



ANNUAL REPORT
**GREEN
BONDS**
2023

LETTER from the Chairman



Our activity and financing model during the 2023 financial year have confirmed once again the validity of our commitment to leading a sustainable, competitive, structuring, safe and intelligent mobility model that contributes to the social and economic cohesion of the territories in which we operate and to the prosperity of citizens and companies.

In terms of sustainability, being aligned with one of the strategic pillars of our 2030 Strategic Plan, we continue to be a benchmark in contributing to the green transition and we are making progress in the fight against climate change, not only to achieve the goal of zero net emissions by 2050, but also to consolidate resilient infrastructures that respond to the increasingly extreme, frequent and longer-lasting effects of climate change.

Respecting the environment, from the design phase to construction, maintaining biodiversity and even contributing to its recovery is another of the objectives that we consider in each action, as well as promoting a culture of awareness of climate change in our organization and

throughout the entire value chain. The chapter on sustainability commitments and the actions we deploy to achieve them also addresses the opportunity to contribute in a decisive way to society, generating a positive social impact in favor of cohesion and social inclusion. And investing in new activities, generating income and value through the opportunities of the energy transition.

Contributing to the development of sustainable finance, precisely, is another of the areas of which you will find details in this new green bond report.

In 2023, Adif AV has consolidated its position as a benchmark in the green bond issuance market, with a total of 4.6 billion euros issued and as the most active 'green' issuer in the European high-speed railway infrastructure management sector.

We are launching issues under a green financing framework aligned with the Green Bond Principles of ICMA (International Capital Market Association) and after having received the high-

est rating from the external evaluator Sustainable Fitch.

In 2023, the Sustainalytics ESG Risk Rating, an indicator that rates ESG aspects (environmental, social and governance), placed Adif AV as the second best company in the transport infrastructure sector (after analysing 187 entities) and the third in the global universe of companies analysed (after studying more than 15,000).

Railway is the best answer to a new mobility model and is also an accelerator of the change promoted by the EU towards an economy based on green and digital principles, because it is the most environmentally friendly mean of transport - it barely represents 0.4% of the sector's total emissions - ; it contributes to more sustainable and competitive urban and interurban mobility, and it displaces private vehicles in cities, thereby reducing greenhouse gas emissions and becoming a key transport model in the fight against climate change.

The roadmap we drew up years ago, materialised in the 2030 Strategic Plan and the Plan

to Combat Climate Change, is aligned with national and transnational initiatives that reinforce our commitments and actions in terms of sustainability: fundamentally, the Recovery, Transformation and Resilience Plan and the NextGeneration European funds, to contribute to economic recovery and promote a more sustainable, resilient and competitive economy; the Safe, Sustainable and Connected Mobility Strategy of the Ministry of Transport and Sustainable Mobility, and the Sustainable Development Goals and Objectives of the UN 2030 Agenda

ÁNGEL CONTRERAS
Chairman of Adif Alta Velocidad



INDEX

ANNUAL REPORT GREEN BONDS

2023

INTRODUCTION

FRAMEWORK

USE OF PROCEEDS IN ELIGIBLE GREEN PROJECTS
SELECTION PROCESS
FUNDS MANAGEMENT
REPORTS

2022 ISSUANCE

2023 ISSUANCE

INDICATORS OF FORESEEN IMPACT BROKEN DOWN BY LINES

INTRODUCTION
PREVIOUS CONSIDERATIONS
DEFINITION OF INDICATORS

ALLOCATION OF FUNDS TO ELIGIBLE GREEN PROJECTS

2022 ISSUANCE
2023 ISSUANCE

INTRODUCTION

Adif Alta Velocidad is a state-owned public entity (“public business entity”) with legal personality, management autonomy and own resources, which operates under the supervision of the Ministry of Transport and Sustainable Mobility, being responsible for the construction and management of the high-speed railway network of Spain.

As a public service company, we understand that we are committed to promoting a socio-economic development model that is sustainable, seeking social well-being and equality with an inclusive, fair and healthy model, and that implies facing different challenges that affect us all, both global and local.

From a global point of view, these challenges are synthesized in the Sustainable Development Goals (SDGs) of the 2030 Agenda of the United Nations (UN), especially in those that are most relevant to our organization, taking into account the contribution that we can make to them according to our nature and activity.

Moreover, we must also align ourselves with national policies and strategies that set the path to follow in the coming years, such as the Spanish Recovery, Transformation and Resilience Plan or the Safe, Sustainable and Connected Mobility Strategy of the **Ministry of Transport and Sustainable Mobility**.



Regarding local challenges, the demands and expectations of our stakeholders are summarized in that we must contribute to a safe, efficient and sustainable transport system.

In addition to global and local challenges, internal challenges for the company must be taken into consideration.

In this context Adif AV, in its Strategic Plan (SP) 2030 has aligned the entity's strategic lines to the major environmental, social, operational, and business challenges it must face in order to become a benchmark as an organization focused on the management of resilient, sustainable, safe and smart infrastructures that contribute to the new ecological transition model.

This Plan is based on four pillars: Safety, Service, Sustainability and Focus on Results. It also has three levers to accelerate the transformation process: Communication, Innovation and Digital Transformation. All of this implies that People are the driving force behind these pillars and levers, which are deployed in different strategic objectives in a total alignment. To this end, the SP2030 takes the SDGs as its inspiration and guide, orienting its strategic initiatives to generate shared value with society.

In the SP2030, Adif AV has the ambition to operate, manage and build a smart rail network adapted to the new technological, competitive, and sustainable ecosystem, thus contributing to the SDGs and generating shared value with society. In doing so, it maintains and reinforces its strong commitment to SUSTAINABILITY by establishing lines of action and specific strategic objectives that seek to improve our impact on society from an economic, social, environmental and good governance point of view.



Thus, in the sustainability pillar the following strategic objectives have been defined:

1. To become a benchmark in the energy transition strategy
2. To fight against climate change (achieving zero net emissions by 2050)
3. To recover nature and biodiversity
4. To promote a culture of climate change awareness
5. To generate a positive social impact in favor of social cohesion and inclusion
6. Reach new revenue streams through energy transition opportunities and contribute to the development of sustainable finance.

In the SP2030, a monitoring system has been put in place in order to evaluate the correct implementation of the SDGs, the evolution of the construction and maintenance of High Speed Lines, as well as the projects aimed at improving the energy efficiency of the railway system and the promotion of its sustainability. This monitoring system also aims to ensure the correct allocation of the funds obtained from the issuance of green bonds and that they indeed have a positive impact on the following Sustainable Development Goals and Targets of the UN 2030 Agenda:



Sustainable Development Goals and Targets of the UN 2030 Agenda



“Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all”.

Target 8.2: “Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, focusing on high value-added and labour-intensive sectors”. Adif AV promotes the development of the railway network with high-level technological solutions and fosters safe and quality employment.



“Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation”.

Target 9.1: “Develop reliable, sustainable, resilient and quality infrastructure, including regional and cross-border infrastructure, to support economic development and human well-being, with particular emphasis on affordable and equitable access for all”. High-speed rail lines are built to the highest quality standards to ensure their resilience and reliability. Strict criteria of sustainability and respect for the environment are applied to their construction and maintenance, with environmental monitoring measures in place to ensure the preservation of natural, cultural and archaeological heritage.



“Make cities and human settlements inclusive, safe, resilient and sustainable”.

Target 11.a: “Support positive economic, social and environmental linkages between urban, peri-urban and rural areas by strengthening national and regional development planning”. High-speed rail lines substantially improve, in a planned manner, the connection between urban, peri-urban and rural areas, allowing the generation of economic and social linkages, thereby generating opportunities for growth and well-being. Furthermore, projects aimed at improving the environmental sustainability of infrastructure, such as those that help to minimize the impact of noise on inhabited areas, can also contribute to achieving this SDG.



“Take urgent action to combat climate change and its impacts”.

Target 13.1: “Strengthen resilience and the capacity to adapt to climate-related risks and natural disasters in all countries”. Since 2020, new rail infrastructure projects requiring European funding are being developed, including an analysis of risk and adaptation to the effects of climate change, thereby improving the resilience of high-speed infrastructure under construction.

Target 13.2: “Integrate climate change measures into national policies, strategies and plans. The development of the high-speed network will shift significant amounts of traffic from road and air transport to rail, which is the means of transport with the lowest CO₂ and other greenhouse gas emissions. This allows combating climate change through a better contribution of the transport sector to the fight against climate change. Likewise, projects aimed at improving energy efficiency are associated with a reduction in CO₂ emissions, so they are also a tool in the fight against climate change.

On a next step within this strategic approach, Adif AV approved in 2019 the Plan to fight climate change 2018-2030 (jointly with ADIF), as a strategic measure of the SP2030 Sustainability pillar, whose main objective is to increase the company’s contribution to this environmental challenge, as well as the contribution of the railway system within the entire national transport sector.

Thus, the main milestones to be achieved with the Plan are reflected in three areas:

In the area of mitigation, the main objective is to improve energy efficiency and reduce greenhouse gas (GHG) emissions:

- Reduce energy consumption of the railway system by 2,900 GWh cumulatively in the period 2018-2030
- Reduce GHG emissions by 9,000 ktCO₂eq accumulated in the 2018-2030 period, with the implementation of the projects included in the Plan plus the emissions avoided by the modal shift. This reduction would reach 12,000 ktCO₂eq if the purchase of green electricity is taken into account
- Reduce the carbon footprint of Adif and Adif AV by at least 25% by 2030, compared to the 2016 value, and up to 86% if the purchase of green electricity (with Guarantee of Origin -GdO- certificates) is taken into account. Our commitment is to reach carbon neutrality by 2050 at the latest, as reflected by signing the 2019 Climate Responsibility Commitment of the International Union of Railways (UIC, for its acronym in French), which seeks to increase the ambition of the sector and align with current European objectives.

In the area of adaptation, with the aim of improving the resilience of rail infrastructures:

- Include the assessment of vulnerability to the adverse effects of climate change in 100% of major rail projects from 2020.

In the area of culture and awareness-raising, the objective is to raise awareness among internal and external stakeholders through various actions, such as:

- Include climate change-related clauses in 100% of contract specifications as from 2025.

In order to achieve these goals, the Plan is structured into five main lines of action: energy management, energy efficiency, decarbonisation and renewable energies, resilience improvement, and culture and raising awareness, which, in turn, are deployed in different programmes and specific projects with different scopes. It is a living document that will be periodically reviewed to update its content and adjust the established goals.

With this Plan, Adif AV aligns with the main existing international commitments in the fight against climate change, contributing both to the achievement of the Sustainable Development Goals of the United Nations Agenda 2030 (specifically goal no. 13 “Climate Action”) and the pact reached by the signatory countries of the Paris Agreement.

It is also in line with current European and national policies aimed at achieving climate neutrality by 2050, as set out in the European Commission’s Green Pact, in the National Integrated Energy and Climate Plan and in the recently approved Climate Change and Energy Transition Act.

Framework

USE OF PROCEEDS IN ELIGIBLE GREEN PROJECTS

SELECTION PROCESS

FUNDS MANAGEMENT

REPORTS

INTRODUCTION

FRAMEWORK

USE OF PROCEEDS IN ELIGIBLE GREEN PROJECTS
SELECTION PROCESS
FUNDS MANAGEMENT
REPORTS

2022 ISSUANCE

2023 ISSUANCE

INDICATORS OF FORESEEN IMPACT BROKEN DOWN BY LINES

INTRODUCTION
PREVIOUS CONSIDERATIONS
DEFINITION OF INDICATORS

ALLOCATION OF FUNDS TO ELIGIBLE GREEN PROJECTS

2022 ISSUANCE
2023 ISSUANCE

FRAMEWORK

Adif Alta Velocidad published in August 2022 the second revision of its Green Funding Framework, which will apply to emissions implemented from 2022. This new framework expands the entity's sustainability ambitions and aligns with the EU taxonomy objective of mitigating climate change and strengthening its governance, especially with regard to project selection and assessment.

In this regard, eligible projects under this framework are divided into two broad categories: on the one hand, investments related to new railway lines and extensions and, on the other hand, investments related to the maintenance, upgrading and energy efficiency of the high-speed rail system. These projects should contribute to the decarbonisation of the Spanish transport sector, with the aim of shifting transport from road and air to rail, generating significant emissions savings. In order to verify the suitability of the projects, and prior to the allocation of funds, an exhaustive evaluation and selection process has been implemented. Eligible projects will include new and ongoing projects with disbursements up to two years before and three years after the issuance of the bonds.

This update of the financing framework has been rated by second opinion provider Sustainable Fitch, as an independent advisor selected through the competitive bidding process. The rating awarded by this rating agency was Excellent, highlighting ADIF Alta Velocidad's commitment to sustainability, in line with its commitment to the Sustainable Development Goals of the United Nations 2030 Agenda.

The previous version of the framework had been rated "Dark Green" by Cicero Shades of Green.

You may find more information in the following [website](#):

+ info



The revised framework reflects the four components included in ICMA's Green Bond Principles:

- Use of funds in Eligible Green Projects
- Selection process
- Management of proceeds
- Reporting



USE OF PROCEEDS IN ELIGIBLE GREEN PROJECTS

Resources from the green bond issuance are allocated to Eligible Green Projects, which include new projects and continuation of ongoing projects, with disbursements up to 24 months prior to bond issuance and up to 36 months from the date of such issuance (24 months from the date of issuance in the case of the 2021 issuance, subject to the previous framework). Specifically, they are earmarked for two categories:

- 1) Investments related to new high-speed rail lines and extensions of existing high-speed lines.
- 2) Investments related to maintenance, upgrade and energy efficiency of high-speed rail lines.



SELECTION PROCESS

100% of funds obtained with the **fifth green bond**, with settlement day on 8 October 2021, were invested on projects belonging to category 1.

Likewise, as of the date of this report, 38.00% of the funds obtained from the **seventh Adif Alta Velocidad green bond**, with settlement day on 25 October 2022, have been applied to projects in said category.

More precisely, funds from both issues have been allocated to the following projects:

1. Chamartín-Atocha-Torrejón UIC Connection and Chamartín Station North Head End
2. Madrid-Sevilla High Speed Line and Córdoba-Málaga High Speed Line Connection (Almódovar del Río Bypass)
3. Madrid - Barcelona - Figueras (La Sagrera Station) High Speed Line
4. Valladolid-Burgos-Vitoria High Speed Line
5. Madrid-Galicia High Speed Line: Olmedo-Lubián-Orense-Santiago section.
6. Cantabria High Speed Line
7. H.S.L. Barcelona- H.S.L. Levante Connection
8. Almería - Murcia High Speed Line
9. Levante High Speed Line
10. Bobadilla- Granada High Speed Line (Loja bypass included)
11. Atlantic Axis High Speed Line (Santiago- Vigo section)
12. Zaragoza-Pamplona H.S.L. (Castejón-Campanas)

1. CHAMARTÍN-ATOCHA-TORREJÓN UIC CONNECTION AND CHAMARTÍN STATION NORTH HEAD END

On 16 June 2022, the Chamartín-Atocha-Torrejón de Velasco connection section was brought into service. The entry into service of this section means that it will be possible to connect the lines from the South and East of Spain with those from the North and vice versa, without passengers having to change trains.

Likewise, the incorporation of two new tracks in the accesses to the Madrid-Levante and Madrid-Andalusia high-speed corridors will increase the capacity of the infrastructure.

Ongoing works consist of:

- **The construction of a double-track UIC standard width tunnel (7.3 km).**
- **The connection of the tunnel with the quadrupling of the Atocha-Torrejón de Velasco section by means of a provisional single-track tunnel (0.9 km). This tunnel passes under the current Atocha station and serves to provide a provisional connection between the tunnel and the new platform until the definitive one that will house the new underground station of Atocha is completed.**
- **New platform between Atocha and Torrejón de Velasco with capacity for two new tracks.**



The renovation project of the suburban lobby under the tracks at the north end of the station includes the refurbishment and renovation of the old suburban hallway under the tracks, as a large space on a single level, with the recovery of the pre-existing vertical communication cores between the platforms and the lower lobby, with the installation of escalators and fixed staircases. Accessibility is completed with the inclusion of lifts within the lobby.

This allows an accessible connection between tracks 1-11, as well as a direct connection with the Metro de Madrid, boosting intermodality between the different means of transport.

With regard to the conversion of tracks 14 and 15 to UIC width at Chamartín Station, the project involves the conversion of the current Iberian width tracks 14 and 15 to standard UIC width, as well as the integration of the new tracks in the high-speed sector of the station, as a prior step to future extensions of the complex to meet the growth in traffic that will occur with the forthcoming entry into service of new sections of the Spanish high-speed network.

As for platforms, shelters and non-railway facilities associated with tracks 14 and 15, as a result of the conversion of tracks 14 and 15, platform 9 needs to be extended for high-speed operation. Likewise, the platform 9 shelter will be extended by 60 m by means of 8 modules of 7.5 m each, of the same type as the current one.

During the month of January 2023, the southern head of tracks 14 and 15 of UIC gauge was put into service for railway operation. In the northern headwaters, the work on these tracks was completed during the month of September 2023, being put into service from said header in December 2023, after receiving the Authorization for Entry into Service from the State Railway Safety Agency (AESF) and having been received the works in January 2024.

A northern subway has been built to provide access to the auxiliary railway installations.

As for the covering of tracks 13 to 17, the foundations and piles located between tracks 13 and 17 that will take part of the cover of the track sidings at the southern end of Chamartín station are being built.



As for the north end of Chamartín Station, the remodeling project for the Iberian width tracks and platforms proposes to provide a total of 13 tracks for the Iberian width station, allowing the removal of tracks 14 and 15, their subsequent conversion to UIC standard width and their integration into the high-speed station. Likewise, the adaptation and remodeling of the respective platforms and the update of the interlocking that governs the station are also contemplated.

It is worth mentioning the construction of new tracks (9-bis and 10-bis), already finished, that increase the line's capacity and make new car parks possible.

Six crossing tracks are assigned to the Sol tunnel (tracks 1 to 6) and seven to the Recoletos tunnel (tracks 7 to 13).

Works are also being carried out on the installation of tracks and signaling equipment to increase the speed of traffic and meet the increase in demand, as well as to rise the flexibility of the railway network and improve the response of the facilities to possible incidents.

Regarding the recovery of the commuter hall under the tracks, the opening of the central hall of the Chamartín Station and its connection with the Metro took place on February 4, 2023, and the work is being completed. In this way, the adaptation for public use of the old Cercanías lobby, which the Chamartín station already had, but closed in the eighties, was completed, being able to absorb passenger movements between tracks 1-11 of the Chamartín Station and the Metro lobby, favoring accessible intermodality.

2. MADRID-SEVILLA HIGH SPEED LINE AND CÓRDOBA-MÁLAGA HIGH SPEED LINE CONNECTION (ALMÓDOVAR DEL RÍO BYPASS)

This is a connecting branch of approximately 1.7 km between KP 364 of the Madrid-Seville High Speed Line and KP 5 of the Cordoba-Málaga High Speed Line, which will take advantage of the existing bypasses already installed on both lines (at Almodóvar and La Marota). This new link will save 20 minutes on the Seville-Málaga/Granada connections.

The infrastructure works have been awarded since 2019 and began in July 2020. The completion of the infrastructure and track works is scheduled for February 2025. Next, the work related to the commissioning of the bypass will be carried out, with said commissioning being planned, in principle, during the first half of 2025.

Regarding the actions that will allow the bypass to be provided with the necessary security, signaling and communications facilities, the solution to be implemented on the Madrid-Sevilla and Córdoba-Málaga high-speed lines has been determined, and the contracting process for drafting the construction project, execution of works and subsequent maintenance of the facilities has been unified. It was technically approved on 4 March 2024, to begin the works on 22 April 2024.

3. MADRID-BARCELONA-FIGUERAS (LA SAGRERA STATION) HIGH SPEED LINE

The following major infrastructure work projects are currently ongoing:

- **Accesses to Sagrera Station:** construction of the underground access to the body of the station itself, both north and south, from the exit of the Sants tunnel towards Sagrera to the railway triangle where the Rodalies de Mataró line forks, allowing the relocation of the standard width platform and the existing commuter lines to their definitive position in the tunnel. These works include the construction of the civil works for the future Train Technical Treatment Area (Z.T.T.T.).
- **Sagrera Station structure:** installation of concrete screens, foundations, slabs, galleries and emergency exits of the station, as well as platforms, both for High Speed and Rodalies. Works also include the car parks and the structure of the access to the vestibule of the platform. Architecture and installations will be the object of another contract, as well as the high-speed superstructure.

Furthermore, within the development of the high-speed phases, the works corresponding to the following proceeding have begun:

- High speed line track assembly (future Sagrera station and Z.T.T.T.).
- High speed line catenary assembly from Sagrera Station (future Sagrera station and Z.T.T.T.).
- Civil Protection and Security facilities in the tunnels and accesses to Sagrera station and the Z.T.T.T.
- Architecture and Facilities of the Z.T.T.T.
- Interior electrical connection Z.T.T.T. and Sagrera station.
- Exterior electrical connection from Sant Martí substation to Z.T.T.T. and Sagrera station.
- CMS, ERTMS and Telecommunications installations, and GSMR communications.

In addition, there are other files currently completed, such as:

- **Sant Andreu Sector:** the contract corresponding to this action was resolved in September 2019, and the pending actions are carried out in independent contracts by the company or Adif. They include the completion of the coverage, the construction of workshops for the maintenance of high-speed trains and separate channels for road access from the Trinidad junction to the station itself.
- **Sant Andreu Comtal Station:** includes the execution of the architecture and facilities of said station. Work executed and in service.
- **Rambla Prim collector:** includes the drainage works that connect the drainage from the Sagrera neighborhood to the Sant Martí neighborhood, transversally crossing the railway line and increasing the drainage capacity, which previously



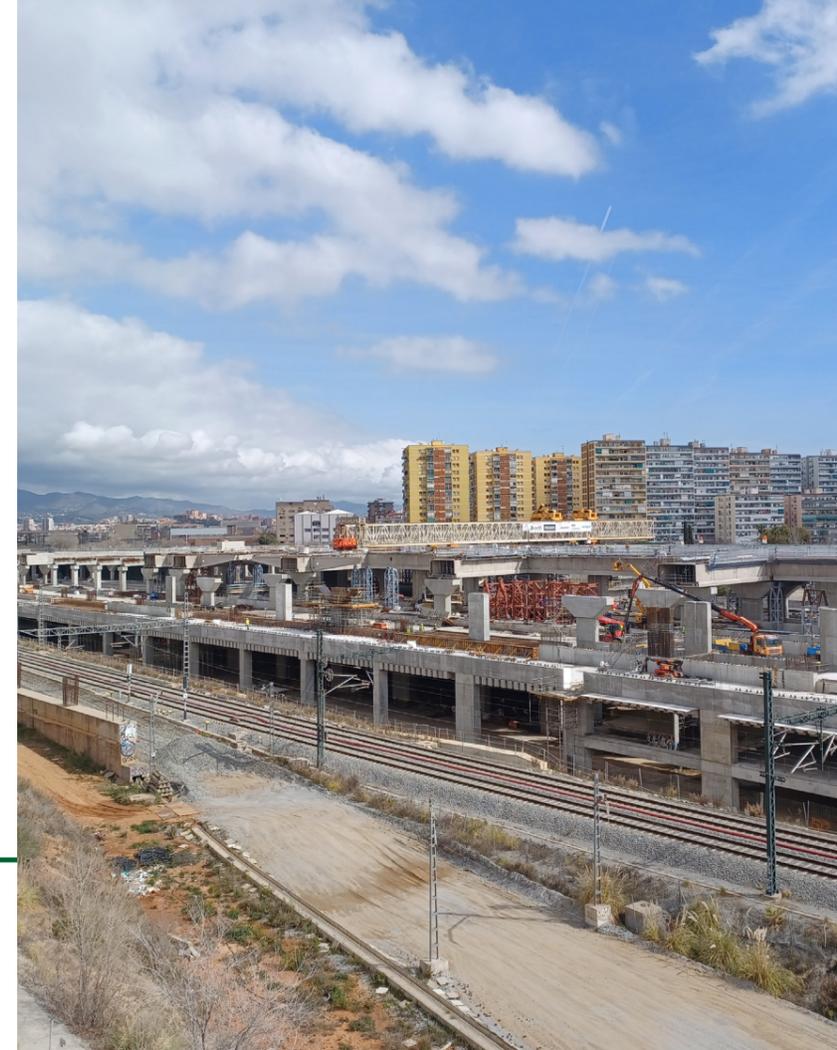
- was insufficient in intense episodes of rain. Work executed and in service.
- Sant Andreu Comtal. Track and electrification. Work executed and in service.
- Sagrera civil protection and security facilities. Work executed and in service.
- Sant Andreu civil protection and security facilities. Work executed and in service.

As for the accesses to Sagrera Station, works were reactivated on 12/04/2018 and will allow the relocation of the UIC platform and the existing suburban railway lines to their definitive position in the tunnel. Works were restarted by carrying out a preliminary clearing work in the different areas of the site. The status of the works is as follows:

- **Mataró Corridor:** it has been finished and put in service since December 2020.
- **Granollers Corridor:** The Granollers corridor is completed inside the station and has been in service since December 2022.
- **Bus station area (north):** the walls corresponding to the future segregated road on the mountain side and bus station are being built.
- The station cover is under construction.

With regards to the structure of the Sagrera Station, works will allow to build the complete station building with its three levels: the lower level houses tracks and platforms of the Rodalies network, the intermediate level corresponds to the lobby and parking area, and the upper level is the platforms and tracks for high speed. The current status of the works is as follows:

- Base slab: work is completed.
- Railway replacements on suburban railway lines: work is completed.
- Parking slab: Execution level 96%.
- High speed forging: 94% completion rate.
- Station cover: completion level at 37%.



4. VALLADOLID-BURGOS-VITORIA HIGH SPEED LINE



The section between Valladolid and Venta de Baños is in service, with ERTMS Level 2 between Valladolid and León having been brought into service in 2019.

On the other hand, the section between Venta de Baños and Burgos is also operating, with ERTMS Level 2 being brought into service in 2022. The entry into service of the Venta de Baños-Burgos section has meant the high-speed passenger connection of Burgos.

Works between Burgos and Vitoria have not begun.

5. MADRID-GALICIA HIGH SPEED LINE: OLMEDO-LUBIÁN-ORENSE-SANTIAGO SECTION.

The entire section from Olmedo to Ourense has been in service in ERTMS since December 2021. It has been brought into service by sections as they were completed. The last section to be put into service was the section between Pedralba de la Pradería and Ourense. The line has been designed for passenger traffic. The new Ourense bypass is currently under construction, specifically two platform subsections between Taboadela and Seixalbo.

Actions on the different sections are detailed below:

- **Olmedo-Zamora:** This 99 km section was commissioned on 17 December 2015 in ASFA. The most representative elements of this section include 20 viaducts totalling a length of 4.66 km. During 2018, the remodelling works at Zamora station were completed. On 27 October 2020, the ERTMS N2 system was put into service on this section, in addition to track 1 (Medina del Campo Junction).
- **Zamora-Pedralba de la Pradería:** 110 km long, the section consists of five subsections, all of them completed and received, with the most characteristic singular works being: 7 tunnels (4.5 km) and 14 viaducts (4 km). During 2020, all the actions and tests corresponding to communications (both signalling and GSM-R fixed and mobile telecommunications) were completed, obtaining authorisation for commercial commissioning from the AESF on 27 October 2020, leaving the section in service and equipped with the ERTMS N2 and ASFA train protection systems. In 2020, work was carried out at Puebla de Sanabria station. The new Sanabria A.V. station is completed and in service.



- **Pedralba de la Pradería-Ourense:** it consists of 22 subsections. Tunnels predominate in the route, reaching a total length of 125 km, compared to 9.4 km of viaducts. This section was put into service on 21 December 2021, with an improvement in journey time from 4:22 hours to 2:15 hours.

In 2021, the track assembly works between Pedralba de la Pradería and Ourense were completed. Also the works necessary for the commissioning of the overhead contact line works and associated systems, autotransformer and remote control centres, and tunnel protection and safety installations, as well as the communications works with the implementation of the ERTMS N2 system.

In March 2023, the works on the A Mezquita Maintenance Base began and will be completed in 2024.



- **Taboadela-Ourense:** on 17 December 2021, authorisation was obtained from the AESF to bring the section into commercial service, leaving the section in service and equipped with ERTMS N2 train protection systems (for UIC gauge) and ASFA (for UIC and Iberian gauge).

On the other hand, at the level of the communications subsystem, a work modification is in process with the aim of proceeding with the drafting of the construction projects that include the treatment of signalling for the following actions between Olmedo y Ourense:

- » Signalling actions accompanying the construction project for the new Ourense intermodal station and pedestrian walkway.
- » Signalling actions accompanying the platform, track and electrification projects for the Taboadela-Seixalbo high-speed railway bypass.
- » Removal of the Pedralba gauge changer.
- » Action for the construction of the left track (Track 2) between Pedralba fork and Vilavella.
- » Duplication of track between Medina del Campo and Coreses Bifurcation.

In 2023, the high-speed platform works for urban integration and conditioning of the Ourense railway network corresponding to the Taboadela-Rante Tunnel and Rante Tunnel-Seixalbo Connection Sections continue.

The works include the necessary actions for the correct execution of the railway platform for double track between Taboadela and Seixalbo of the Madrid - Galicia High Speed Line up to the level of sub-ballast for earth elements and boards in the case of structures.

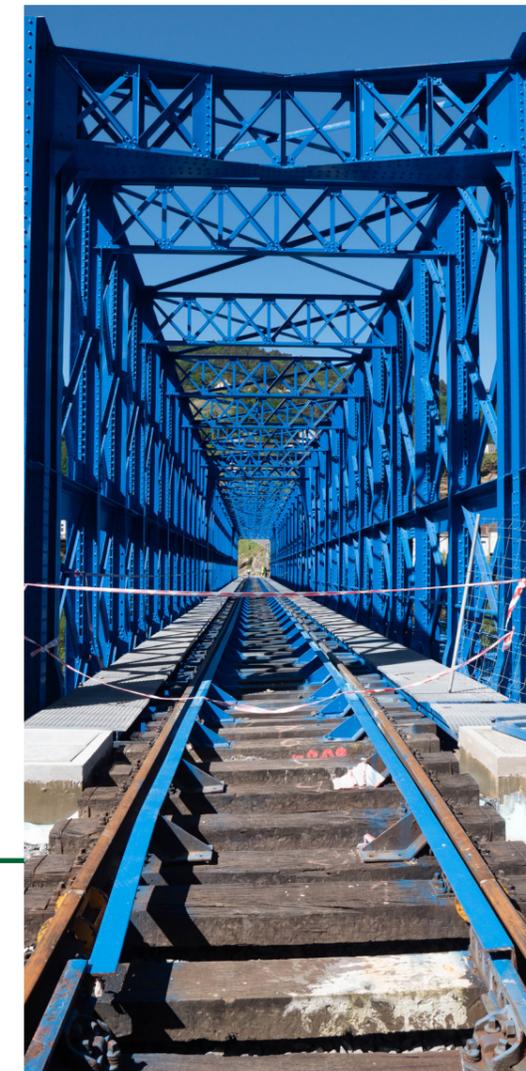
These works include the 3,410-metre Rante Tunnel and the 356-metre Viaduct over the OU-525 and the Barbaña river.

In the Taboadela-Rante Tunnel section, the excavation and maintenance of the Rante Tunnel is being carried out. The Mesón de Calvos Viaduct deck is also being built. The completion of this section is scheduled for 2025.

In the Rante Tunnel - Seixalbo Connection section, the Viaduct over the OU-525 and the Barbaña River (deck practically completed in 2023), the viaduct over the OU-510, and the viaduct over the future road to Bemposta are being built. Progress has also been made in the earthworks, and in the reinforcements necessary to build the new platform over the current Áspera Tunnel and on the existing embankment of Line 822 in Seixalbo. The expected completion of this section is the end of 2024.

Furthermore, in the section between Pedralba and Ourense, in 2023 the drafting of the following projects has begun:

- » Construction project for the installation of aerodynamic fins in protection barriers against bird collisions on the Madrid-Galicia high-speed line, Lubián-Prado section.
- » Project to widen evacuation corridors in several tunnels on the Madrid-Galicia high-speed line, Pedralba-Ourense section.
- » Construction project for the execution of acoustic protection on the Madrid-Galicia, high-speed line (Campobecerros).



6. CANTABRIA HIGH SPEED LINE

This high-performance connection between Palencia and Alar del Rey (Nogales) will extend high-speed passenger services to the north of Palencia, linking with Santander.

In 2018, the EIS (Environmental Impact Statement) was issued and the Palencia-Nogales section was approved. Given the need for detailed studies to be able to issue the resolution, the MITECO did not include the Nogales-Aguilar de Campoo section in the scope of the EIS. We are currently executing the following sections:

- Palencia-Palencia Norte (1.3 km): works started on 03/02/2023 for €26.87 M (VAT included) and a 30-month term.
- Palencia Norte - Amusco (20.79 km): work awarded for €77.28 M (VAT included) and a term of 36 months. Works started on 20/10/2021.
- Amusco - Osorno (21.95 km): work awarded for €79.26 M (VAT included) and a term of 40 months. Works started on 03/07/2021.
- Osorno - Calahorra de Boedo (20.73 km): work awarded for €93.50 M (VAT included) and a term of 48 months. Works started on 07/07/2023.
- Calahorra de Boedo - Alar del Rey (13.60 km): work awarded for €109.25 M (VAT included) and a term of 36 months. Works started on 26/09/2023.

Following the capacity and the study of functionality performed to determine the solution best suited to the service demand foreseen for the Madrid - Santander corridor, the following functional scheme was considered as the best solution:

- Single-track platform in the first 4.00 km (from KP 0+000 in Palencia).
- Double-track platform for the following 37 km (from KP 4+000 to KP 41+000).
- Single-track platform from KP 41+000 to the end of the section (KP 78+630).



The action has been divided into two phases:

- The works of the 1st phase, for an area of about 500 m, began in December 2019. They have been partially suspended due to biological shutdown on two occasions. Completed in May 2022 and received in June 2022. The current budget is €5.6 M (with VAT).
- On 04/26/2022, the works of phase 2 were awarded for €95.48 million (with VAT), with an estimated period of 36 months and began in July 2022. They affect the AV lines of Andalusia, Levante and Barcelona, so it will require night work.

Other conditions in execution/processing are the EXOLUM Hydrocarbon pipeline, 4 REE high voltage lines and 2 UFD medium voltage lines, as well as the Madrid City Hall South Collector.

Track assembly has been segregated into an independent project to avoid railway disruptions and to be able to manage supplies more effectively. Once the complete action is completed, the electrification and signaling work will have to begin, with an estimated duration of 12 months.



8. ALMERÍA – MURCIA HIGH SPEED LINE

After the Functional Study for the Optimization of the Murcia-Almería high-speed projects, a new solution was proposed to address the approach of the line in a comprehensive manner, based on which the platform construction projects have been developed, with the following advantages:

- » Allows the exploitation of AV, satisfying the expected demand.
- » Optimization of investments to be executed with the use of those already executed.

Current situation:

- Undergrounding of Estación del Carmen and Barriomar and Nonduermas: In progress since July 2019.
- Nonduermas-Sangonera: In execution since June 2019.
- Sangonera-Totana: In execution since April 2021.
- Totana-Totana: In execution since October 2022.
- Totana-Lorca: In execution since May 2021.
- New Totana Station: In bidding process.
- Integration of the railway in Lorca: In execution since April 2024.
- Lorca-Pulpí: In execution since June 2022.
- Pulpí-Vera: In execution since April 2019.

- New Vera-Almanzora high-speed station: In the project drafting phase
- Vera-Los Arejos: Platform completed.
- Los Arejos-Níjar: In execution since January 2020.
- Níjar-Rio Andarax: In execution since February 2020.
- Andarax-El Puche River: In service since July 2021.
- Integration of the railway in Almería. Phase 1. (El Puche): In service since July 2021.
- Integration of the railway in Almería. Phase 2. In execution since October 2023.
- Pulpí-Águilas branch adaptation: The project is in the drafting stage.

The cut of rail Service is being carried out in 2 phases:

- **Phase 1: circulations between Alcantarilla and Águilas interrupted since 10/01/2021.**
- **Phase 2: in February 2022, interruption of Murcia-Alcantarilla circulations.**

An alternative road transportation plan has been established for both phases. Murcia Mercancías is operational for merchandise destined for the Chinchilla de Montearagón line.

7. H.S.L. BARCELONA- H.S.L. LEVANTE CONNECTION

To guarantee the full functionality of this corridor, in 2018 Adif AV awarded the contract to draft the connection project for the Madrid-Levante high speed rail and the Madrid-Barcelona high speed rail, which will complete the North-South transversal connections. It is located in a complex environment due to the confluence of road and railway infrastructures that must be saved: M-31; M-45; M-50; Perales Variant; LAV Northeast, East and South; Affected Services, Manzanares riverbed.



9. LEVANTE HIGH SPEED LINE

SECTION: MONFORTE DEL CID-MURCIA

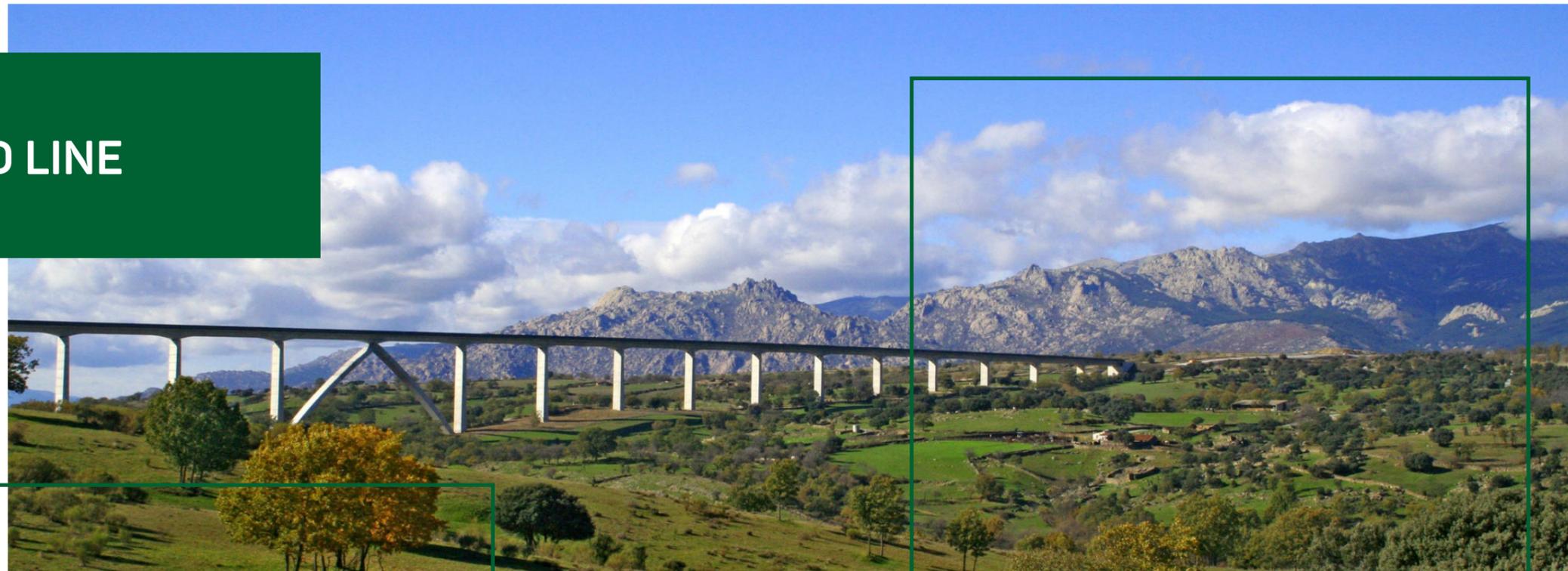
Current Phase:

- Double standard gauge track between Monforte del Cid and Callosa de Segura.
- Standard gauge single track between Callosa de Segura and Accesos a Murcia.
- Double track on access to Murcia (mixed width + standard width).

On 12/19/2022, the High Speed Line was put into service to the city of Murcia with the Beniel-Murcia del Carmen section, completing the route from Monforte del Cid.

Work status:

- » **Acoustic protection project:** In execution since March 2024.



10. BOBADILLA-GRANADA HIGH SPEED LINE (LOJA BYPASS INCLUDED)

- Viaduct over the railway- Loja bypass. Río frío: It is received and liquidated.
- Bobadilla-Ronda:
 - » Remote energy control works: start of work scheduled for May 2026 with a period of 12 months.
 - » Works on the Ronda electrical substation: start of work scheduled for May 2026 with a period of 18 months.

11. ATLANTIC AXIS HIGH SPEED LINE (SANTIAGO- VIGO SECTION)

- **Vigo- Padrón:** Acoustic protection works in progress since July 2022. End scheduled for September 2024.
- **Padrón-Coruña:** A modification of these acoustic protection works is in progress, which began in January 2023 and is expected to be completed in 2025.
- **Vigo-Coruña:** received the supply of equipment for commissioning of the traction electrical substation.

The indicators analyzed for each of the selected projects are summarized below:



12. ZARAGOZA-PAMPLONA HIGH SPEED LINE

SECTION: CASTEJÓN - CAMPANAS

The Castejón-Comarca de Pamplona section, within the Zaragoza-Pamplona HSR, is part of the Cantabrian-Mediterranean Corridor, a railway axis that will connect the Spanish Atlantic and Mediterranean corridors of the Basic Network of the Trans-European Transport Network, connecting cities and ports of the two maritime frontage of the Iberian Peninsula.

The section between Castejón (link with the Zaragoza-Logroño route) and Pamplona is made up of the following subsections:

1. **Subsection 0-A. Connection with line 700 Casetas-Bilbao.** Length: 3 km.
2. **Subsection 0-B. Viaduct over the Ebro.** Length: 0.7 km.
3. **Subsection 1. Castejón-Villafranca.** In turn integrated by the Castejón- Cadreíta and Cadreíta- Villafranca sections. Length: 14.7 km.
4. **Subsection 2. Villafranca-Olite.** Composed of the two subsections, Villafranca-Peralta and Peralta-Olite. Length: 15.3 km.
5. **Subsection 3. Olite-Tafalla.** Composed of the subsections. Olite-Tafalla(s) and Tafalla(s)-Tafalla. Length: 14.7 km
6. **Subsection 4. Tafalla-Campanas.** Length: 15.2 km.
7. **Subsection 5. Campanas-Esquiros.**
8. **Pamplona Railway Loop.**



These subsections are currently being executed (total length 30.6 km):

- » **Viaduct over the Ebro River**, which given its size is being executed independently in a single contract. It consists of a 700 m structure on 10 circular piers and 2 abutments, all founded using perforated piles with a recoverable metal jacket and the use of thixotropic muds. The construction process allows respect for the riverside vegetation and its associated fauna, with minimal impact on the riverbed, while at the same time stopping times are minimized in the event of floods.
- » **The Olite-Tafalla South subsection**, is currently at a level of execution greater than 65%, with the excavation of the Monte Plano Tunnel having been the most complex action. This tunnel has a length of 1,971 meters and will be equipped with a 341-meter evacuation gallery. Its excavation is carried out using mechanical means in advance and destroyed with support using trusses, shotcrete and bolts.
- » **Tafalla Sur-Tafalla subsection**, currently with a completion rate of more than 70%, highlights the tunnel under the Navarra canal, 598 m long, with two viaducts and an overpass also under construction. In this section, the existence of the Gariposa archaeological site is notable, with Adif AV avoiding its impact by constructing a tunnel.
- » **Tafalla-Campanas subsection**, the mine construction of three tunnels is planned (La Catedral, 475 m, Artzaretta, 660 m, and Murugain, 508 m), a viaduct (Arroyo de la Majada, 540 m), a parking of freight trains (Garisoain, 2,400 m), 10 overpasses and one underpass, which will promote permeability on both sides of the railway line, as well as the channeling of the Errekaldea regatta and the structures on the same. After carrying out archaeological studies and with part of the route already cleared, earthworks and drainage works are being carried out, in addition to the construction of the mouths of the Catedral and Artzaretta tunnels.

The platform sections between Castejón and Olite have already been completed and the informative study for the connection with the Casetas-Bilbao line and the Campanas-Pamplona section is being drafted.

	EXTERNAL COSTS (Thousand Euros)	TIME (Thousand hours)		MODAL TRANSFER (Thousand Passengers/ KM Transferred)		TONS OF CO ₂	
	30 years	30 years	Annual average	30 years	Annual average	30 years	Annual average
Valladolid-Burgos-Vitoria HSL	5,778,232	114,677	3,823	60,397,188	2,013,240	2,625,652	87,522
Madrid-Galicia Tramo Olmedo-Zamora-Ourense HSL	4,228,626	144,273	4,809	38,418,279	1,280,609	1,851,003	61,700
Atocha-Chamartín-Torrejón de Velasco y Chamartín North Head End Connection	15,137,189	266,739	8,891	91,156,778	3,038,559	8,594,328	286,478
Madrid-Sevilla y Córdoba-Málaga (Almodóvar del Río) Connection	372,252	7,502	250	11,991,020	399,701	163,916	5,464
Madrid-Barcelona Figueras HSL	19,264,365	346,659	11,555	132,240,235	4,408,008	9,464,741	315,491
Madrid-Cantabria HSL	699,856	17,064,328	568,811	9,890,256	329,675	355,060	11,835
Mediterranean Corridor HSL (Almería-Castellbisbal)	17,001,738	476,591	15,886	112,917,458	3,763,915	8,667,164	288,905
Madrid-Levante HSL	18,196,280	283,178	9,439	95,507,061	3,183,569	3,898,322	129,944
Antequera-Granada HSL	2,783,655	56,478	1,883	26,727,956	890,932	1,360,089	45,336
Atlantic Axis HSL (Santiago-Vigo)	2,578,482	84,509	2,817	7,508,705	250,290	711,214	23,707
Cantabrian-Mediterranean HSL (Castejón-Campanas)	939,059	28,795	960	19,869,459	662,315	337,486	11,250
Total	86,979,732	18,873,730	629,124	606,624,393	20,220,813	38,028,974	1,267,632



FUNDS MANAGEMENT

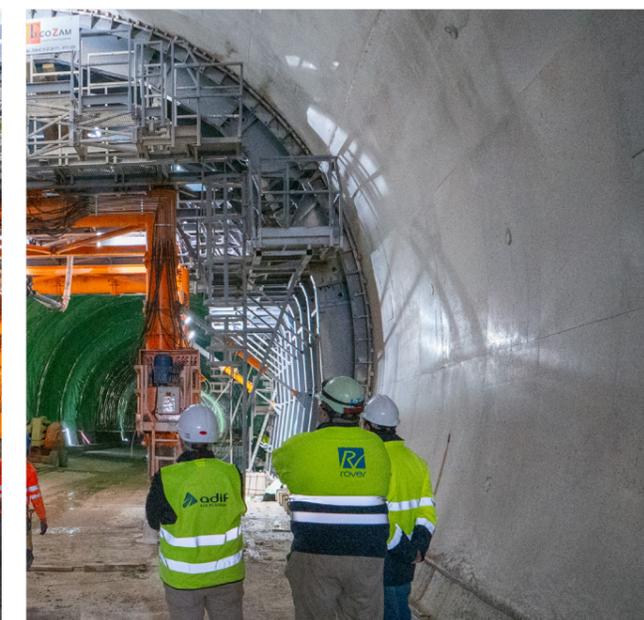
Until the total allocation of the net amount of the issue disbursed on 8 October 2021 and of the issue disbursed on 25 October 2022, to Eligible Green Projects, Adif Alta Velocidad temporarily keep the unallocated funds invested in current accounts.

The audit firm PKF Attest, appointed by Adif AV, has verified the internal monitoring method and the allocation of funds to Eligible Green Projects. The auditor's report is attached to this document.

REPORTS

Until full implementation of the issued Green Bonds, Adif AV will publish the following information annually on its website:
www.adifaltavelocidad.es

- Annual information on funds allocated during the period to Eligible Green Projects
- Expected impact indicators
- Annual report of auditors or a third party verifying the internal traceability method and placement of funds in Eligible Green Projects.



2022 Issuance

2023 Issuance

INTRODUCTION

FRAMEWORK

USE OF PROCEEDS IN ELIGIBLE GREEN PROJECTS
SELECTION PROCESS
FUNDS MANAGEMENT
REPORTS

2022 ISSUANCE

2023 ISSUANCE

INDICATORS OF FORESEEN IMPACT BROKEN DOWN BY LINES

INTRODUCTION
PREVIOUS CONSIDERATIONS
DEFINITION OF INDICATORS

ALLOCATION OF FUNDS TO ELIGIBLE GREEN PROJECTS

2022 ISSUANCE
2023 ISSUANCE

2022 ISSUANCE

(SIXTH GREEN BONDS ISSUANCE)

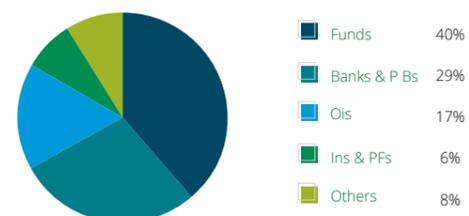
Issuer	Adif Alta Velocidad
Volume	500,000,000 EUR
Ratings (Moody's/Fitch)	Baa2/A-
Pricing Date	17 October 2022
Settlement Date	25 October 2022
Maturity	30 July 2029
Ranking	Senior Unsecured
Format	Fixed rate
Coupon	3.50% annual, ACT/ACT
Benchmark	SPGB 0.80% 07/29
Reoffer Spread	+45 b.p.
Reoffer Yield	3.517%
Reoffer Price	99.91%
Net amount	498,800,000 EUR
Documentation	AIAF / Spanish Law
Use of proceeds	Finance and/or refinance Eligible Green Projects

2023 ISSUANCE

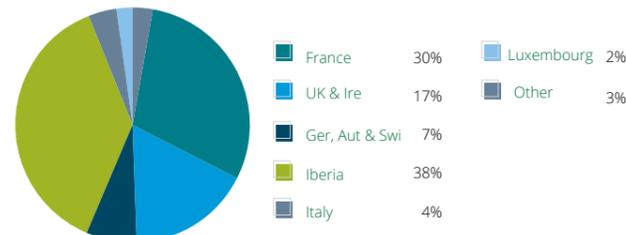
(SEVENTH GREEN BONDS ISSUANCE)

Issuer	Adif Alta Velocidad
Volume	500,000,000 EUR
Ratings (Moody's/Fitch)	Baa2/A-
Pricing Date	18 April 2023
Settlement Date	27 April 2023
Maturity	30 April 2033
Ranking	Senior Unsecured
Format	Fixed rate
Coupon	3.90% annual, ACT/ACT
Benchmark	SPGB 3.15% 04/33
Reoffer Spread	+45 b.p.
Reoffer Yield	3.919%
Reoffer Price	99.845%
Net amount	498,425,000 EUR
Documentation	AIAF / Spanish Law
Use of proceeds	Finance and/or refinance Eligible Green Projects

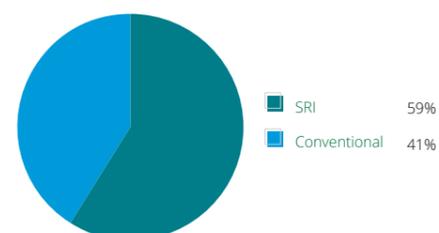
INVESTOR CATEGORY



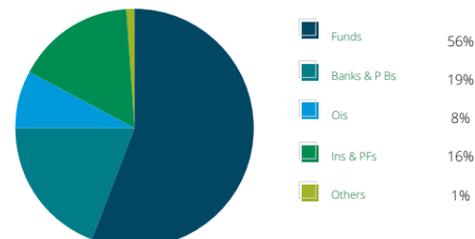
GEOGRAPHIC DISTRIBUTION



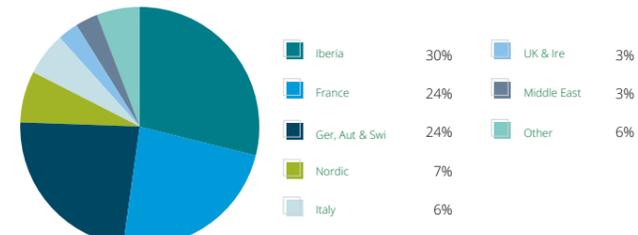
SOCIALLY RESPONSIBLE INVESTORS VS CONVENTIONAL INVESTORS



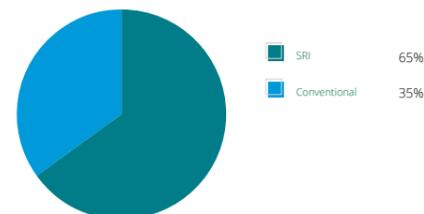
INVESTOR CATEGORY



GEOGRAPHIC DISTRIBUTION



SOCIALLY RESPONSIBLE INVESTORS VS CONVENTIONAL INVESTORS



Indicators of foreseen impact broken down by lines

INTRODUCTION

FRAMEWORK

USE OF PROCEEDS IN ELIGIBLE GREEN PROJECTS
SELECTION PROCESS
FUNDS MANAGEMENT
REPORTS

2022 ISSUANCE

2023 ISSUANCE

INDICATORS OF FORESEEN IMPACT BROKEN DOWN BY LINES

INTRODUCTION
PREVIOUS CONSIDERATIONS
DEFINITION OF INDICATORS

ALLOCATION OF FUNDS TO ELIGIBLE GREEN PROJECTS

2022 ISSUANCE
2023 ISSUANCE

INDICATORS OF FORESEEN IMPACT

BROKEN DOWN BY LINES



1. Introduction

This document presents the socio-economic savings indicators established in the high-speed projects which are involved in the issuance of green bonds performed by Adif Alta Velocidad.

These indicators, which are defined in a chapter below, are the following ones:

- A. Saving of External Costs, expressed in Thousand Euros.**
- B. Time Saving, expressed in thousand of hours.**
- C. Modal Transfer, expressed in thousand of traveler's km transferred from the different modes of transport to the high-speed railway mode.**
- D. CO2 Tons Savings.**

The high-speed lines analyzed as green projects are the following ones:

- **Valladolid-Burgos-Vitoria High Speed Line.**
- **Madrid – Galicia High Speed Line: Section Olmedo-Zamora-Ourense. This Project includes the Ourense variant.**
- **Necessary actions to increase the capacity of the Puerta de Atocha and Chamartín Clara Campoamor AV high-speed stations.**
- This project includes the Chamartín-Atocha-Torrejón de Velasco connection, the Chamartín North head-end and Barcelona-Levante High Speed Lines connection.**
- **Connection of the Madrid-Seville and Córdoba-Málaga High Speed Lines in the area of Almodóvar del Río (Córdoba).**
- **Alta Velocidad Madrid – Barcelona High Speed Line. Including La Sagrera.**
- **Madrid-Cantabria High Speed Line: Section Palencia – Alar del Rey.**
- **Mediterranean Corridor High Speed Line: Section Castellbisbal-Almería.**
- **Madrid- Levante High Speed Line.**
- **Antequera – Granada High Speed Line.**
- **Atlantic Axis High Speed Line: Santiago de Compostela- Vigo section.**
- **Atlantic Mediterranean Corridor: Castejón-Campanas section.**



2. Previous Considerations

The estimation of the indicators of socio-economic savings of each high-speed railway project **is based on studies of profitability or cost-benefit analysis** performed by Adif Alta velocidad in each of the lines analyzed, which follow the methodology and criteria established by the European Commission of Regional Policy in the document “Guide to Cost-benefit Analysis of Investments Projects. Economic appraisal tool for Cohesion Policy 2014-2020”, published in 2014.

These analysis cost-benefit are based, in turn, on previous studies which provide the needed data for the estimations of socio-economic profitability, which without being exhaustive are:

- Demand (of travelers and in the case of High Speed Lines of mixed traffic, also of freight) both of the situation without project and of the situation with project, both needed for the differential calculation of the savings.
- Modal split within the transport system.
- Transfer of passengers/freight to the railway in the situation of project (in this case the new High Speed Line), for each one of the existing means in the field of the project.
- Flows of traffic generated/induced: additional traffic caused by the improvement of transport after the implementation of the analyzed project, in this case, the high-speed railway line.
- Travel times in each means of transport based on the relationship Origin-Destination, as well as the time saving caused by the modal change.

The cost-benefit analysis uses a 30 years' period since the implementation of the High Speed Line, a period that meets the one mentioned in the document “Guide to Cost-benefit Analysis of Investments Projects. Economic appraisal tool for Cohesion Policy 2014-2020” for railway projects.

EUROPEAN COMMISSION'S REFERENCE PERIODS BY SECTOR	
Sector	Reference period (years)
Railways	30
Roads	25-30
Ports and airports	25
Urban transports	25-30
Water supply / sanitation	30
Waste management	25-30
Energy	15-25
Broadband	15-20
Reserch and innovation	15-25
Buisiness infranstructure	10-15
Other sectors	10-15

Demand Variables

The demand variables needed for the estimation of the indicators subject of this report are the ones below



- Travelers km transferred (thousands)**
 - From private vehicle
 - From bus
 - From conventional train
 - From airplane
- Travelers km HLS (thousands)**
 - Captured
 - Induced
- Hours saved (thousands)**
 - Obligated
 - Not obliged
- Tons km (thousands)**
 - Transferred from truck (ton*km in truck)
 - Captured (ton km railways)

3. Definition of indicators

SAVING OF EXTERNAL COSTS

The indicator "Saving of external costs" shows the socioeconomic benefits monetized which are calculated in each study of profitability, arising from the improvement of the transport conditions thanks to the project and the savings that the users experience.

In this indicator of external costs saving, the following concepts are grouped in a single value:

A. TIME SAVINGS

Time savings are calculated for the travelers attracted (flow Origin/Destination (O/D) of travelers) by the new railway services, as a difference between the time in situation without project (or of reference) for a displacement in the means of transport used in such scenario, and the time in railway used in the scenario with project.

As a result, the savings of time are differentiated depending on the O/D and on the means of departure of each traveler attracted by the railway.

The savings of time are obtained, therefore, directly from the results of modelling of the situation of reference and from the one of the projects.

The monetary valuation of the time is performed in each study of profitability from the values of €/hour of the European project "Developing Harmonized European Approaches for Transport Costing and Project Assessment (HEATCO)", differentiated according to the reason for travel (Obliged/work and not obliged/remaining reasons).



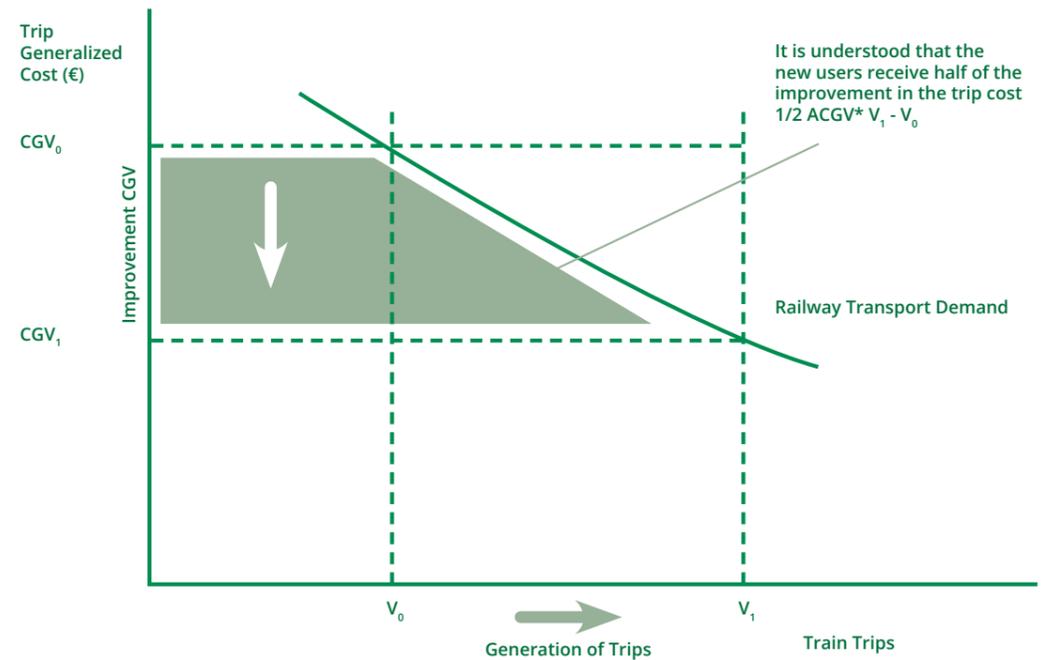
B. NET SURPLUS OF THE CONSUMER OF NEW TRAVELERS

Generated/induced traffic

As previously described, generated or induced traffic is understood as the new users who perform their travel thanks to the improvement made by the implementation of the project of new railway infrastructure, and which in the situation of reference, where the transport does not improve, do not perform the travel.

In order to estimate the monetary valuation of the consumer surplus of these new travelers in each Origin-Destination relation, the methodology established in the Guide of Analysis of Cost Benefit of Projects of Investment, published by the European Commission of Regional Policy in 2014 - known as the rule of the half, is used.

CALCULATION OF THE NET SURPLUS OF THE CONSUMER OF NEW TRAVELERS "RULE OF THE HALF"





C. SAVINGS OF RUNNING OR OPERATION COSTS OF OTHER MEANS (DIFFERENT TO THE RAILWAY ONES)

The collection of travelers coming from other means by the new railway services causes a global decrease of running or operation costs in these means.

The monetization of this saving is obtained through the product of the number of travelers

transferred from the different means of transport to the railway, by the unit operation cost by travelers in its mode of origin.

D. SAVING OF ACCIDENTS

The variation of accident cost comes from the different probability of suffering accidents between the railway in the project and the means of origin of the travelers captured or transferred to the railway.

For the monetization of this saving, the product of the number of travelers transferred from the different means of transport to the railway, by the unit cost of accidents by traveler in their means of origin, is calculated.

E. SAVING OF ENVIRONMENTAL COSTS

It comprises the ensemble of the environmental savings caused by the project, and includes:

- Saving in net costs by impact in the climate change.

This corresponds to the costs in order to prevent the negative effects of the climate change caused by emissions of Greenhouse Gases (GHG). For the sector of transports the pertinent emissions are carbon dioxide, nitrogen dioxide and methane.

- Saving in net costs by impact on the atmospheric pollution.

Refers to the costs by the adverse effects of atmospheric pollution (mainly particles, nitrogen oxides, sulphur dioxide, volatile organic compounds and ozone): effects on health, buildings and materials, and harvests.

- Saving in net costs by impact on the noise or acoustic pollution.

For this type of projects, the incidence of the global impact can be very low or almost negligible. Its main incidence is in the sections of transit along cities affected by the project, and its effect is usually reduced by corrective measures, such as acoustic screens.

- Saving in net costs by indirect environmental impacts.

Related to indirect effects of the transport activity, such as the production of energy (fuels and electricity).

- Saving in net costs by impact on nature and landscape.

It refers to the costs estimated necessary to improve the existing infrastructures according to the needs of the environment. They are repair and balancing costs. These costs are no longer considered during the evaluation, because they are covered by the infrastructure investments, a significant part of which is assigned to compensate nature and landscape impacts of the works.

- Saving in net costs by congestion.

Related to the cost caused by the time spent regarding a non-congestion situation, not taking into account the loss of efficiency part of the system.

For the estimation of these environmental savings and their monetization, unit costs are used from the "Handbook on the external cost of transport" performed by CE Delft, INFRAS, TRT and Ricardo, with values in 2016's euro for Spain, and published in 2019 by the European Commission (hereinafter Handbook on External Costs).

In this Handbook on External Costs, appear the average unit costs of the EU for each one of the concepts involved in the environmental costs, as well as the cost of accidents, expressed in euros per 1,000 travelers-km and in euros by 1,000 tons km in the case of freight.

The following tables show the value of the study:

AVERAGE TRAVELER COST (€/1,000 TRAVELER-KM)

	Passenger cars	Buses and Coaches	Motorcycles	High Speed Rail	Electric Rail	Diesel Rail	Aviation
Accidents	41.89	8.41	92.13	0.47	3.71	3.71	0.37
Air pollution	6.54	3.43	8.23	0.02	0.09	5.59	1.26
Climate change	11.95	4.02	9.29	0.00	0.00	2.92	22.64
Noise	9.94	3.19	111.55	0.60	2.63	2.64	0.62
Energy production	3.05	1.20	3.55	7.51	0.70	0.70	8.65
Enviroiment damages	-	-	-	-	-	-	-
Congestion	51.29	6.33	0.00	0.00	0.00	0.00	0.00
Total	124.65	26.57	224.74	3.77	13.94	15.57	33.53

AVERAGE FREIGHT COST (€/1000 TON-KM)

	Light Truck	Heavy Truck (1)	Electric Rail	Diesel Rail
Accidents	251.82	6.86	0.48	0.48
Air pollution	52.96	5.00	0.04	13.78
Climate change	74.02	4.73	0.00	4.76
Noise	55.68	10.49	2.71	3.04
Energy production	17.72	1.46	1.92	1.79
Enviroiment damages	-	-	-	-
Congestion	490.25	4.81	0.00	0.00
Total	942.44	33.35	5.15	23.85

Source: Handbook on the external cost of transport. CE Delft, INFRAS, TRT y Ricardo 2019.

TIME SAVING

This indicator is the saving, expressed in thousands of hours, experienced by the travelers attracted to high-speed railway. The estimation is made as difference between the time of the travel in situation of project (time of travel of each user between an origin and a destination in the railway mean with the new HSL), and the time in situation of reference or without project (time of travel of each user between an origin and a destination in the means of transport used originally).

MODAL TRANSFER

This indicator is the result of the travelers captured and generated/induced by the high-speed railway as difference between the situation without project (or similar) and the situation with the project, in all transport means.

In this indicator of modal transfer appear the travelers-km (in thousand) who change of means of transport, changing to the railway as a result of the improvement of the transport that the users experience because of the new high-speed railway line.

In the situation of project, the travelers in high-speed railway include the travelers generated/induced, who have already been previously defined.

SAVING OF TONS OF CO₂

For the calculation of this indicator the factors of emission of CO₂ obtained in the "Study of External Costs of the Transport in Europe" (2011, CE Delft, INFRAS and Fraunhofer) have been used. These factors, measured in grams of CO₂ by vehicle km, have been calculated for each country, differentiating by transport means, both for freight and for travelers.

The following table shows the values of these CO₂ emission factors, where the values corresponding to Spain are highlighted in yellow.



PASSENGER TRANSPORT						FREIGHT TRANSPORT					
UNIT	ROAD			RAIL	AVIATION		ROAD	RAIL	WATERBORNE		
	Passenger cars	Buses & coaches	Motorcycles	Total road transport	Passenger Transport	Passenger Transport (incl. LTO)	LDV	HDV	Total road transport	Freight Transport	Inland waterways
	g/vkm			g/vkm	g/train-km		g/vkm		g/vkm	g/train-km	g/vkm
BASE	2008										
SOURCE	Tremove										
AUSTRALIA	188	586	84	198	942	11,980	268	634	394	802	25,400
BELGIUM	195	615	79	198	401	11,778	240	751	415	4,089	20,660
BULGARIA	174	566	51	202	1,338	16,804	221	617	357	2,200	21,312
CZECH REPUBLIC	188	556	77	186	1,334	11,787	221	721	393	1,666	22,226
DENMARK	198	626	80	211	4,932	13,128	213	707	383	5,809	n,a,
ESTONIA	226	623	65	226	4,498	8,896	231	627	367	36,355	n,a,
FINLAND	213	648	81	220	217	12,869	232	712	397	4,762	21,667
FRANCE	196	636	84	198	1,043	14,200	254	663	327	1,137	19,882
GERMANY	212	672	94	215	1,928	14,844	276	680	415	3,036	21,667
GREECE	185	581	79	172	6,467	19,830	219	633	361	6,934	n,a,
HUNGARY	193	552	74	188	1,530	13,342	225	599	353	2,936	22,664
IRELAND	186	630	76	198	6,435	19,045	200	633	349	13,336	n,a,
ITALY	188	652	86	192	879	17,610	271	707	421	494	19,882
LATVIA	223	669	84	220	4,655	11,251	230	616	362	41,610	n,a,
LITHUANIA	203	598	71	194	9,069	10,210	222	656	371	35,202	21,667
LUXEMBURGO	196	618	76	204	50	6,398	209	670	367	5,371	20,660
NETHERLANDS	210	747	74	214	188	14,193	256	741	422	2,843	21,317
NOREWAY	207	608	69	210	757	13,155	214	679	373	2,949	n,a,
POLAND	181	576	69	180	1,366	13,071	215	665	369	1,815	14,939
PORTUGAL	192	615	75	190	2,270	16,553	221	760	406	5,436	n,a,
ROMANIA	186	561	56	175	2,293	12,715	224	610	357	5,932	22,835
SLOVAKIA	189	544	84	197	1,797	13,703	218	546	331	2,290	22,694
SLOVENIA	192	596	75	172	1,269	6,838	223	661	373	1,437	n,a,
SPAIN	191	607	57	192	1,018	20,654	211	699	378	3,149	n,a,
SWEEDEN	230	585	81	234	112	15,210	225	684	382	900	n,a,
SWITZERLAND	208	630	64	205	0	12,151	240	661	403	583	21,667
UNITED KINGDOM	231	820	97	237	1,123	17,795	234	815	406	7,434	21,317
Total	204	647	79	206	1,314	15,887	242	242	381	3,420	21,431

From the emission factors corresponding to Spain in the previous table, measured in grams of CO2 by vehicle km, and the ratio by occupation (travelers by vehicle) used in each profitability study, the values needed to perform the estimation of the saving of tons of CO2 for each project evaluated are obtained and shown in this table.

	CONVENTIONAL RAILWAY	BUS	CAR	AIRPLANE	A. RAILWAY
g CO2 / vehicle - km	1,018	607	191	20,654	1,018
Average occupation	180	39	1.8	150	260
g CO2 / traveler - km	5.7	15.6	106.1	137.7	3.9
kg CO2 / traveler - km	0.0057	0.0156	0.1061	0.1377	0.0039

	FREIGHT RAILWAY	FREIGHT TRUCK
g CO2 / vehicle - km	3,149	699
Average load	400	11.8
g CO2 / ton - km	7.9	59.2
kg CO2 / ton - km	0.0079	0.0592

The total saving of emissions of CO2 (in tons) is calculated as application of the ratios from the previous table to the travelers.km and tons.km, captured and induced by each high-speed project.



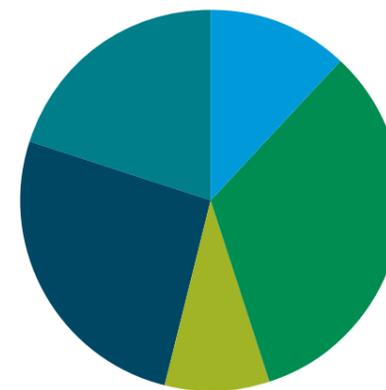
VALLADOLID-BURGOS-VITORIA HIGH SPEED LINE

A. SAVING OF EXTERNAL COSTS

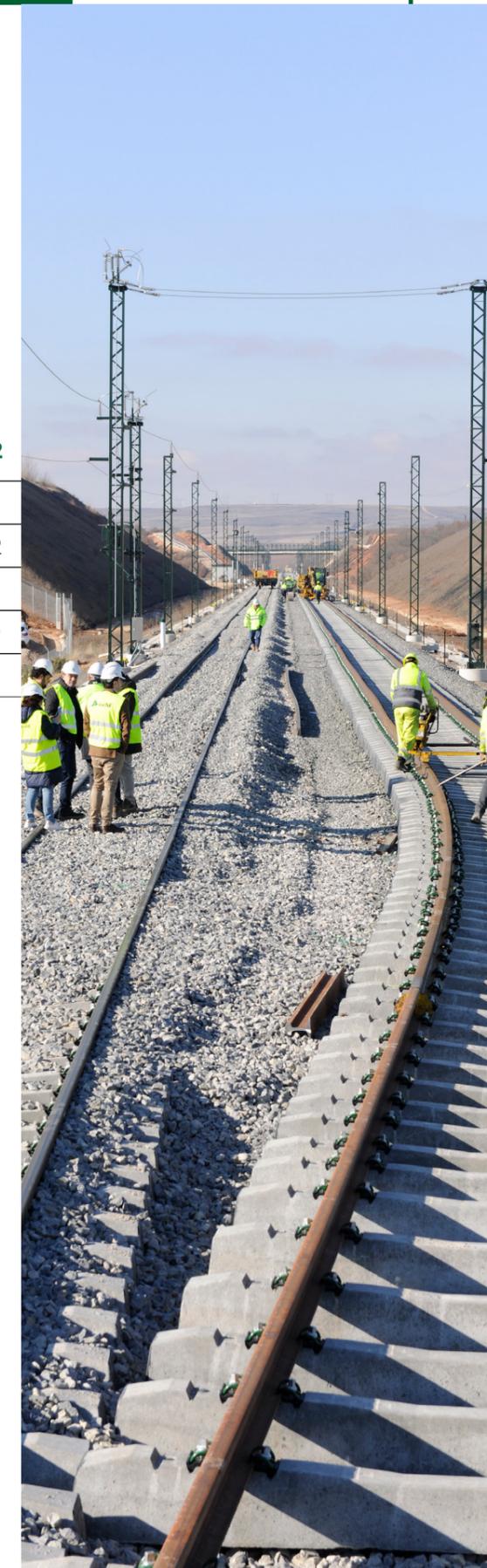
These results are calculated for a period of evaluation of 30 years since the implementation of the first phase of the project (2019).

Total savings (expressed in VAN to 2019 at 3%, Thousand Euros of 2016) of this line is the following:

SAVINGS (Thousand Euros of 2016)	5,778,232
Surplus of the Customer (by generated traffic)	697,189
Saving of Time	1,915,172
Saving of Accidents	522,440
Saving in Operating Costs	1,514,149
Saving of environmental costs	1,129,281



- Surplus of the Customer (by generated traffic) 12%
- Saving of Time 33%
- Saving of Accidents 9%
- Saving in Operating Costs 26%
- Saving of Environmental Costs 20%



B. TIME SAVINGS

Total hours saved along the 30 years of the study:

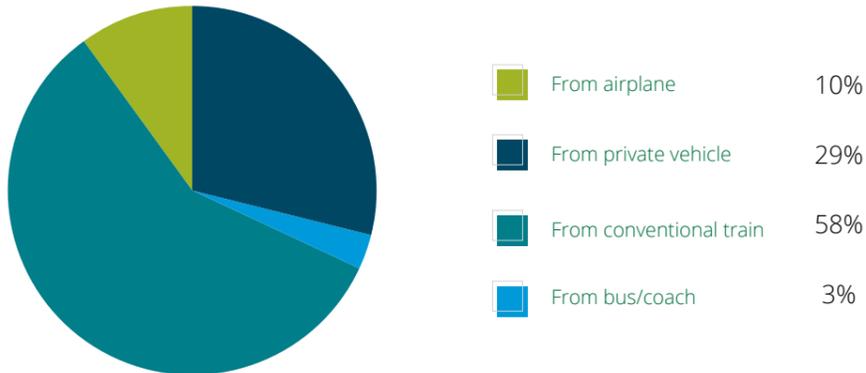
GLOBAL SUMMARY	TOTAL (30 years)	AVERAGE ANNUAL SAVING
Thousand hours saved	114,677	3,823

C. MODAL TRANSFER

Below appears the summary of the Travelers.Km transferred of each means of transport and the graphic of percentages of modal transfer:

TRAVELERS.KM TRANSFERRED (Thousand)	TOTAL (30 years)	ANNUAL AVERAGE
From private vehicle	17,281,210	576,040
From bus/coach	2,156,858	71,895
From conventional train	34,945,031	1,164,834
From airplane	6,014,088	200,470
TOTAL	60,397,188	2,013,240

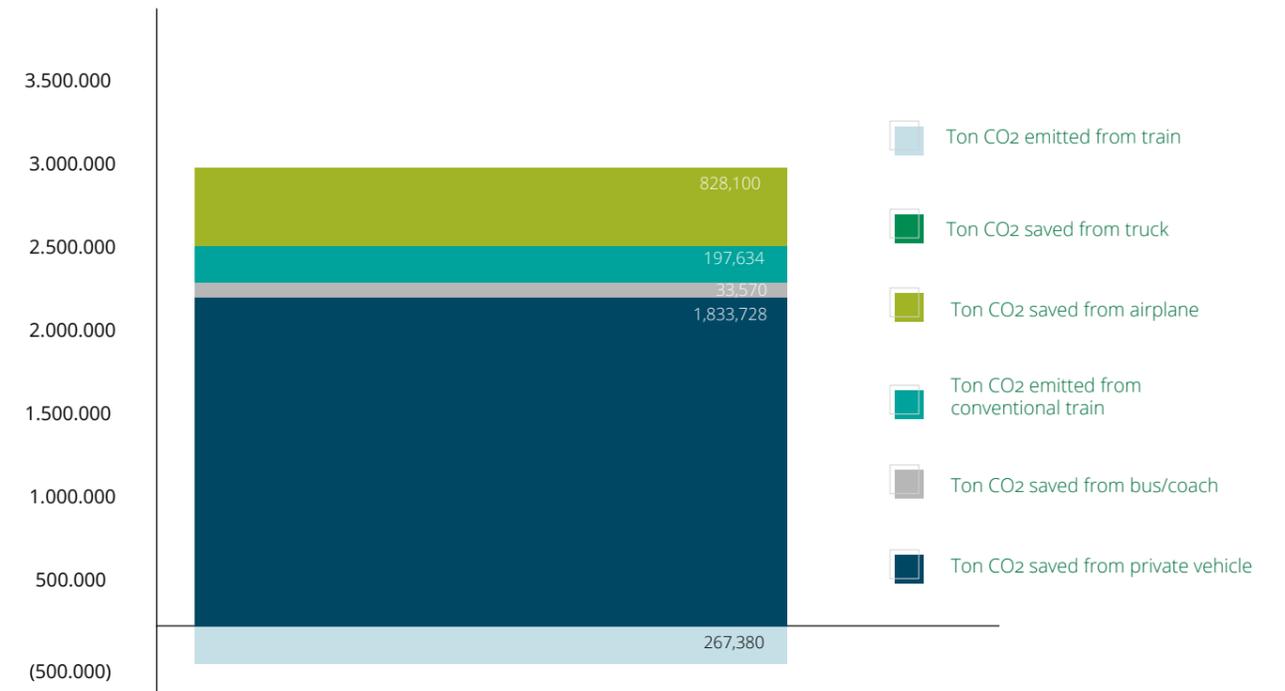
On the other hand, it is important to highlight that from the total traveler's km in high speed, the 12.5% corresponds to the travelers induced. From the travelers transferred the greater percentage comes from the conventional train itself with a 57.9%, followed by the private vehicle with a 28.6%.



D. SAVING OF TONS OF CO₂

Savings of CO₂ by the Travelers.Km transferred from each mean of transport for the total of the analyzed period (30 years) are the ones below:

TONS CO ₂ SAVED	TOTAL (30 years)	ANNUAL AVERAGE SAVING
Ton CO ₂ saved from private vehicle	1,833,728	61,124
Ton CO ₂ saved from bus/coach	33,570	1,119
Ton CO ₂ saved from conventional train	197,634	6,588
Ton CO ₂ saved from airplane	828,100	27,603
Ton CO ₂ issued from train	-267,380	-8,913
TOTAL	2,625,652	87,522



MADRID-GALICIA HIGH SPEED LINE: OLMEDO-ZAMORA- OURENSE SECTION

A. SAVING OF EXTERNAL COSTS

These results are calculated for a 30 years period of evaluation since the implementation of the first phase of the project (2016).

Total savings (expressed in VAN at 2016 at 3%, Thousand Euros of 2017) of this line is the following one:

SAVINGS (Thousand Euros of 2017)	4,228,626
Surplus of the Customer (by generated traffic)	309,320
Saving of Time	2,070,938
Saving of Accidents	234,110
Saving in Operating Costs	981,501
Saving of Environmental costs	632,756



B. TIME SAVINGS

Total hours saved along the 30 years of the study.

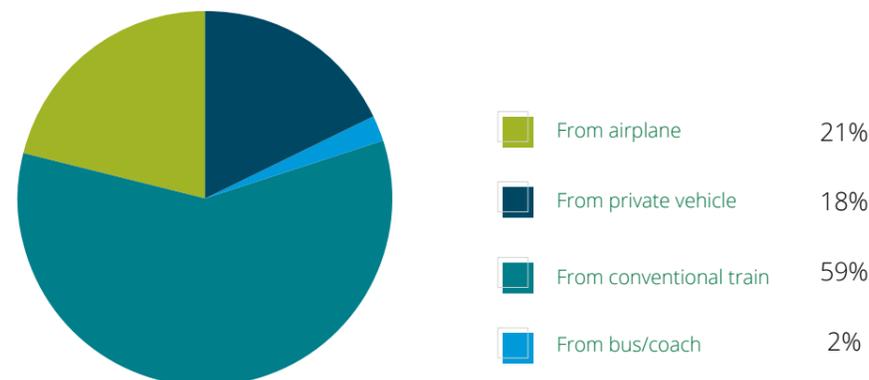
GLOBAL SUMMARY	TOTAL (30 years)	ANNUAL AVERAGE SAVING
Thousand hours saved	144,273	4,809

C. MODAL TRANSFER

Below appears the summary of the Travelers.Km transferred of each means of transport and the graphic of percentages of modal transfer:

TRAVELERS.KM TRANSFERRED (Thousand)	TOTAL (30 years)	ANNUAL AVERAGE
From private vehicle	7,052,230	235,074
From bus/coach	656,253	21,875
From conventional train	22,597,690	753,256
From airplane	8,112,106	270,404
TOTAL	38,418,279	1,280,609

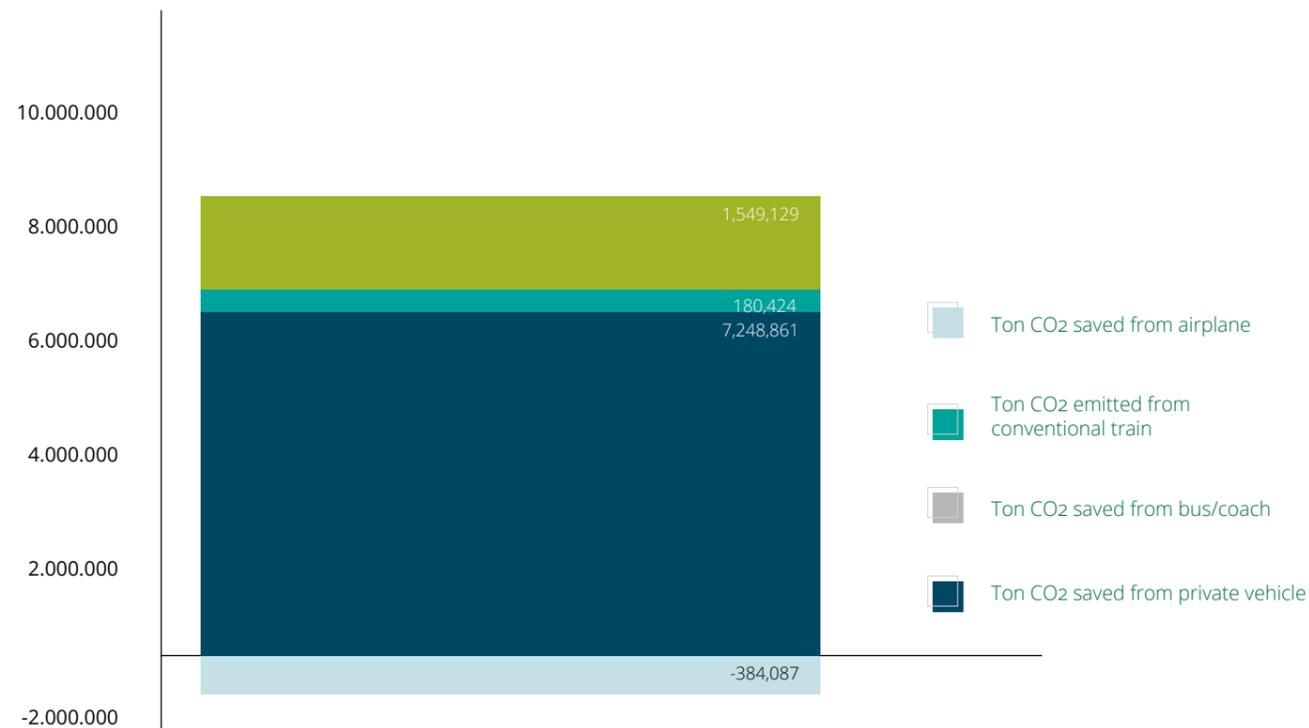
On the other hand, it can be observed that from the total traveler's km in high speed, an 8.9% corresponds to the travelers induced. From the travelers transferred, the greater percentage comes from the conventional train itself with a 58.8%, followed by airplane with 21.1%.



D. SAVING OF TONS OF CO₂

The savings of CO₂ by the traveler's km transferred from each mean of transport for the total of the analysis period (30 years) are the ones below.

TONS CO ₂ SAVED	TOTAL (30 years)	ANNUAL AVERAGE SAVING
Ton CO ₂ saved from private vehicle	748,320	24,944
Ton CO ₂ saved from bus/coach	10,214	340
Ton CO ₂ saved from conventional train	127,802	4,260
Ton CO ₂ saved from airplane	1,116,983	37,233
Ton CO ₂ issued from train	-152,316	-5,077
TOTAL	1,851,003	61,700



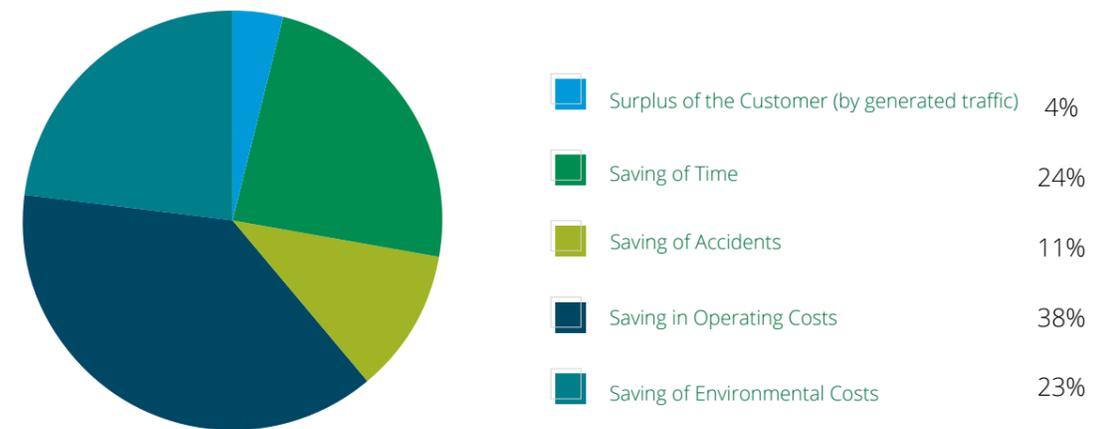
ACTIONS NEEDED TO INCREASE THE CAPACITY OF THE HIGH-SPEED STATIONS PUERTA DE ATOCHA AND CHAMARTÍN CLARA CAMPOAMOR

A. EXTERNAL COSTS SAVINGS

These results are calculated for a period of evaluation of 30 years since the implementation of the first phase of the project (2021).

Total savings (expressed in VAN at 2021 at 3%, Thousand Euros of 2018) of this line is the one following:

SAVINGS (Thousand Euros of 2018)	15,137,189
Surplus of the Customer (by generated traffic)	503,824
Saving of Time	3,668,240
Saving of Accidents	1,713,326
Saving in Operating Costs	5,767,174
Saving of Environmental costs	3,484,626



B. TIME SAVING

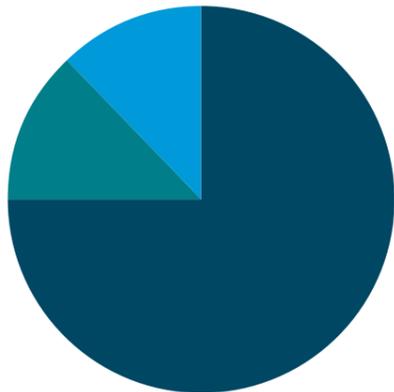
Total hours saved along the 30 years of the study:

GLOBAL SUMMARY	TOTAL (30 years)	ANNUAL AVERAGE SAVING
Thousand hours saved	266,739	8,891

C. MODAL TRANSFER

Below appears the summary of the Travelers.Km transferred from each transport mean and the graphic of percentages of modal transfer:

TRAVELERS.KM TRANSFERRED (Thousand)	TOTAL (30 years)	ANNUAL AVERAGE
From private vehicle	68,313,874	2,277,129
From bus/coach	11,592,329	386,411
From train	11,250,575	375,019
TOTAL	91,156,778	3,038,559



- From private vehicle 75%
- From conventional train 13%
- From bus/coach 12%

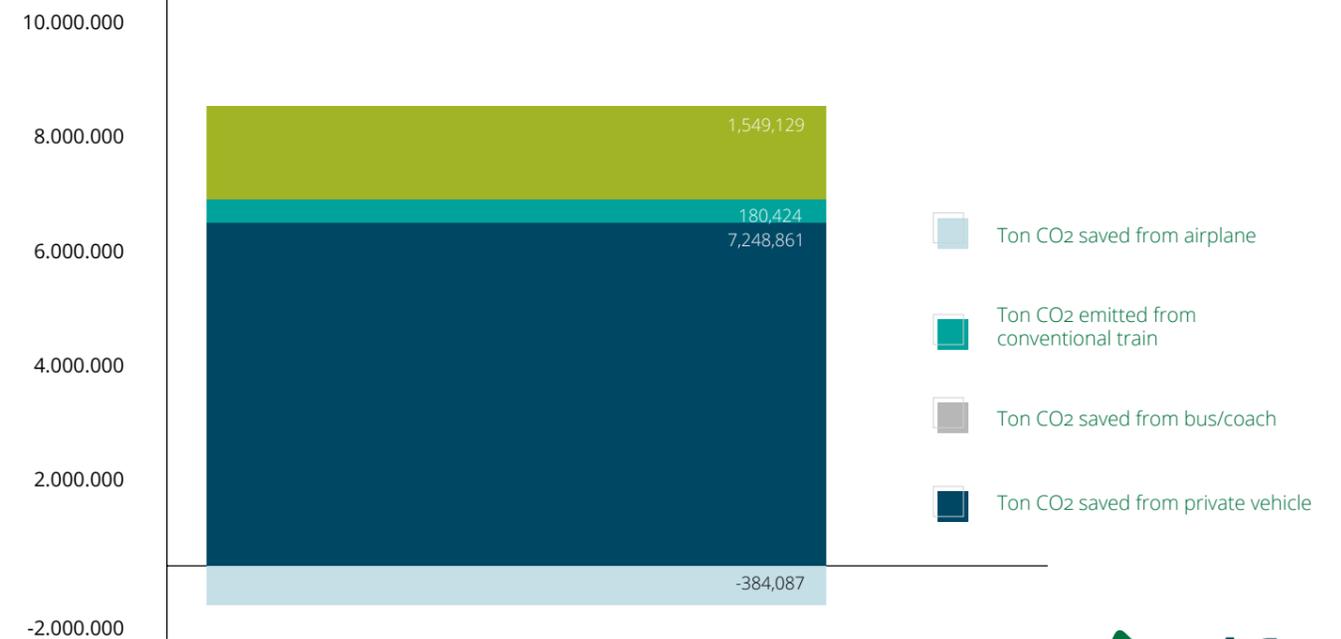
It is important to highlight that, from the total passengers in high-speed Line, an 8.01% corresponds to induced travelers. And from the travelers transferred, the highest percentage comes from the private vehicle with a 74.94 % followed by the bus with a 12.72 %.



D. SAVINGS OF TONS OF CO₂

The savings of CO₂ by the Travelers.Km transferred from each mean of transport for the total of the analyzed period (30 years) are the ones below:

TONS CO ₂ SAVED	TOTAL (30 years)	ANNUAL AVERAGE SAVING
Ton CO ₂ saved from private vehicle	7,248,861	241,629
Ton CO ₂ saved from bus/coach	180,424	6,014
Ton CO ₂ saved from conventional train	1,549,129	51,638
Ton CO ₂ saved from airplane	-384,087	-12,803
TOTAL	8,594,328	286,478



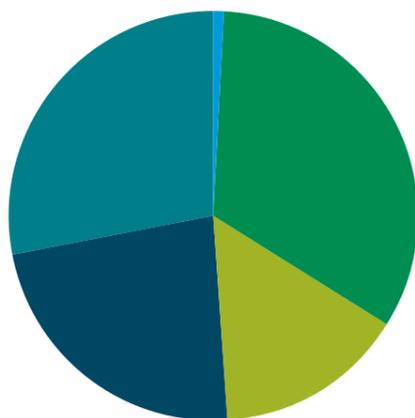
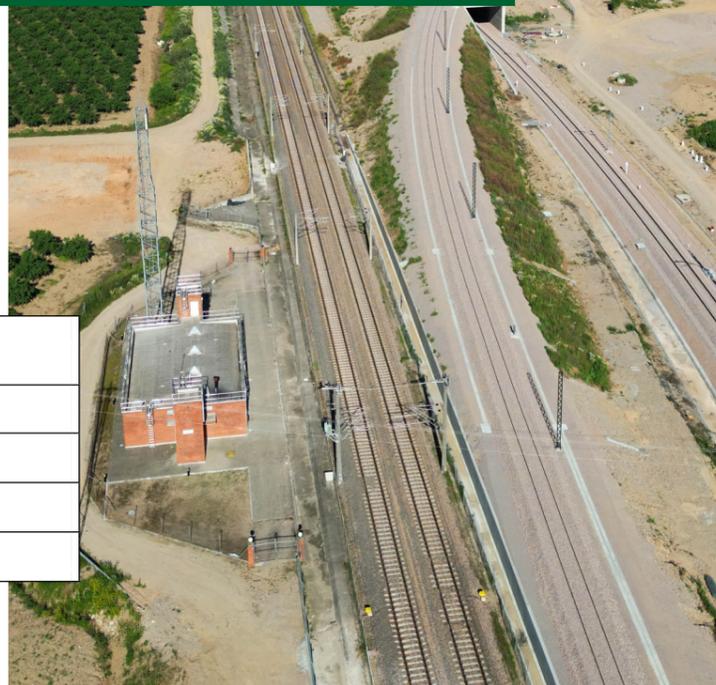
MADRID-SEVILLA AND CÓRDOBA-MÁLAGA (ALMODÓVAR DEL RÍO) HIGH SPEED LINE CONNECTION

A. EXTERNAL COSTS SAVINGS

These results are calculated for a given period of 30 years from the commissioning of the first phase of the project (2021).

Total savings (expressed in VAN at 2021 at 3%, Thousand Euros of 2017) of this line are the following:

SAVINGS (Thousand Euros of 2017)	372,251
Surplus of the Customer (by generated traffic)	4,113
Saving of Time	121,665
Saving of Accidents	54,312
Saving in Operating Costs	87,672
Saving of Environmental costs	104,489



Surplus of the Customer (by generated traffic)	1%
Saving of Time	33%
Saving of Accidents	15%
Saving in Operating Costs	23%
Saving of Environmental Costs	28%

B. TIME SAVING

Total hours saved along the 30 years of the study:

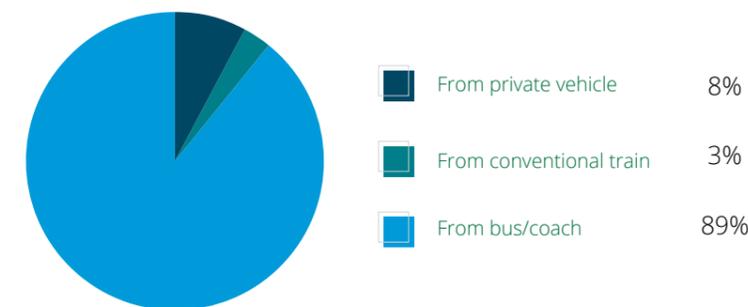
GLOBAL SUMMARY	TOTAL (30 years)	ANNUAL AVERAGE SAVING
Thousand hours saved	7,502	250

C. MODAL TRANSFER

Below appears the summary of the Travelers.Km transferred from each transport mean and the graphic of percentages of modal transfer:

TRAVELERS.KM TRANSFERRED (Thousand)	TOTAL (30 years)	ANNUAL AVERAGE
From private vehicle	989,309	32,977
From bus/coach	330,856	11,029
From train	10,670,855	355,695
TOTAL	11,991,020	399,701

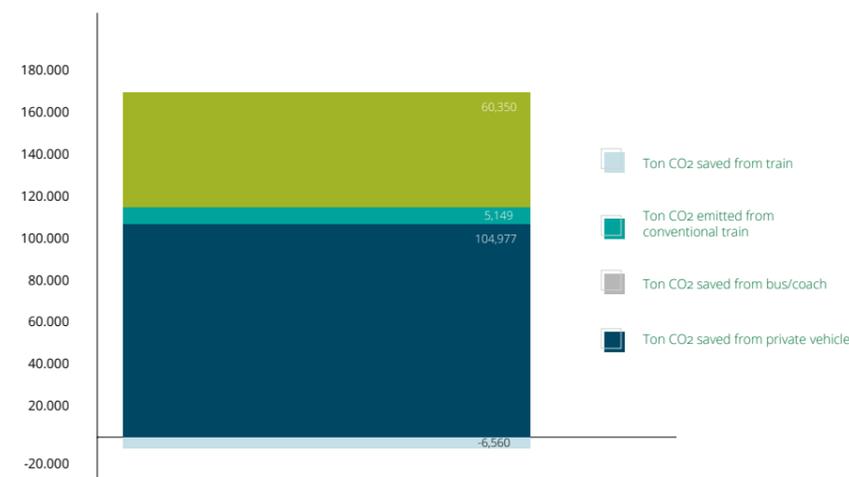
It is important to highlight that, from the total passengers in High Speed Line, an 0.7% corresponds to induced travelers. And from the travelers transferred, the highest percentage comes from the train with an 89% followed by the private vehicle with an 8.3 %.



D. SAVING OF TONS OF CO₂

The savings of CO₂ by the Travelers.Km transferred from each mean of transport for the total of the analysis period (30 years) are the ones below:

TONS CO ₂ SAVED	TOTAL (30 years)	ANNUAL AVERAGE SAVING
Ton CO ₂ saved from private vehicle	104,977	3,499
Ton CO ₂ saved from bus/coach	5,149	172
Ton CO ₂ saved from conventional train	60,350	2,012
Ton CO ₂ emitted from train	-6,560	-219
TOTAL	163,916	5,464



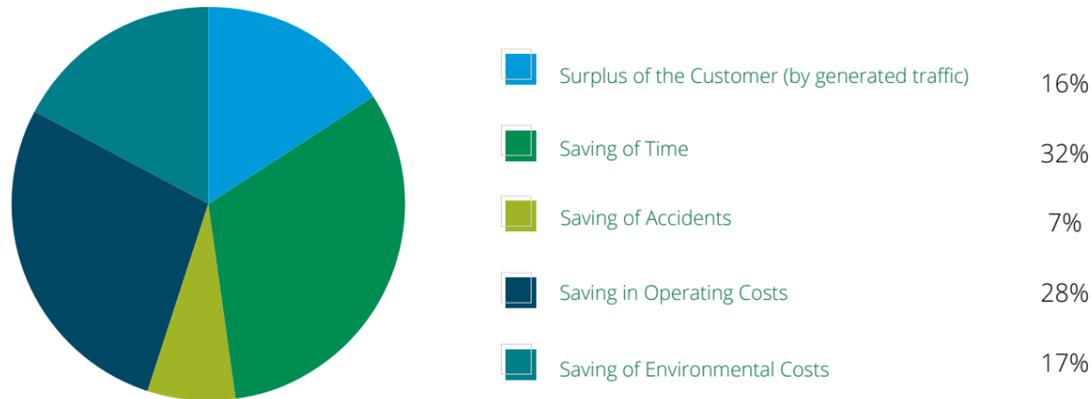
MADRID-BARCELONA HIGH SPEED LINE

A. SAVING OF EXTERNAL COSTS

These results are calculated for a period of evaluation of 30 years since the implementation of the first phase of the project (2004).

Total savings (expressed in VAN at 2004 at 3%, Thousand Euros of 2018) of this line is the following:

SAVINGS (Thousand Euros of 2018)	19,264,365
Surplus of the Customer (by generated traffic)	3,115,705
Saving of Time	6,122,666
Saving of Accidents	1,340,355
Saving in Operating Costs	5,492,945
Saving of Environmental costs	3,192,693



B. TIME SAVINGS

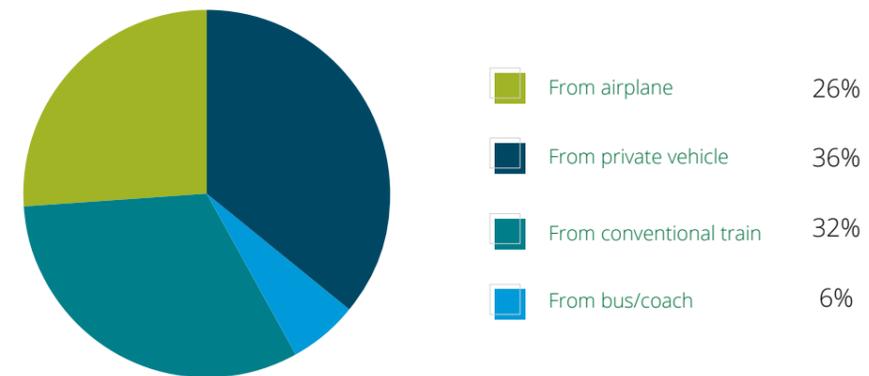
Total hours saved along the 30 years of the study.

GLOBAL SUMMARY	TOTAL (30 years)	ANNUAL AVERAGE SAVING
Thousand hours saved	346,659	11,555

C. MODAL TRANSFER

Below appears the summary of the Travelers.Km transferred from each transport mean and the graphic of percentages of modal transfer:

TRAVELERS.KM TRANSFERRED (Thousand)	TOTAL (30 years)	ANNUAL AVERAGE
From private vehicle	48,039,219	1,601,307
From bus/coach	8,317,074	277,236
From conventional train	42,085,505	1,402,850
From airplane	33,798,437	1,126,615
TOTAL	132,240,235	4,408,008



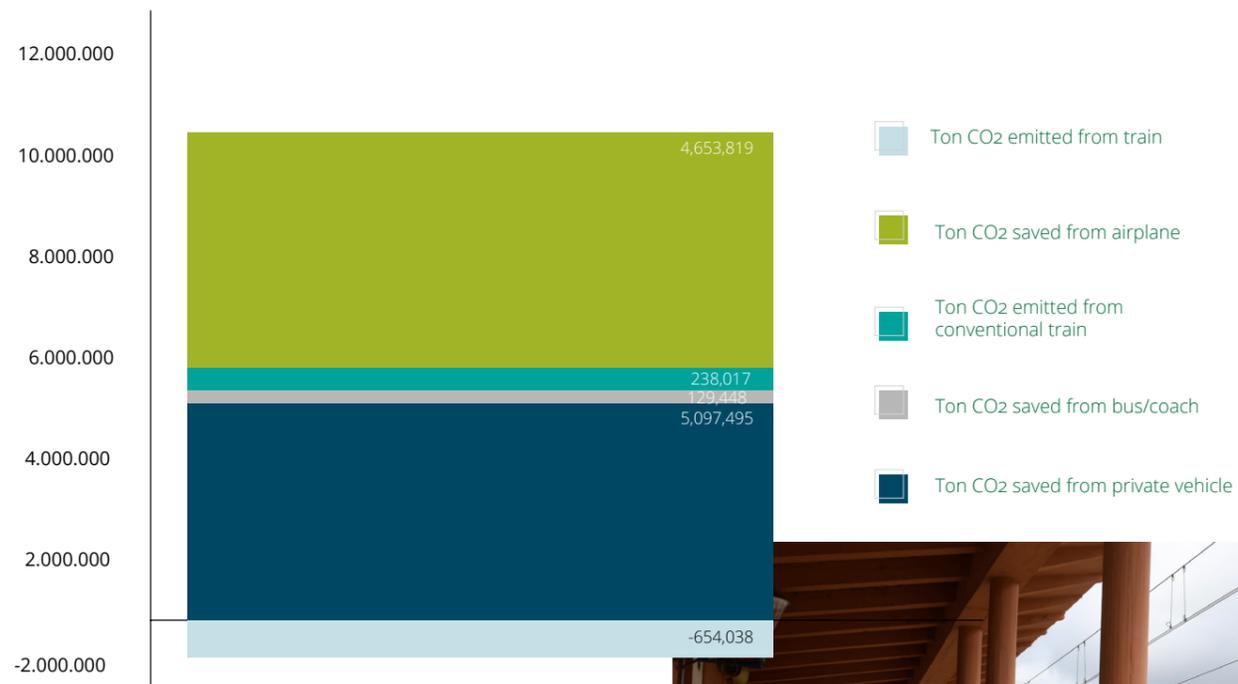
It is important to highlight that, from the total passengers in high-speedLine, an 16.94% corresponds to induced travelers. And from the travelers transferred, the highest percentage comes from the private vehicle with a 36.3% followed by the conventional train with a 31.8%.



D. SAVING OF TONS OF CO₂

The savings of CO₂ by the traveler's km transferred from each mean of transport for the total of the analysis period (30 years) are the ones below.

TONS CO ₂ SAVED	TOTAL (30 years)	ANNUAL AVERAGE SAVING
Ton CO ₂ saved from private vehicle	5,097,495	169,916
Ton CO ₂ saved from bus/coach	129,448	4,315
Ton CO ₂ saved from conventional train	238,017	7,934
Ton CO ₂ saved from airplane	4,653,819	155,127
Ton CO ₂ emitted from train	-654,038	-21,801
TOTAL	9,464,741	315,491



**CANTABRIA
(PALENCIA – ALAR DEL REY)
HIGH SPEED LINE**

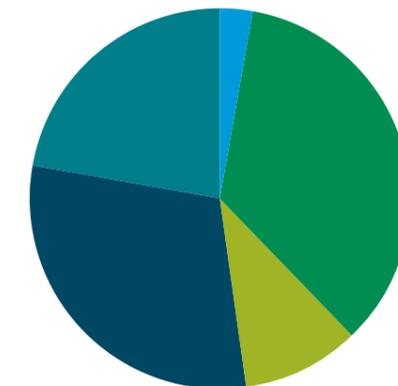


A. EXTERNAL COSTS SAVINGS

These results are calculated for a period of evaluation of 30 years since the implementation of the first phase of the project (2015).

Total savings (expressed in VAN at 2021 at 3%, Thousand Euros of 2015) of this line is the following:

SAVINGS (Thousand Euros of 2015)	699,856
Surplus of the Customer (by generated traffic)	25,241
Saving of Time	244,000
Saving of Accidents	68,818
Saving in Operating Costs	207,509
Saving of environmental costs	154,288



Surplus of the Customer (by generated traffic)	3%
Saving of Time	35%
Saving of Accidents	10%
Saving in Operating Costs	30%
Saving of Environmental Costs	22%



B. TIME SAVING

Total hours saved along the 30 years of the study:

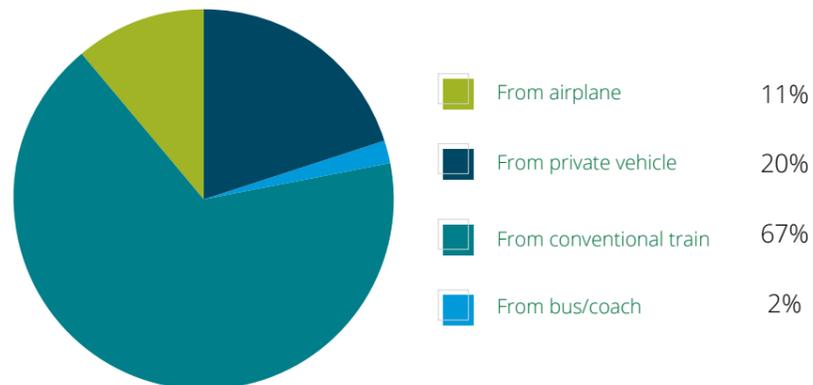
GLOBAL SUMMARY	TOTAL (30 years)	ANNUAL AVERAGE SAVING
Thousand hours saved	17,064,328	568,811

C. MODAL TRANSFER

Below appear summarized the Travelers.Km transferred of each transport mean and the graphic of percentages of modal transfer:

TRAVELERS.KM TRANSFERRED (Thousand)	TOTAL (30 years)	ANNUAL AVERAGE
From private vehicle	2,015,136	67,171
From bus/coach	209,639	6,988
From conventional train	6,605,098	220,170
From airplane	1,060,382	35,346
TOTAL	9,890,256	329,675

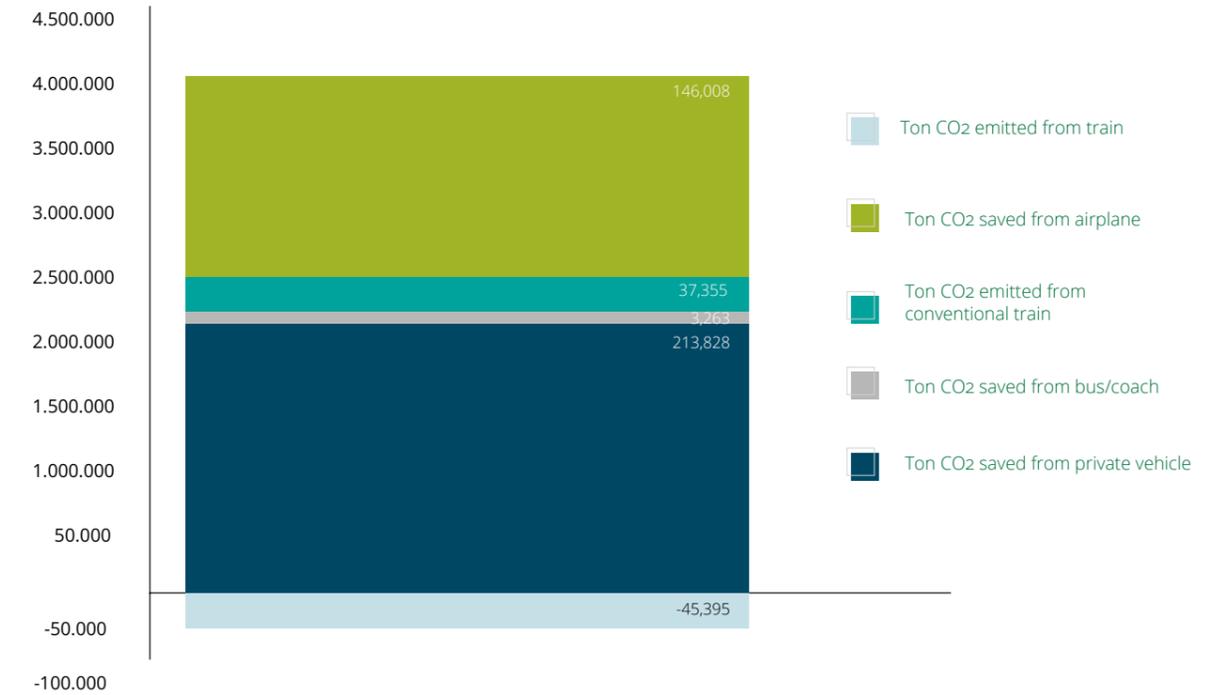
On the other hand, it is important to highlight that from the total traveler's km in high speed, a 6.1% corresponds to the travelers induced. From the travelers transferred, the highest percentage comes from conventional train with a 66.8%, followed by the airplane with a 20.4%.



D. SAVING OF TONS OF CO₂

The savings of CO₂ by the traveler's km transferred from each mean of transport for the total of the analysis period (30 years) are the ones below.

TONS CO ₂ SAVED	TOTAL (30 years)	ANNUAL AVERAGE SAVING
Ton CO ₂ saved from private vehicle	213,828	7,128
Ton CO ₂ saved from bus/coach	3,263	109
Ton CO ₂ saved from conventional train	37,355	1,245
Ton CO ₂ saved from airplane	146,008	4,867
Ton CO ₂ emitted from train	-45,395	-1,513
TOTAL Tons CO₂ SAVED	355,060	11,835



MEDITERRANEAN CORRIDOR HIGH SPEED LINE: CASTELLBISBAL-ALMERÍA SECTION

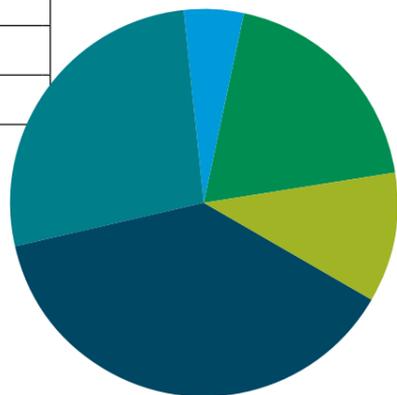


A. SAVING OF EXTERNAL COSTS

These results are calculated for a period of evaluation of 30 years since the implementation of the first phase of the project (2023).

Total savings (expressed in VAN to 2023 at 3%, Thousand Euros of 2020) of this line is the following:

SAVINGS (Thousand Euros of 2020)	17,001,738
TRAVELLERS	14,600,098
Surplus of the Customer (by generated traffic)	876,452
Saving of Time	2,298,145
Saving of Accidents	2,222,921
Saving in Operating Costs	4,968,950
Saving of environmental costs	4,233,630
FREIGHT	2,401,640
Saving of Time	274,939
Saving of Accidents	169,906
Saving in Operating Costs	889,303
Saving of environmental costs	1,067,492



Surplus of the Customer (by generated traffic)	5%
Saving of Time	15%
Saving of Accidents	14%
Saving in Operating Costs	35%
Saving of Environmental Costs	31%



B. TIME SAVINGS

Total hours saved along the 30 years of the study:

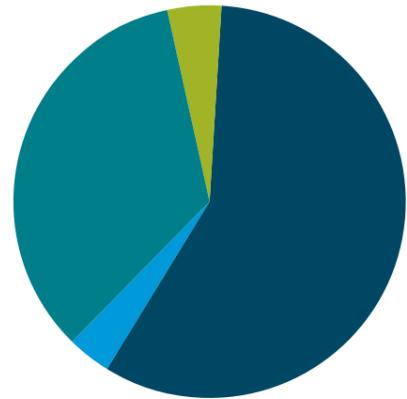
GLOBAL SUMMARY	TOTAL (30 years)	ANNUAL AVERAGE SAVING
Thousand hours saved	476,591	15,886

C. MODAL TRANSFER

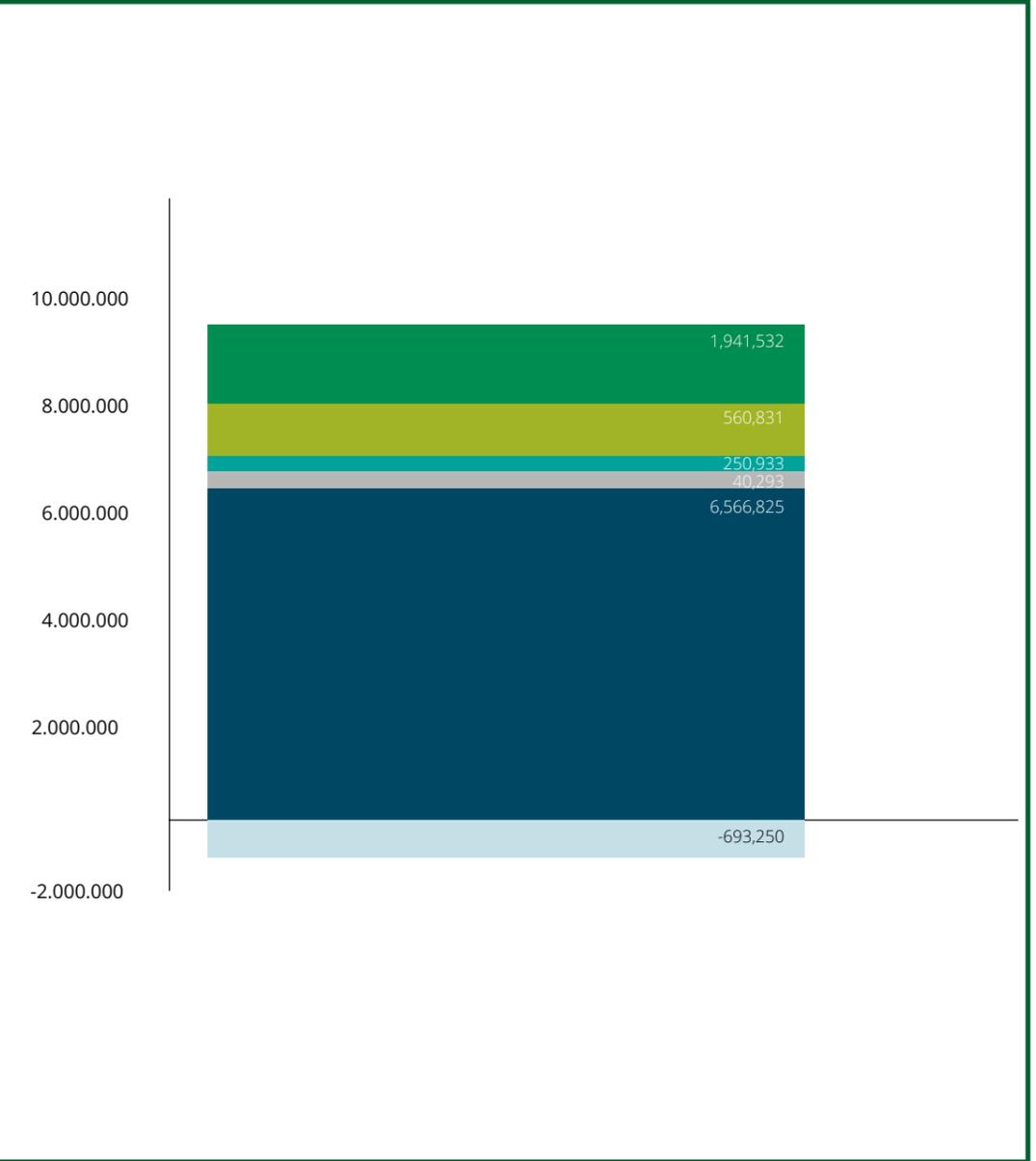
Below appears the summary of the Travelers.Km transferred from each transport mean and the graphic of percentages of modal transfer:

TRAVELERS.KM TRANSFERRED (Thousand)	TOTAL (30 years)	ANNUAL AVERAGE
From private vehicle	61,886,311	2,062,877
From bus/coach	2,588,826	86,294
From conventional train	44,369,279	1,478,976
From airplane	4,073,042	135,768
TOTAL Thousands of Passengers Km transferred	112,917,458	3,763,915

On the other hand, it is necessary to point out that, of the total number of passengers km at high speed, 21.8% correspond to induced passengers. Of the transferred passengers, the highest percentage comes from the private vehicle with 54.8% followed by the conventional train with 39.3%.



- From airplane 3.6%
- From private vehicle 54.8%
- From conventional train 2.3%
- From bus/coach 39.3%



D. SAVINGS OF TONS OF CO₂

The savings of CO₂ by the Travelers.Km transferred from each mean of transport for the total of the analyzed period (30 years) are the ones below:

CASTELLBISBAL-ALMERÍA SECTION	TOTAL (30 years)	ANNUAL AVERAGE SAVING
Ton CO ₂ saved from private vehicle	6,566,825	218,894
Ton CO ₂ saved from bus/coach	40,293	1,343
Ton CO ₂ saved from conventional train	250,933	8,364
Ton CO ₂ saved from airplane	560,831	18,694
Ton CO ₂ saved from truck	1,941,532	64,718
Ton CO ₂ emitted from train	-693,250	-23,108
TOTAL Tons CO₂ SAVED	8,667,164	288,905

- Ton CO₂ emitted from train
- Ton CO₂ saved from truck
- Ton CO₂ saved from airplane
- Ton CO₂ emitted from conventional train
- Ton CO₂ saved from bus/coach
- Ton CO₂ saved from private vehicle



MADRID-LEVANTE HIGH SPEED LINE

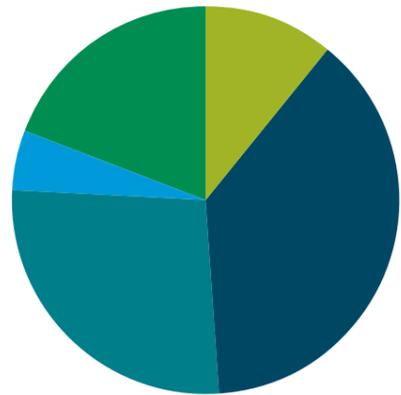


A. EXTERNAL COSTS SAVINGS

These results are calculated for a period of evaluation of 30 years since the implementation of the first phase of the project (2011).

Total savings (expressed in VAN at 2011 at 3%, Thousand Euros of 2011) of this line is the one following:

SAVINGS (Thousand Euros of 2011)	18,196,280
Surplus of the Customer (by generated traffic)	6,855,188
Saving of time	5,018,366
Accidents Saving	969,097
Operating Cost Saving	3,390,155
Environmental Cost Saving	1,963,474



	Saving of Environmental Costs	11%
	Surplus of the Customer (by generated traffic)	38%
	Saving of Time	27%
	Saving of Accidents	5%
	Saving in Operating Costs	19%

B. TIME SAVINGS

Total hours saved along the 30 years of the study:

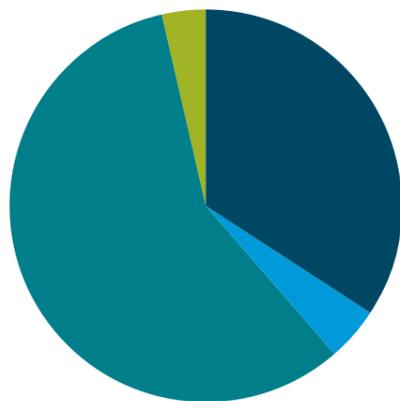
GLOBAL SUMMARY	TOTAL (30 years)	ANNUAL AVERAGE SAVING
Thousand hours saved	283,178	9,439

C. MODAL TRANSFER

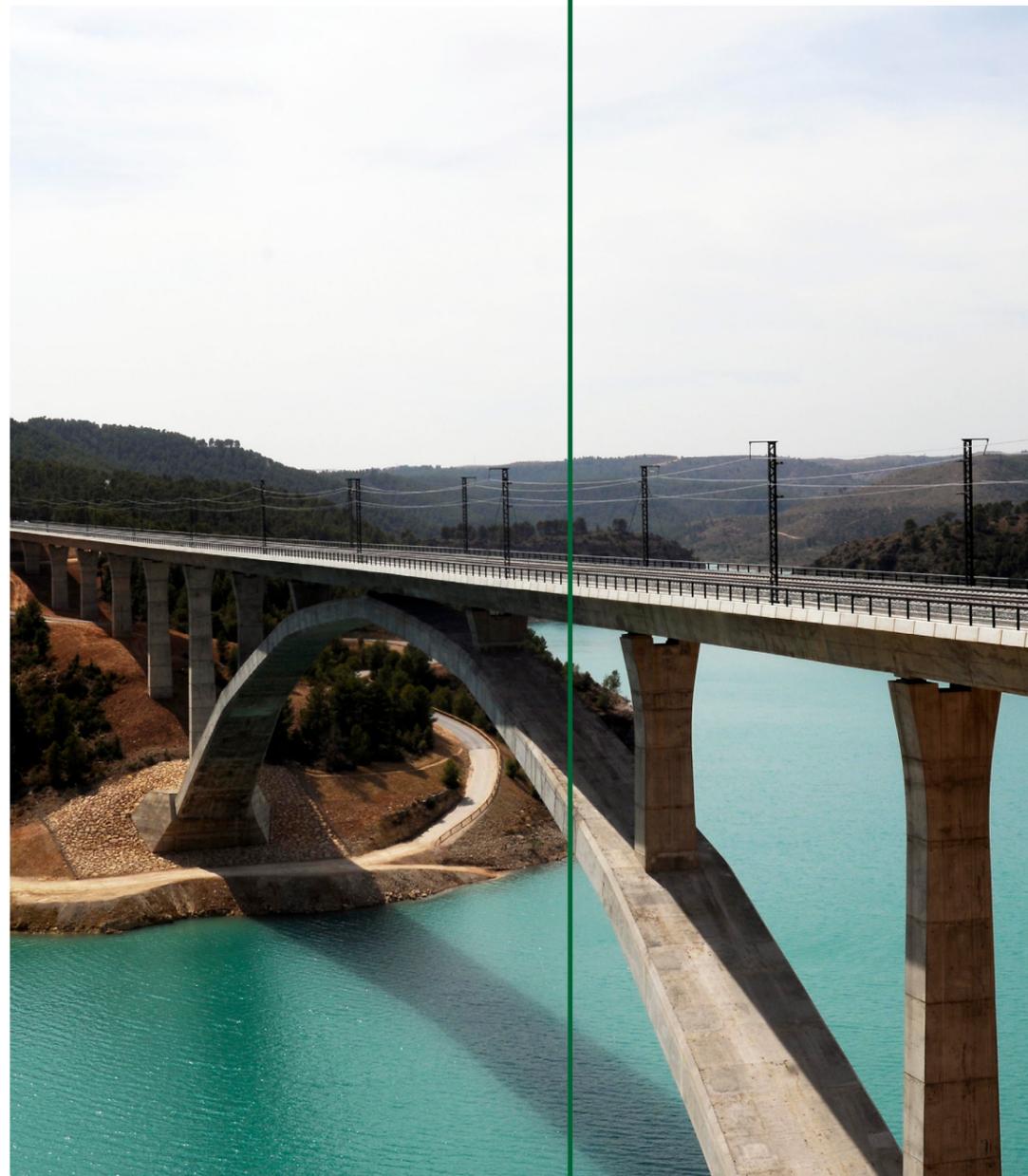
Below appears the summary of the Travelers.Km transferred from each transport mean and the graphic of percentages of modal transfer:

TRAVELERS.KM TRANSFERRED (Thousand)	TOTAL (30 years)	ANNUAL AVERAGE
From private vehicle	32,838,353	1,094,612
From bus/coach	4,197,197	139,907
From conventional train	55,095,573	1,836,519
From airplane	3,375,938	112,531
TOTAL Thousands of Passengers Km transferred	95,507,061	3,183,569

On the other hand, it is necessary to highlight that, of the total number of passengers km at high speed, 14.4% correspond to induced passengers. From the transferred passengers, the highest percentage comes from the conventional train with 57.7% followed by the private vehicle with 34.4%.



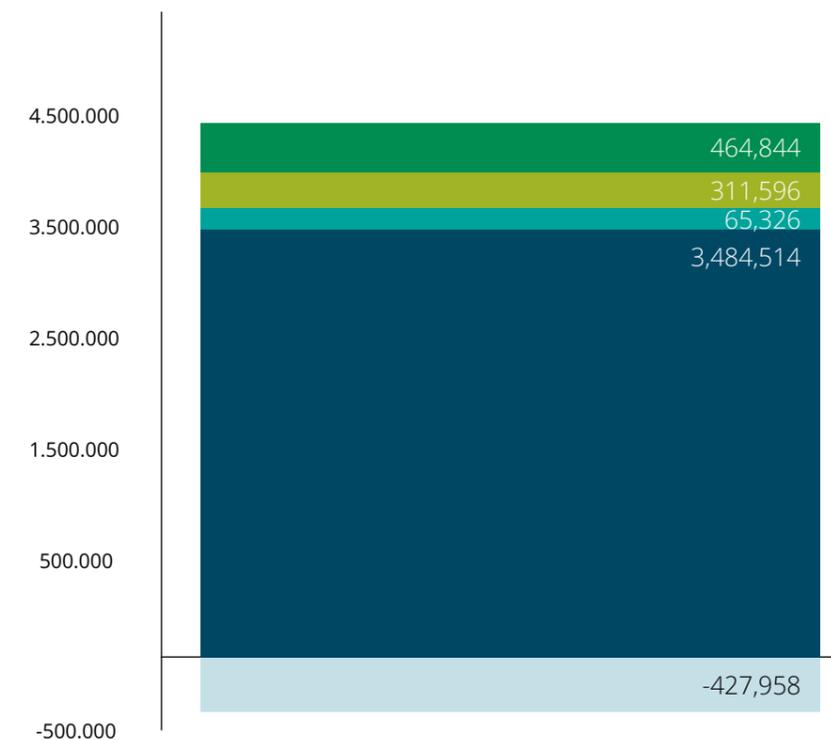
- From airplane 3.5%
- From private vehicle 34.4%
- From conventional train 4.4%
- From bus/coach 57.7%



D. SAVING OF TONS OF CO₂

The savings of CO₂ by the Travelers.Km transferred from each mean of transport for the total of the analyzed period (30 years) are the ones below:

MADRID-LEVANTE H.S.L.	TOTAL (30 years)	ANNUAL AVERAGE SAVING
Ton CO ₂ saved from private vehicle	3,484,514	116,150
Ton CO ₂ saved from bus/coach	65,326	2,178
Ton CO ₂ saved from conventional train	311,596	10,387
Ton CO ₂ saved from airplane	464,844	15,495
Ton CO ₂ emitted from train	-427,958	-14,265
TOTAL Tons CO₂ SAVED	3,898,322	129,944



- Ton CO₂ saved from airplane
- Ton CO₂ saved from private vehicle
- Ton CO₂ emitted from conventional train
- Ton CO₂ saved from bus/coach
- Ton CO₂ emitted from train

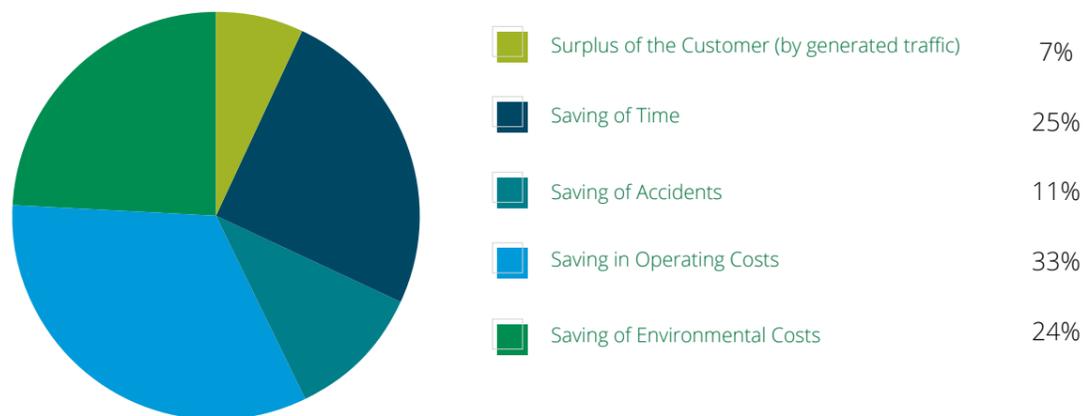
ANTEQUERA-GRANADA HIGH SPEED LINE

A. EXTERNAL COSTS SAVINGS

These results are calculated for a given period of 30 years from the commissioning of the first phase of the project (2015).

Total savings (expressed in VAN at 2015 at 3%, Thousand Euros of 2015) of this line are the following:

SAVINGS (Thousand Euros of 2015)	2,783,655
Surplus of the Customer (by generated traffic)	205,709
Saving of time	683,677
Accidents Saving	320,859
Operating Cost Saving	909,627
Environmental cost saving	663,783



B. TIME SAVINGS

Total hours saved along the 30 years of the study.

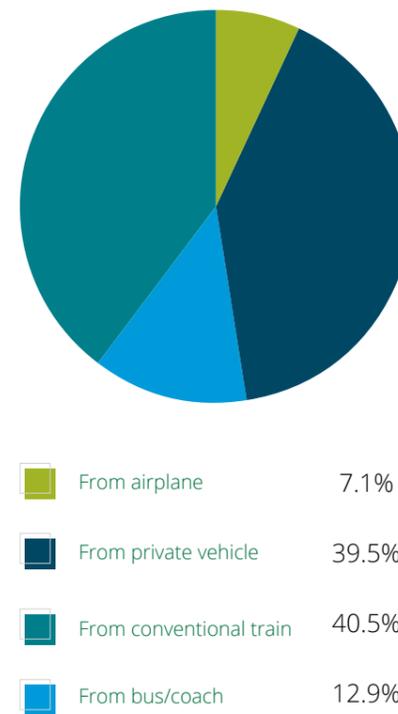
GLOBAL SUMMARY	TOTAL (30 years)	ANNUAL AVERAGE SAVING
Thousand hours saved	56,478	1,883

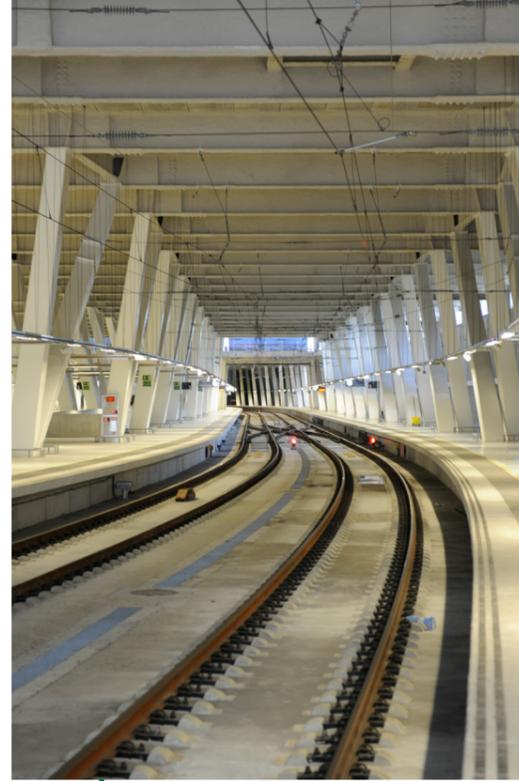
C. MODAL TRANSFER

Below appears the summary of the Travelers.Km transferred from each transport mean and the graphic of percentages of modal transfer:

TRAVELERS.KM TRANSFERRED (Thousand)	TOTAL (30 years)	ANNUAL AVERAGE
From private vehicle	10,554,836	351,828
From bus/coach	3,444,035	114,801
From conventional train	10,834,862	361,162
From airplane	1,894,223	63,141
TOTAL Thousands of Passengers Km transferred	26,727,956	890,932

On the other hand, it is necessary to point out that, of the total number of passengers km at high speed, 15.1% correspond to induced passengers. From the transferred passengers, the highest percentage comes from the conventional train with 40.5% and then from the private vehicle with 39.5%.





ATLANTIC AXIS HIGH SPEED LINE: SANTIAGO DE COMPOSTELA-VIGO SECTION

D. SAVING OF TONS OF CO₂

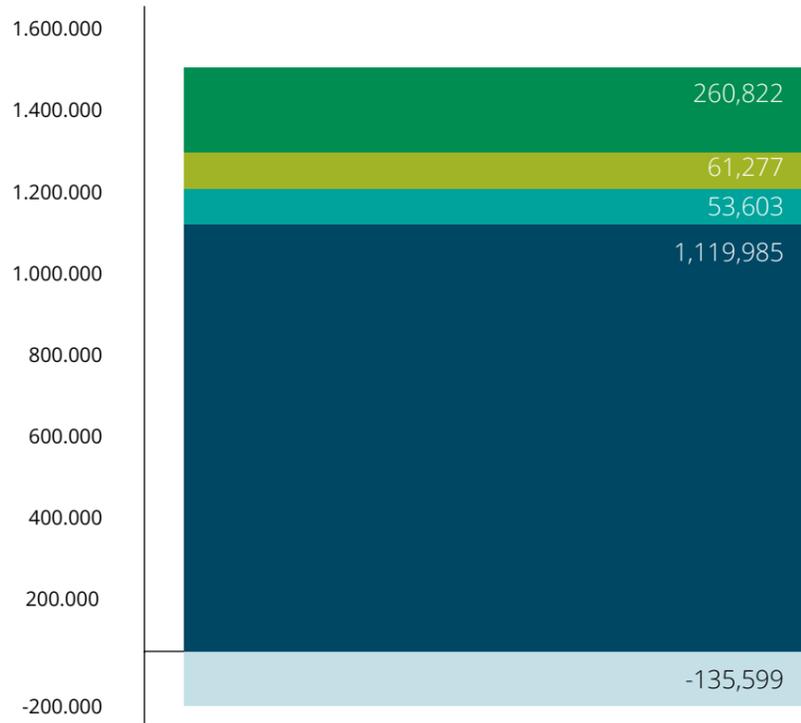
The savings of CO₂ by the Travelers.Km transferred from each mean of transport for the total of the analysis period (30 years) are the ones below:

ANTEQUERA-GRANADA H.S.L.	TOTAL (30 years)	ANNUAL AVERAGE SAVING
Ton CO ₂ saved from private vehicle	1,119,985	37,333
Ton CO ₂ saved from bus/coach	53,603	1,787
Ton CO ₂ saved from airplane	61,277	2,043
Ton CO ₂ issued from train	260,822	8,694
Ton CO ₂ saved from private vehicle	-135,599	-4,520
TOTAL Tons CO₂ SAVED	1,360,089	45,336

A. SAVINGS OF EXTERNAL COSTS

These results are calculated for a period of evaluation of 30 years since the implementation of the first phase of the project (2016).

Total savings (expressed in VAN at 2016 at 3%, Thousand Euros of 2015) of this line are the following:

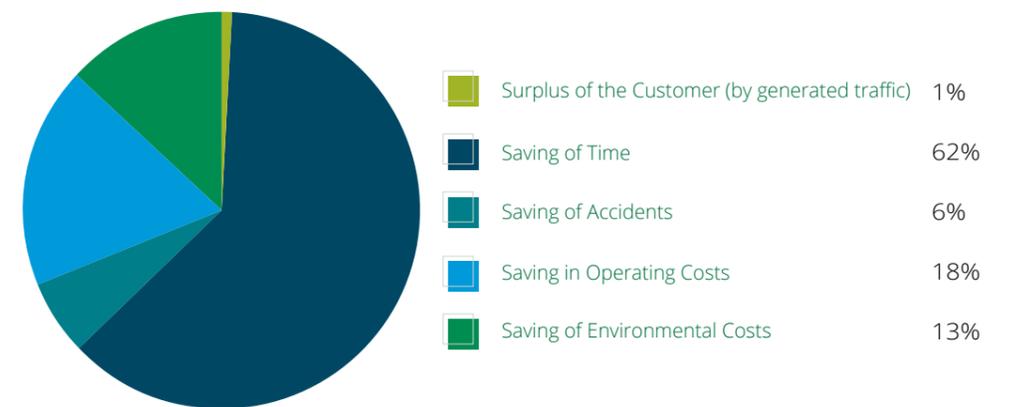


- Ton CO₂ saved from airplane
- Ton CO₂ saved from bus/coach
- Ton CO₂ emitted from conventional train
- Ton CO₂ saved from private vehicle
- Ton CO₂ emitted from train



SAVINGS (Thousand Euros of 2015) 2,578,482

Surplus of the Customer (by generated traffic)	23,650
Saving of time	1,592,161
Accidents Saving	169,618
Operating Cost Saving	461,022
Environmental cost saving	332,030



B. TIME SAVING

Total hours saved along the 30 years of the study:

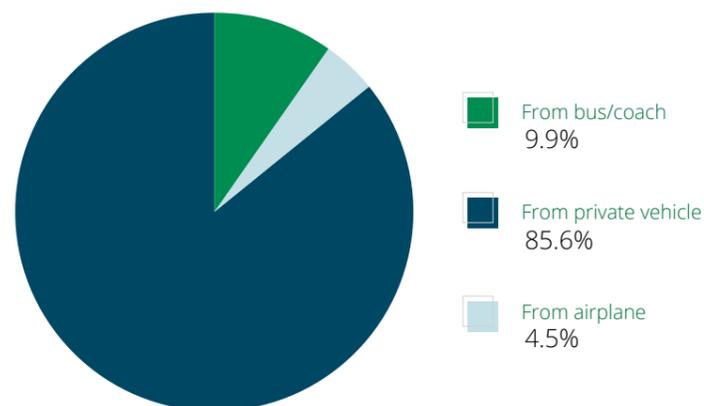
GLOBAL SUMMARY	TOTAL (30 years)	ANNUAL AVERAGE SAVING
Thousand hours saved	84,509	2,817

C. MODAL TRANSFER

Below appears the summary of the Travelers.Km transferred from each transport mean and the graphic of percentages of modal transfer:

TRAVELERS.KM TRANSFERRED (Thousand)	TOTAL (30 years)	ANNUAL AVERAGE
From private vehicle	6,427,144	214,238
From bus/coach	741,883	24,729
From airplane	339,677	11,323
TOTAL Thousands of Passengers. km transferred	7,508,705	250,290

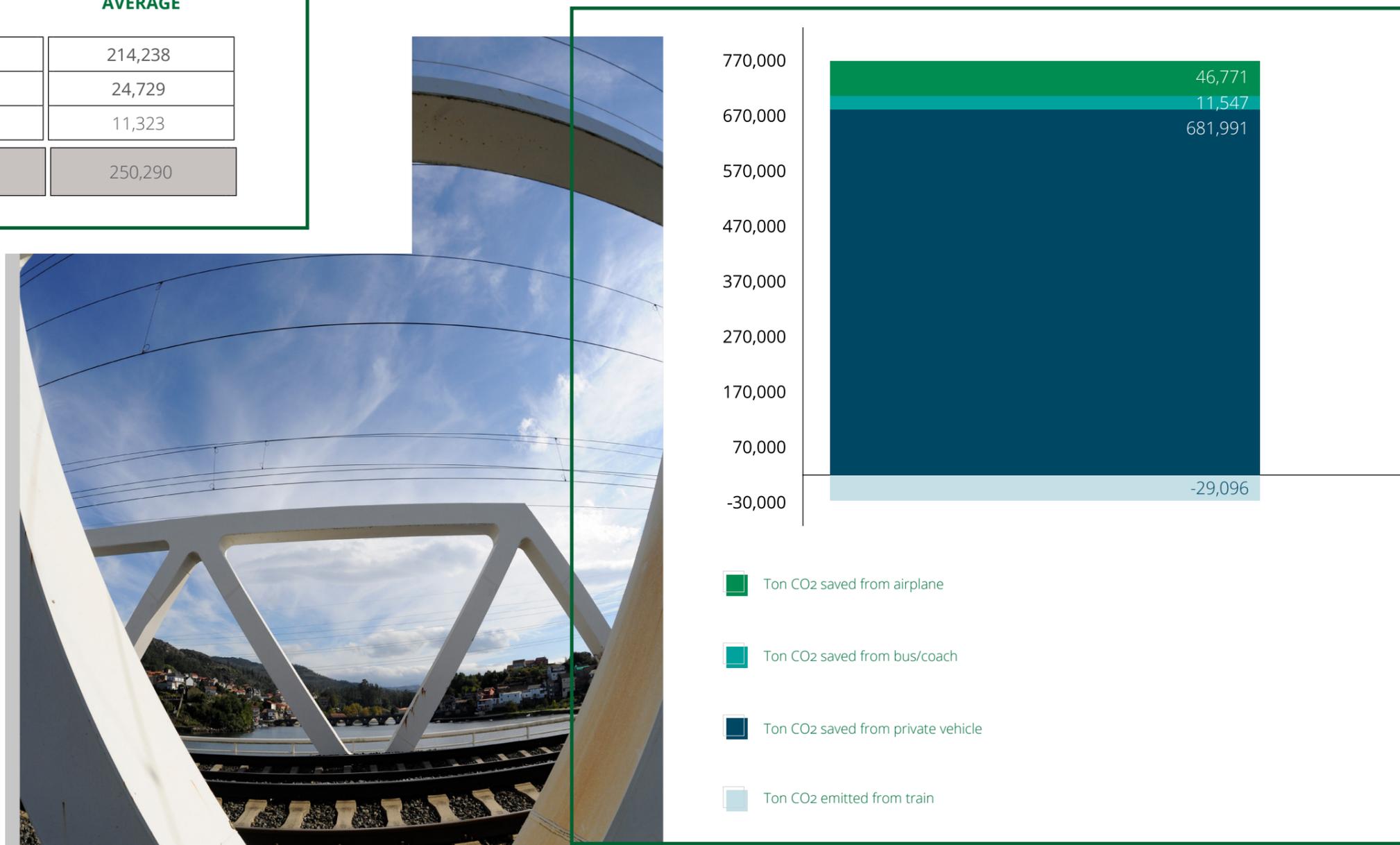
On the other hand, it should be noted that, of the total number of passengers km at high speed, 1% correspond to induced passengers. From the transferred travelers, the highest percentage comes from the private vehicle with 85.6% and followed by the bus with 9.9%.



D. SAVING OF TONS OF CO₂

The savings of CO₂ by the Travelers.Km transferred from each mean of transport for the total of the analysis period (30 years) are the ones below:

SANTIAGO - VIGO H.S.L.	TOTAL (30 years)	ANNUAL AVERAGE SAVING
Ton CO ₂ saved from private vehicle	681,991	22,733
Ton CO ₂ saved from bus/coach	11,547	385
Ton CO ₂ saved from airplane	46,771	1,559
Ton CO ₂ issued from train	-29,096	-970
NET AMOUNT 2022 GREEN BOND	711,214	23,707



CANTABRIAN MEDITERRANEAN CORRIDOR HIGH SPEED LINE: Castejón de Ebro - Campanas Section

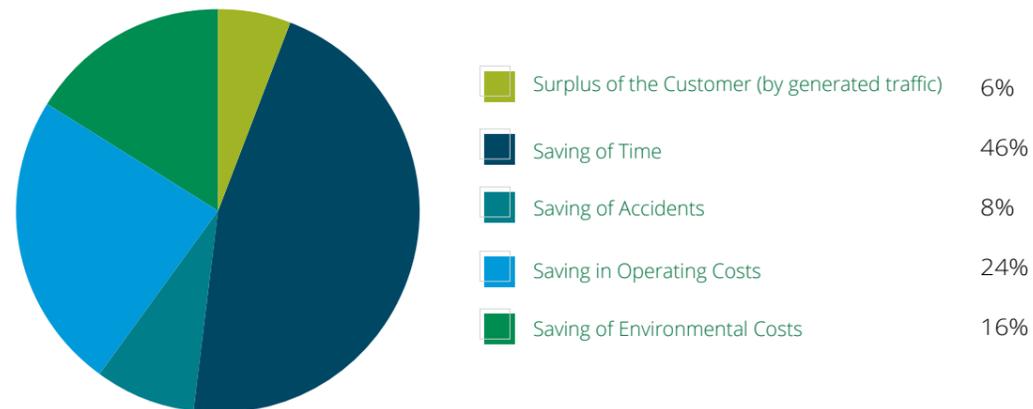


A. SAVING OF EXTERNAL COSTS

These results are calculated for a period of evaluation of 30 years since the implementation of the first phase of the project (2030).

Total savings (expressed in VAN to 2030 at 3%, Thousand Euros of 2020) of this line is the following:

SAVINGS (Thousand Euros of 2020)	939.059
Surplus of the Customer (by generated traffic)	55,594
Saving of Time	435,053
Saving of Accidents	73,946
Saving in Operating Costs	224,823
Saving of environmental costs	149,664



B. TIME SAVINGS

Total hours saved along the 30 years of the study:

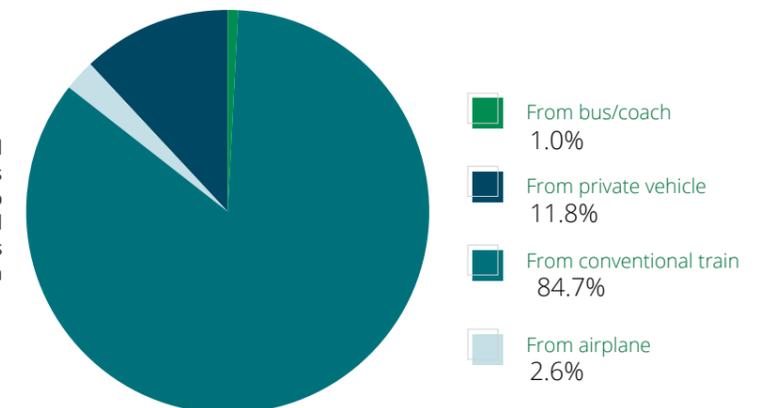
GLOBAL SUMMARY	TOTAL (30 years)	AVERAGE ANNUAL SAVING
Thousand hours saved	28,795	960

C. MODAL TRANSFER

Below appears the summary of the Travelers.Km transferred from each transport mean and the graphic of percentages of modal transfer:

TRAVELERS, KM TRANSFERRED (Thousand)	TOTAL (30 years)	ANNUAL AVERAGE
From private vehicle	2,337,052	77,902
From bus/coach	199,784	6,659
From conventional train	16,822,755	560,759
From airplane	509,868	16,996
TOTAL Miles de Viajeros, km trasvasados	19,869,459	662,315

On the other hand, it should be noted that, of the total number of passengers km at high speed, 5.3% correspond to induced passengers. Of the transferred passengers, the highest percentage comes from the railway itself with 84.7% and then from private vehicles with 11.8%.

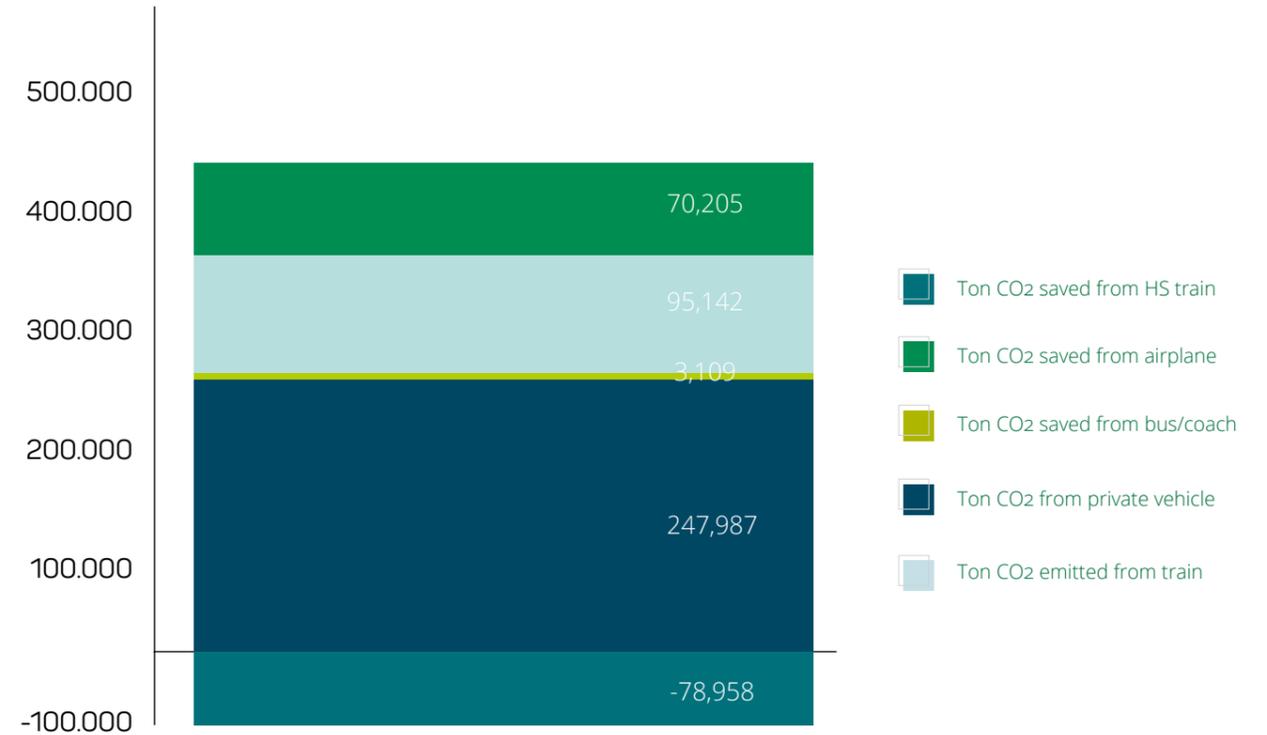




D. SAVINGS OF TONS OF CO2

The savings of CO2 by the Travelers.Km transferred from each mean of transport for the total of the analyzed period (30 years) are the ones below.

CASTEJÓN - CAMPANAS	TOTAL (30 years)	ANNUAL AVREAGE SAVING
Ton CO2 saved from private vehicle	247,987	8,266
Ton CO2 saved from bus/coach	3,109	104
Ton CO2 saved from conventional train	95,142	3,171
Ton CO2 saved from airplane	70,205	2,304
Ton CO2 emitted from HS train	-78,958	-2,632
TOTAL TON CO2 SAVED	337,486	11,250



Allocation of funds to eligible Green Projects

2022 ISSUANCE & 2023 ISSUANCE

INTRODUCTION

FRAMEWORK

USE OF PROCEEDS IN ELIGIBLE GREEN PROJECTS
SELECTION PROCESS
FUNDS MANAGEMENT
REPORTS

2022 ISSUANCE

2023 ISSUANCE

INDICATORS OF FORESEEN IMPACT BROKEN DOWN BY LINES

INTRODUCTION
PREVIOUS CONSIDERATIONS
DEFINITION OF INDICATORS

ALLOCATION OF FUNDS TO ELIGIBLE GREEN PROJECTS

2022 ISSUANCE
2023 ISSUANCE

2022 ISSUANCE

As indicated at the beginning of this report, 100% of the net amount of the funds obtained from the sixth Green Bond of Adif Alta Velocidad (25 October 2022), has been allocated to the first category of Eligible Green Projects established in our Green Financing Framework: "Investments related to new lines and expansions of existing lines".

This first category includes projects of construction of high-speed Lines which are already being executed or that are planned to be, as well as lines already put into service. The detail of such investments, performed in the years 2020 to 2024, is the following:



HIGH SPEED LINES	EXECUTED ELIGIBLE AMOUNT ACCORDING TO FRAMEWORK (Thousand Euros)	FUNDING WITH 2022 GREEN BOND (Thousand Euros)	2022 GREEN BOND ALLOCATION (%)
VALLADOLID-BURGOS-VITORIA H.S.L.	43,186.64	10,858.25	2.18%
MADRID-GALICIA (ORENSE BYPASS) H.S.L.	54,020.83	4,537.22	0.91%
NORTH-END CHAMARTIN STATION	191,674.81	30,062.61	6.03%
MADRID-SEVILLA AND CÓRDOBA-MÁLAGA (ALMODÓVAR DEL RÍO) H.S.L. CONNECTION	18,240.08	372.58	0.07%
CANTABRIA H.S.L.	93,445.19	25,228.11	5.06%
ALMERÍA-MURCIA H.S.L.	724,514.75	274,230.40	54.98%
BARCELONA H.S.L.- LEVANTE H.S.L. CONNECTION	35,316.30	11,996.15	2.40%
BOBADILLA-GRANADA H.S.L.	27,021.19	19,369.37	3.88%
ATLANTIC AXIS (SANTIAGO- VIGO)	15,097.69	9,375.32	1.88%
LEVANTE H.S.L.	268,463.12	54,606.03	10.95%
ZARAGOZA-PAMPLONA H.S.L. (CASTEJÓN-CAMPANAS)	147,199.23	58,163.96	11.66%
TOTAL	1,618,179.83	498,800.00	100.00%

In summary, the funds allocation corresponding to the Green Bond issuance in 2022 is as follows:

	FINANCING WITH 2022 GREEN BOND (Thousand Euros)	2022 GREEN BOND ALLOCATION (%)
Category 1: High Speed Lines	498,800.00	100.00%
TOTAL AMOUNT ALLOCATED	498,800.00	100.00%
Funds pending allocation	0.00	0.00%
NET AMOUNT 2022 GREEN BOND	498,800.00	100.00%



2023 ISSUANCE

Likewise, as of the date of this report, 38.00% of the funds obtained from the seventh Green Bond of Adif Alta Velocidad (27 April 2023) have been allocated to the first category of Eligible Green Projects established in the Green Financing Framework: "Investments related to new lines and expansions of existing lines".

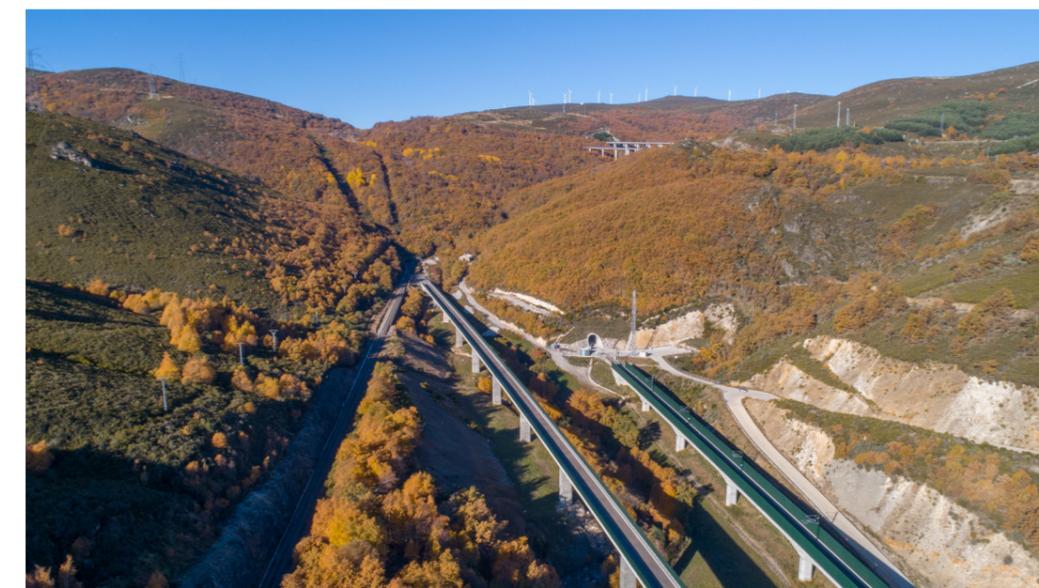
The details of these investments, made in the years 2021 to 2024, are as follows:



HIGH SPEED LINES	AMOUNT ACCORDING TO FRAMEWORK (Thousand Euros)	GREEN BOND (Thousand Euros)	BOND ALLOCATION 2023 (%)
MADRID-GALICIA (OLMEDO-LUBIÁN-OURENSE) H.S.L	43,987.64	27,586.76	4.81%
MADRID-BARCELONA-FIGUERAS H.S.L	257,213.24	65,862.99	13.21%
BARCELONA H.S.L.- LEVANTE H.S.L. CONNECTION	32,890.75	3,117.84	0.63%
ATLANTIC AXIS (SANTIAGO- VIGO)	15,097.69	5,722.37	1.15%
ZARAGOZA-PAMPLONA H.S.L. (CASTEJÓN-CAMPANAS)	134,735.09	87,090.69	17.47%
TOTAL	483,924.40	189,380.65	38.00%

As a summary, the total allocation of funds corresponding to the 2023 green bond issuance would be as follows:

	FINANCING WITH 2023 GREEN BOND (Thousand Euros)	2023 GREEN BOND ALLOCATION (%)
Category 1: High Speed Lines	189,380.65	38.00%
TOTAL AMOUNT ALLOCATED	189,380.65	38.00%
Funds pending allocation	309,044.35	62,00%
NET AMOUNT 2022 GREEN BOND	498,425.00	100.00%



INDEPENDENT ASSURANCE REPORT ON THE APPLICATION OF FUNDS SECTION OF THE GREEN BOND ANNUAL REPORT 2023

(Translation from the original in Spanish. In the event of discrepancy, the Spanish-language version prevails.)

To the President of the ENTIDAD PÚBLICA EMPRESARIAL ADIF – ALTA VELOCIDAD.

Scope of the work

We have performed a reasonable assurance engagement on the contents of Tables of the section "APPLICATION OF THE FUNDS TO ELIGIBLE GREEN PROJECTS" of the ADIF Alta Velocidad Green Bonds 2023 Annual Report (hereinafter, Application of Funds Section of the Green Bond Report), of ENTIDAD PÚBLICA EMPRESARIAL ADIF – ALTA VELOCIDAD, (hereinafter ADIF-AV or the Entity).

In particular, the specific aspects that we have confirmed about the aforementioned information are the following:

- That the net amount received by the Entity for the issue of the Green Bonds, disbursed on 25 October 2022, coincides with the net amount stated in the Application of Funds Section of the Green Bonds Report (498,800.00 thousand euros).
- That the net amount received by the Entity for the issue of the Green Bonds, disbursed on 27 April 2023, coincides with the net amount stated in the Application of Funds Section of the Green Bonds Report (498,425.00 thousand euros).
- That the typology of the projects in which the investments have been materialized, stated in the Application of Funds Section of the Green Bond Report, corresponds to one of the two categories of "eligible green projects" indicated in the Entity's Green Financing Framework.
- 2022 ISSUE. That the investment executed in the period from 2020 to 2024, both inclusive, in the eligible green projects (1,618,179.83 thousand euros) and stated in the Application of Funds Section of the Green Bonds Report, is higher than the funds used to make said investment (498,800.00 thousand euros) corresponding to the issue of Green Bonds disbursed on 25 October 2022, stated in the aforementioned Application of Funds Section of the Green Bonds Report.
- 2023 ISSUE. That the investment executed in the period from 2021 to 2024, both inclusive, in the eligible green projects (483,924.40 thousand euros) and stated in the Application of Funds Section of the Green Bonds Report, is higher than the funds used to make said investment (189,380.65 thousand euros) corresponding to the issue of Green Bonds disbursed on 27 April 2023, stated in the aforementioned Application of Funds Section of the Green Bonds Report.

Inherent limitations

Our assurance work has not included the evaluation of the risks of material misstatements due to fraud or error, nor the evaluation of the control environment, nor of the internal control implemented by the Entity for the adequate preparation and presentation of the information included in the Green Bonds Report.

Responsibility of ADIF-AV's Management

The preparation of the Green Bond Report and its contents are the responsibility of ADIF-AV's Management, which is also responsible for establishing, implementing and maintaining the internal control and management systems where information is obtained.

Our responsibilities

Our responsibility is to issue an independent assurance report, based on work performed in accordance with the provisions of ISAE 3000 "Assurance Engagements Other Than Audits or Reviews of Historical Financial Information" issued by the International Auditing and Assurance Standards Board (IAASB) from the International Federation of Accountants (IFAC) for a reasonable level of assurance.

This standard requires planning and applying procedures to obtain sufficient evidence to reduce the risk of the assignment to an acceptably low level, according to the circumstances thereof, as a basis for expressing a conclusion.

For the purpose of this report, we have asked several questions to ADIF-AV management and ADIF-AV areas that have participated in the preparation of the Annex to the Green Bond Report, and we have carried out certain procedures, including, among others, the following:

- Obtaining and reading of the Application of Funds Section of the Green Bond Report issued by the Entity.
- Meetings with ADIF-AV's staff and management at a corporate level and at the level of its business of the Green Bonds projects, to ascertain the nature of the projects financed in the Application of Funds Section of the Green Bond Report and the correct allocation of the funds.
- Verify the cash receipts, in the bank account of the Entity, of the net funds received for the issuance of Green Bonds, disbursed by the Entity on 27 April 2023, by reviewing the corresponding bank statements.
- Confirm that the typology of the projects in which the investments stated in the Application of Funds Section of the Green Bond Report has been materialized corresponds to one of the two categories of "eligible green projects" indicated in the Entity's Green Financing Framework.
- 2022 ISSUE. By reviewing the main support documentation, we have verified that the investment executed in the period from 2020 to 2024, both inclusive, in the eligible green projects (1,618,179.83 thousand euros) and stated in the Application of Funds Section of the Green Bonds Report, is higher than the funds used to make said investment (498,800.00 thousand euros) corresponding to the issue of Green Bonds disbursed on 25 October 2022, stated in the aforementioned Application of Funds Section of the Green Bonds Report.
- 2023 ISSUE. By reviewing the main support documentation, we have verified that the investment executed in the period from 2021 to 2024, both inclusive, in the eligible green projects (483,924.40 thousand euros) and stated in the Application of Funds Section of the Green Bonds Report, is greater than the funds used to make said investment (189,380.65 thousand euros) corresponding to the issue of Green Bonds disbursed on 27 April 2023, stated in the aforementioned Application of Funds Section of the Green Bonds Report.

We consider that the evidence which we have obtained provides an adequate basis for our conclusions, drawing attention to what is indicated in the section on inherent limitations.

Our independence and quality control

We have complied with the independence and other ethical requirements of the Code of Ethics for Professional Accountants issued by the International Ethics Standards Board for Accountants (IESBA), which is founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behaviour.

Our firm applies International Standard on Quality Control 1 (NICC 1) and accordingly maintains a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

Conclusion

In our opinion, based on the procedures performed, we conclude that:

- That the net amount received by the Entity for the issue of the Green Bonds, disbursed on 25 October 2022, coincides with the net amount stated in the Application of Funds Section of the Green Bonds Report (498,800.00 thousand euros).
- That the net amount received by the Entity for the issue of the Green Bonds, disbursed on 27 April 2023, coincides with the net amount stated in the Application of Funds Section of the Green Bonds Report (498,425.00 thousand euros).
- That the type of projects in which the investments have been made, as stated in the Application of Funds Section of the Green Bonds Report, corresponds to one of the two categories of "eligible green projects" indicated in the Entity's Green Financing Framework.
- 2022 ISSUE. That the investment executed in the period from 2020 to 2024, both inclusive, in the eligible green projects (1,618,179.83 thousand euros) and stated in the Application of Funds Section of the Green Bonds Report, is greater than the funds used to make said investment (498,800.00 thousand euros) corresponding to the issue of Green Bonds disbursed on 25 October 2022, stated in the aforementioned Application of Funds Section of the Green Bonds Report.
- 2023 ISSUE. That the investment executed in the period from 2021 to 2024, both inclusive, in the eligible green projects (483,924.40 thousand euros) and stated in the Application of Funds Section of the Green Bonds Report, is higher than the funds used to make said investment (189,380.65 thousand euros) corresponding to the issue of Green Bonds disbursed on 27 April 2023, stated in the aforementioned Application of Funds Section of the Green Bonds Report.

Other matters

This work does not constitute an audit of accounts nor is it subject to the regulations governing the audit activity in force in Spain, and therefore we do not express an audit opinion in the terms provided in the aforementioned regulations.

PKF ATTEST Servicios Empresariales, S.L.



Diego Galipienzo

31 July 2024

ANNUAL REPORT
**GREEN
BONDS**
2023