metrotenerife

GREEN BOND ALLOCATION AND IMPACT REPORT

2023

INDEX

EXECUTIVE OVERVIEW

At the end of July 2021, Metropolitano de Tenerife issued its first green bond with a volume of €130 million and a maturity of 15 years. The issuance was made in accordance with Metropolitano de Tenerife's Green Bond Framework 2021, designed according to the ICMA Green Bond Principles (2018) and verified by Sustainalytics and S&P. The bond funds would be used to finance green projects, in particular the refinancing of the tram line infrastructure and the financing of the photovoltaic plant integrated into the transport system infrastructure. The projects are linked respectively to the clean transport and renewable energy categories. The projects are expected to contribute to the achievement of Sustainable Development Goals 7 (Affordable and Clean Energy), 9 (Industry, Innovation and Infrastructure), 11 (Sustainable Cities and Communities) and 13 (Climate Action). It has been estimated that, thanks to the operation of the tramway and in the period 2018-2022, annual greenhouse gas emissions avoided have been 1,529.94 tCO_2 e per year.

1. INTRODUCTION

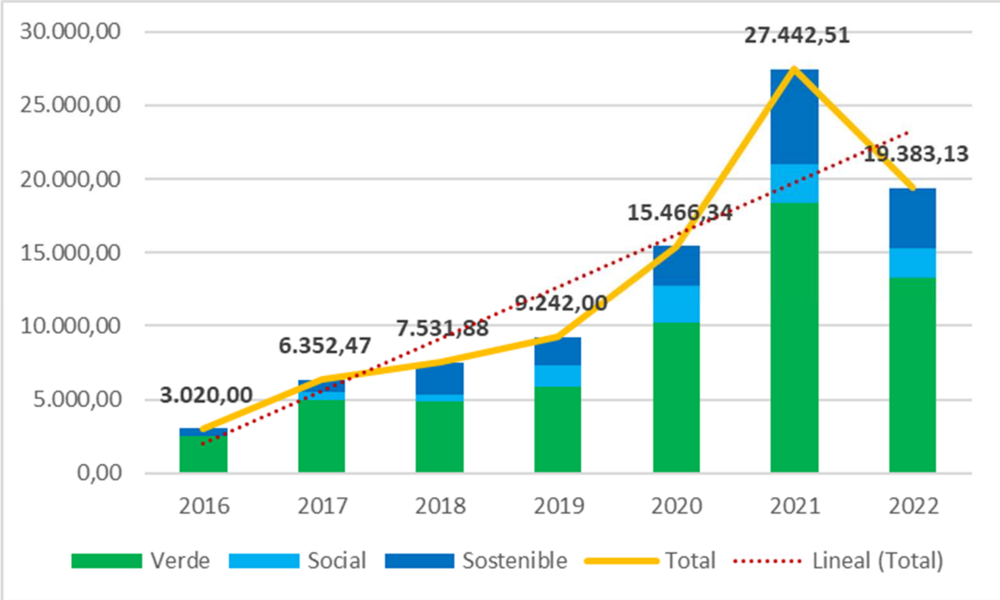
1.1 BR EVE DESCRIPTION OF THE CONTEXT

The European Investment Bank issued the first green bond in 2007. In Spain, within the public sector, the pioneer entity in issuing sustainable bonds was the government of the Community of Madrid, which has been followed by many other regional and local entities. At the level of green bonds specifically, ADIF, ICO have been the first entities to start with this type of debt, until Metropolitano de Tenerife, the Government of Spain and the Community of Madrid joined the market in 2021. In the private sector, there is a greater diversity of issuers in sustainable and green debt, given that various industrial, infrastructure, energy, telecommunications and engineering entities have joined as bond issuers in recent years.

There is an increasing trend of financial resources destined to finance sustainable projects, as can be seen in the trend line in figure 1. Although there has been a recession in 2022 compared to 2021, specifically by 29.37%. This decline may be linked to the slowdown in the economy generated by the sale of bonds and the increase in interest rates.

A detailed analysis of sustainable bond issuance by 2022 shows that green bond issuance was 68.44%, far higher than sustainable and social bond issuance at 21.14% and 10.42% respectively. The prevalence of green bond issuance over sustainable bond issuance is maintained, although total issuance has decreased, and the cause may be the imperative need to accelerate the transition to sustainable development based on a decarbonised economy and to reduce dependence on fossil energy resources.

Figure 1. Green, social and sustainable bond issuance in Spain (million €).



Source: Own elaboration based on Bloomberg, December 2022.

1.2 MAIN OBJECTIVES OF THE REPORT AND DESCRIPTION OF THE VOUCHER

This report is based on the premise conveyed by the International Capital Market Association (ICMA):

"Green bond issuers are encouraged to report on resource use as well as expected environmental impact at least annually"[1] .

Metropolitano de Tenerife S.A. (Metrotenerife) is a public transport company[2] founded in 2001 with the aim of developing new alternative public transport solutions in the form of railway lines and linking the island's two major cities by light rail. The Cabildo Insular de Tenerife saw the need to address the transport problem in the Metropolitan Area of Santa Cruz de Tenerife and San Cristóbal de La Laguna, given the increasing density and complexity of the road network, the increasing traffic intensity on urban and interurban roads and the resulting pressures on the island environment. In addition, the island environment is limited and topographically difficult. This project is ambitious and is located in a geographical area with many technical difficulties (steep slope, route on the main roads of the cities). It is also a novel project for the public, but

[1] ICMA et al. (2018, 2020): Handbook. Harmonized Framework for Impact Reporting. Translation by Afi. https://www.icmagroup.org/assets/documents/Regulatory/Green-Bonds/Handbook-Harmonized-Framework-for-Impact-Reporting-December-2020-151220.pdf

[2] Wholly owned by the Cabildo Insular de Tenerife, Metrotenerife is a solid and self-sufficient company with revenues from the two tram lines covering all operating and maintenance costs.

one that brings with it a series of positive externalities for the transport system, such as speed, reliability, punctuality and lower environmental impact.

Metrotenerife is headquartered in Spain. In order to build an island-wide rail network, Metrotenerife is working on rail projects in the north and south of the island. At the same time, the company is improving existing facilities and developing other projects to further expand and propose innovative solutions in public transport.

The rail transport sector will play a key role in achieving the EU's commitments to reduce greenhouse gas (GHG) emissions by at least 40% by 2030, as well as the goal of climate neutrality by 2050. As a provider of public transport services in the metropolitan area of Tenerife, Metrotenerife intends to make a major contribution to this commitment at local level. Indeed, rail transport is the most efficient means of transport in terms of energy consumed. The development and use of trains can reduce air pollution and GHG emissions, and therefore contribute to the fight against climate change.

Metrotenerife is aware of the importance of offering a transport service that contributes to sustainable development while meeting the travel needs of its citizens. It is committed to moving Tenerife towards a more sustainable, accessible and intelligent mobility system. In this sense, the company aims to be a key player in sustainable public transport and one of the main axes in the island's transport system.

In particular, Metrotenerife is deeply convinced that green bonds are an effective financing tool to fill the financing gap that is necessary to combat climate change and thus to transition to a carbon neutral world. Through its first green bond issue, it strives to contribute to the development of the Sustainable Debt Market by providing both itself and the investment community with an opportunity to channel proceeds towards the financing of green projects (see Use of funds).

In compliance with the Green Bond Principles (GBP; ICMA, 2018), this report follows the indications outlined in its fourth component: the preparation of an allocation report. Although these principles are not mandatory, they stand as the reference framework in the sustainability debt market. This report also takes into account the Harmonised Framework for Impact Reporting (ICMA, 2020).

The purpose of this report is to provide information on the allocation of funds from the inaugural green bond issued by Metropolitano de Tenerife on 20 July 2021. Its issue volume was €130 million (for more details, see table 1).

In November 2019, Standard & Poor's assigned Metrotenerife its 'A/A-1' long-term and short-term ratings with a stable outlook. This is equal to the rating of the Kingdom of Spain.

Table 1. Financial terms and conditions of the inaugural green bond of Metropolitano de Tenerife

Terms and Conditions

Emitter	**Metropolitano de Tenerife.** *Ratings*: A (Negative-outlook) by S&P
ISIN	ES0205597000
Pricing date	20 July 2021
Date of assignment	30 July 2021
Expiry date	30 July 2036
Volume	130 million
Coupon	1,229
Differential	SPGB[3] Interpolated Curve (07/35 & 07/37) + 55bps
Listing	IBERCLEAR / AIAF

Source: Metrotenerife, Bloomberg, Afi

Following the ICMA Green Bond Principles (GBP), Metrotenerife's Green Bond Framework[4] sets out the guidelines to be followed in its green bond issuance, in the form of four key components:

i. **Use of funds**

This section defines the eligibility criteria for green expenditures and classifies them into 2 green categories, clean transport and renewable energy. This component also specifies:

- Eligibility criteria.
- The typology of projects that could be included in each category of expenditure.
- Contribution to the United Nations Sustainable Development Goals (SDGs).

[3] Spanish government bonds.

[4] https://inversor.metrotenerife.com/aptdo-elemento/marco-de-bonos-verdes/

ii. **Project evaluation and selection process**

Metrotenerife is responsible for the financing strategy of the infrastructure projects to be operated by Metrotenerife, which must be previously approved by the Island Government of the Cabildo of Tenerife.

Metrotenerife has established a Green Bond Committee that proposes to Metrotenerife's Board of Directors the financing of new infrastructure or the refinancing of existing infrastructure in line with the eligibility criteria defined in the Green Bond Framework.

The Green Bonds Committee builds and supervises Metrotenerife's green portfolio of eligible green projects. It is responsible for eliminating those projects that are no longer eligible, which could be replaced by new eligible green projects if deemed necessary.

iii. **Management of funds**

On an annual basis, the Green Bonds Committee will monitor the green portfolio in order to ensure that the total amount of eligible green projects exceeds the total amount of Green Bonds issued. In the event that there are insufficient eligible green projects in the portfolio, Metrotenerife will invest the balance of the net proceeds in cash or equivalent instruments in accordance with its cash management policy.

In case of refinancing, and taking into account that project costs will have been fully disbursed in the past, no separate revenue management is required.

iv. **Reporting**

Metrotenerife will provide investors and other stakeholders with a report on the net revenue allocation and environmental impact of the eligible green projects financed. This report responds to the requirements of this fourth component.

The report will be available on the website of Metrotenerife: https://metrotenerife.com/home/

The structure of this report is organised in three sections and an annex. Section 2 describes the methodology used and assumptions made to prepare this report. The second section (point 3) is devoted to the description of the allocation of funds to green projects, together with relevant financial and qualitative information on the projects funded. It ends with section 3 (point 4) where the analysis of results and impact from a sustainability point of view is found and Annex I is used for further information.

2. METHODOLOGY AND ASSUMPTIONS

This section explains how resources have been allocated and their impact has been measured. Following the ICMA (Harmonised Framework for Impact Assessment) guidelines, qualitative and quantitative indicators have been collected for each selected project. Therefore, this analysis has been carried out on a project-by-project basis, and not at programme level. All results described in the following sections are based on this methodology.

The set of **quantitative monitoring** and **impact indicators** has been selected according to their ability to determine and show the extent to which an objective has been achieved. In particular, the indicators should be:

- **Relevant**: they should make it possible to analyse the impact on the socio-economic environment by measuring the achievements or results generated by the funded projects.
- **Meaningful**: they should be able to monitor progress in a way that facilitates the communication of results to key stakeholders.
- **Reliable**: they should allow information to be quantified and updated as it evolves over time. The reliability of indicators depends on how the information is collected and processed, the credibility of the sources and the quality control processes of the information.

In this report we will distinguish between outcome indicators and impact indicators, where the first type refers to the tangible services produced as a result of the projects and the second to the long-term changes resulting from the projects. In the case of the selected impact metric, i.e. the estimation of annual GHG emissions avoided, the methodology used is detailed in section 4.2 and the assumptions adopted are set out in Annex I.

3. RESOURCE ALLOCATION AND IMPACT

3.1 QUALITATIVE ANALYSIS OF FUNDED PROJECTS

This section describes the list of refinanced and financed projects. In particular, it introduces information on the project name; the project's green category and eligibility criteria; the alignment with the SDGs; and the amount of green bond proceeds allocated to the selected projects. In addition, the target population is also indicated.

The funds are allocated to eligible green projects in one of the two eligible categories, clean transport and renewable energy. Thanks to the financial resources of the Metrotenerife green bond, it has been possible to develop two green projects related to the implementation of the Tenerife tramway:

1. Full early repayment of the above financial structure to finance the infrastructure of the tram lines (see Figure 2).
   This project falls under the clean transport category and contributes to SDGs 9 (Industry, innovation and infrastructure; targets 9.1, 9.5), 11 (Sustainable cities and communities; target 11.2) and 13 (Climate action; target 13.2).

Figure 2. Lines 1 and 2 of the Tenerife tramway.

Source: Metrotenerife Annual Report, 2020

In particular, the funds have refinanced the infrastructure of the tram lines (light rail lines 1 and 2).

In the first years after the foundation of Metrotenerife (see section 1), mobility studies, environmental impact studies, construction projects and territorial plans were carried out, so that the investment began to be presented as a real project. The economic quantification of the cost of execution and the search for the necessary funds was carried out in two ways: by signing collaboration agreements with all the corporations involved and through financing with banks.

The construction and commissioning of line 1 was carried out in 2007. Subsequently, in 2008, with the experience acquired, Metrotenerife began the construction of line 2 of the light metro, which was completed in 2009, the year in which it came into operation.

2. Lease contracts for a photovoltaic plant (Phase I and Phase II)

   The second project concerns the lease contracts for the photovoltaic plant. This project falls under the renewable energy category and contributes to SDG 7 (Affordable and clean energy; target 7.2) and SDG 13 (Climate action; target 13.2).

   The photovoltaic plant is integrated into the transport system infrastructure. In 2008, Metrotenerife carried out the photovoltaic plant investment project, which was installed on the roof of the building that serves as workshops and depots of the tram infrastructure. In particular, the photovoltaic plant was installed in two phases. The installation of the first phase started in July 2008 while the second phase started in September of the same year. The photovoltaic plant became operational in September 2008 (phase I) and in January 2009 (phase II).

3.2 FINANCIAL INFORMATION

Tables 2 and 3 present the summary of the main figures of the financing structure of the tram infrastructure, divided into 4 parts:

- Total costs of the tram infrastructure (lines 1 and 2) and the costs of the investment in the photovoltaic plants.
- Pre-financing agreements:
  - (A) Allocation of green bond revenues: project (1) and project (2)
  - (B) Balance of unearmarked revenue

Table 2. Previous financial structure.

Execution costs of the projects for lines 1 and 2 of the Tenerife Tramway.	
Total cost line 1	342.705.208,00 €
Total cost line 2	60.743.326,00 €
Investment cost of the photovoltaic plant integrated in the transmission system infrastructure	
Total cost of photovoltaic plant	4.977.808,98 €
Total cost	408.426.342,98 €
In order to partially finance these projects, several financing contracts were signed.	
Financing costs (financing contract and loan with bank syndicate)	117.644.000,00 €
Unamortised financing costs (at the time of issuance of the green bonds, 20 July 2021)	93.838.350,00 €
Cost of interest rate risk hedging transactions (value as at 20 July 2021)	33.900.000,00 €
Total financing costs	**127.738.350,00 €**

Source: Own elaboration based on Metrotenerife data.

Table 3. Allocation of funds to projects 1 and 2 (A) and remaining funds (B).

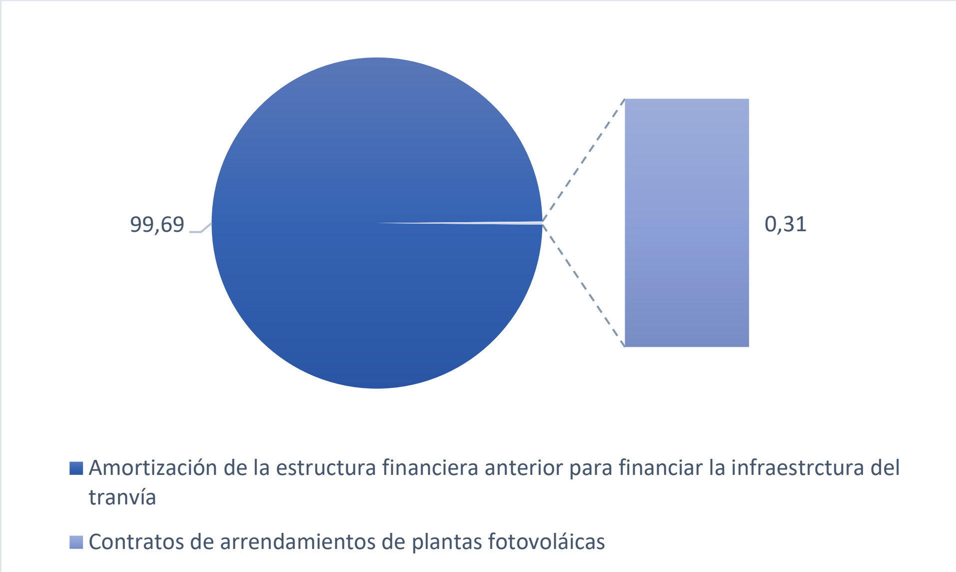
A. Allocation of funds from the green bond issue (€130M)	
(1) Full early amortisation of the previous financial structure	
Debt cancellation of financing contracts	127.738.350,00 €
Total allocated (1)	**127.738.350,00 €**
(2) Lease contracts for photovoltaic plant (phase I and phase II)	
Lease payments - Photovoltaic Plant Phase I	396.806,43 €
Lease payments - Photovoltaic Plant Phase II	224.889,58 €
Total allocated (2)	**621.696,01 €**
Total allocated funds (1+2)	**128.360.046,01 €**
B. Balance of unallocated funds (carryover)	
Remaining total	**1.639.953,99 €**

** The remaining balance to be allocated will be used to pay outstanding lease payments on the photovoltaic plant, to projects to extend the current grid and to the costs of renovation and maintenance of the infrastructure of Lines 1 and 2.*

Source: Own elaboration based on Metrotenerife data.

In financial terms, as can be seen in Figure 3, the refinancing of the financial costs derived from the implementation of the tram (clean transport) has been particularly important. However, the photovoltaic plant (renewable energy) has been equally important in terms of sustainability criteria, as it contributes 14.70%[5] of the total energy consumed annually by the Tenerife tram.

Figure 3. Allocation of funds by eligible green category.



Source: Own elaboration based on Metrotenerife data.

Finally, the remaining funds (1.26% of the bond funds) will be used to pay outstanding lease payments on the photovoltaic plant, projects to extend the current grid, and infrastructure renewal and maintenance costs for lines 1 and 2.

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[5] Cfr. Annual reports of Metrotenerife. Average for the period considered, 2010-2020

4 RESULTS AND IMPACT REPORT

4.1 PERFORMANCE INDICATORS

This section includes quantitative information for monitoring the results derived from the investment in projects 1 and 2.

Project 1. Investment in Metrotenerife tram infrastructure, light rail lines 1 and 2.

- Kilometres of infrastructure built or renovated

Table 4: Kilometres of infrastructure built or renewed

Line 1- km between the stations of Intercambiador and La Trinidad.	12.45 km
Line 2 - km between la Cuesta and Tíncer stations	3.43 km
Total	15,88

Source: Own elaboration based on Metrotenerife data.

- Number of passengers carried annually

Table 5: Number of tram passengers

Year	Passengers
2010	13.946.405
2011	13.973.149
2012	13.191.105
2013	12.459.172
2014	12.726.906
2015	13.273.083
2016	13.490.312
2017	14.158.691
2018	14.757.687
2019	15.554.855
2020	10.313.051
2021	12.543.185
2022	14.981.498

Source: Metrotenerife-Afi

- Number of jobs created

Table 6: Number of employees of Metrotenerife

Year	Number of employees
2007	132
2008	154
2009	187
2010	188
2011	186
2012	181
2013	179
2014	175
2015	179
2016	181
2017	180
2018	180
2019	187
2020	194
2021	206
2022	202

Source: Metrotenerife-Afi

Project 2. Photovoltaic plant integrated into the transport system infrastructure.

The installation of the solar panels was carried out in two phases. First, Phase I was built, a 600 kW plant with a total surface area of 4,698.04 m^2 . The plant consists of 3,680 photovoltaic modules with a maximum power of 175 W and 6 three-phase inverters with a nominal power of 100 kW.

In Phase II, the photovoltaic plant was extended by 280 kW with a total area of 2,132 m^2 . The extension consists of 1,608 photovoltaic modules with a nominal power of 175 W and 3 three-phase inverters with a nominal power of 100 kW.

The average annual production of the photovoltaic plant, from the year of its installation until 2022, is 1,348,378.078 kWh/year. To feed all the energy into the grid, there is a 1,000 kVA15 transformer supplying a three-phase voltage of 20 kV16 at a frequency of 50 Hz.

4.2 IMPACT INDICATOR

The selected impact indicator is the avoided GHG emissions (in tCO_2 e/year) resulting from the implementation of the tramway in Tenerife (Figure 5).

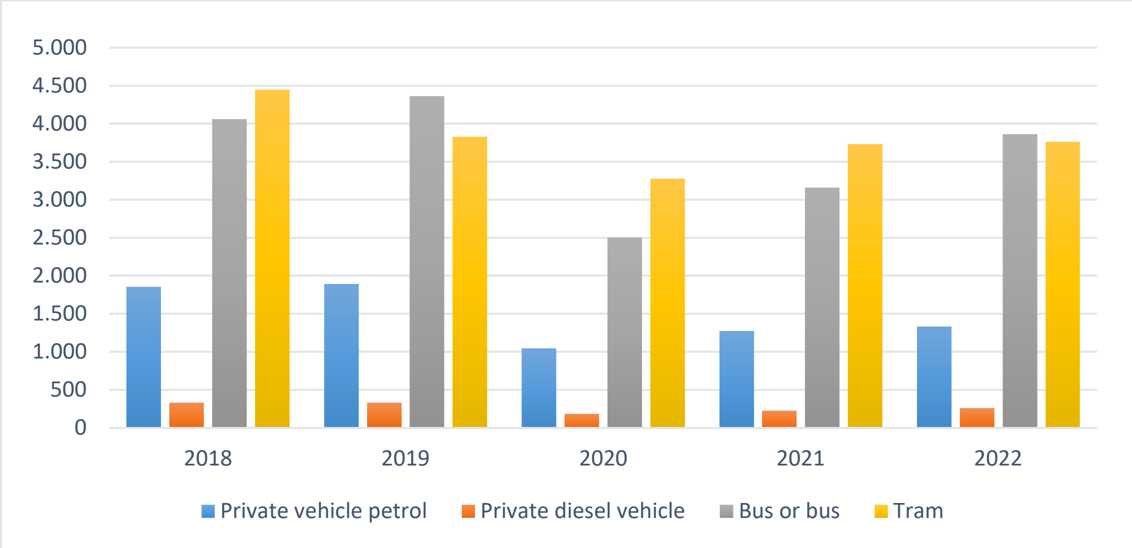
The methodology used to estimate the annual GHG emissions avoided, derived from the use of the Tenerife tramway, consists of comparing (differentiating) two scenarios, the counterfactual scenario or Base Project and the real scenario or Tramway Project. It is based on a set of assumptions included in Annex I.

The counterfactual scenario represents the scenario that would have occurred in the absence of the tram. This scenario considers the alternatives that existed before the tram was built - bus lines (owned by TITSA), private vehicle and taxi (diesel or petrol) and other options that do not generate GHG emissions (cycling or walking) - and estimates emissions by considering a distribution of total tram passengers across these three travel categories based on tram users' preferences for the use of each mode of transport. The GHG emissions calculation of this scenario is summarised as the product of distance travelled by users for each mode of transport by the corresponding factor (see details in Annex I).

The real scenario considers that the tramway exists and estimates the GHG emissions from its operation. In this case, the calculation is the multiplication of the annual energy consumed by the tram traction -electrical energy consumption- and its emission factor.

The evolution of the emissions of t CO_2 e of each mode of transport is shown in Figure 4 for the period under consideration (2018-2022).

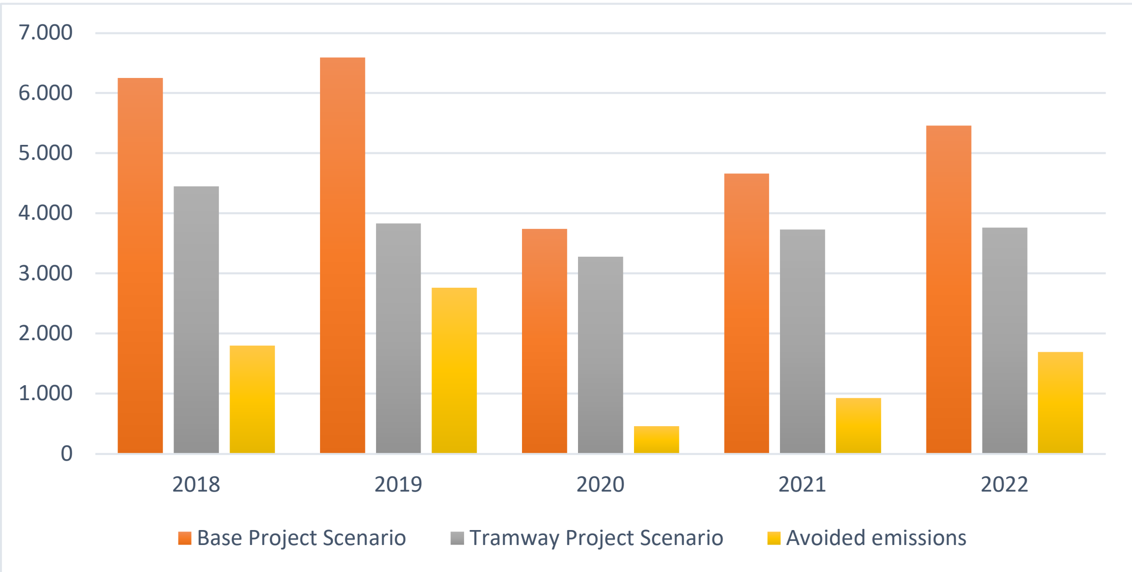
Figure 4. Evolution of GHG emissions (tCO_2 e) for each mode of transport.



Source: Metrotenerife, Afi

The estimated annual avoided GHG emissions are the result of subtracting the GHG emissions generated in the counterfactual scenario (petrol vehicle, diesel vehicle, bus) from the emissions generated in the actual scenario (tram), in tonnes of CO_2 e (tCO_2 e) (Figure 5).

Figure 5. Evolution of GHG emissions in each scenario and estimated avoided emissions (tCO2e)



Source: Metrotenerife, Afi

ANNEX 1

For the estimation of GHG emissions avoided by the use of the tramway for the period 2018-2022, the methodology described below has been followed, which is based on modal shift methodologies in road freight transport (MITECO, 2023).

Scenarios

The criteria for defining the scenarios are as follows:

Criterion 1 (C1): It is considered that all passengers using the tramway would use other means of transport if it did not exist.

Criterion 2 (C2): The average distance travelled by tram passengers is considered to be the same for the other modes of transport.

Based on these criteria, the following scenarios are envisaged:

1. ***Base Project Scenario or counterfactual***, which is the situation where there is no tramway and passengers travel by the following means of transport:
    a. Private diesel or petrol vehicle.
    b. Motorbike with diesel or petrol.
    c. Diesel and petrol taxis.
    d. Guagua (bus).
    e. Other GHG-free modes of transport: walking and cycling
2. ***Scenario Tramway Project***, the tramway exists and there are users who use this means of transport.

Methodology for the estimation of avoided GHG emissions

The calculation of avoided GHG emissions is carried out according to the following equation (EC.1):

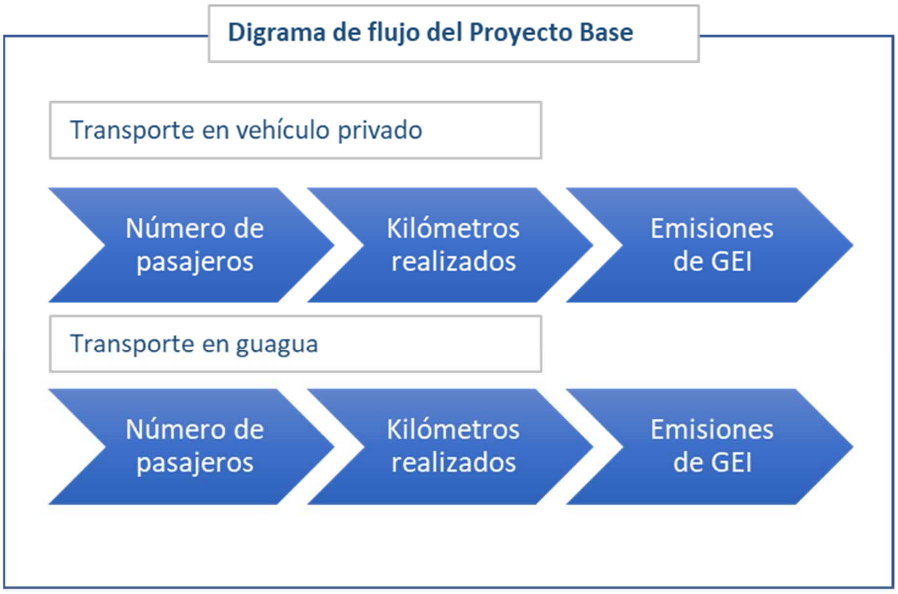
$$Emisiones\ de\ GEI\ evitadas = Emisiones\ GEI\ de\ Proyecto\ base - Emisiones\ GEI\ de\ Tranvía \quad \text{EC.1}$$

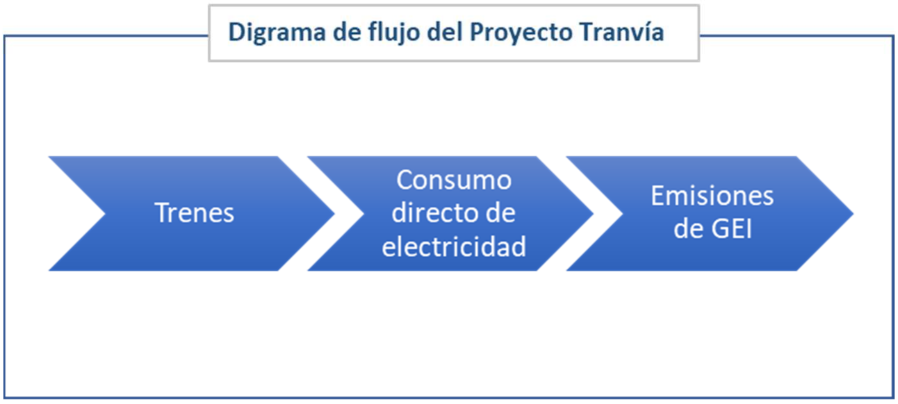
The following calculation method (EC.2) will be used to calculate the emissions for each scenario:

$$Emisiones\ de\ GEI\ (kg\ CO_2) = datos\ de\ actividad\ (ud) * factor\ de\ emisión\ \left({}^{kg\ CO_2}/_{ud} \right) \quad \text{EC.2}$$

Figure 6 shows the flow chart of the methodology for the quantification of GHG emissions for each scenario and the estimation of GHG emissions avoided by the use of the tram.

Figure 6: Flowchart of avoided emissions estimation





The following is a detailed explanation of the derivation of each of the variables requested in EC2 and the flowchart in Figure 6.

Activity data for the "Base Project" Scenario

For the estimation of GHG emissions of the Base Project, it is necessary to know the distance travelled (in kilometres) for each means of transport: private vehicle and Guagua (EC3):

$$Distancia\ recorrida\ (km) = nº\ de\ pasajeros * distancia\ media\ recorrida\ \left(\frac{km}{pasajero}\right) \quad \text{EC.3}$$

The data available are the number of tram passengers and the average kilometres travelled by each tram passenger. This situation makes it necessary to resort to modelling to estimate the kilometres travelled for each mode of transport.

To achieve the desired data, the model builds on criteria C1 and C2 described in this document and uses the information on trends of change in the mode of transport used in the absence of the tram.

The steps to be followed to obtain the distance travelled for each means of transport are as follows:

1. Estimate the number of passengers for each means of transport through the surveys published in Metrotenerife's Annual Reports on the quality of the service provided.
2. Estimate the average distance travelled for each mode of transport.

Each of these steps is explained below.

Estimated number of passengers for each mode of transport

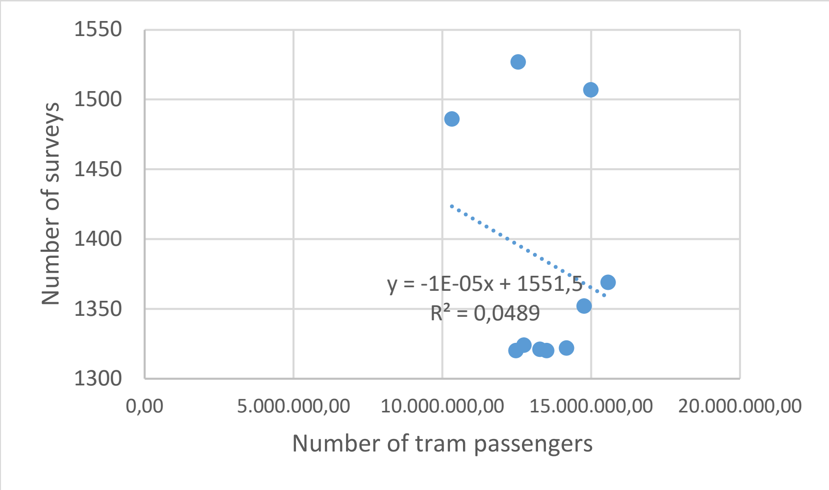
From 2020 onwards, Metrotenerife includes in its service quality surveys the trend of passenger use of other means of transport if the tram did not exist. With this information it is possible to estimate the number of passengers for private vehicles, Guagua and other means of transport.

These data are only available for the period 2020-2022, but it is necessary to know this information since 2010. To achieve this, an estimate is made by linear regression using the following data:

- Number of surveys conducted. Complete data since 2013
- Percentage of people who would use another mode of transport if there were no tramway in 2020, 2021 and 2022.

To find out the number of surveys conducted for the period 2010-2012, the linear regression model is used with the input data of the number of surveys and number of total tram passengers for the period 2013-2022 (Figure 7).

Figure 7: Model for quantifying the number of surveys from 2010-2012



With this input data, the equations (figures 8, 9 and 10) are used to estimate the percentages of each mode of transport for the period 2010-2019 (table 8).

Figure 8: Model for quantifying the percentage of passengers who would use the private car

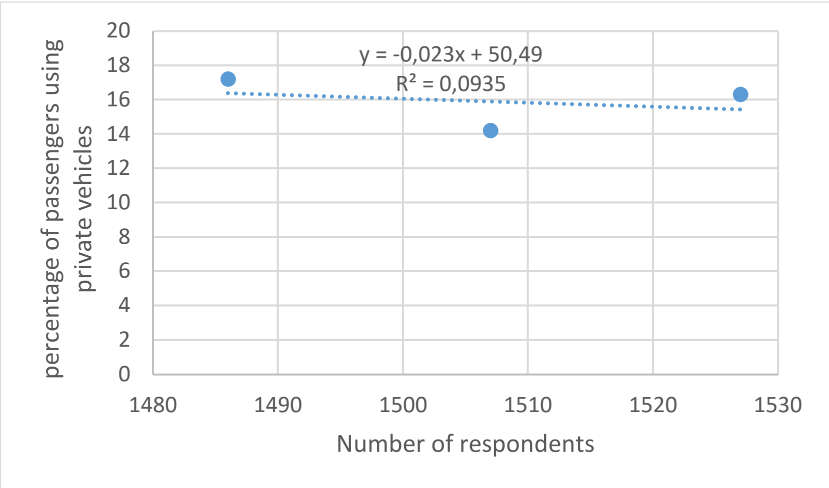


Figure 9: Model to quantify the percentage of passengers who will use the bus.

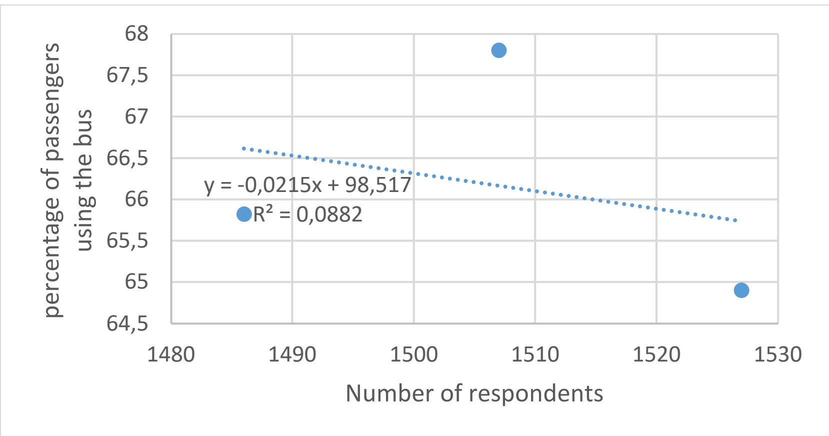
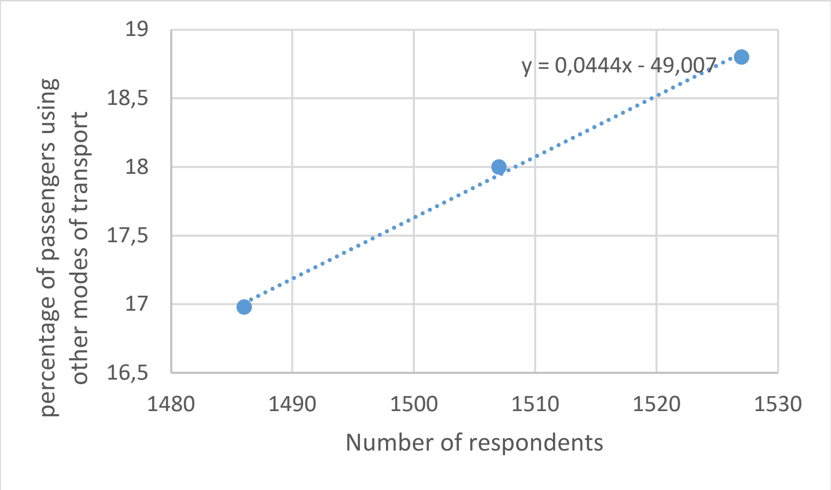


Figure 10: Model for quantifying the percentage of passengers who would use another mode of transport



Since there are two types of private vehicles, petrol and diesel, the distribution has been carried out using the percentage application for each means of transport, extracted from the vehicle inventory of the Dirección General de Tráfico (DGT) (table 7).

With the equations obtained from the linear modelling and the information obtained from the DGT (table 7), the number of passengers for each mode of transport can be estimated (table 8).

Table 7: Number of private vehicles in Santa Cruz de Tenerife extracted from the inventory of vehicles of the Dirección General de Tráfico.

Type of vehicle	Fuel type	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Tourism	Petrol	422.033	422.543	420.522	413.271	411.754	415.985	425.343	439.959	453.302	466.274	469.676	473.105	
	Diesel	68.283	73.076	76.719	79.962	85.942	90.793	96.150	101.549	105.403	108.093	109.575	111.426	
Motorbike	Petrol	48.132	49.417	50.188	50.969	52.952	55.229	57.891	61.044	64.618	68.662	71.982	75.794	
	Diesel	26	24	24	24	18	22	31	29	35	40	46	50	
Other vehicles	Petrol	2.350	2.309	2.265	2.236	2.237	2.230	2.238	2.255	2.278	2.300	2.319	2.361	
	Diesel	6.748	6.778	6.603	6.418	6.371	6.149	6.287	6.665	7.214	7.817	8.361	9.155	
Total* Total	Petrol	472.515	474.269	472.975	466.476	466.943	473.444	485.472	503.258	520.198	537.236	543.977	551.260	538.297
	Diesel	75.057	79.878	83.346	86.404	92.331	96.964	102.468	108.243	112.652	115.950	117.982	120.631	125.397
Total percentage*	**Petrol**	**86,29**	**85,59**	**85,02**	**84,37**	**83,49**	**83,00**	**82,57**	**82,30**	**82,20**	**82,25**	**82,18**	**82,05**	**81,11**
	Diesel	**13,71**	**14,41**	**14,98**	**15,63**	**16,51**	**17,00**	**17,43**	**17,70**	**17,80**	**17,75**	**17,82**	**17,95**	**18,89**

**Data for the year 2022 are estimated using Excel's "Forecasting" tool based on historical data.*

Table 8: Number of passengers by each mode of transport for the Base Project

		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Number of respondents		1412	1412	1420	1320	1324	1321	1320	1322	1352	1369	1486	1527	1507
Tram users	A	13.946.405	13.973.149	13.191.105	12.459.172	12.726.906	13.273.083	13.490.312	14.158.691	14.757.687	15.554.855	10.313.051	12.543.185	14.981.498
Private Vehicle (%)	B	18,01	18,02	17,84	20,13	20,04	20,11	20,13	20,08	19,39	19,00	17,2	16,3	14,2
Baby (%)	C	68,16	68,16	68,00	70,14	70,05	70,12	70,14	70,09	69,45	69,08	65,82	64,9	67,8
Other means of transport without emissions (%)	D	13,69	13,68	14,02	9,60	9,78	9,65	9,60	9,69	11,02	11,78	16,98	18,8	18
Number of passengers private vehicle	**E=A*B**	2.512.190,08	2.517.867,03	2.353.221,13	2.508.031,32	2.550.217,42	2.668.818,80	2.715.599,81	2.843.631,50	2.862.105,82	2.955.889,10	1.773.844,77	2.044.539,16	2.127.372,72
Number of passengers private vehicle petrol	***(1)***	***2.167.838,195***	***2.154.926,902***	***2.000.670,051***	***2.116.076,58***	***2.129.199,953***	***2.215.144,681***	***2.242.316,68***	***2.340.274,671***	***2.352.629,725***	***2.431.175,858***	***1.457.689,611***	***1.677.463,539***	***1.725.429,703***
Number of passengers private diesel vehicle	***(2)***	***344.351,89***	***362.940,13***	***352.551,08***	***391.954,74***	***421.017,47***	***453.674,12***	***473.283,13***	***503.356,83***	***509.476,09***	***524.713,24***	***316.155,16***	***367.075,62***	***401.943,01***
Number of bus passengers	**F=A*C**	9.505.622,39	9.524.654,08	8.969.402,33	8.738.489,47	8.915.324,92	9.306.488,51	9.461.700,13	9.924.392,87	10.249.066,04	10.745.838,25	6.788.050,17	8.140.527,07	10.157.455,64
Number of passengers other modes	**G=A*D**	1.908.899,71	1.910.901,04	1.849.755,59	1.196.205,10	1.244.513,23	1.280.241,95	1.295.204,86	1.371.948,84	1.626.562,75	1.831.833,05	1.751.156,06	2.358.118,78	2.696.669,64

(1) These values are the product of multiplying the number of private vehicle passengers by the percentage of petrol vehicles in table 7.

(2) They are the result of multiplying the number of private vehicle passengers by the percentage of diesel vehicle in table 7.

The data in blue are estimated from the equations in figures 7, 8, 9 and 10.

Estimated average distance travelled per passenger for each mode of transport

To estimate the average distance travelled per passenger, it is based on the C2 criterion that all passengers, regardless of the means of transport used, travel the same average distance as the tram.

As with the data for estimating the number of passengers by mode of transport, quality data on average distances travelled are only available for the years 2019, 2020 and 2021. Linear regression is therefore used again to obtain data for the years 2010-2018 and 2022.

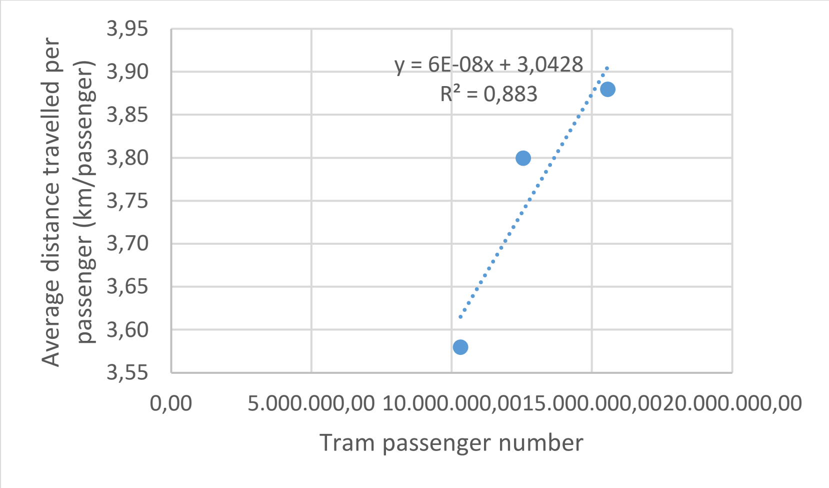
The results obtained can be seen in table 9.

Table 9: Average distance travelled per passenger

Year	Total number of passengers	*Average distance travelled for passenger (km/passenger)*
2010	13.946.405,00	3,88
2011	13.973.149,00	3,88
2012	13.191.105,00	3,83
2013	12.459.172,00	3,79
2014	12.726.906,00	3,81
2015	13.273.083,00	3,84
2016	13.490.312,00	3,85
2017	14.158.691,00	3,89
2018	14.757.687,00	3,93
2019	15.554.855,00	3,88
2020	10.313.051,00	3,58
2021	12.543.185,00	3,80
2022	14.981.498,00	3,94

The data in blue are the result of applying the equation in figure 11.

Figure 11: Model for quantifying average distance travelled per passenger (km/passenger)



Estimated distance travelled by each mode of transport

To estimate the distance travelled for each means of transport, equation 3 (EC3) has to be applied, the results of which can be seen in table 13.

$$Distancia\ recorrida\ (km) = \text{número de pasajeros} * distancia\ media\ \left(\frac{km}{pasajero}\right) \quad \text{EC3}$$

Activity data for the "Tramway Project" Scenario

The electricity consumption data is provided by Metrotenerife, it is the energy used for the traction of the tram, subtracting in proportion to the total energy consumed the energy produced by the solar panels. The result can be seen in table 10.

Table 10: Tramway Electricity Consumption

Year	Calculation of traction consumption discounting photovoltaic energy
2018	6.783.087,96
2019	6.312.346,05
2020	5.665.368,60
2021	6.763.235,94
2022	6.783.087,96

Data in blue are estimates

For the years 2021 and 2022 the actual information on total electricity consumption could not be calculated due to failures in the metering register from the electricity supply company. For this reason, it has been decided to use the electricity consumption of another year with a similar number of passengers, so that the energy consumed could be considered equivalent:

- Year 2021 the consumption of year 2014 is used.
- Year 2022 is considered the same consumption as year 2018.

Emission factor

Base Project

The emission factors used are as follows (table 11):

- For private vehicles the *Emission Factors* have been used. *Carbon Footprint Register, Offset and Carbon Dioxide Absorption Project* (2023).
- For the bus (Guagua) the factors provided by DEFRA (Department for Environment, Food and Rural Affairs) have been used.
  It is important to note that the reason for choosing these emission factors is the quality of the data and DEFRA is an internationally recognised body on climate change issues because it provides assurance and reduces uncertainty about the final result.

Table 11: Emission factors (EF) for private vehicle and bus

Year	FE of Private Vehicle (Kg CO2e/km)		FE bus (Kg CO2e/passenger km)
	diesel	petrol	
2010	0,169	0,206	0,1488
2011	0,167	0,203	0,1488
2012	0,164	0,203	0,1355
2013	0,16	0,203	0,1116
2014	0,17	0,204	0,1015
2015	0,168	0,202	0,1003
2016	0,168	0,200	0,1017
2017	0,167	0,201	0,1025
2018	0,166	0,201	0,1009
2019	0,164	0,201	0,1047
2020	0,164	0,201	0,1031
2021	0,163	0,200	0,1022
2022	0,165	0,196	0,0965

Tram

To calculate the GHG emissions generated by the use of the tramway, the emission factor provided by Red Eléctrica de España for electricity generation in the Canary Islands has been used (table 12).

Table 12: Emission factor for electricity consumption

Year	FE Canary Islands
2010	0,794
2011	0,807
2012	0,810
2013	0,791
2014	0,784
2015	0,783
2016	0,784
2017	0,787
2018	0,656
2019	0,607
2020	0,579
2021	0,552
2022	0,555

Source: Red Eléctrica (https://www.ree.es/es/datos/aldia)

Quantification of avoided GHG emissions

Equation 1 (EC1) is applied to calculate the avoided GHG emissions (table 15) and Equation 2 (EC2) is applied to calculate the emissions of the Base Project and the Tramway with the activity data (tables 7, 8 and 9) and the corresponding emission factors (tables 11 and 12). The results are:

- GHG Emissions from the Base Project (table 13)
- Tramway GHG emissions (table 14)

Table 13: GHG emissions of the Base Project

Private vehicle petrol		2018	2019	2020	2021	2022
passenger number	A	2.352.629,73	2.431.175,86	1.457.689,61	1.677.463,54	1.725.429,70
km/passenger	B	3,93	3,88	3,58	3,80	3,94
km	C=A*B	6.161.162,74	6.288.641,55	3.479.019,21	4.249.574,30	4.534.072,53
Kg CO e/km$_2$	D	0,201	0,201	0,201	0,2	0,196
Emissions VP gasoline (t CO_2 e)	**E=C*D**	**1.857,59**	**1.896,03**	**1.048,92**	**1.274,87**	**1.333,02**
Private vehicle diesel		**2018**	**2019**	**2020**	**2021**	**2022**
passenger number	A1	509.476,09	524.713,24	316.155,16	367.075,62	401.943,01
km/passenger	B1	3,93	3,88	3,58	3,80	3,94
km	C1=A1*B1	2.001.355,17	2.035.887,36	1.131.835,47	1.394.887,34	1.584.334,71
Kg CO e/km$_2$	D1	0,166	0,164	0,164	0,163	0,165
Diesel VP emissions (t CO_2 e)	**E1=C1*D1**	**332,22**	**333,89**	**185,62**	**227,37**	**261,42**
Bus or bus		**2018**	**2019**	**2020**	**2021**	**2022**
number of passengers	A2	10.249.066,04	10.745.838,25	6.788.050,17	8.140.527,07	10.157.455,64
km/passenger	B2	3,93	3,88	3,58	3,80	3,94
km	C2=A2*B2	40.261.008,68	41.693.852,43	24.301.219,60	30.934.002,85	40.037.540,12
Kg CO e/km$_2$	D2	0,1009	0,1047	0,1031	0,1022	0,0965
Emissions Bus (t CO_2 e)	**E2=C2*D2**	**4.062,34**	**4.365,35**	**2.505,46**	**3.161,46**	**3.863,62**
Total emissions from the baseline project t CO2e	**F=E+E1+E2**	**6.252,15**	**6.595,26**	**3.740,00***	**4.663,69**	**5.458,06**

** This data is not representative as a result of COVID 19*

Table 14: GHG emissions of the tramway

Tramway		2018	2019	2020	2021	2022
Energy consumed (kWh)	A3	6.783.087,96	6.312.346,05	5.665.368,60	6.763.235,94	6.783.087,96
FE Energy (tCO2e/MWh)	B3	0,656	0,607	0,579	0,552	0,555
Emissions Tramway (t CO_2 e)	**C3=A3*B3**	**4.449,71**	**3.831,59**	**3.280,25***	**3.733,31**	**3.764,61**

With the results of tables 13 and 14 and applying equation EC1, the GHG emissions avoided by the use of the tramway are obtained (table 15).

Table 15: GHG emissions avoided by tram use.

		2018	2019	2020	2021	2022
GHG emissions avoided (t CO_2 e)	**G=F-C3**	**1.802,45**	**2.763,66**	**459,75***	**930,39**	**1.693,44**

** This data is not representative as a consequence of COVID 19*