REPORT

Annual Impact Assessment Green Portfolio

CLIENT

Santander Consumer Bank AS

SUBJECT

Impact assessment Norwegian EV portfolio

DATE: / REVISION: 27.02.2024/ 03

DOCUMENT CODE: 10253303-01-TVF-RAP-001

Multiconsult

Multiconsult

REPORT

PROJECT	**Annual Impact Assessment Green Portfolio**	DOCUMENT CODE	10253303-01-TVF-RAP-001
SUBJECT	Impact assessment Norwegian EV portfolio	ACCESSIBILITY	Open
CLIENT	**Santander Consumer Bank AS**	PROJECT MANAGER	Kjersti Rustad Kvisberg
CONTACT	**Anders Harestad Fuglsang**	PREPARED BY	Kjersti Rustad Kvisberg, Stig Jarstein, Vincent Menot
		RESPONSIBLE UNIT	10105080 Renewable Energy Advisory Services

03	27.02.24	Update Table 7 and Table 8	KJRK	KJRK	MSF
02	26.02.24	Preliminary report	KJRK	KJRK	VINM
01	08.02.24	Revised draft	KJRK	KJRK	MSF
00	31.10.23	Draft	KJRK	STJ	STJ
REV.	DATE	DESCRIPTION	PREPARED BY	CHECKED BY	APPROVED BY

TABLE OF CONTENTS

1 Introduction

On assignment from Santander Consumer Bank AS, Multiconsult has assessed the impact of electric passenger vehicles in Norway on climate gas emissions.

The pool of electric vehicles presented in this report is found solely in the Santander Consumer Bank portfolio. The intention is that both Santander Consumer Bank and Santander Consumer Finance can issue green bonds and deposits backed by these assets. The allocation reports from both issuers and this report's section 5 will document the share of the portfolio each issuance cover, and that no double counting occurs.

In this document we describe the result of an analysis of the loan portfolio of Santander Consumer Bank qualifying for the relevant criteria stated in the bank's Green Bond Framework. For more information related to the eligibility criteria we refer to Santander Consumer Bank's website[1]. The electric vehicle eligibility criterion is formulated in line with Climate Bonds Initiative (CBI) criteria[2]. The eligible EVs/ zero tailpipe emissions vehicles in the portfolio are also eligible according to the wording in the EU Taxonomy Delegated Acts[3].

The bank's portfolio is assessed regarding direct emissions (Scope 1) and indirect emissions related to electric power production (Scope 2). A baseline is established as the average emissions from the new vehicles introduced to the market, EV's excluded.

2 Electric Vehicles – general description

Personal mobility in Norway is among the highest in Europe, with privately owned passenger vehicles accounting for most of the passenger transportation work. Figure 1 shows the nature of passenger transport in Norway compared to other selected countries.

Historical figures of how far the average passenger vehicle is driven annually in Norway, show a falling slope from 2007 and 2008, when the passenger vehicles peaked and were on average driven about 14,000 km. In 2022 the average passenger vehicle travelled about 11,100 km[4] in Norway. The expected yearly travelled distance for the vehicles in the portfolio is in this analysis estimated based on an expectation of a continuing trend of reduced yearly travelled distance, and as an average in the vehicles' lifetime.

[1] https://www.santanderconsumer.no/om-oss/investor-relations/green-bonds/
[2] https://www.climatebonds.net/standard/transport
[3] https://ec.europa.eu/info/law/sustainable-finance-taxonomy-regulation-eu-2020-852/amending-and-supplementary-acts/implementing-and-delegated-acts_en
[4] SSB Road traffic volumes, by main type of vehicle, type of fuel and age of vehicle 2005 - 2022, 2023

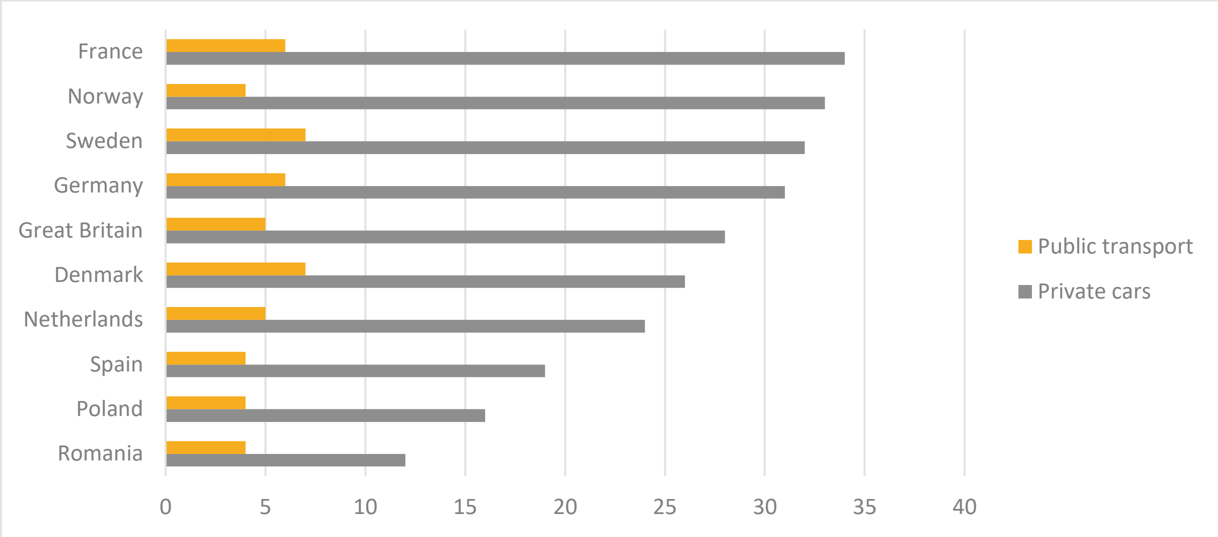


Figure 1 Passenger transport in selected countries [passenger kilometre per person per day] (Source: Statistics Norway[5]/Eurostat, 2014).

In 2022 the average age of passenger vehicles scrapped for refund in Norway was 18 years old[6]. The history of modern EV's is short and there is yet no evidence for the lifetime of EV's being different from other vehicles. Due to big uncertainties related to the expected lifetime of new vehicles sold between 2011 and 2022, the average lifetime is set to 18 years in this analysis independent of fuel type.

2.1 EV policy in Norway

The Norwegian government have over time, with different administrations, had high ambitions both regarding electric vehicles and biofuel to reduce CO_2-emissions. There were 599,000 electric passenger vehicles on Norwegian roads by the end of 2022, which accounts for 20 percent of the total passenger vehicle stock[7]. The Norwegian Parliament have unanimously adopted a target of 100 percent sales of zero light-duty and passenger vehicles from 2025[8].

A broad consensus around gradually expanding the Norwegian EV-politics has been sustained in parliament. The Norwegian EV policy, one of the world's most ambitious EV policies, was made effective by the tax exemption on VAT and the steep registration tax, in addition to a series of initial benefits like free fares on the many toll roads, ferries, free parking and free charging in cities.

In 2023, the Norwegian government adjusted the previous VAT exemption to only be applicable up to 500,000 NOK of the purchase price. Additionally, EV vehicles now need to pay a registration fee, to the same degree as fossil fuel vehicles. Many of the other benefits have been reduced and EVs are currently paying up to a maximum, by law, of 70 percent for toll roads, and 50 percent for parking and ferries.

2.2 Biofuel policy in Norway

Norway has an ambitious biofuel policy, with a 50 percent reduction in greenhouse gas (GHG) emissions from fossil fuel from 2018[9]. In 2018 legislation was put in place to require all petrol retailers to sell fuel containing biofuels. The goal has since been advanced, with a special emphasis on avoiding

[5] https://www.ssb.no/transport-og-reiseliv/artikler-og-publikasjoner/koyrer-nest-mest-i-europa
[6] SSB 05522: Vehicles scrapped for refund (C) 1999 - 2022, 2023
[7] https://www.ssb.no/transport-og-reiseliv/landtransport/statistikk/bilparken
[8] https://www.regjeringen.no/no/tema/transport-og-kommunikasjon/veg_og_vegtrafikk/faktaartikler-vei-og-ts/norge-er-elektrisk/id2677481/
[9] Produktforskriften kapittel 3: Omsetningskrav for biodrivsoff og bærekraftskriterier for biodrivstoff og flytende biobrensel, Lovdata, 2019

the usage of biofuels with a high risk of increasing deforestation[10]. As of 2023, the percentage of advanced biofuel of the overall quota obligation (24.5 percent) is set at 12.5 percent. To incentivise the use of advanced biofuels, one litre of advanced biofuels is counted as two litres of conventional biofuel, for every litre that exceeds the 12.5 percent advanced biofuel requirement. Subsequently, the overall use of advanced biofuel has increased year after year. In 2022, advanced biofuels accounted for 94 percent of the overall biofuel usage, thus reducing the usage of conventional biofuels[11]. As a result, the overall volume of biofuel has declined the past years, even though the percentage of biofuels has increased. The current government platform ("Hurdalsplattformen") strengthens the obligations to utilize second-generation biofuels in the fuels sold[12].

In 2020, a road tax (no; veibruksavgift) for all biofuel was introduced. The taxation of bioethanol is significantly lower compared to standard gasoline, but the road tax for biodiesel is equal to conventional diesel[13]. Previous estimates from 2018 concluded that biofuel used in Norway resulted in 72 percent lower GHG emissions in a life cycle perspective compared to regular fuels[14]. The same year, legislation was passed stipulating that biofuels shall have a minimum of 50 percent lower life cycle GHG emissions than fossil fuels[15].

In 2022, 94 percent of the biofuel utilized in the Norwegian transportation sector stems from waste and residue, most of it imported from North America, and China. Biofuels accounted for 13 percent of all fuels consumed by domestic road traffic in 2022- a similar level to 2021. The share of biofuels sold in Norway containing soy or palm oil is also below 0.5 percent, aligning with the target to reduce the usage of raw materials with a high risk for deforestation[16].

3 Climate gas emissions (Scope 1 and 2)

Categorizing the emissions, we have chosen to use the CBI guidelines for the Scope 1, Scope 2 and Scope 3 emission calculations. CBI's *Land Transport Background Paper*[17] underlines the focus on tailpipe emissions because of their dominance, the need to send strong signals to vehicle purchasers and the need to promote technologies and infrastructure that have the potential to radically shift emissions trajectories and avoid fossil fuel lock-in. We do however include information on indirect emissions related to power production.

3.1 Indicators

In this analysis we are using this relevant climate gas emission indicator for vehicles:

- Emissions per kilometre [gCO_2/km]

The passenger vehicle fleet composition and emissions from the types of passenger vehicles is used to calculate the emissions per kilometre.

3.2 Direct emissions (tailpipe) - Scope 1

Under scope 1 of the "Low Carbon Land Transport and the Climate Bonds Standard (Version 1.0)" we calculate the "Direct tailpipe CO_2 emissions from fossil fuels combustion" avoided.

[10] https://www.regjeringen.no/no/dokumenter/politisk-plattform/id2626036/
[11] https://www.miljodirektoratet.no/aktuelt/nyheter/2023/mai-2023/mer-frityrolje-og-slakteavfall-pa-tanken-i-2022/
[12] https://res.cloudinary.com/arbeiderpartiet/image/upload/v1/ievv_filestore/43b0da86f86a4e4bb1a8619f13de9da9afe348b29bf24fc8a319ed9b02dd284e
[13] https://www.skatteetaten.no/satser/veibruksavgift/?year=2023#rateShowYear
[14] https://www.miljodirektoratet.no/aktuelt/nyheter/2019/mai-2019/salget-av-avansert-biodrivstoff-okte-i-fjor/
[15] https://lovdata.no/dokument/LTI/forskrift/2022-12-20-2356
[16] https://www.miljodirektoratet.no/aktuelt/nyheter/2023/mai-2023/mer-frityrolje-og-slakteavfall-pa-tanken-i-2022/
[17] https://www.climatebonds.net/files/files/CBI_Background%20Doc_Transport_Jan2020%20.pdf page 25

The estimation of the baseline is performed through three steps:

1. Estimating the gross CO_2-emission per km (c) from the average vehicle that is being substituted by the zero-emission vehicle.
2. Multiplied by the number of km (d) the vehicle is estimated to travel.
3. Multiplied by the number (n) of vehicles substituting fossil vehicles in the portfolio.

This can be described in the following equation:

$$E_{baseline} = c_{weighted\ average} \cdot d_y \cdot n_{total} = E_{avoided} \qquad (1)$$

All EVs and fuel cell vehicles are considered eligible with zero tailpipe emissions. Therefore, for scope 1 calculations, the emissions from these vehicles are set to zero, and the baseline will amount to the total avoided emissions.

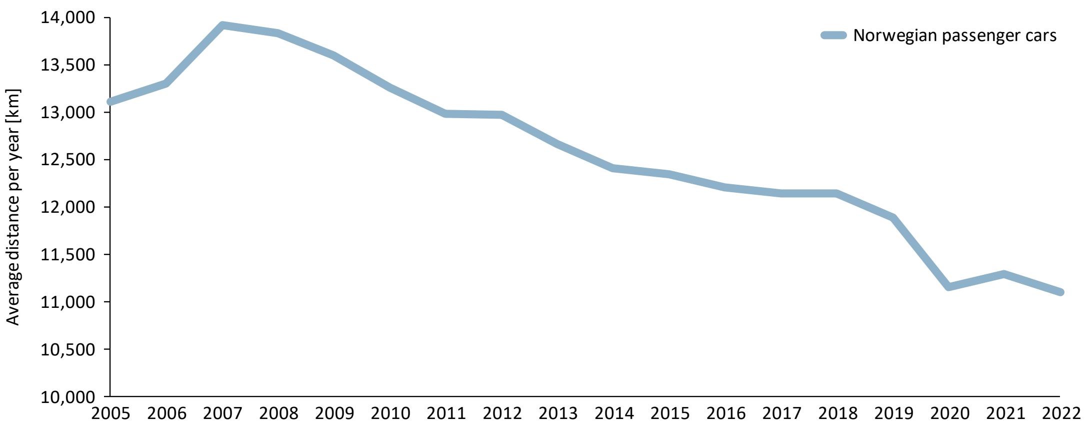
To estimate the annual emissions avoided by the eligible assets, projections are made for direct tailpipe CO_2-emissions from fossil fuels combustion in the national passenger vehicle fleet.

For the substituted fossil-fuelled vehicles, emission data are retrieved from recognized test methods and not actual registrations of emissions in a Nordic climate. Test methods have lately been improved to better reflect actual emissions but are still likely to underestimate the emissions[18].

Biofuels are to some degree mixed with fossil fuels, and the reduced emissions due to these contributions are considered in the emissions from the vehicle that would have been bought as an alternative for the electric vehicle in this portfolio, in effect reducing the climate impact of zero-emission vehicles. As Norway is aiming at substantially reducing emissions from fossil fuelled vehicles through use of biofuel in the fuel sold before 2030, the marginal emission reduction possibly obtained through these political goals between 2020-2030 have been accounted for in the analysis. It is assumed that the biofuel share in the fuel mix will remain constant between 2030 and 2038.

To estimate the weighted average of emissions per fossil passenger vehicle ($c_{weighted\ average}$) we use the average annual emission from new passenger vehicle models from 2011-2022[19].

To estimate the distance travelled by the average passenger vehicle we assume that EVs drive the average of the total passenger vehicle portfolio in each country each of the 18 years it is used. Statistics of annual driven distance by electric, diesel and gasoline cars younger than 10 years builds up under this assumption[4].



[18] https://www.vegvesen.no/fag/fokusomrader/miljo+og+omgivelser/klima

[19] https://ofv.no/CO2-utslippet/co2-utslippet

Figure 2 Average travelled distance per passenger vehicles 2005-2022 [km] (Source: Statistics Norway[4] [20]).

Traffic volumes per passenger vehicle have shown a historic decline and we use linear regression on publicly available dataset (d_{2005}-d_{2021}) and extrapolate until 2040. This is a conservative approach as it is likely, at some point, to see a flattening.

Table 1 presents the calculated emission factors and CO_2-emissions in a year for the relevant vehicle category. The calculations are based on calculated gross tailpipe CO_2-emissions for the average vehicle produced in each of the years between 2011-2022, biofuel- and fossil fuel content in petrol/diesel pumped in each year between 2022-2040, as well as the travelled annual distance for the average vehicle.

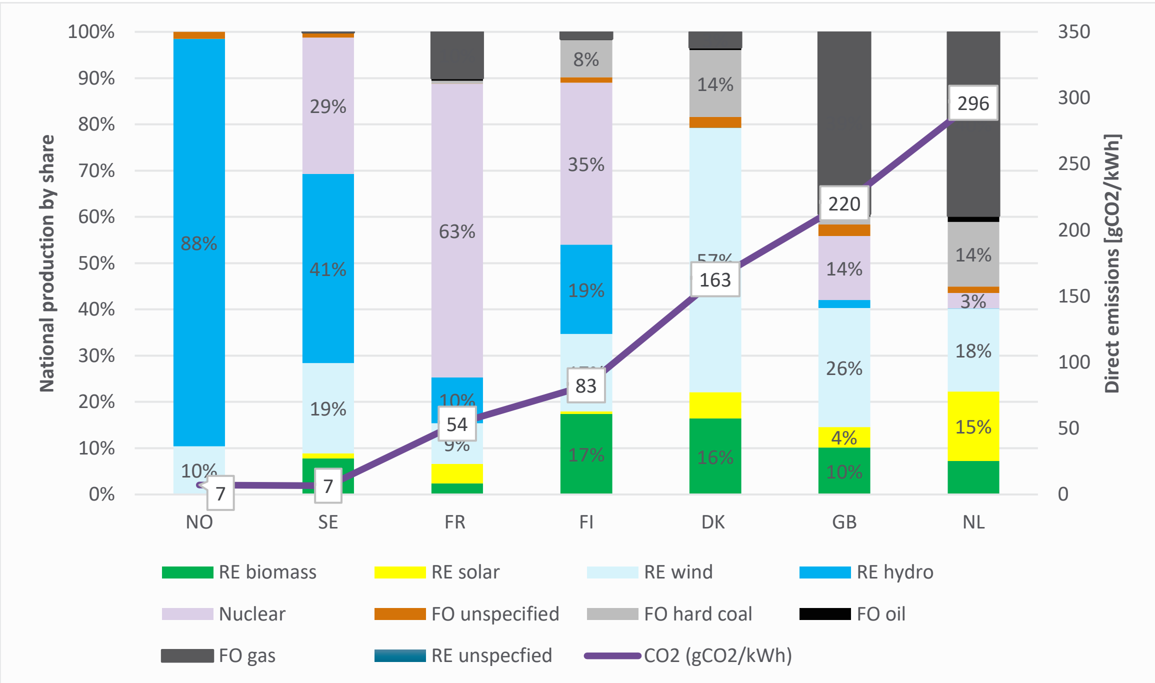
Table 1 Passenger vehicles: Greenhouse gas emission factors (CO2- equivalents) for substituted fossil vehicles and EV's, average direct emissions.

	Direct emissions substituted fossil passenger vehicles – Average Norway	Direct emissions EV
Emissions per km	77 gCO_2/km	0 gCO_2/km
Emissions per vehicle per year	646 $kgCO_2$/vehicle/year	0 $kgCO_2$/vehicle/year

3.3 Indirect emissions (Power consumption only) - Scope 2

3.3.1 Electricity production mix

In 2022, renewables accounted for 98 percent of the total (145.9 TWh) Norwegian electricity production[21]. As shown in Figure 3, the Norwegian production mix in 2022 (88 percent hydropower and 10 percent wind[21]) resulted in emissions of 7 gCO_2/kWh. In the figure, the production mix is included for other selected European states for comparison.



[20] SSB 12575: Road traffic volumes, by type of vehicle and age of vehicle 2005 - 2022, 2023
[21] SSB 08307: Production, imports, exports and consumption of electric energy (GWh) 1950 - 2022, 2022

Figure 3 National electricity production mix in some selected countries (Source: European Residual Mixes 2022, Association of Issuing Bodies[2222]).

3.3.2 CO_2- emissions related to electricity demand

Power is traded internationally in an interconnected European electricity grid. For impact calculations of all power consumption, and even electrification of transportation, the regional or European production mix is more relevant than the national power production mix and is the basis for the main analysis. We have, however, also included calculations of indirect emissions from power production setting the system boundary at national borders.

The direct emissions in power production in Europe (EU27 + UK + Norway) is expected to be dramatically reduced the coming decades. Figure 4 illustrates the emission trajectory used as basis for scope 2 emission calculations for EV's. The trajectory takes into consideration the 1.5°C scenario and a substantial reduction of emissions in the power sector that will have close to zero emissions in 2040. This is in line with the EU's ambitious decarbonizing the power sector[23].

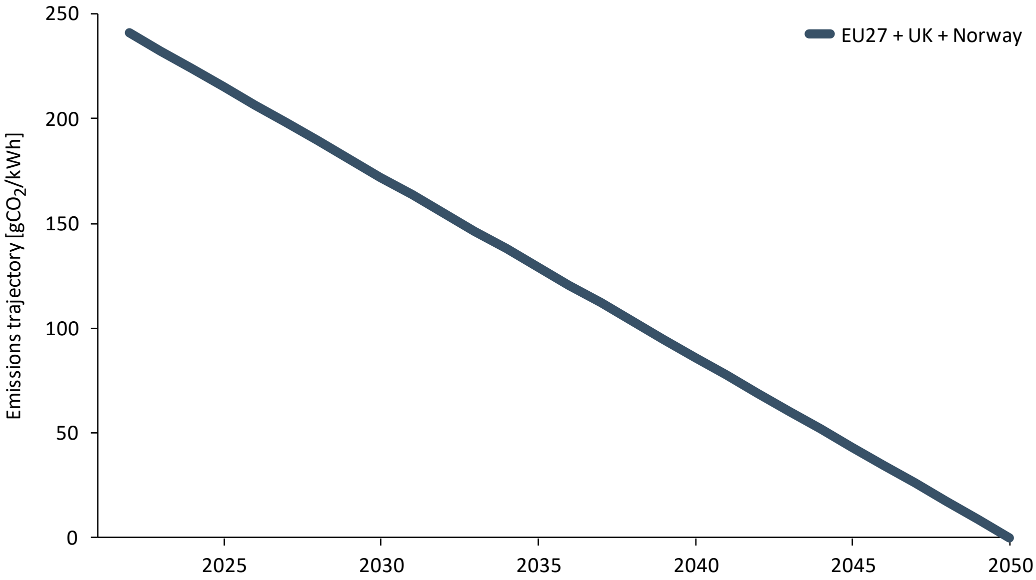


Figure 4 Direct CO_2 emissions in European electricity production mix, trajectory from 2022 to a zero target in 2050 (Source: EU, Multiconsult, Association of Issuing Bodies).

The GHG emission intensity baseline for power consumption may be calculated with different system boundaries. For this section a three-year average emission factor for power in Europe and Norway is applied. In Table 2, the CO_2-emissions related to yearly power production calculated by the Association of Issuing Bodies[24] are included for all European countries except Iceland, Cyprus, Ukraine, Russia and Moldova, and for Norway. The most recent numbers are for 2022, so the interval 2020-2022 is used.

Table 2 Electricity production greenhouse gas factors for European and Norwegian production mixes (CO2-equivalents) (Source: Association of Issuing Bodies[24]).

Scenario	CO_2- factor
European (EU27+UK+Norway) production mix average 2020- 2022	241 gCO_2/kWh
Norwegian production mix average 2020- 2022	6.4 gCO_2/kWh

[22] https://www.aib-net.org/facts/european-residual-mix, 2023
[23] http://www.europarl.europa.eu/RegData/etudes/BRIE/2019/631047/IPOL_BRI(2019)631047_EN.pdf
[24] https://www.aib-net.org/facts/european-residual-mix, 2023

Using a European production mix is in line with Nordic Public Sector Issuers: Position Paper on Green Bonds Impact Reporting (February 2020)[25]. The following calculations use the CO_2- factor as an average from a baseline in 2022 (the European production mix in Table 2) and the expected lifetime for each type of vehicle, following the trajectory of the European production mix in Figure 4. For passenger vehicles, with an expected lifetime of 18 years, the CO_2- factor will then be an average of the CO_2-factors presented in Table 2 in the period from 2022-2039. The projected trajectories for declining CO_2 emissions related to power production, from 2022 and forward, will impact the indirect emissions and avoided emissions from the vehicle portfolio.

The energy consumption of EV's is very much dependent on size and outdoor temperature. There is not sufficient available data to ensure an accurate estimation of energy consumption for the average EV. In these calculations we are using the average for all currently available EV models in the Electrical Vehicle Database[26], 0.2 kWh/100 km. In Table 3 and Table 4 emission factors are presented both for a European power production mix and a Norwegian power production mix.

Table 3 Indirect emission GHG-factors for annual average of electricity consumption (CO2- equivalents) for EV's, European and Norwegian power production mixes.

	Electric passenger vehicles – annual average
Indirect emissions per km from European power production	33.2 gCO_2/km
Indirect emissions per km from Norwegian power production	0.9 gCO_2/km

Table 4 Indirect emission GHG-factors for annual average of electricity consumption (CO2- equivalents) for fossil fuelled alternatives, European and Norwegian power production mixes.

	Fossil vehicles [27] – annual average
Indirect emissions per km from European power production	0 gCO_2/km
Indirect emissions per km from Norwegian power production	0 gCO_2/km

[25] https://www.kbn.com/globalassets/dokumenter/npsi_position_paper_2020_final_ii.pdf
[26] https://ev-database.org/cheatsheet/energy-consumption-electric-car
[27] Note that there are indirect emissions related to fossil fuel as well, but scope 3 emissions are not included in this analysis. Scope 3 emissions differ between fossil and electric vehicles mostly due to the batteries where there is rapid technology development.

4 Portfolio analysis and impact assessment - avoided emissions EVs

The 64,641 eligible vehicles in Santander Consumer Bank's FY23 portfolio are estimated to drive 561 million km per year. The available data from the bank includes the current number of contracts and related portfolio volume.

Table 5 Number of eligible passenger vehicles, expected yearly mileage and outstanding loan balance (Source: Santander Consumer Bank).

	Number of vehicles	Sum distance	Sum balance outstanding
Passenger vehicle portfolio	**64,641**	**561.3 mill. km/year**	**NOK 20.3 billion**

The table below summarise the lower CO_2-emissions compared to baseline for the eligible assets in the portfolio in an average year in the lifetime of the vehicles in the portfolio, presented as reductions in direct emissions and indirect emissions. Note that the indirect emissions are only calculated for EV's and not fossil fuelled vehicles.

In the analysis, it is assumed that for each additional EV in the portfolio, this car replaces a fossil car from the same purchase year. Given the increase in EVs in car sales in Norway, the average car in Norway now has significantly lower emissions than the average fossil car. If instead each EV were to replace an average car across fossil fuels and EVs, that would decrease the avoided emissions significantly.

Direct emissions in the following Table 6 are calculated by multiplying distance travelled by the vehicles in the portfolio in a year, by the specific emission factor [gCO_2/kWh] in Table 2. Indirect emissions are calculated by multiplying distance travelled by the vehicles in the portfolio in a year by the specific emission factors [gCO_2/km] in Table 3 through Table 4.

Table 6 The portfolio's estimated impact on GHG-emissions, indirect emissions based on European and Norwegian power production mix.

	CO_2-emissions compared to baseline **European** power production mix	CO_2-emissions compared to baseline **Norwegian** power production mix
Direct emissions only (Scope 1)	- 43,368 tonnes CO_2/year	- 43,368 tonnes CO_2/year
Indirect emissions only (Scope 2, European and Norwegian mixes)	18,382 tonnes CO_2/year	493 tonnes CO_2/year
Sum direct and indirect	**- 24,986 tonnes CO_2/year**	**- 42,875 tonnes CO_2/year**

The reduction in direct emissions based on European power production mix correspond to 18 million litres gasoline saved per year.

5 Impact related to green instruments

The impact assessment in the previous section describes the total green portfolio (Norwegian electric passenger vehicles) of Santander Consumer Bank AS. The following sections refer to existing green bond issuances by Santander Consumer Bank AS and Santander Consumer Finance S.A. per 31.12.2023, and the impact related to specific issuances as calculated per the same date.

Share of impact is here calculated based each issuance's share of outstanding balance from Table 5 and impact from Table 6, based on European power mix.

5.1 Green instruments issued by Santander Consumer Bank AS

Table 7 Impact related to green instruments issued by Santander Consumer Bank AS per 31.12.23.

Instrument number (ISIN)	Instrument due date	Principal	NOK equivalent balance outstanding [28]	CO_2-emissions compared to baseline European mix, as calculated per 31.12.23
XS2287887322	January 2026	SEK 500 million	NOK 503,850,000	- 619 tonnes CO_2/year
XS2337104660	September 2024	SEK 1 billion	NOK 1,007,700,000	- 1,238 tonnes CO_2/year
NO0011146409	November 2024	NOK 750 million	NOK 750,000,000	- 922 tonnes CO_2/year
NO0011146425	November 2026	NOK 250 million	NOK 250,000,000	- 307 tonnes CO_2/year
Total			**NOK 2,511,550,000**	**- 3,086 tonnes CO_2/year**

5.2 Green instruments issued by Santander Consumer Finance S.A.

Table 8 Impact related to green instruments issued by Santander Consumer Finance S.A. per 31.12.23.

Instrument number (ISIN)	Instrument due date	Principal	NOK equivalent balance outstanding [28]	CO_2-emissions compared to baseline European mix, as calculated per 31.12.23
-	-	-	-	-

[28] NOK equivalent amount: 1 SEK = 1.0077 NOK per end of December 2023