline and carbon intensity

Throughout the report, three ***fleets*** within LP's funding fleet are distinguished:

- ***Total funded fleet:*** refers to all powertrains (e.g., internal combustion engine vehicles ("**ICE**"), electric vehicles ("**EVs**"), hybrid electric vehicles ("**HEVs**"), etc.) and vehicle types (e.g., passenger cars, light commercial vehicles ("**LCVs**"), trucks, etc.) in LP's funded fleet;
- ***BEV funded fleet:*** refers to BEVs only in LP's total funded fleet. If not specified, it refers to all vehicle types within the BEV powertrain (e.g., passenger cars and LCVs); and
- ***Passenger car funded fleet:*** refers to passenger cars only in LP's total funded fleet. If not specified, it refers to all powertrains (e.g., ICE, EVs, HEVs, etc.).

Avoided emissions refer to the incremental difference in Direct or "tailpipe" 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" see definition below), compared with the Indirect carbon emissions associated with generating electricity to charge BEVs to drive the same given distance. Figure 1 below illustrates this concept; these are also defined as follows:

[1] LeasePlan's Green Finance Framework.

[2] The LeasePlan Green Finance Framework is structured in alignment with the ICMA Green Bond Principles as well as the LMA "Green Loan Principles."

- ***Direct emissions:*** Direct emissions occur from ICE vehicles during the combustion of fuel, often referred to as "tailpipe" emissions. BEVs have zero tailpipe emissions.
- ***Indirect emissions:*** Indirect emissions originate from the production of electricity required to charge BEVs.

Both Direct and Indirect emissions originate from the use phase of the vehicle and do not include upstream (e.g., well-to-wheel emissions, battery manufacturing, etc.) or downstream (e.g., end of life treatment) emissions.

The ***baseline*** can be considered as a hypothetical scenario in which BEVs in the LP total funded fleet[3] were replaced with ICE vehicles. In other words, the baseline refers to what would have happened if LP had not, in recent years, increased the share of BEVs in its total funded fleet and had leased ICE vehicles in their place. The baseline represents the emissions that would have occurred if the current budgeted mileage of BEVs was driven by ICE vehicles instead, using an emission factor derived from the carbon intensity of ICE vehicles in LP's total funded fleet.

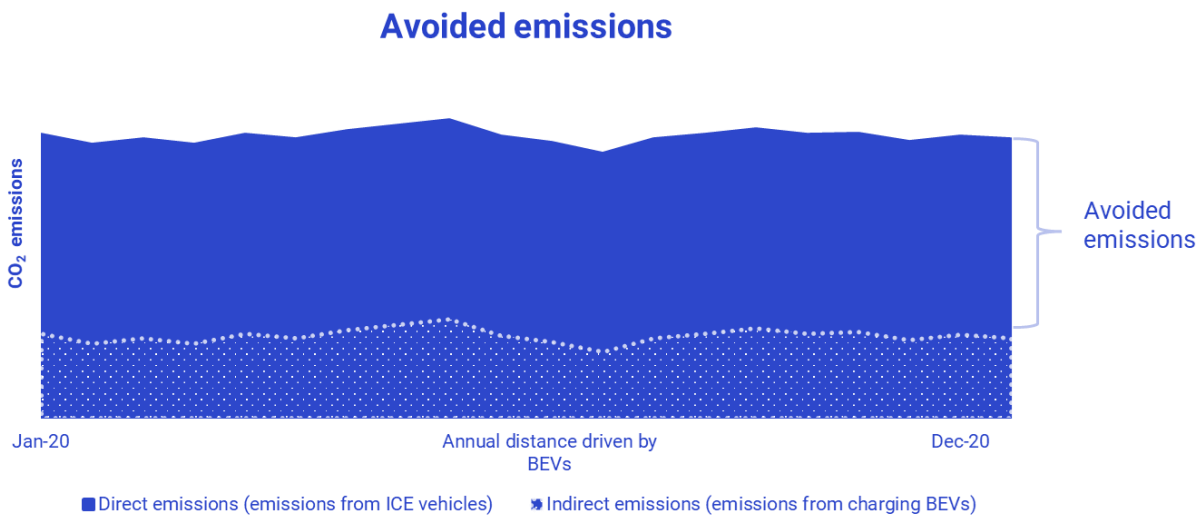


Figure 1. Visual representation of avoided emissions, or Direct emissions minus Indirect emissions (demonstration purposes only).

Carbon intensity refers to the weighted average of the emission factors of LP's passenger car funded fleet[4] (including BEVs) based on the number of passenger cars in each country and is measured in carbon emissions per kilometre travelled (gCO_2/km).

[3] In this report, only the carbon intensity of LP passenger cars funded fleet (rather than the total funded fleet) was considered. Please see section 2.4 below for more information.

[4] See footnote 3.

Avoided emissions calculation

The diagram below provides an insight into how avoided emissions were calculated. The full report provides extensive detail on the methodology used in the calculations. The estimated annual carbon emissions resulting from LP's BEV funded fleet were calculated using both the EU average emissions factor for charging BEVs and the relevant country emission factor for charging BEVs[5].

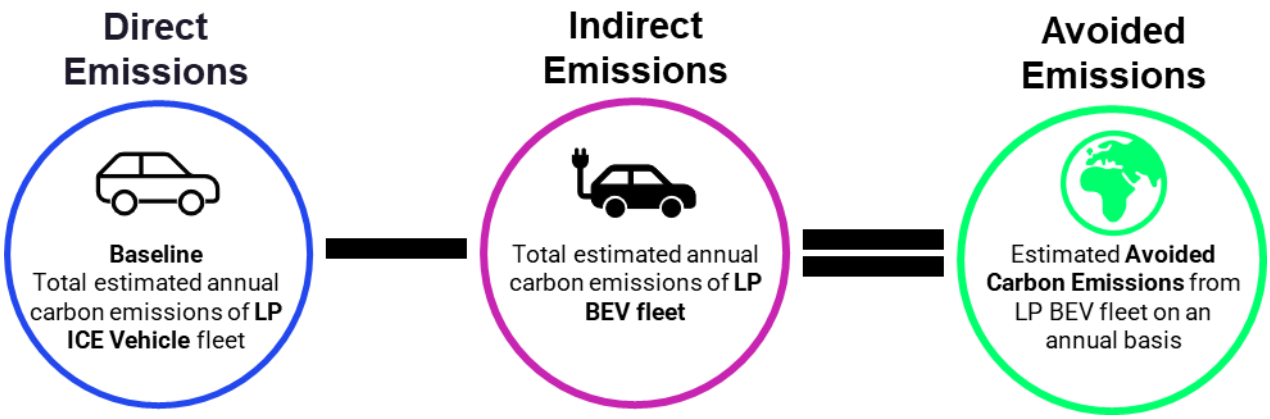


Figure 2. Avoided emissions calculation.

Recent changes in methodology

The emissions factors used within this assessment and previous assessments have been sourced from the International Energy Agency's (IEA) annual GHG emission factors for world countries from electricity and heat generation[6]. The IEA had previously updated their methodology to begin accounting for the trade of electricity between nations. Using methodology developed by the UK Department for Business, Energy, and Industrial Strategy (BEIS) the IEA adjusts the emission factor of a country depending on its portion of imported electricity, an approach which the Carbon Trust now aligns itself with as best practice for footprinting analysis.

The trade adjusted emission factor considers any part of the electricity consumed in one country which may have been generated in another one as well as if part of the electricity generated in one country has been exported to another country, therefore, adjustments have been made to the emission factors calculated to account for this trade. Such adjustments are based on the share of electricity that is imported or exported compared to the domestic supply and therefore acts as a correction factor that accounts for the net trade of electricity between countries.

The Carbon Trust view this change as in line with best practice, and as such to provide the most accurate representation of the emissions used by BEV vehicles within LP's fleet. In the previous year, this assessment was carried out using both the trade-adjusted emissions factors and the non-trade-adjusted. This year, the assessment was only carried out using the trade-adjusted emissions factors.

[5] Using electricity grid emission factors from the International Energy Agency (2023).

[6] IEA Emissions Factors 2023

Results

The estimated annual avoided emissions from LP's BEV funded fleet and average carbon intensity of LP's passenger car funded fleet was calculated for the period January 2023 – December 2023. The analysis considered all vehicles in LP's total funded fleet as of December 2023. Table 1 provides a summary of all results, split by emission factor source, which are further discussed in the full report.

Table 1. Avoided emissions from BEVs in LP's Eligible Project Portfolio.[7]

Description	Units	Result – EU trade-adjusted grid emission factor	Result – country trade-adjusted grid emission factor
Total distance travelled by LP BEV funded fleet	Million km/year	3,604	3,604
Direct emissions ("baseline" emissions from the equivalent miles being driven by ICE vehicles in LP's fleet)	tCO_2e	451,931	451,931
Indirect emissions (from electricity used to charge LP BEV funded fleet)	tCO_2e	(-) 219,181	(-) 201,036
Estimated avoided emissions from LP BEV fleet (annual)	tCO_2e	232,750	250,895

Carbon intensity

A weighted average of LP's passenger car funded fleet emission factors by country was provided by LP. This was evaluated against the weighted average of each country's average trade-adjusted emission factor for newly sold passenger cars in 2023 sourced from publicly available databases. Both carbon intensity figures included zero-carbon emitting vehicles (e.g., BEVs) as a way to illustrate how LP compares against a 'best-in-class' scenario (i.e., the European market of newly sold cars) with regards to mobility decarbonisation trends.

Across all countries, the average carbon intensity of LP's passenger car funded fleet was 93.2 gCO_2e/km, compared to the EU average of 109.2 gCO_2e/km, a difference of 15.96 gCO_2e/km. This suggests that, if LP's passenger car funded fleet was representative of one country, it would be less carbon intensive than the European market average of newly sold cars (adjusted to reflect LP's fleet composition and presence in individual countries).

At a country level, LP's emission factors were lower in 17 out of the 19 countries analysed, while the EU country average was lower in two countries. See section 3.2 for more information.

[7] All numbers in this table and all subsequent tables and figures have been rounded to the nearest whole number for illustration purposes. Any minor discrepancies in calculations based of values shown in the tables and figures will be as a result of the whole number rounding (e.g., 144,438.93 – 69,735.18 = 74,703.75).

Comparison with previous assessment[8]

The following chart shows a comparison of this year's results (for the period from January 2023 to December 2023) against the results from the previous assessment (for the period from January 2022 to December 2022), displaying a significant increase in emissions as well as avoided emissions. This is mostly due to a large increase in LP's funded BEV fleet size, resulting in higher absolute avoided emissions. This along with the decarbonisation of EU and UK grids is resulting in lower emissions from charging BEVs. More detailed comparisons from last year are available in section 5.

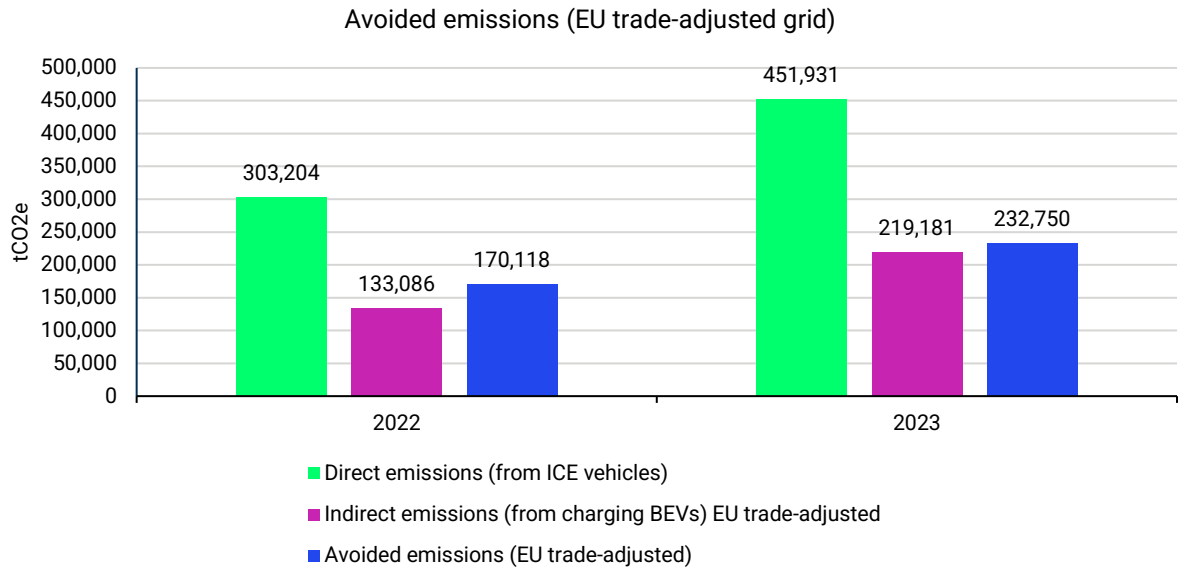


Figure 4:Direct, indirect, and avoided emissions, 2023 and 2022 comparison (EU trade-adjusted grid).

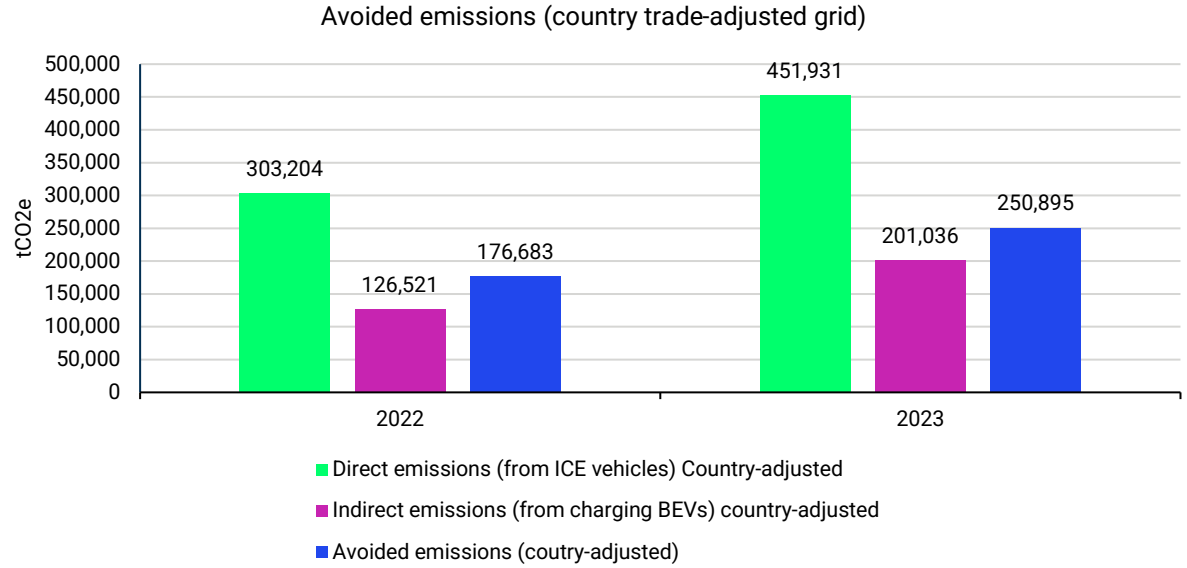


Figure 3: Direct, indirect, and avoided emissions, 2023 and 2022 comparison (country trade-adjusted grid).

[8] The 2022 results have been updated to ensure consistency of data on a comparative basis. The updated results have been incorporated across this entire report.

1. Introduction

To underpin and achieve the aims of its sustainability strategy, LP has established a Green Finance Framework[9] (Framework) under which LP can issue green bonds to finance and/or refinance a portfolio (Eligible Project Portfolio) of Eligible Projects (defined as eligible vehicles meaning battery electric vehicles, or BEVs) that contribute to the development of clean transportation and the transition to a low-carbon future (LeasePlan, 2020)[10].

Up to December 2023, LeasePlan had EUR 3 billion in Green Bonds outstanding[11]. Under its Framework, LP has committed to reporting on:

1. The estimated CO_2e emissions avoided as a result of increasing the proportion of BEVs in LP's total funded fleet; and
2. The carbon intensity of LP's passenger car funded fleet measured after increasing the proportion of BEVs[12].

This report therefore outlines the methodology used to 1) estimate the annual avoided emissions of the BEVs included in the Eligible Project Portfolio that substituted ICE and other types of carbon-emitting vehicles, and 2) showcase the carbon intensity of LP's passenger car funded fleet after increasing the proportion of BEVs.

[9] Which supersedes its Green Bond Framework (2019).

[10] LeasePlan's Green Finance Framework.

[11] Total outstanding value of €3 billion. EUR 500 million issued in February 2019, EUR 500 million issued in April 2020, EUR 1 billion issued in February 2021 and EUR 1 billion issued in September 2021.

[12] Based on vehicle manufacturer's data concerning engine carbon emissions per kilometre travelled.

2. Methodology

This methodology explains how 1) the estimated annual avoided emissions originating from LP's Eligible Project Portfolio were calculated, and 2) the carbon intensity of LP's passenger car funded fleet was measured.

***Definition - avoided emissions**:* 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 – see section 2.2 (below for full definition), compared with the carbon emissions associated with generating electricity to charge BEVs to drive the same given distance (Indirect emissions). In other words, the estimated annual emissions are avoided as a result of driving a fully electrical vehicle instead of a vehicle with an internal combustion engine (ICE) over a given distance.

Definition - carbon intensity: the weighted average of the emission factors of LP's passenger car funded fleet[13] (including BEVs) based on the number of vehicles in each country, measured in carbon emissions per kilometre travelled (gCO_2e/km).

The report presents and discusses the results of the annual avoided emissions calculation for the Eligible Project Portfolio and of LP's passenger car funded fleet carbon intensity for the period January 2023 to December 2023.

2.1. Scope

2.1.1. Carbon emissions assessed

As more BEVs are sold and circulated on the road, they replace conventional petrol and diesel cars, therefore reducing CO_2e emissions that would have otherwise been emitted following the combustion of these fuels. BEVs do not produce any Direct ("tailpipe") emissions but they cause Indirect emissions through the charging of their batteries.

In calculating the avoided emissions of the eligible vehicles, this study has considered two types of emissions, categorized as follows:

- ***Direct emissions, or ICE emissions:*** Tailpipe CO_2e emissions from fossil fuel combustion when driving ICE vehicles; and
- ***Indirect emissions, or BEVs emissions**:* CO_2e emissions from generating electricity used to charge BEVs.

To standardise the emission comparison between Direct and Indirect emissions (between emissions originating from ICE vehicles when driving and BEVs when charging), an emission factor (expressed in gCO_2e/km driven) for both vehicle categories was developed (see sections 2.3.3 and 2.3.4 below). These ratios are subsequently used in CT's impact assessment model to calculate the CO_2e emissions avoided as a result of LP replacing ICE vehicles with BEVs.

[13] In this report, only the carbon intensity of LP passenger car funded fleet (rather than the total funded fleet) was considered. Please see section 2.4 below for more information.

Both Direct and Indirect emissions originate from the use phase of the vehicle and do not include upstream (e.g., well-to-wheel emissions, battery manufacturing, etc.) or downstream (e.g., end of life treatment) emissions.

2.1.2. Eligible projects (BEVs)

Eligible Projects are BEVs[14], classified as eligible projects by the Climate Bonds Initiative's Land Transport Criteria (2020)[15] and in accordance with the ICMA Green Bond Principles, and LMA Green Loans Principles [16]. The criteria used to select eligible projects for LeasePlan comply with the recommendations of the Technical Expert Group (TEG) on the EU Taxonomy[17], which establishes a system to classify environmentally sustainable activities by setting out metrics and thresholds. In accordance with the final EU Taxonomy, electric powertrain passenger vehicles are considered fully eligible for green finance purposes. The Eligible Project Portfolio refers to the total number of Eligible Projects, or BEVs, that can be financed or re-financed by LP's green bonds. See section 2.3.1 for more information.

2.1.3. Time period

The avoided emissions are calculated for an annual period[18]. All the data provided by LP for this current reporting cycle is as of December 2023. Given the ongoing flow of acquisition and turnover of LP's total funded fleet composition, this period was considered to be an accurate representation for the whole year of 2023.

The timeframe provides a boundary for which eligible vehicles are included in the analysis, which also guides the following decisions:

- The analysis considers all BEVs circulating on the road at the end of 2023.
- The analysis considers the estimated annual avoided emissions of a given BEV vehicle, regardless of when it was included in LP's total funded fleet during 2023 and of how much of its annual budgeted mileage the BEV has driven; and
- The reporting period is from January 2023 to December 2023.

More detail, discussion and rationale for all the inputs used in the analysis can be found in section 2.3.

[14] For the avoidance of doubt, vehicles with the following powertrains are excluded: ICE, Hybrid electric including PHEV, Liquefied Petroleum Gas (LPG), Compressed Natural Gas (CNG), Ethanol, Biofuels. Only battery electric vehicles are included.

[15] Climate Bonds Initiative's Land Transport Criteria.

[16] LeasePlan's Green Finance Framework.

[17] EU Taxonomy.

[18] LeasePlan will report annually, throughout the life of its green bonds.

2.1.4. Geography

The impact calculation considers only European countries[19] in which BEVs represent a proportion of LP's total funded fleet equal to or greater than 0.1%. This includes the following 19 countries: Austria, Belgium, Denmark, France, Germany, Greece, Hungary, Ireland, Italy, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Spain, Sweden, Switzerland, and the UK. While this year Turkey met the minimum threshold required to be included, it was not included in the calculation due to a lack of data on passenger vehicle fleet average CO_2/km.

2.2. Baseline to calculate the avoided emissions

The baseline can be considered as a hypothetical scenario in which BEVs in the LP total funded fleet (Eligible Project Portfolio) were replaced with ICE vehicles. In other words, the baseline refers to what would have happened if LP had not, in recent years, increased the share of BEVs in its total funded fleet and had leased ICE vehicles in their place. It calculates the emissions that would have occurred if the current budgeted mileage of BEVs was driven by ICE vehicles instead, using an emission factor derived from the carbon intensity of ICE vehicles in LP's total funded fleet.

One main baseline was developed to calculate the avoided emissions originating from increasing the proportion of EVs in LP's total funded fleet (a baseline was not needed for the carbon intensity output – see section 2.4):

- ***Baseline – LeasePlan total funded fleet:*** Calculating the Direct Emissions based on the composition of all ICE vehicles in LP's total funded fleet and the distance driven by LP's Eligible Project Portfolio in 2023.

Table 2 summarises the input data used in the baseline. The 'Inputs' section that follows gives further details on the datasets used in the calculations.

Table 2. Summary of input data for the baseline considered.

Baseline	Number of ICE Vehicles	Distance Driven	ICE Emissions Factors
LeasePlan total funded fleet	LP's Eligible Project Portfolio	Based on LP's Eligible Project Portfolio	Based on LP's Total Funded Fleet (excluding BEVs)

2.3. Inputs to calculate the avoided emissions

The inputs required to calculate the avoided emissions include the:

- Number of BEVs in the Eligible Project Portfolio;
- Distance travelled by BEVs;

[19] Where the greatest proportion of LeasePlan's BEV funded fleet is operational.

- Emission factor of ICE vehicles; and
- Emission factor related to charging BEVs.

Table 3 summarises the main inputs of the model and Table 4 provides an example for one of the countries analysed. The subsequent sections provide further information on each individual input.

Table 3. Summary of inputs used to calculate avoided emissions.

Input	Unit	Description	Source	Section
Number of BEVs in the Eligible Project Portfolio	#	Number of BEVs included in the Eligible Project Portfolio	Provided by LP	2.3.1
Distance driven in 2023	km/year	Budgeted and expected annual mileage driven for each leased BEV	Provided by LP	2.3.2
Emission factor of ICE vehicles	(k)gCO_2e/km	Weighted average of LP ICE vehicles' emission factors	Provided by LP	2.3.3
Emission factor of BEVs – EU average	(k)gCO_2e/km	Emission factor for charging BEVs based on an EU average grid emission factor	Carbon Trust analysis based on BEIS and DEFRA (2023) and IEA (2023) data	2.3.4
Emission factor of BEVs – country-specific	(k)gCO_2e/km	Emission factor for charging BEVs based on country-specific grid emission factors	Carbon Trust analysis based on BEIS and DEFRA (2023) and IEA (2023) data	2.3.4

Table 4. Example of inputs used for one selected country.

Input	Description	Value	Unit
Number of BEVs in the Eligible Project Portfolio	BEV cars	544	#
	BEV LCVs	31	#
Distance	Average annual budgeted mileage (LP)	23,667	km
ICE emission factor	ICE vehicle emission factor (LP country avg)	0.106	kgCO_2e/km
Electricity	Grid emission factor (example country trade-adjusted)	0.333	kgCO_2e/kWh

	Grid emission factor (EU trade-adjusted avg)	0.582	$kgCO_2e/kWh$
BEV emission factor	BEV car emission factor (example country specific trade-adjusted grid)	0.036	$kgCO_2e/km$
	BEV LCV emission factor (example country trade-adjusted specific grid)	0.038	$kgCO_2e/km$
	BEV car emission factor (EU trade-adjusted avg grid)	0.061	$kgCO_2e/km$
	BEV LCV emission factor (EU trade-adjusted avg grid)	0.064	$kgCO_2e/km$

2.3.1. Number of BEVs in the Eligible Project Portfolio

'Number of BEVs' refers to the quantity of battery electrical vehicles included in the LP's Eligible Project Portfolio as of December 2023. This only includes vehicles that were already circulating on the road at the end of 2023.

Within the Eligible Project Portfolio, LP leases different types of vehicles, primarily: passenger cars, LCVs, and micro-mobility vehicles. Despite the majority of BEVs being passenger cars, different emission factors were used to calculate the emissions related to charging a passenger car and an LCV (see section 2.3.4).

It is important to make this distinction for two reasons:

1. The efficiency of passenger cars is higher than LCVs, therefore a car would normally drive further per every unit of electricity used for charging compared to an LCV; and
2. LP projects the share of LCVs to increase in the next few years in line with the overall fleet mix percentage[20], making this distinction necessary for future reporting purposes.

2.3.2. Distance driven

The distance driven considered each country's average budgeted annual mileage for BEVs included in the Eligible Project Portfolio during the reference period considered (2023). It should be noted that budgeted mileage could be different from the mileage ultimately driven by vehicles once contracts are signed, however, it represents a reasonable estimate.

2.3.3. Emission factors for Direct emissions (ICE vehicles)

To calculate the Direct emissions originating from ICE vehicles, the impact assessment model used an emission factor expressed in $kgCO_2e$ per kilometre driven ($kgCO_2e/km$). The ICE emission factor for

[20] Funded total fleet mix as of December 2023: 86% passenger vehicles and 14% LCVs.

every country was provided by LP and it represents a weighted average of all vehicles generating Direct emissions (therefore excluding BEVs included in the Eligible Project Portfolio) in each country's respective fleet as of December 2023. The ICE emission factor includes all vehicle types in LP's total funded fleet, including passenger cars, vans, LCVs, and others.

2.3.4. Emission factors for Indirect emissions (BEVs)

To calculate the Indirect emissions originating from charging BEVs, an emission factor expressed in $kgCO_2e$ per kilometre driven was used. The UK's emission factors for an average-sized fully electric passenger car and LCV expressed in km/kWh were sourced from BEIS and DEFRA (2023). Subsequently, an EU average and each country's grid emission factor for electricity were sourced from IEA (2023). Through a proportionality calculation, the electricity emission factors were used to obtain the charging emission factors for both BEV passenger cars and LCVs for all countries in the study.

In line with best practice and to provide the most accurate representation of the Indirect emissions associated with BEVs, the Carbon Trust aligns itself with the IEA's EU trade-adjusted grid emission factor. This approach provides a more accurate assessment of LP's BEVs due to:

1. Europe's electricity network is interconnected and therefore allows for frequent energy trading within countries; and
2. As a result of 1), it is not technically feasible for the electricity generated in a country to be fully and solely used within that same country throughout one given year.

The formula below illustrates the calculation performed for both BEVs and LCVs and Table 5 illustrates an example for one of the countries.

$$EF_{BEV}^{x} = \frac{(EF_{grid}^{x} x EF_{BEV}^{UK})}{EF_{grid}^{UK}} \quad (1)$$

Where:

- EF_{BEV}^{x}, is the BEV trade-adjusted emission factor of country x;
- EF_{grid}^{x}, is the grid emission factor of country x (this was substituted with the EU trade-adjusted average grid emission factor);
- EF_{BEV}^{UK}, is the UK's BEV emission factor; and
- EF_{grid}^{UK}, is the UK's trade-adjusted grid emission factor.

Table 5. Example of calculation process for a select country's BEV passenger car emission factor.

Emission Factor	Unit	Value
UK grid emission factor	$kgCO_2e/kWh$	0.207
UK BEV charging emission factor	$kgCO_2e/km$	0.050
Country *x*'s grid emission factor	$kgCO_2e/kWh$	0.133
Country *x*'s BEV charging emission factor	$kgCO_2e/km$	0.112

2.4. Inputs for carbon intensity calculation

Carbon intensity refers to the weighted average of the emission factors of LP's passenger car funded fleet (including BEVs) based on the number of vehicles in each country. To measure the carbon intensity of LP's passenger car funded fleet it was not necessary to develop a baseline. Rather than a calculation, a comparison analysis was performed between the carbon intensity of LP's passenger car funded fleet versus each country's average emissions factor of newly sold passenger cars in 2022[21] sourced from publicly available databases (namely EEA, 2022[22]; and SFOE[23], 2022).

Both measurements included zero-carbon vehicles, which have no Direct ("tailpipe") emissions.

This comparison was included to:

1. Assess the impact of BEVs in the Eligible Project Portfolio on the overall carbon density of LP's passenger car funded fleet versus the carbon density of each country's newly sold passenger cars; and
2. Assess LP's passenger car funded fleet against a 'best-in-class' scenario (or the market of newly sold cars in Europe, adjusted to reflect LP's fleet composition and presence in individual countries).

Only Direct (tailpipe) emissions of passenger cars were considered because:

1. The emission factor of a given vehicle as per its manufacturer's data refers to Direct emissions from fuel combustion when driving; and
2. The emission data sourced at the EU level was for passenger cars only and therefore to ensure fair comparison other vehicle types present in LP's total funded fleet (e.g., trucks, LCVs, vans, etc.) were excluded.

[21] 2022 was selected based on data availability. Vehicle sales data is available a year in arrears (this was the same for the previous year's assessment (which was 2022)).

[22] European Environment Agency - CO2 emissions from new passenger cars.

[23] Swiss Federal Office for Energy.

2.5. Outputs

2.5.1. Total distance driven

To calculate the total distance travelled by LP's eligible vehicles, the total number of BEVs in each country was multiplied by the average distance driven in said country. Subsequently, each of the respective 22 country's distance travelled was summed to obtain the cumulative distance travelled, as per the below two formulas:

$$D_{tot}^{x} = D_{avg}^{x} \times BEV_{n}^{x} \quad (2)$$

$$\sum_{i=1}^{21} D_i = D_{tot}^{1} + D_{tot}^{2} + \cdots + D_{tot}^{21} \quad (3)$$

Where,

- D_{tot}^{x} , is the total distance driven in country x;
- D_{avg}^{x} , is the average distance travelled in country x; and
- BEV_{n}^{x} , is the number of BEVs in country x.

2.5.2. Total Direct emissions (the baseline – equivalent emissions from ICE vehicles)

To obtain the total Direct emissions (emissions from ICE vehicles) that ICE vehicles would have generated by driving the considered total distance, each country's average ICE emission factor was multiplied by the total distance travelled in said country. Subsequently, each of the respective 22 country's emissions from ICE vehicles were summed to obtain the cumulative Direct emissions, as per the below two formulas:

$$E_{tot\ (ICE)}^{x} = D_{tot}^{x} \times EF_{ICE}^{x} \quad (4)$$

$$\sum_{i=1}^{21} E(ICE)_i = E_{tot\ (ICE)}^{1} + E_{tot\ (ICE)}^{2} + \cdots + E_{tot\ (ICE)}^{21} \quad (5)$$

Where,

- $E^{x}_{tot\ (ICE)}$, are the total Direct emissions in country x;
- D^{x}_{tot} , is the total distance driven in country x;
- EF^{x}_{ICE} , is the ICE emission factor in country x; and
- $E(ICE)$, are the cumulative Direct emissions (emissions from ICE vehicles) from all countries.

2.5.3. Total Indirect emissions (emissions from BEVs)

While the same emission factor was used for all ICE vehicles, two distinct emission factors were used to calculate the Indirect emissions related to charging BEVs: one for electric passenger cars and one for electric LCVs. As such, an additional step was included to calculate the total emissions originating from charging BEVs. The total number of vehicles in each BEV category was multiplied by each country's average distance driven, and subsequently multiplied by the emission factor of the respective BEV category. The total Indirect emissions from both BEV categories were summed to obtain the cumulative Indirect emissions from charging BEVs sufficiently to drive the given total distance. The same calculation process was performed using both an EU average and country-specific grid emission factors to account for the carbon intensity of the electricity used to charge the BEVs. These steps are summarised in the following two formulas:

$$E^{x}_{tot\ (BEV)} = \left(D^{x}_{avg} \times EF^{x}_{BEV\ car}\right) + \left(D^{x}_{avg} \times EF^{x}_{BEV\ LCV}\right) \quad (6)$$

$$\sum_{i=1}^{21} E(BEV)_i = E^{1}_{tot\ (BEV)} + E^{2}_{tot\ (BEV)} + \cdots + E^{21}_{tot\ (BEV)} \quad (7)$$

Where:

- $E^{x}_{tot\ (BEV)}$, are the total Indirect emissions from charging BEVs in country x;
- D^{x}_{avg} , is the average distance travelled in country x;
- $EF^{x}_{BEV\ car}$, is the emission factor for an electric passenger car in country x;
- $EF^{x}_{BEV\ LCV}$, is the emission factor for an electric LCV in country x; and
- $E(BEV)$, are the cumulative Indirect emissions from charging BEVs in all countries.

2.5.4. Avoided emissions

Once the total Direct emissions from ICE vehicles (the baseline) and Indirect emissions from BEVs were obtained as per formula (5) and (7) above, the avoided emissions were calculated by subtracting Indirect emissions from Direct emissions, as per the below formula:

$$E_{tot\ (avoided)} = E(ICE) - E(BEV)$$

(8)

The above calculation was performed with both an EU trade-adjusted average and a country-specific trade-adjusted grid emission factor for electricity.

Additionally, to show the avoided emissions per Eligible Project (BEV), the total avoided emissions were divided by the total number of BEVs:

$$E_{(per\ BEV)} = E_{tot\ (avoided)} \div BEV_{tot}$$

(9)

Where,

- $E_{(per\ BEV)}$, are the avoided emissions per Eligible Project (BEV);
- $E_{tot\ (avoided)}$, are the total avoided emissions; and
- BEV_{tot} , are the total number of Eligible Projects (BEVs).

3. Results

3.1. Avoided emissions

This impact report calculated the total avoided emissions as a result of increasing the proportion of BEVs in LP's total funded fleet. The avoided emissions originate from BEVs replacing ICE vehicles in driving a given distance. In other words, avoided emissions are the total Direct emissions minus the total Indirect emissions[24]. The tables below summarise the total distance driven by BEVs, the total Direct emissions (from ICE vehicles) and Indirect emissions (from charging BEVs) from driving that distance, as well as the avoided emissions for the considered baseline.

Table 6. Avoided emissions from BEVs in LP's Eligible Project Portfolio

Description	Units	2022 result	2023 result	Change (%)
Number of passenger vehicles in LeasePlan's funded fleet	#	889,419	878,285	-1.3%
Number of BEVs in LeasePlan's funded fleet	#	101,698	148,329	45.9%
Total distance travelled by LP BEV funded fleet	mkm/year	2,411	3,604	49.5%
Direct emissions (from ICE vehicles)	tCO_2e	303,204	451,931	49.1%
EU trade-adjusted emissions factor results				
Indirect emissions (from charging BEVs)	tCO_2e	133,086	219,181	64.7%
Avoided emissions	tCO_2e	170,118	232,750	36.8%
Avoided emissions per eligible project	tCO_2e/vehicle	1.67	1.57	-6.2%
Country-adjusted emissions factor results				
Indirect emissions (from charging BEVs)	tCO_2e	126,521	201,036	58.9%
Avoided emissions	tCO_2e	176,683	250,895	42.0%
Avoided emissions per eligible project	tCO_2e/vehicle	1.74	1.69	-2.6%

[24] Considering avoided emissions as the difference between Direct and Indirect emissions is normally advised and is Carbon Trust's advisable approach when developing green bond impact reporting. However, there are other approaches that consider Direct emissions as the avoided emissions, thus not considering the Indirect emissions related to charging BEVs.

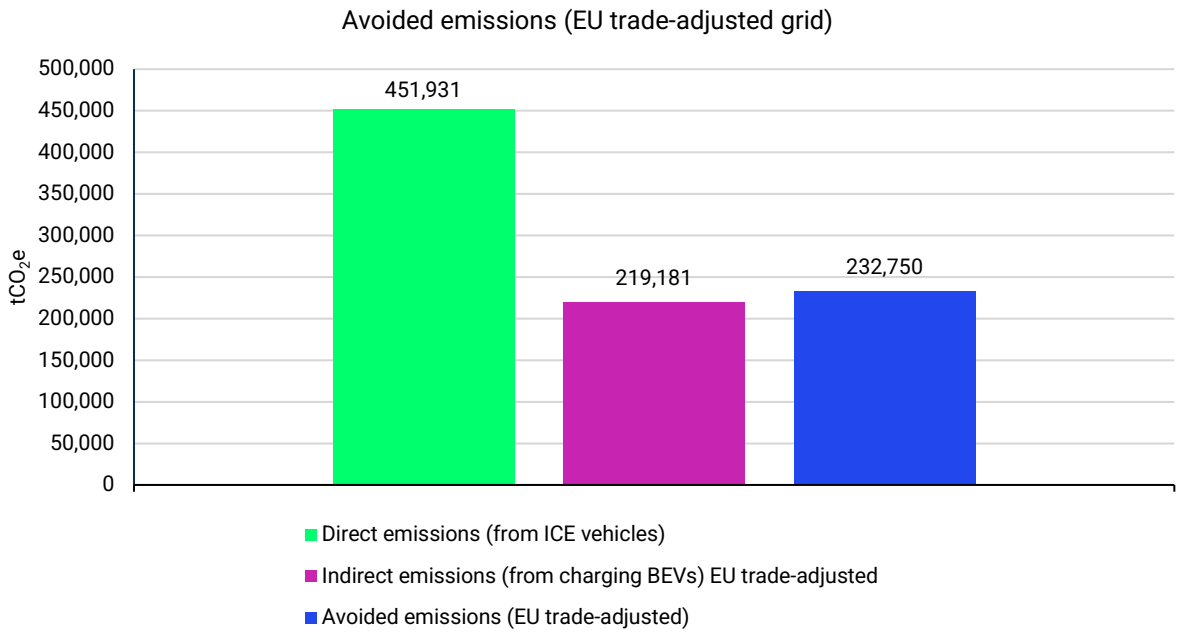


Figure 5. Avoided emissions using an EU trade-adjusted emission factor.

As can be seen in figure 6 and 7, it is noticeable that emissions originating from charging BEVs are not insignificant. This is especially true when using EU trade-adjusted grid emission factors. When comparing the country and EU trade-adjusted grids, 12 out of the 19 countries having a smaller emission factor than the EU average. Countries that have a smaller emissions factor make up 54% of the indirect emissions of the EU trade-adjusted calculation compared to 59% of the country trade-adjusted calculation. As a result, when using a country-specific trade-adjusted average grid emission factor for electricity, the avoided emissions are greater.

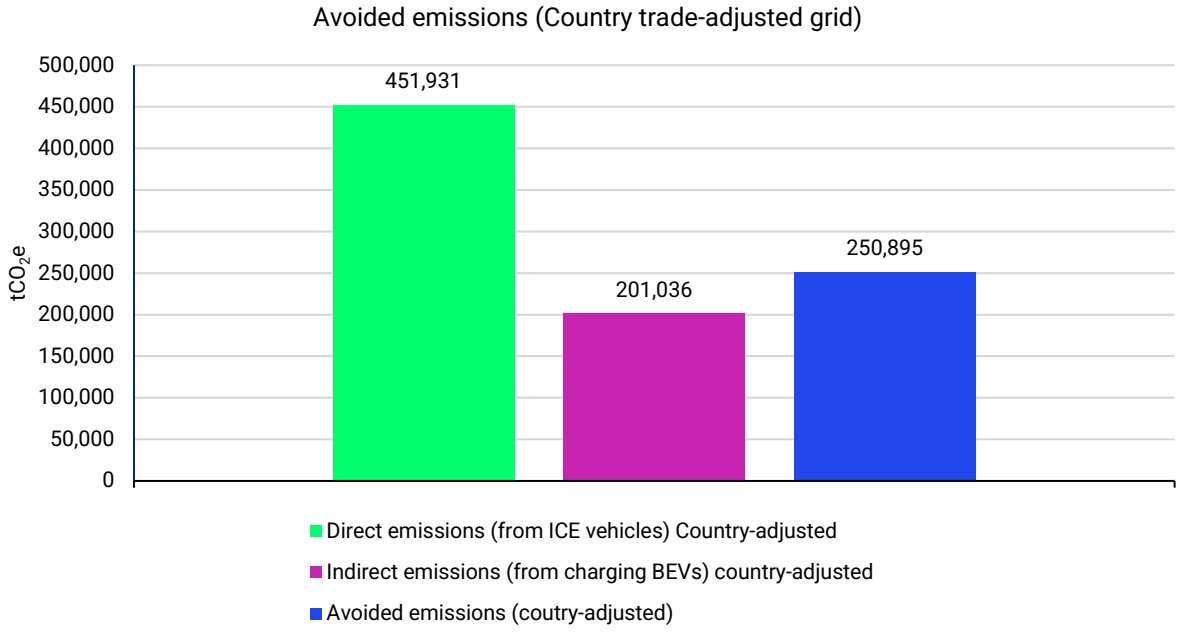


Figure 6. Avoided emissions using a country-specific grid emissions factor.

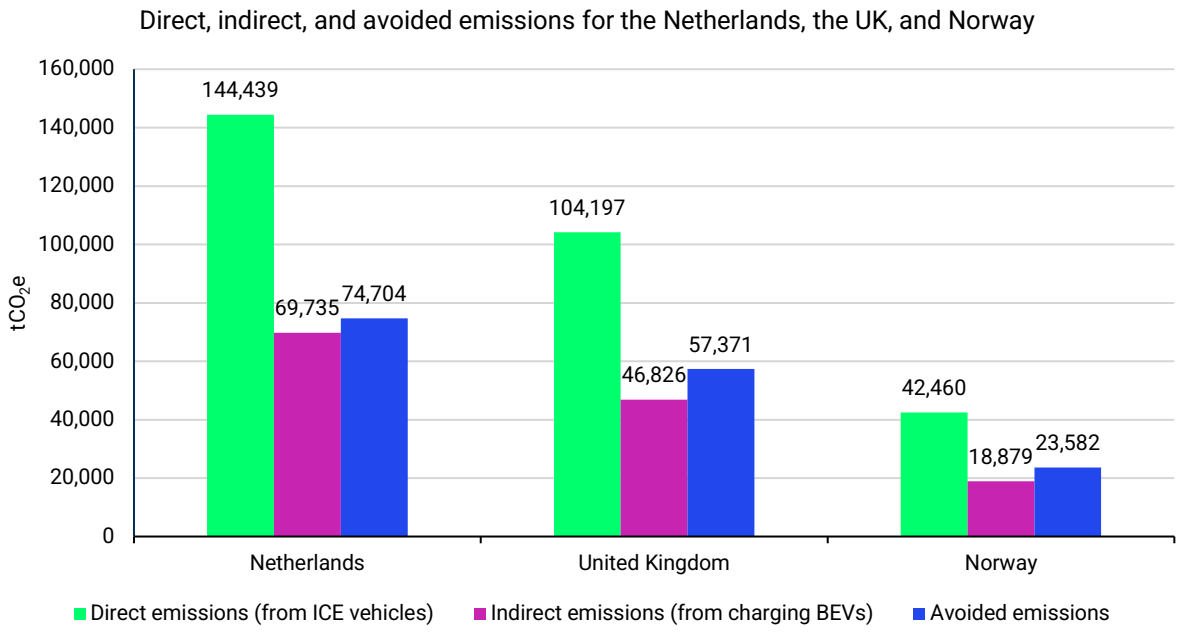


Figure 7. Direct, indirect, and avoided emissions in the Netherlands, UK, and Norway (using an EU trade-adjusted grid emission factor).

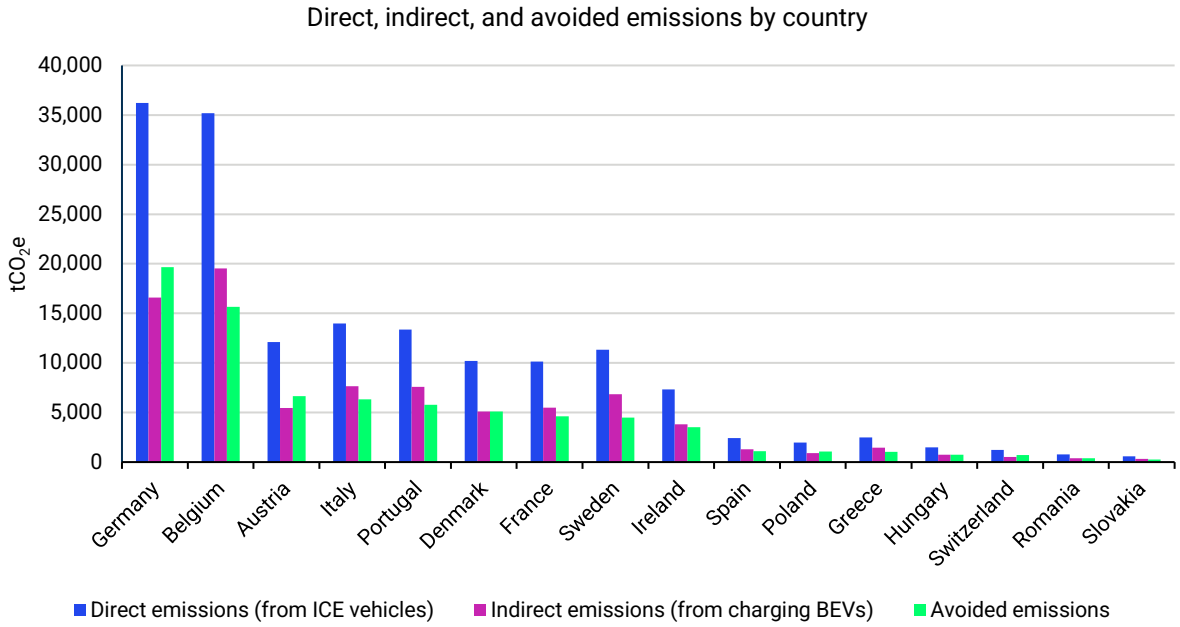


Figure 8. Direct, indirect, and avoided emissions across all countries, excluding Netherlands, UK, and Norway (using an EU trade-adjusted grid emissions factor).

3.1.1. Avoided emissions by country

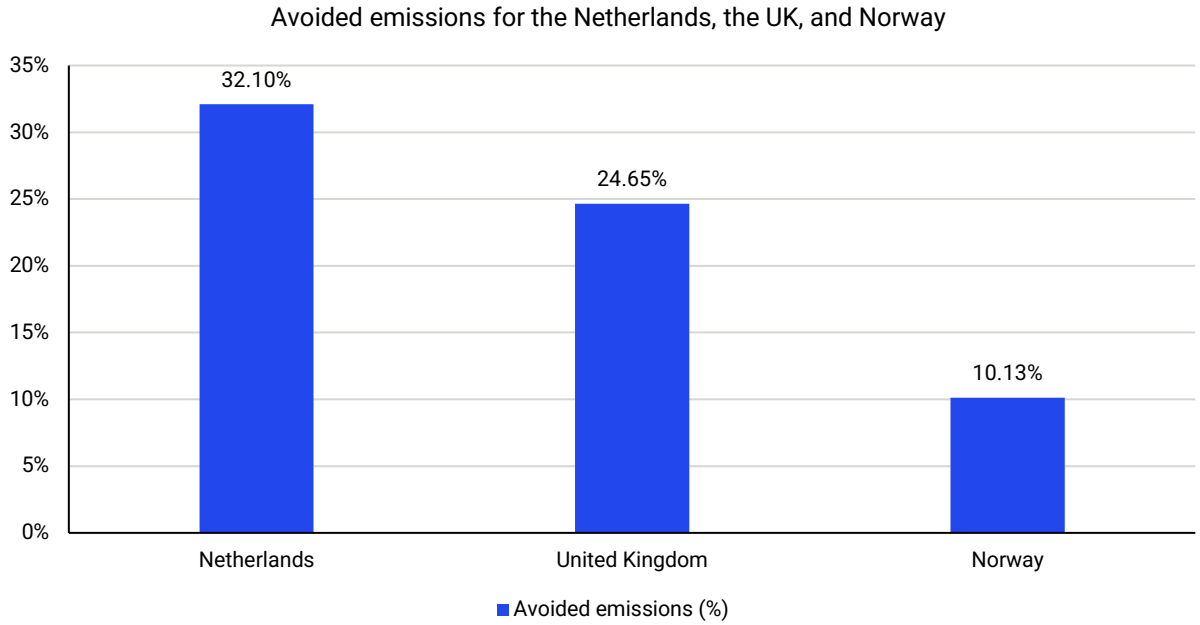


Figure 9. Avoided emissions by country (using an EU trade-adjusted grid emission factor), expressed in percentage of total (top three contributing countries).

Similar to last year, the majority (66.7%) of Leaseplan's total avoided emissions are from the Netherlands, the United Kingdom and Norway. BEV in Netherlands, UK and Norway represent 62% of the BEV portfolio, having had a combined increase from last year of 88%; while the total combined fleet only increased 3%. These three countries account for 29.9% of Leaseplan's total vehicle fleet. The following two figures display the percentage breakdown of avoided emissions by country. For demonstration purposes, the top three contributing countries were graphed separately to the rest.

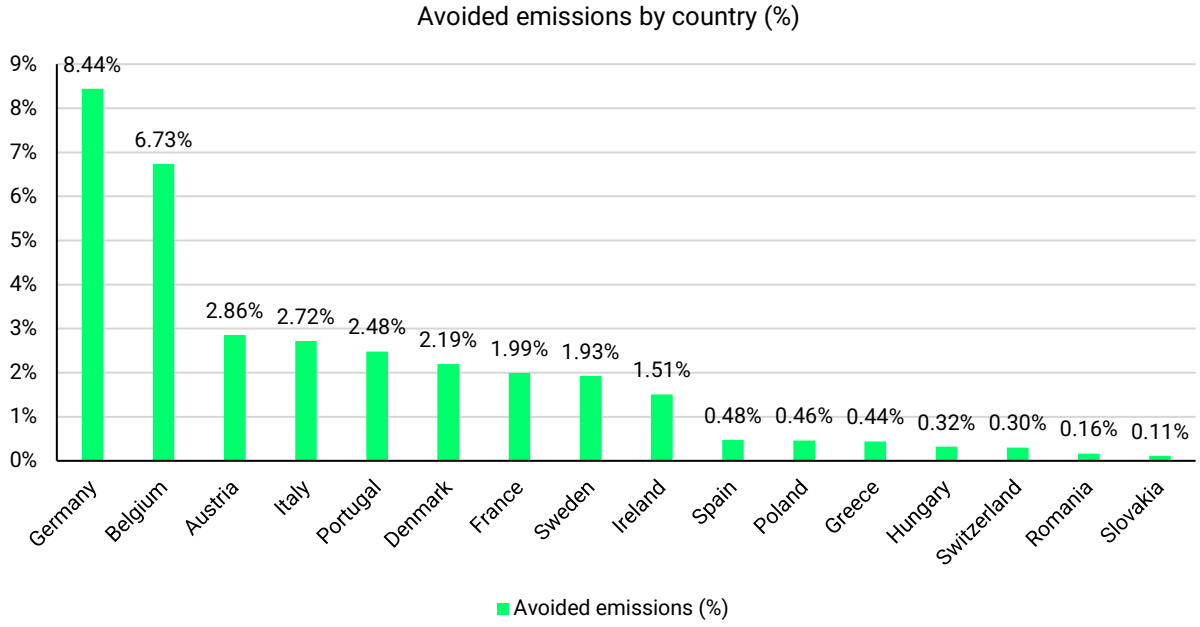


Figure 10. Avoided emissions by country (using an EU trade-adjusted grid emission factor), expressed in percentage of total (other countries).

3.1.2. Avoided emissions per eligible vehicle

Table 7. Avoided emissions per eligible vehicle versus baseline.

Approach	Avoided emissions (tCO_2e)		Number of eligible vehicles (#)		Avoided emissions per eligible vehicle (tCO_2e/vehicle)	
	2022	2023	2022	2023	2022	2023
EU trade-adjusted grid	170,118	232,750	101,698	148,329	1.67	1.57
Country trade-adjusted grid	176,683	250,895	101,698	148,329	1.74	1.69

As can be seen in table 7, despite an overall increase in the absolute avoided emissions, of 36.8% and 42%, there is a decrease in the avoided emissions per eligible project. The reason for the decrease is due to the weighted average emissions factor for EVs increasing by 5% year on year, however the LP average for ICE vehicles has decreased by -1%, and as such the indirect emissions increased greater than the direct.

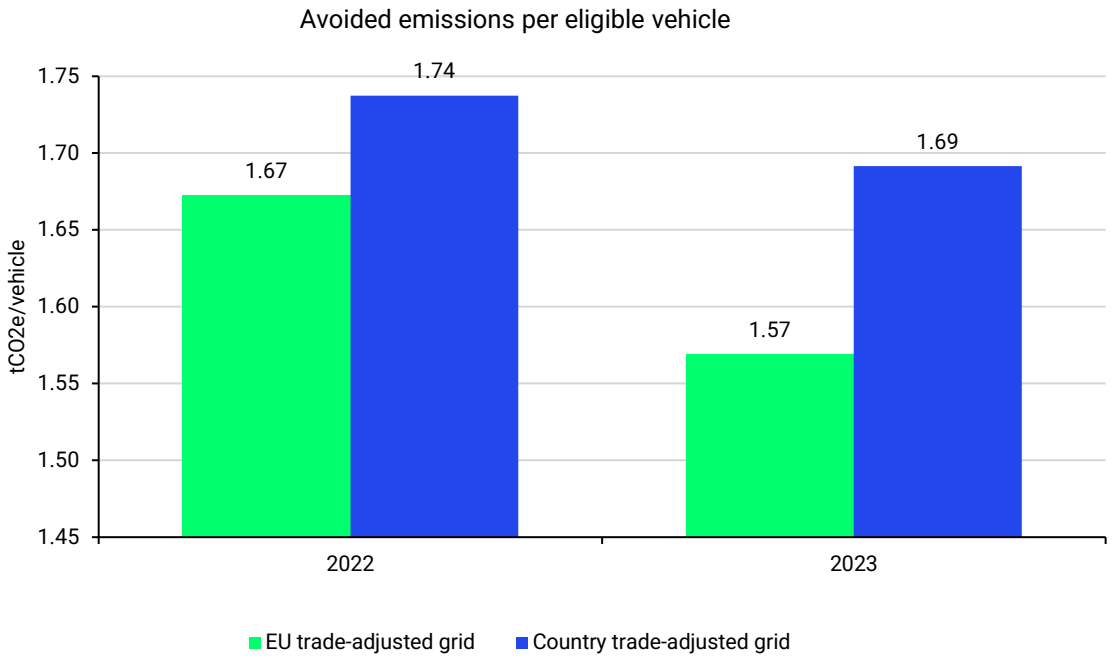


Figure 11. Avoided emissions per eligible vehicle estimated for the year 2023 (current assessment) and 2022 (previous assessment).

3.2. Carbon intensity

A weighted average of LP's passenger car funded fleet emission factors by country was provided by LP. This was evaluated against the weighted average[25] of each country's average emission factor for newly sold passenger cars in 2022 sourced from publicly available databases (2022 provided the most up to date information). Both carbon intensity figures included zero-carbon emitting vehicles (e.g., BEVs) as a way to illustrate how LP compares against a 'best-in-class' scenario (i.e., the European market of newly sold cars) with regards to mobility decarbonisation trends.

The average carbon intensity of LP's passenger car funded fleet was 93.20 gCO_2e/km down from 99.22 gCO_2e/km the previous year and 19.58 gCO_2e/km lower than the EU country averages sourced (112.78 gCO_2e/km)[26]. This suggests that, if LP's passenger car funded fleet was representative of one country, it would be less carbon-intensive than the European market average of newly sold cars (adjusted to reflect LP's fleet composition and presence in individual countries). At a country level, LP's emission factors were lower in 17 out of the 19 countries analysed, while the EU country average was lower in four countries.

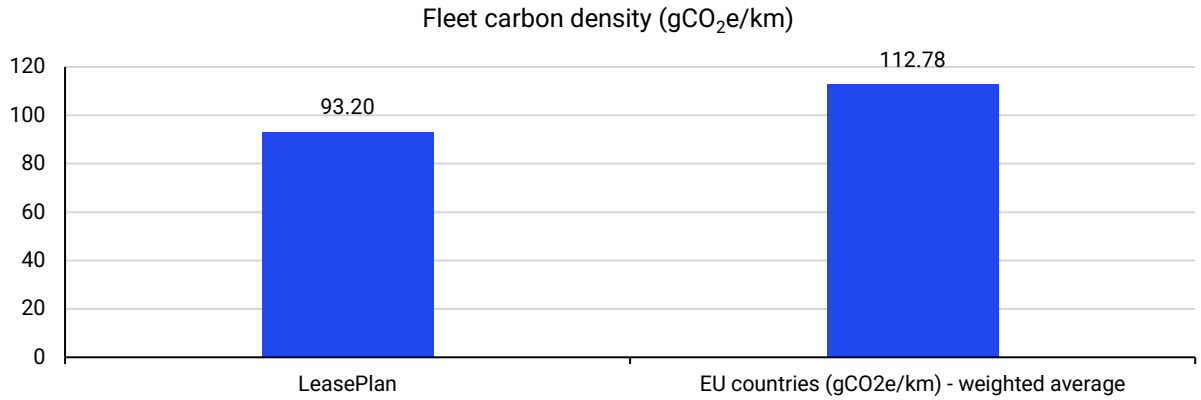


Figure 12. Visual comparison of carbon intensity between LP's passenger car funded fleet and the analysed EU countries' newly sold passenger car fleets (gCO2e/km).

These findings suggest that when compared against a 'best-in-class' scenario such as the European market of newly sold passenger cars, LP's passenger car funded fleet performs strongly in that its decarbonisation efforts reach beyond the European market average. In other words, LP is overall increasing its proportion of BEVs at a greater rate than the European passenger car market. The findings are summarised in Table 8 and Figure 12.

Table 8. Comparison of carbon intensity between LP's passenger car funded fleet and the analysed EU countries' newly sold passenger car fleets (gCO2e/km).

	LeasePlan (gCO_2e/km)	EU countries (gCO_2e/km)
Passenger car fleet average	**93.20**	**112.78**[27]

[25] Weighted on the total number of vehicles in LP's fleet in each country considered.

[26] Using a simple average instead of a weighted average, this would be 109.16 gCO_2e/km, which would make the carbon intensity of LP's fleet 15.96 gCO_2e/km lower.

[27] Weighted average of all 19 EU countries analysed based on the number of vehicles in LP's fleet in each country.

4. References

DESNZ, 2023. *UK Government GHG Conversion Factors for Company Reporting.* Department for Energy Security and Net Zero.

CBI (Climate Bonds Initiative), 2020. The Land Transport Criteria for the Climate Bonds Standard & Certification Scheme. [online] CBI.

EEA (European Environment Agency), 2022. CO_2 emissions from new passenger cars. [online] EEA.

EU TEG (European Union Technical Expert Group) on Sustainable Finance, 2020. Taxonomy: Final report of the Technical Expert Group on Sustainable Finance. [online] European Commission.

ICMA (International Capital Markets Association), 2022. Green Bond Principles. [online] ICMA.

IEA (2023). Emission Factors. IEA ©OECD/IEA 2023.

LeasePlan, 2022. Green Finance Framework. [online] LeasePlan.

LMA (Loan Market Association), 2023. Green Loan Principles. [online] LMA.

SFOE, 2020. Key Data For New Vehicle Fleet. [online] Bfe.admin.ch.

5. Appendix

The table and figures below show detailed comparisons between this assessment (January 2023 to December 2023) and the previous assessment (January 2022 to December 2022).

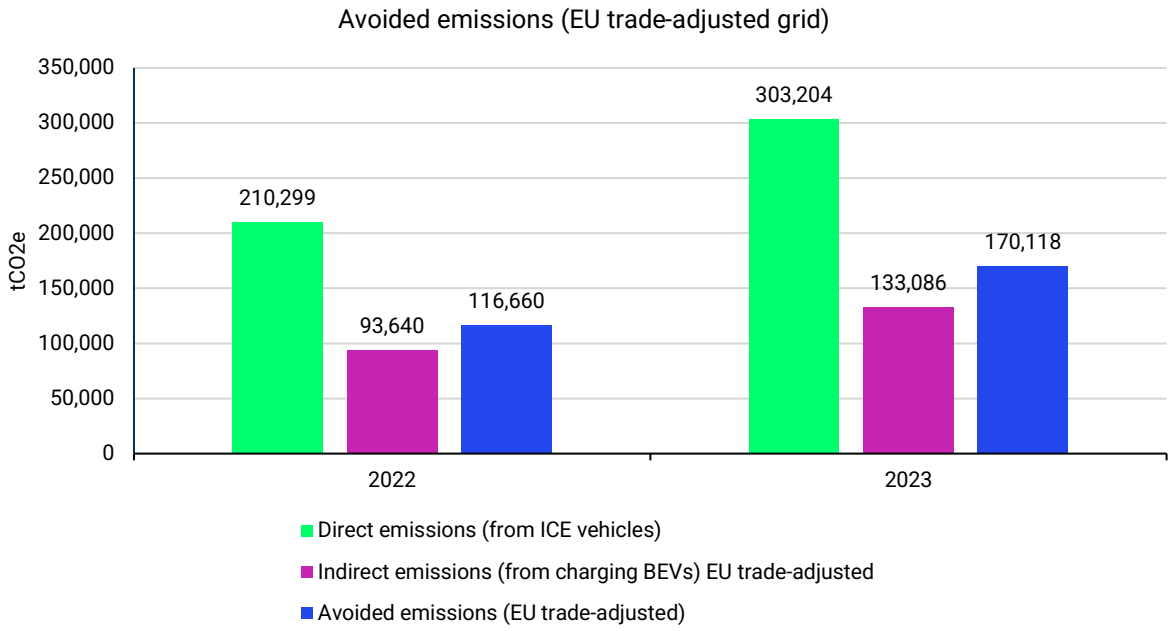


Figure 13. Direct, indirect, and avoided emissions, 2023 and 2022 comparison (EU trade-adjusted grid).

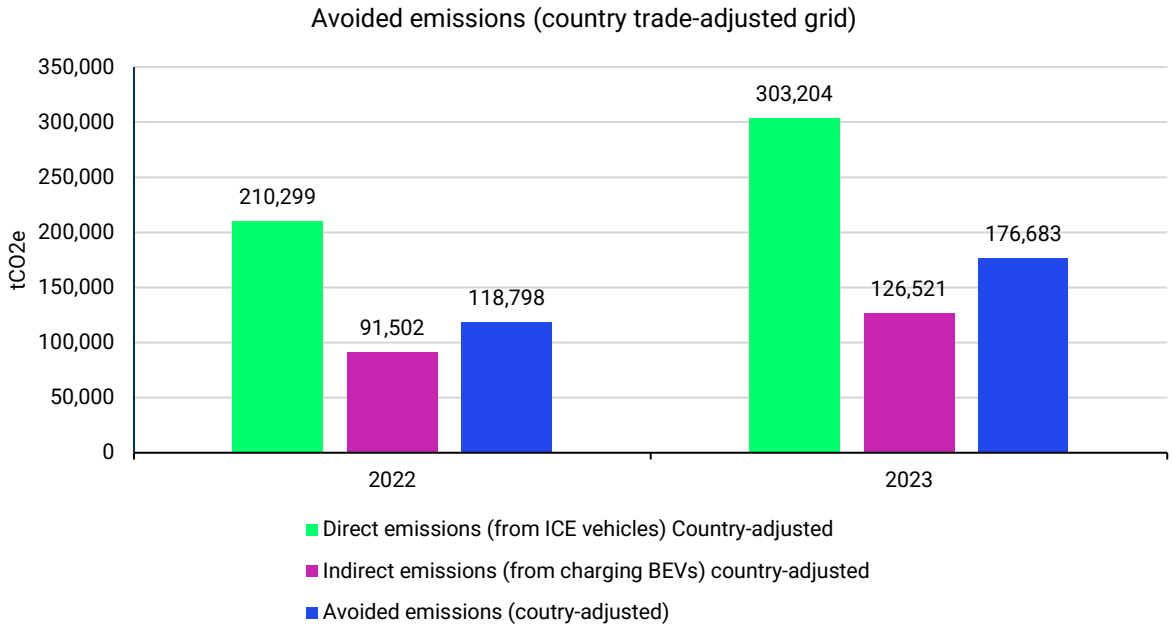


Figure 14. Direct, indirect, and avoided emissions, 2023 and 2022 comparison (country trade-adjusted grid).

carbontrust.com

+44 (0) 20 7170 7000

Published in the UK: 2024