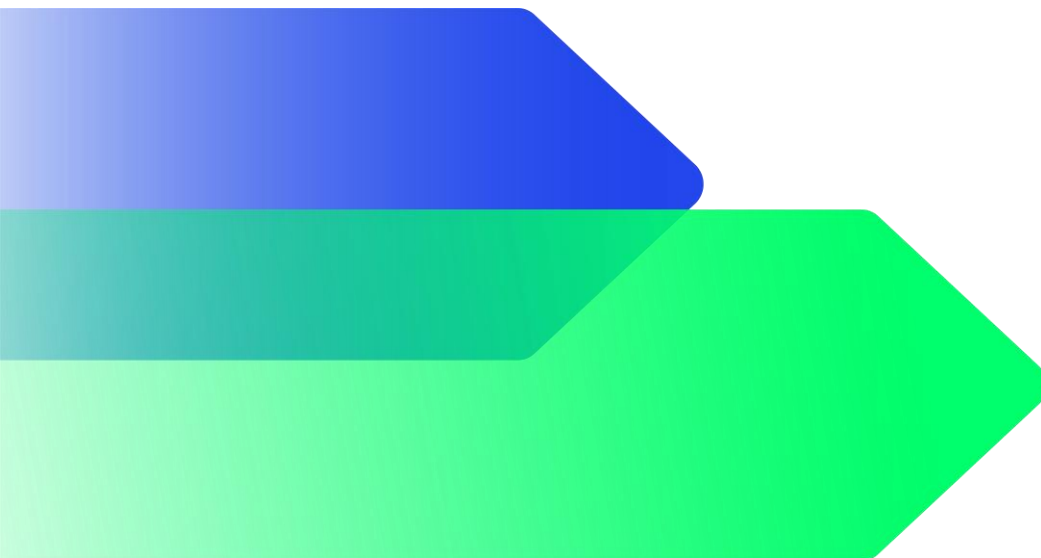# LeasePlan's 2022 green bond impact assessment report

March 2023

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 over 28 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 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.

Authors:

Marc Mohajer

Associate

Marc.mohajer@carbontrust.com

Camilla Zanetti

Analyst

Camilla.zanetti@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.
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:

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

---

[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."

- *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.

Avoided emissions

■ Direct emissions (emissions from ICE vehicles) ✹ Indirect emissions (emissions from charging BEVs)
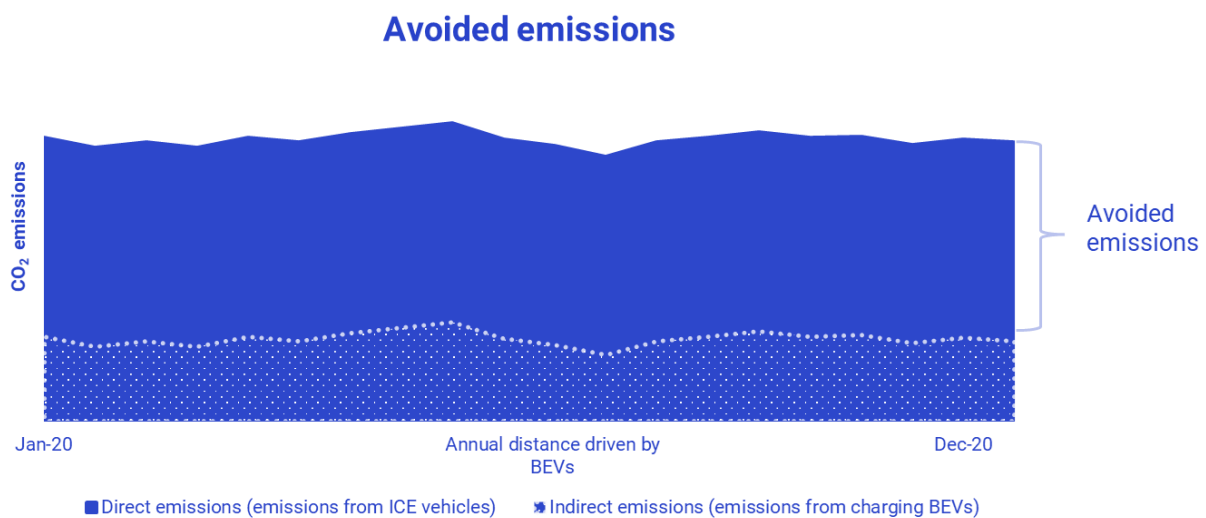
Figure 1. Visual representation of avoided emissions, or Direct emissions minus Indirect emissions (demonstration purposes only).

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].
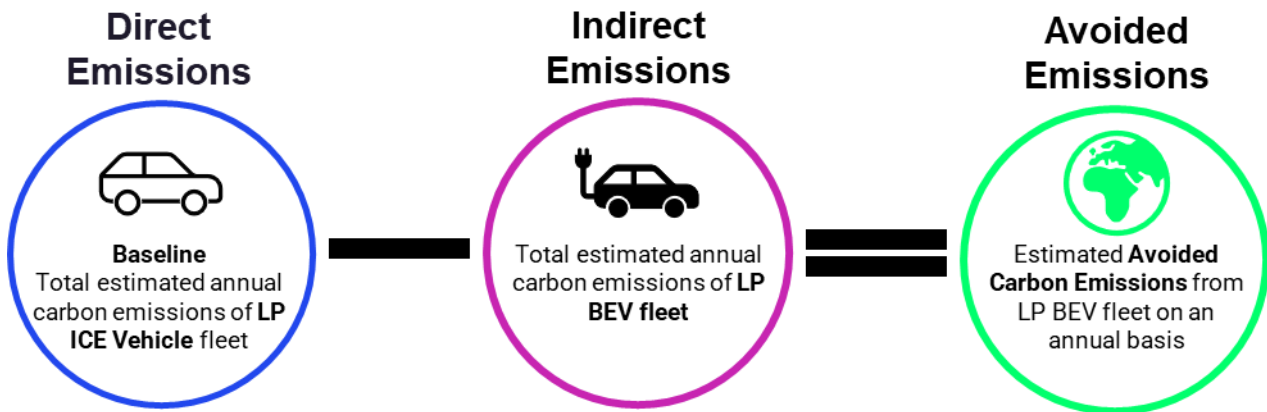
Figure 2. Avoided emissions calculation.

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 (2022).

[6] IEA Emissions Factors 2022

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 2022 – December 2022. The analysis considered all vehicles in LP's total funded fleet as of December 2022. 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	2,411	2,411
Direct emissions ("baseline" emissions from the equivalent miles being driven by ICE vehicles in LP's fleet)	tCO_2e	302,319	302,319
Indirect emissions (from electricity used to charge LP BEV funded fleet)	tCO_2e	(-) 133,086	(-) 126,521
Estimated avoided emissions from LP BEV fleet (annual)	tCO_2e	169,233	175,798

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 2021 sourced from publicly available databases (2021 was chosen as the latest available data). 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 99.2 gCO_2e/km, compared to the EU average of 119.77 gCO_2e/km, a difference of 20.55 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

---

[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., 302,319.49 − 133,086.09 = 169,233.40).

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 20 out of the 22 countries analysed, while the EU country average was lower in two countries. See section 3.2 for more information.

Comparison with previous assessment

The following chart shows a comparison of this year's results (for the period from January 2022 to December 2022) against the results from the previous assessment (for the period from January 2021 to December 2021), 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 sections 3.3 and 5.

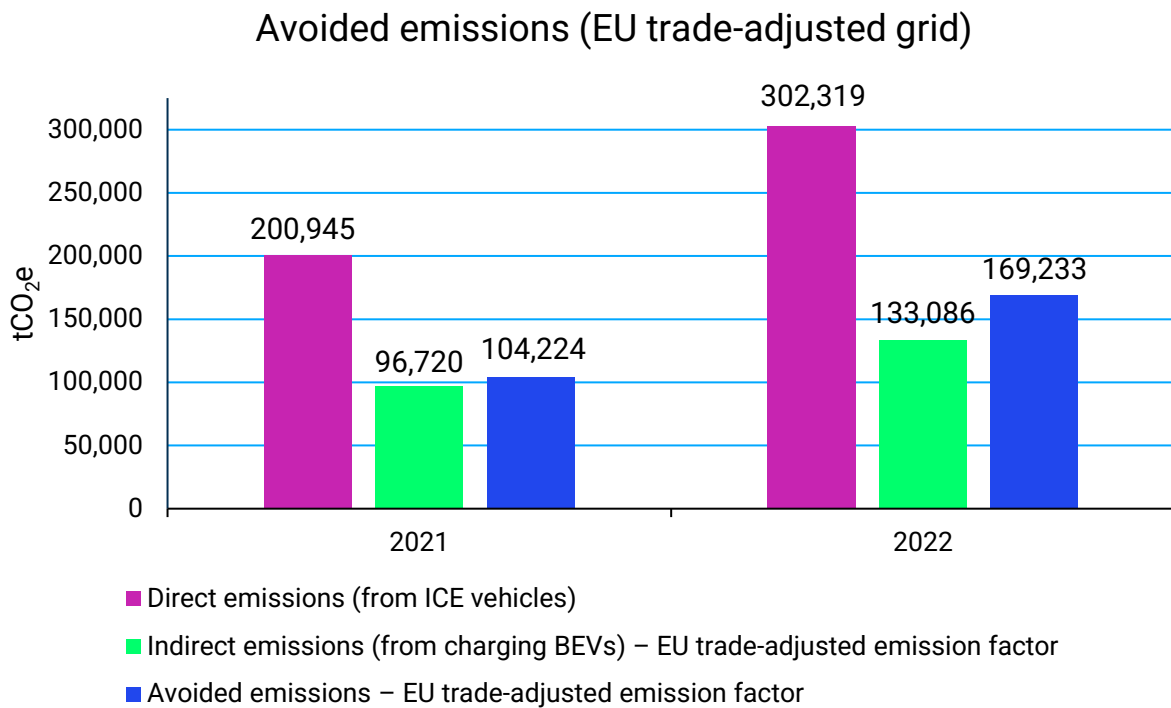### Avoided emissions (EU trade-adjusted grid)

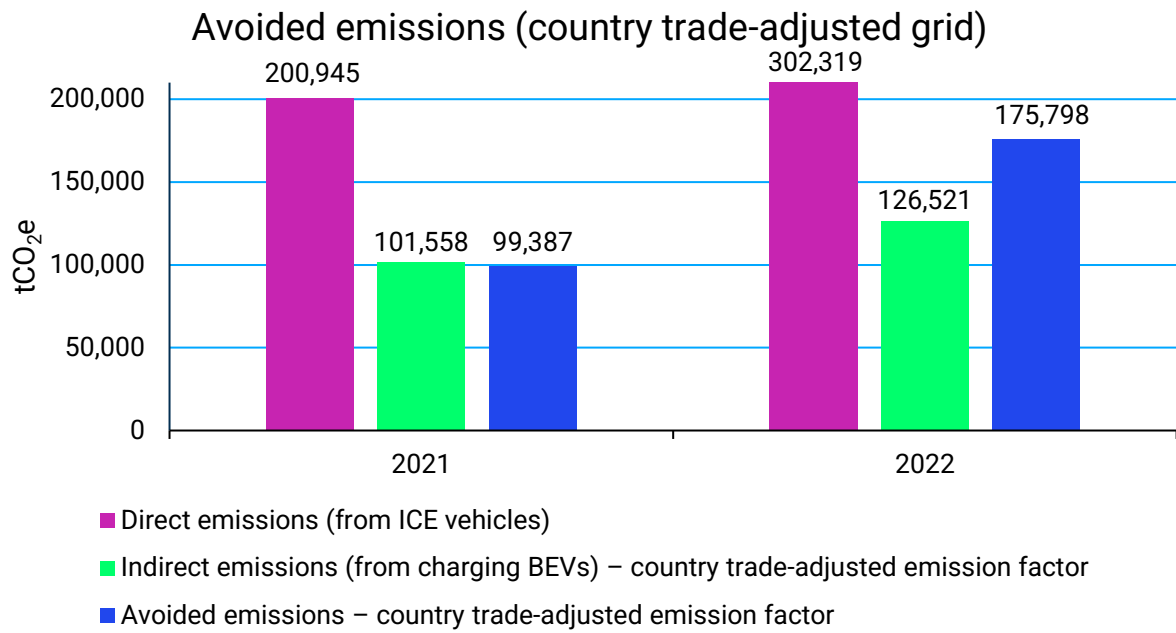**Figure 3. Direct, indirect, and avoided emissions, 2022 and 2021 comparison (EU trade-adjusted grid).**

Figure 4. Direct, indirect, and avoided emissions, 2022 and 2021 comparison (country trade-adjusted grid).

1. Introduction

1.1. From LeasePlan[8]

As one of the world's leading 'Car as a Service' (CaaS) companies LeasePlan has committed to taking a leadership role in the transition from internal combustion engine (ICE) vehicles to alternative powertrains such as battery electric vehicles (BEVs). LeasePlan's aim is to help create healthier environments in towns and cities by promoting cleaner, low-emission vehicles and the infrastructure required to make these cars a viable option for customers.

LeasePlan has set the ambitious goal of working towards net zero emissions from the funded fleet by 2030, supporting the effective implementation of the Paris Agreement and climate-related United Nations (UN) Sustainable Development Goals (SDGs). In September 2021, to further align LeasePlan's decarbonization ambitions with climate science, LeasePlan announced its commitment to reducing Scope 1, 2, and 3 emissions to net zero in a way that is consistent with reaching net-zero emissions through eligible 1.5°C-aligned pathways.

In late 2021, LeasePlan developed and introduced its new 'Driving to Zero' sustainability strategy update, which further broadens its focus from car tailpipe emissions to all of today's important ESG challenges and includes the formal integration of climate-related and environmental risks into LeasePlan's governance, strategy, Risk Management Framework and disclosures. Sustainability therefore remains at the heart of LeasePlan's business and is viewed as a vital enabler of its overall strategy towards all stakeholder groups. The pillars of the updated strategy are 1. Protect the planet (environment); 2. Contribute to societal wellbeing (social); and 3. Be responsible (governance).

Sustainability is also of growing importance in the CaaS industry as customers look to access cleaner, low-emission vehicles. Through its 'full package electric vehicle (EV) solution', which includes both home and office charging solutions, as well as educational initiatives, LeasePlan is aiding its customers to make the switch to EVs.

LeasePlan is committed to using its scale, expertise and broad geographic presence to be at the heart of the discussion on the transition to low-emission mobility. LeasePlan's global advocacy programmes and initiatives include the EV100, World Economic Forum (WEF), World Business Council for Sustainable Development and WEF's Global Battery Alliance. In 2021, LeasePlan became a signatory of the UN Global Compact.

In line with its ambition of providing low-carbon mobility solutions, LeasePlan established its Green Finance Framework under which it can issue Green Bonds to finance and/or refinance assets within the 'Eligible Category' of Clean Transportation. Under the Framework, LeasePlan committed to reporting the weighted average fleet carbon intensity and the estimated CO_2 emissions avoided as a result of increasing the proportion of BEVs in the funded fleet.

---

[8] Please note – this introduction was authored by LeasePlan and was included for context purposes. The Carbon Trust did not write this part of the report.

1.2. From Carbon Trust

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 2022, LeasePlan had EUR 3 billion in Green Bonds outstanding[11]. Under its Framework, LP has committed to reporting on:

3. The estimated CO_2e emissions avoided as a result of increasing the proportion of BEVs in LP's total funded fleet; and

4. 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 2022 to December 2022.

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 2022. 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 2022.

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 2022.

- 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 2022 and of how much of its annual budgeted mileage the BEV has driven; and

- The reporting period is from January 2022 to December 2022.

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

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 22 countries: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, 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 CO2/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 2022.

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;

---

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

- Distance travelled by BEVs;

- 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 2022	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$_2$e/km	Weighted average of LP ICE vehicles' emission factors	Provided by LP	2.3.3
Emission factor of BEVs – EU average	(k)gCO$_2$e/km	Emission factor for charging BEVs based on an EU average grid emission factor	Carbon Trust analysis based on BEIS and DEFRA (2022) and IEA (2022) data	2.3.4
Emission factor of BEVs – country-specific	(k)gCO$_2$e/km	Emission factor for charging BEVs based on country-specific grid emission factors	Carbon Trust analysis based on BEIS and DEFRA (2022) and IEA (2022) 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)	22,720	km
ICE emission factor	ICE vehicle emission factor (LP country avg)	0.128	$kgCO_2e$/km
Electricity	Grid emission factor (example country trade-adjusted)	0.1437	$kgCO_2e$/kWh
	Grid emission factor (EU trade-adjusted avg)	0.2433	$kgCO_2e$/kWh
BEV emission factor	BEV car emission factor (example country specific trade-adjusted grid)	0.0363	$kgCO_2e$/km
	BEV LCV emission factor (example country trade-adjusted specific grid)	0.0382	$kgCO_2e$/km
	BEV car emission factor (EU trade-adjusted avg grid)	0.0615	$kgCO_2e$/km
	BEV LCV emission factor (EU trade-adjusted avg grid)	0.0647	$kgCO_2e$/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 2022. This only includes vehicles that were already circulating on the road at the end of 2022.

Within the Eligible Project Portfolio, LP leases different types of vehicles, primarily: passenger cars, LCVs, and micro-mobility vehicles[20]. 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:

---

[20] Despite having a significant share in France and Italy, a separate emission factor for micro-mobility vehicles was not calculated; instead, they were grouped under, and were considered to have, the same emission factor as passenger cars. This is because, over time, the share of micro-mobility vehicles will become insignificant as the number of BEVs (passenger cars) are expected to grow materially.

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[21], 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 (2022). 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$_2$e per kilometre driven (kgCO$_2$e/km). The ICE emission factor for 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 2022. 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$_2$e 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 (2022). Subsequently, an EU average and each country's grid emission factor for electricity were sourced from IEA (2022). 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.

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

---

[21] Funded fleet mix as of December 2022: 85% passenger vehicles, 15% LCVs, and less than 1% others.

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	$kgCO_2e/kWh$	0.1934
UK BEV charging emission factor	$kgCO_2e/km$	0.0471
Country *x*'s grid emission factor	$kgCO_2e/kWh$	0.1437
Country *x*'s BEV charging emission factor	$kgCO_2e/km$	0.0363

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 2021[22] sourced from publicly available databases (namely EEA, 2020[23]; and SFOE[24], 2020).

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

---

[22] 2021 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 2020)).

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

[24] Swiss Federal Office for Energy.

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.

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:

$$D_{tot}^x = D_{avg}^x \times BEV_n^x \tag{2}$$

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

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:

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

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

Where,

- $E_{tot\,(ICE)}^{x}$, are the total Direct emissions in country x;

- D_{tot}^{x} , is the total distance driven in country x;

- EF_{ICE}^{x} , 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:

$$E_{tot\,(BEV)}^{x} = \left(D_{avg}^{x} \times EF_{BEV\,car}^{x}\right) + \left(D_{avg}^{x} \times EF_{BEV\,LCV}^{x}\right) \tag{6}$$

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

Where:

- $E_{tot\,(BEV)}^{x}$, are the total Indirect emissions from charging BEVs in country x;

- D_{avg}^{x} , is the average distance travelled in country x;

- $EF_{BEV\,car}^{x}$, is the emission factor for an electric passenger car in country x;

- $EF_{BEV\,LCV}^{x}$, 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:

$$E_{tot\,(avoided)} = E(ICE) - E(BEV) \tag{8}$$

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:

$$E_{(per\ BEV)} = E_{tot\ (avoided)} \div BEV_{tot} \qquad (9)$$

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[25]. 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	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	**2,411**	**2,411**
Direct emissions ("baseline" emissions from the equivalent miles being driven by ICE vehicles in LP's fleet)	tCO_2e	**302,319**	**302,319**
Indirect emissions (from electricity used to charge LP BEV funded fleet)	tCO_2e	**(-) 133,086**[26]	**(-) 126,521**[27]
Estimated avoided emissions from LP BEV fleet (annual)	**tCO_2e**	**169,233**	**175,798**

---

[25] 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.

[26] Please note that charging BEVs does generate emissions and that this is being presented as negative for demonstration purposes only – to show that indirect emissions are being subtracted from Direct emissions to calculate avoided emissions.

[27] See footnote 26.
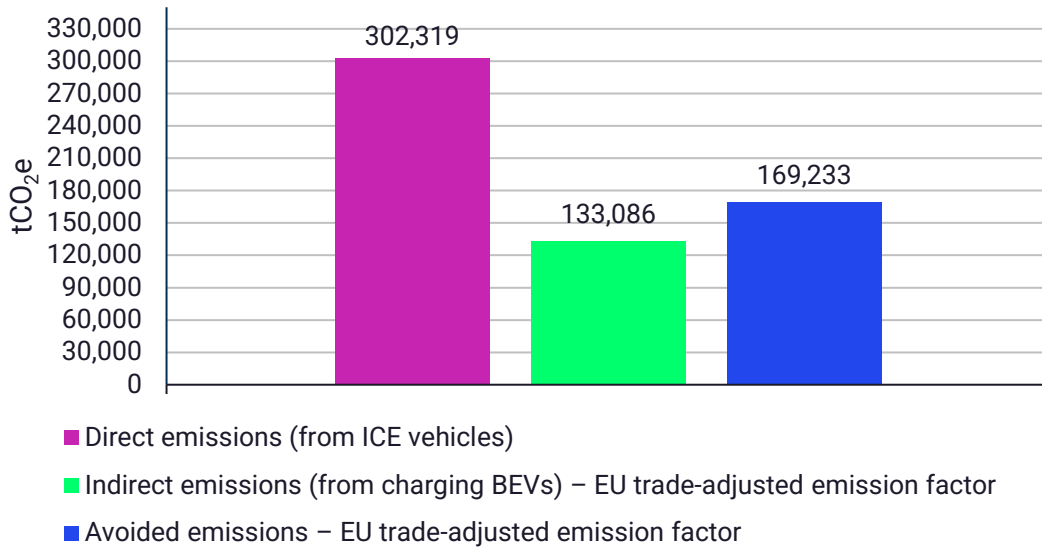
Avoided emissions (EU trade-adjusted grid)

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

As can be seen in figure 3 and 4, 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, 11 out of the 22 countries having a smaller emission factor than the EU average, however, the countries that have a smaller emissions factor make up 57% of the indirect emissions of the EU trade-adjusted calculation compared to only 49% of the country trade-adjusted calculation, shifting the emissions up in the EU trade-adjusted calculation. As a result, when using a country-specific trade-adjusted average grid emission factor for electricity, the avoided emissions are greater. Figures 3-6 showcase the Direct emissions from ICE vehicles, Indirect emissions from charging BEVs and the associated avoided emissions. Figure 5 highlights the Netherlands, UK and Norway as they are the three countries with the highest avoided emissions.

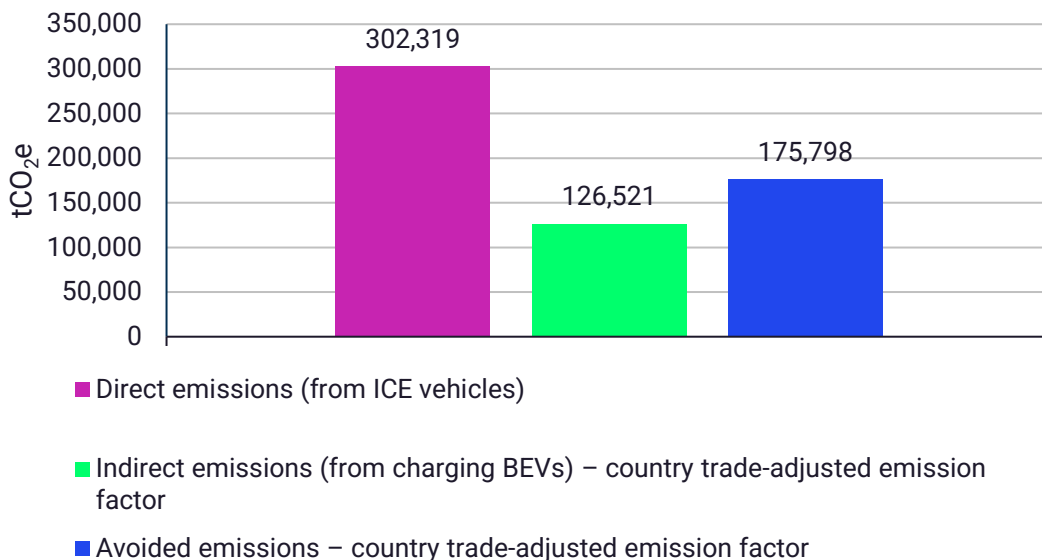## Avoided emissions (country trade-adjusted grid)

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

Direct, indirect, and avoided emissions for the Netherlands, the UK, and Norway
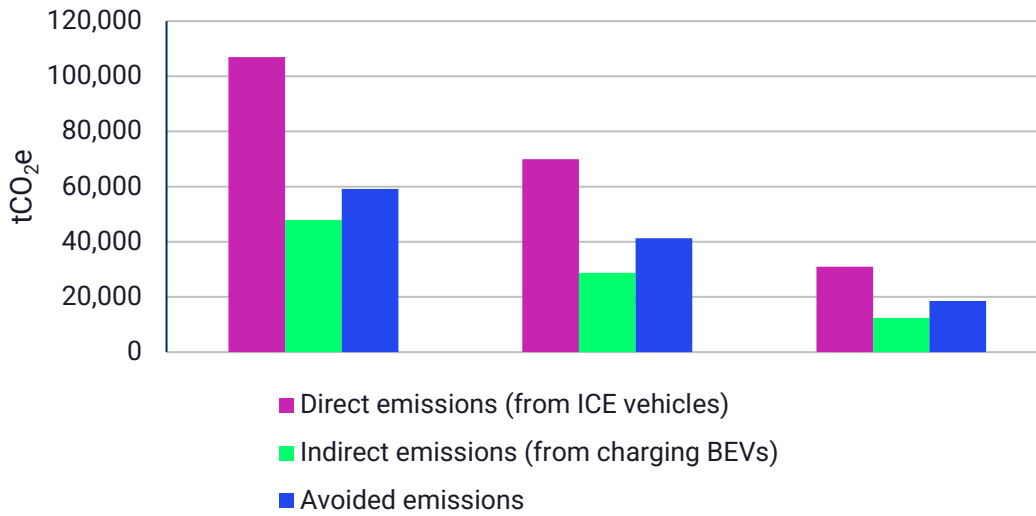

Figure 7. Direct, indirect, and avoided emissions in the Netherlands, UK, and Norway (using an EU trade-adjusted grid emission factor).

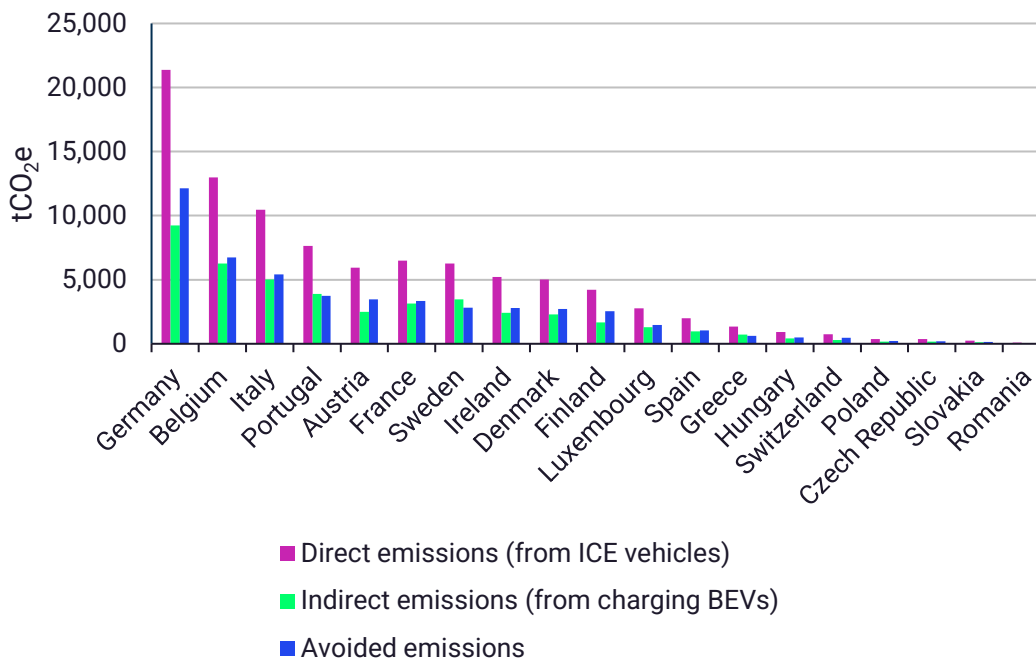## Direct, indirect, and avoided emissions by country

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

Avoided emissions for the Netherlands, the UK, and Norway (%)
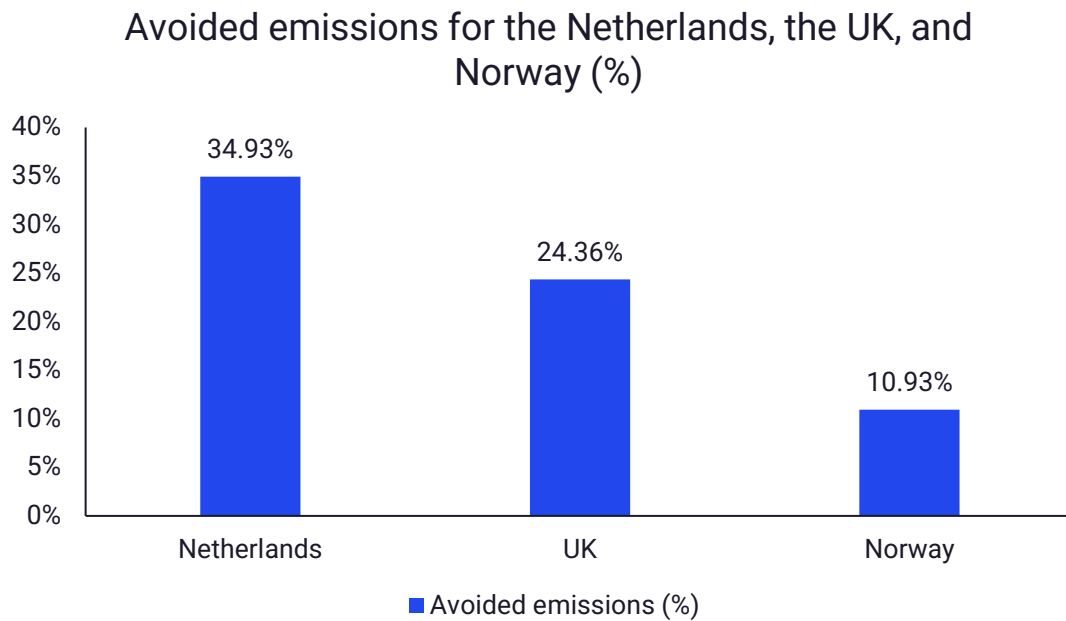

Figure 9. Avoided emissions by country (using an EU trade-adjusted grid emission factor), expressed in percentage of total (top three contributing countries).

When breaking down the avoided emissions by country, the Netherlands is the highest contributor (34.93% of the total avoided emissions, down from 40% in the previous year due to a lower share of the total portfolio), primarily due to having the largest number of Eligible Projects (BEVs) with 23.69%. The UK (24.36%) and Norway (10.93%) are the next highest. 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.
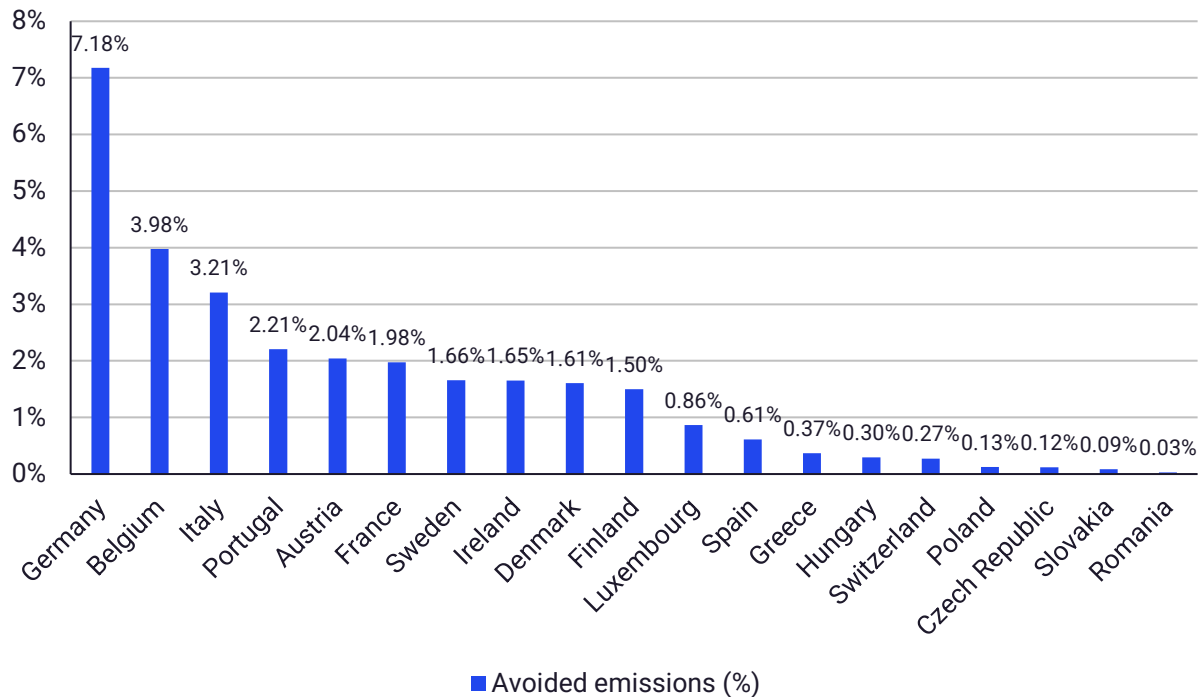
Avoided emissions by country (%)

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 project

Table 7 Avoided emissions per Eligible Project versus baseline.

Approach	Avoided emissions (tCO$_2$e)		Number of eligible projects (#)		Avoided emissions per eligible project (tCO$_2$e/vehicle)	
	2021	2022	2021	2022	2021	2022
EU trade-adjusted grid	104,224	169,233	73,394	101,698	1.42	1.66
Country trade-adjusted grid	99,387	175,798	73,394	101,698	1.35	1.73

As can be seen in table 7, the avoided emissions per eligible project increased by 17% for the EU trade-adjusted calculation and 28% for the country trade-adjusted calculation. From 2021 to 2022, while the number of eligible BEVs increased significantly by 39%, the avoided emissions can be seen to have increased by 62% for EU calculations and 77% for country calculations. This increase in avoided emissions can be seen to be as a result of the following factors:

1. **Direct emissions from ICE Vehicles –** From 2021 to 2022 the direct emissions from ICE vehicles increased by 50.45% (200,945 tCO$_2$e to 302,319 tCO$_2$e), this can be seen to be a direct correlation to the total distance travelled increasing by 48% (1,627 million km to 2,411 million km). This is assumed to be as a result of the lifting of Covid restrictions across the EU, increasing the distance driven.

2. **The rate of grid decarbonisation -** The Indirect emissions from BEVs is completely dependent on the grid from which they are sourcing electricity. The 2021 impact assessment had a weighted average grid emission factor of 256 gCO_2e/kWh compared to 223 gCO_2e/kWh for 2022, a reduction of around 13%.

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[28] of each country's average emission factor for newly sold passenger cars in 2020 sourced from publicly available databases (2020 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 99.22 gCO_2e/km down from 98.65 gCO_2e/km the previous year and 20.55 gCO_2e/km lower than the EU country averages sourced (119.77 gCO_2e/km)[29]. 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 18 out of the 22 countries analysed, while the EU country average was lower in four countries.

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 10.

---

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

[29] Using a simple average instead of a weighted average (as was done in the previous assessment), this would be 107.09 gCO_2e/km, which would make the carbon intensity of LP's fleet 8.43 gCO_2e/km lower.
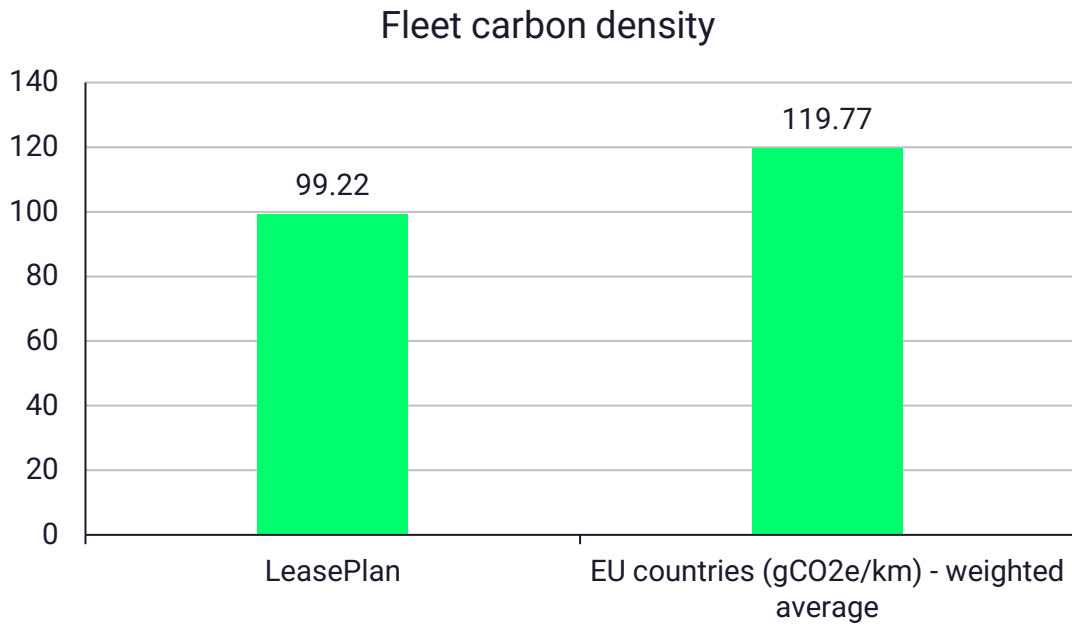
Fleet carbon density

Figure 11. Visual comparison of carbon intensity between LP's passenger car funded fleet and the analysed EU countries' newly sold passenger car fleets (gCO2e/km).

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$_2$e/km)	EU countries (gCO$_2$e/km)
Passenger car fleet average	**99.22**	**119.77**[30]

---

[30] Weighted average of all 22 EU countries analysed based on the number of vehicles in LP's fleet in each country.
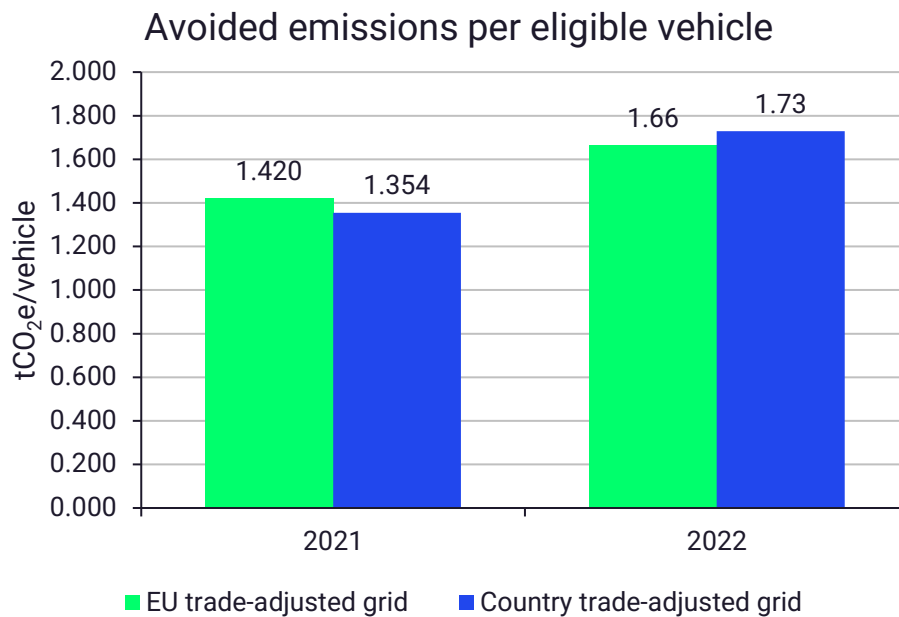
3.3. Comparison with previous assessment

Figure 12. Avoided emissions estimated for the year 2022 (current assessment) and 2021 (previous assessment).

Figure 11 shows a comparison of this year's results (for the period from January 2022 to December 2022) against the results from the previous assessment (for the period from January 2021 to December 2021). A comparison of these results shows that there has been a significant increase in avoided emissions in the past year, of 17.18% (EU trade-adjusted average grid) and 27.65% (country-specific trade-adjusted grid). The growth is mostly due to an increase in the ICE scope 1 emissions. The large increase in the country trade-adjusted results is mostly down to the share of emission across the portfolio, where in 2021 the Netherlands, which has an emissions factor larger than the EU average, made up 64% of the country grid emissions and 47% of the EU grid emissions. In 2022, this share went down to 36% and 32% respectively. This decrease in the percentage of the portfolio where individual countries had a grid emissions factor larger than the EU average resulted in the EU average emissions avoided per vehicle being larger than the country specific avoided emissions per vehicle.

4. References

BEIS and DEFRA, 2020. *UK Government GHG Conversion Factors for Company Reporting.* Department for Business, Energy & Industrial Strategy and Department for Environment Food & Rural Affairs.

CBI (Climate Bonds Initiative), 2020. The Land Transport Criteria for the Climate Bonds Standard & Certification Scheme. [online] CBI. [Accessed 16 April 2021].

EEA (European Environment Agency), 2021. CO_2 emissions from new passenger cars. [online] EEA. [Accessed 27th April 2023].

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. [Accessed 30 April 2021].

ICMA (International Capital Markets Association), 2018. Green Bond Principles. [online] ICMA. [Accessed 30 April 2021].

IEA (2021). Emission Factors. IEA ©OECD/IEA 2018.

LeasePlan, 2019. Green Bond Framework. [online] LeasePlan. [Accessed 16 April 2021].

LeasePlan, 2020. Green Finance Framework. [online] LeasePlan. [Accessed 28 April 2021].

LeasePlan, 2022. Green Finance Framework. [online] LeasePlan. [Accessed 27 February 2023].

LMA (Loan Market Association), 2018. Green Loan Principles. [online] LMA. [Accessed 30 April 2021].

SFOE, 2020. Key Data For New Vehicle Fleet. [online] Bfe.admin.ch. [Accessed 27 February 2021].

5. Appendix

The table and figures below show detailed comparisons between this assessment (January 2022 to December 2022) and the previous assessment (January 2021 to December 2021).

Table 9. Detailed comparison between 2022 and 2021 assessments (EU trade-adjusted grid emission factor).

Description	Units	2022 result	2021 result	*Change (%)*
Number of BEVs in LeasePlan's funded fleet	#	101,698	73,394	*38.56%*
Total distance travelled by LP BEV funded fleet	mkm/year	2,411	1,627	*48.19%*
Direct emissions (from ICE vehicles)	tCO2e	302,319	200,945	*50.45%*
Indirect emissions (from charging BEVs) – EU trade-adjusted emission factor	tCO2e	133,086	96,720	*37.60%*
Avoided emissions – EU trade-adjusted emission factor	tCO2e	169,233	104,224	*62.37%*
Avoided emissions per eligible project - EU	tCO2e/vehicle	1.66	1.42	*17.18%*

Avoided emissions (EU trade-adjusted grid)

200,945
96,720
104,224
302,319
133,086
169,233

2021
2022

■ Direct emissions (from ICE vehicles)
■ Indirect emissions (from charging BEVs) – EU trade-adjusted emission factor
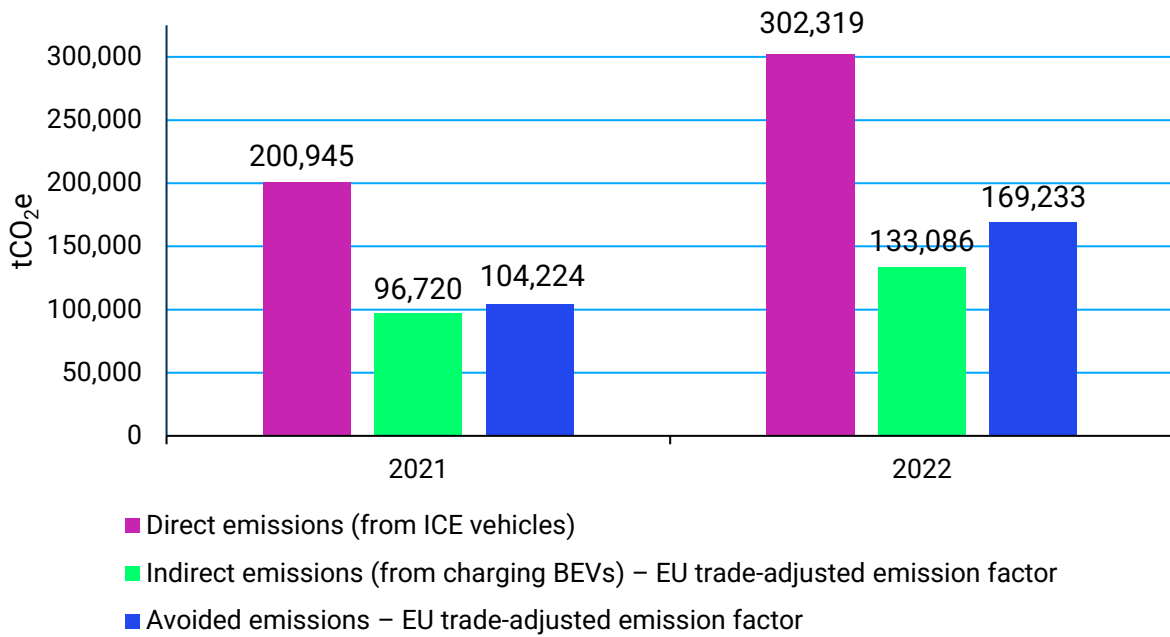■ Avoided emissions – EU trade-adjusted emission factor

Figure 13. Direct, indirect, and avoided emissions, 2022 and 2021 comparison (EU trade-adjusted grid).
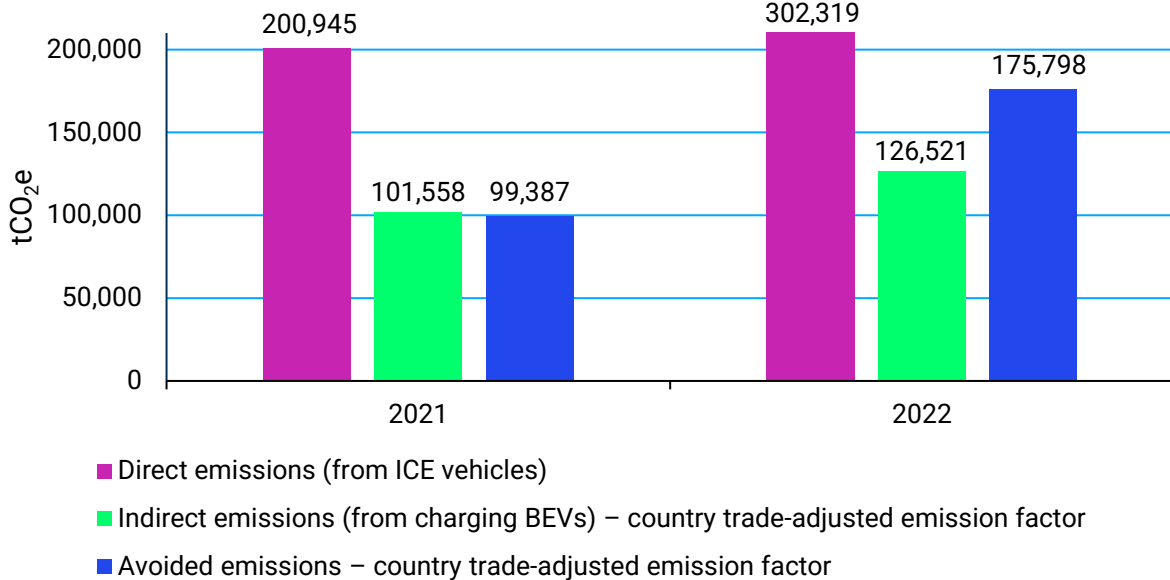

Avoided emissions (country trade-adjusted grid)

200,945
101,558
99,387
302,319
126,521
175,798

2021
2022

■ Direct emissions (from ICE vehicles)
■ Indirect emissions (from charging BEVs) – country trade-adjusted emission factor
■ Avoided emissions – country trade-adjusted emission factor

Figure 14. Direct, indirect, and avoided emissions, 2022 and 2021 comparison (country trade-adjusted grid).

carbontrust.com

+44 (0) 20 7170 7000

Whilst reasonable steps have been taken to ensure that the information contained within this publication is correct, the authors, the Carbon Trust, its agents, contractors and sub-contractors give no warranty and make no representation as to its accuracy and accept no liability for any errors or omissions. Any trademarks, service marks or logos used in this publication, and copyright in it, are the property of the Carbon Trust. Nothing in this publication shall be construed as granting any licence or right to use or reproduce any of the trademarks, service marks, logos, copyright or any proprietary information in any way without the Carbon Trust's prior written permission. The Carbon Trust enforces infringements of its intellectual property rights to the full extent permitted by law.

The Carbon Trust is a company limited by guarantee and registered in England and Wales under Company number 4190230 with its Registered Office at: 4th Floor, Dorset House, 27-45 Stamford Street, London SE1 9NT.

© The Carbon Trust 2022. All rights reserved.

Published in the UK: 2022