2023

ENVIRONMENTAL REPORT

adif
ALTA VELOCIDAD

2023 ENVIRONMENTAL REPORT INDEX

APPENDICES

1. BRIEF INTRODUCTION OF THE COMPANY

1. BRIEF INTRODUCTION OF THE COMPANY

Adif-Alta Velocidad was established on 31 December 2013, by Royal Decree-Law 15/2013[1], which provided for the division of Adif into two public business entities based on principles of rationalisation, efficiency, and budgetary stability.

Pursuant to Art. 23 of the Railway Act (Law 38/2015[2]) and as laid down in the Royal Decree 1044/2013[3] of 27 December2004, approving the Statute of Adif-Alta Velocidad thereunder, the following functions - among others - correspond to Adif-Alta Velocidad:

- Approval of basic and construction projects for railway infrastructures.
- The administration of the railway infrastructures it owns and those entrusted to it.
- The provision of the minimum access package to the railway infrastructure and to put in place the coordination mechanisms.
- Control, monitoring and inspection of the railway infrastructure it manages, as well as of its protection areas and of its railway traffic.
- The allocation of infrastructure capacity to railway undertakings and other applicants who so request.
- The provision of basic, complementary and ancillary services to rail transport services.
- The determination, revision and collection of charges for the use of railway infrastructures.

This network is primarily built according to European technical specifications for interoperability, enabling seamless rail services to and from Spain, connecting with the broader European rail network. Its main function is to provide a safe, reliable, and efficient railway system, adding value and emphasizing sustainability as one of its core principles.

Spain's current economic and social situation is marked by the European funds for the reconstruction and recovery of countries, which was approved after the pandemic. Spain has the opportunity to carry out a strong economic, digital, social and ecological transformation, which should also serve as a basis for the definition of Adif and Adif-Alta Velocidad's strategic lines of action that will benefit from this transformative momentum. Its lines of action include moving towards the decarbonisation of the economy, clearly contributing to the emission reduction targets set by Agenda 2030 and Spain's National Energy and Climate Plan 2030.

Moving towards the decarbonisation of the economy is one of Adif-Alta Velocidad's main lines of action

In recent years, Adif-Alta Velocidad has evolved from a business model based on the key but rather complementary role played by Corporate Social Responsibility, which was sometimes separated from the strategy of the company, to a model in which the Corporate Responsibility and Sustainability strategy equals the Business Strategy.

> *Adif Alta Velocidad aims to contribute to specific sustainable development goals in accordance with the United*

[1] Royal Decree Law 15/2013 of 13 December 2013 on the restructuring of the State-owned company 'Administrador de Infraestructuras Ferroviarias' (Adif) and other urgent economic measures (BOE No. 299 of 14 December 2013).

[2] Law 38/2015 of 29 September 2015 on the Rail Sector (BOE No. 234 of 30 September 2015) and its amendments.

[3] Royal Decree 1044/2013 of 27 December, approving the Statute of the Public Business Entity ADIF-Alta Velocidad (Official State Gazette (BOE) No. 311, 28 December 2013).

Nations 2030 Agenda and public policies promoted by the Ministry of Transport and Sustainable Mobility and the Spanish Government.

With this approach and a defined corporate purpose, Adif-Alta Velocidad defines the Entity's Vision and Mission.

2. COMPANY'S ENVIRONMENTAL STRATEGY

2. COMPANY'S ENVIRONMENTAL STRATEGY

3-3

In 2019, a process of reviewing and updating the business strategy was carried out through the formulation of the 2023 Strategic Plan (SP 2030), which aims to optimise the competitiveness and sustainability of Adif and Adif-Alta Velocidad in the railway infrastructure management and operation sector, responding to the challenges of the future. This Plan is aligned with the European Funds, Spain's Recovery and Resilience Plan, Spain 2050 national long-term strategy, the Safe, Sustainable and Connected Mobility Strategy of the Ministry of Transport, Mobility and Urban Agenda (MITMA), and the United Nations Sustainable Development Goals (SDGs).

SP 2030 is based on four pillars: safety, service, sustainability, and results orientation, which are fully aligned with the mission, vision and values of the institution. These pillars are driven by three levers that will stimulate their achievement: communication, innovation, and digital transformation. People, considered as the drivers of the Plan, are the pillars and the levers.

SP 2030 places the environment and climate as one of the priorities of the business strategy through the pillars of safety and sustainability - understood as a commitment to present and future generations -, which promote actions that guarantee the well-being of people in a healthy environment. These pillars are specified in a series of strategic and tactical objectives that develop Adif and Adif-Alta Velocidad's commitment to the environment.

As part of this process, the tools with which the sustainability objectives are achieved have been defined:

- Plan to combat climate change
- Circular economy plan

These plans are specified in the strategic initiatives. In addition, there is a separate strategic initiative: the responsible public procurement project.

Sustainability pillar	
Strategic objective 1: Becoming a benchmark in contributing to the energy transition - To develop an energy community	
Lead the way in reducing environmental impact through transport electrification, more efficient energy management, renewable energy sourcing and the use of other sustainable and recycled materials.	Tactical objective 30: Enhance the responsible and sustainable energy positioning of rail transport.
	Tactical objective 31: Contribute to environmentally friendly transport and to the responsible use of resources.
Strategic objective 2: Fight the effects of climate change (achieving net zero emissions by 2050)	
Strengthen the commitment of Adif and Adif-Alta Velocidad in the fight against climate change by allocating actions aimed at climate neutrality by 2050 in line with the European Strategy.	Tactical objective 32: Contribute to environmentally friendly transport and to the responsible use of resources.
	Tactical objective 33: Adapt entity's assets to environmental requirements.
	Tactical objective 34: Increasing the use of smart and sustainable materials to improve the resilience of the infrastructures.
Strategic objective 3: Restoring nature and biodiversity	
Ensure the protection of nature and develop measures that contribute to reversing the degradation of ecosystems, reducing pressure on biodiversity.	Tactical objective 35: Increasing the use of smart and sustainable materials to improve the resilience of the infrastructures.
Strategic objective 4: Promoting a culture of climate change awareness	
Raise awareness among our internal and external stakeholders of the fight against climate change by shaping a culture that promotes rail as a more sustainable mode of transport, favours energy efficiency, and works to reduce their carbon footprint. Encourage the use of an economic and social system that is committed to optimising resources through alternatives that promote circular economy models.	Tactical objective 36: Raise stakeholder awareness of climate change issues.
Strategic objective 6: Reach new revenue lines through energy transition opportunities - contribute to the development of sustainable finance	
Achieve the development of new lines of business derived from investment opportunities in self-consumption systems that will enable Adif and Adif-Alta Velocidad to obtain greater energy independence.	Tactical objective 38: Develop services that promote the use of sustainable modes of transport.
Safety pillar	
Strategic objective 6: Strengthening environmental protection	
Keep promoting an activity that ensures comprehensive environmental safety, taking preventive measures to mitigate threats and reduce the environmental risks and impacts, which derive from the effects derived from our presence in the environment.	Tactical objective 11: Undertake actions that reduce the environmental impact of Adif and Adif-Alta Velocidad, minimise risks, and ensure comprehensive environmental protection.

Pillars of the Strategic Plan 2030 and the action lines for sustainability and security

For the monitoring of the SP 2030, a set of strategic indicators has been defined for each pillar. The strategic indicators of the environmental dimension of the sustainability

pillar are reduction of greenhouse gases (GHGs) emissions and improvement of energy efficiency.

Table 1. Indicators of the environmental dimension of the sustainability pillar *, **

	2021	2022	2023
GHGs emissions reduction (t CO_{2eq})	14,344	15,426	15,620
Energy efficiency improvement (GWh equivalent)	120.56	123.60	125.17

* Base year 2009.

** Data revised in relation to the Adif 2022 Environmental Report

Source: Management Report, financial year 2022 Adif-Alta Velocidad.

Adif-Alta Velocidad's Code of Ethics and Conduct is the guide for ethical and responsible behaviour for people working at Adif-Alta Velocidad, regardless of the area or corporate department in which they work.

The Code translates Adif-Alta Velocidad's values, principles and commitments to conduct into guidelines for behaviour. It takes into account its nature as a public business entity and the applicable regulatory framework. At the same time, the Code expresses Adif-Velocidad's commitment to its stakeholders (groups or persons with whom it relates, including employees, customers, providers, contractors, operators or third parties) regarding the ethical model towards its management and efforts.

The commitments to conduct set out in the Code also include respecting and preserving the natural environment and cultural heritage, as part of its responsibility as a company and in order to respond to the requests of its stakeholders.

Code of Ethics Commitments

1. Follow procedures and recommendations to reduce the environmental impact of activities.
2. Minimise the use of toxic, polluting, or hazardous materials by replacing them with safer alternatives.
3. Conserve energy and natural resources by using only what is necessary for work.
4. Reduce pollution by cutting down on waste, reusing, recycling, and protecting natural spaces.
5. Safeguard cultural heritage of historical value, particularly in relation to railway activities.
6. Share ideas and projects to improve work processes, focusing on environmental impact and cultural heritage, while raising awareness among colleagues.

Respect for the natural environment has become one of the priorities of advanced entities such as Adif-Alta Velocidad, and it plays a key role regarding the technical and economic effort to modernise railway services from an environmental and service quality perspective.

Adif-Alta Velocidad identifies the existence of environmental effects associated with the maintenance of the railway infrastructures it owns, as well as the ones whose administration has been entrusted to it by the State. These effects are also produced by transport operations carried out on them and by the creation of new lines.

The Environmental Policy, which was approved by the President of Adif and Adif-Alta Velocidad in 2019, is the highest-level document regarding Adif-Alta Velocidad's commitment to environmental, in line with the Standard Procedure for the Management and Coordination of Environmental Activities (ADIF-PG-109-001-001-001).

Environmental Policy of Adif - Alta Velocidad

1. Promote commitments to the continual improvement of environmental performance based on the implementation, audit and periodic certification of its environmental criteria, based on the ISO 14001 standard, specifying the responsibilities, as well as the internal tools for its control and monitoring.
2. Ensure that we always act in accordance with legal compliance obligations, as well as other applicable requirements, and in collaboration with the official organizations in charge of its supervision.
3. Achievethe environmental integration of the railway while maintaining maximum respect for natural spaces and cultural and archaeological heritage, protecting biodiversity and ecosystems, preserving all their values and recovering those environments that may have been affected.
4. Require identical degree of environmental commitment from subsidiary companies, contractors and suppliers, by signing the corresponding contractual agreements and defining the necessary criteria to carry out a sustainable public procurement.
5. Define internal procedures that guaranteeenvironmental protection and pollution prevention, during all operations phases of the life cycle ofrailway infrastructure and facilities, promoting the transition towards a circular economy that optimizes the use of resources.
6. Develop energy efficiency improvement plans that decrease energy consumption and reduce CO_2 emissions, both in construction, maintenance and operation of railway infrastructure and facilities.
7. Rationalize water consumption, as well as thegeneration of waste and wastewater, minimize the impact on soils, as well as recover those that have been contaminated, and adopt all technically and economically viable measures in order to reduce the impact from noise and vibrations.
8. Determine the environmental risk associated with threats and opportunities, delving especially into issues related to Resilience to Climate Change in all railway infrastructure and facilities.
9. Implement specific training and environmental awareness programs for operational, technical and managerial staff of all organizational units of Adif and Adif Alta Velocidad.
10. Promote commitment to the environment from Senior Management. Provide human, economic and material resources necessary to guarantee compliance with these commitments and to communicate publicly and regularly the results of their application for the sake of transparency.

*The president of Adif and Adif Alta Velocidad, February 2019

What is Expected from Adif-Alta Velocidad?

1. We must follow internal procedures and recommendations to improve the environmental performance of Adif-Alta Velocidad, comply with all environmental laws relating to our activities, and collaborate with the relevant Official Bodies for supervision.
2. We must assess the environmental risks of our activities and processes, considering potential damage to the entity's reputation or serious breaches of environmental legislation, internal rules, and procedures.
3. We should continuously seek ways to improve our work to minimise our environmental impact. Suggestions for improvement in this area are always welcome.
4. We will strive to reduce the use of toxic, polluting, or hazardous materials, replacing them with more environmentally friendly alternatives whenever possible.
5. We must take necessary measures to preserve energy and natural resources, avoiding unnecessary waste and using only what is needed for our work.
6. We will minimise pollution by reducing, reusing, and recycling waste and wastewater, and we will act with the utmost respect for protected natural areas, fostering awareness of these issues among colleagues.
7. Finally, we will actively participate in environmental initiatives and activities that raise awareness of the natural environment, supporting Adif-Alta Velocidad's relationship with organisations dedicated to nature conservation.

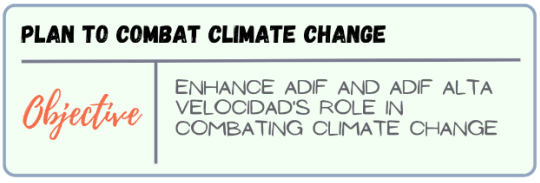
3. MAIN ACHIEVEMENTS

3. MAIN ACHIEVEMENTS

PLAN TO COMBAT CLIMATE CHANGE (PLCCC)

3-3

Adif and Adif-Alta Velocidad's PLCCC 2018-2030 is part of the Strategic Plan 2030 (SP 2030). It is embedded in the sustainability pillar, which has several strategic objectives related to the fight against climate change. It also advocates for a means of transport which is environmentally friendly and which makes responsible use of resources.



The PLCCC takes advantage of the knowledge and experience acquired with the Energy Saving and Efficiency Master Plans that have been developed in Adif and Adif-Alta Velocidad since 2009. PLCCC replaces those.

The PLCCC aims to go beyond energy efficiency, including measures to decarbonise the railway system and to increase the use of renewable energies. It also aims at improving the resilience of railway infrastructures. Its time scope is 2018-2030, setting specific targets for energy savings and GHGs emissions reduction for 2020, 2025 and 2030 milestones.

It is structured in 5 lines of action that are deployed through 17 programmes and 56 projects to achieve the mitigation, adaptation and culture, and awareness objectives. The lines of action are the following:

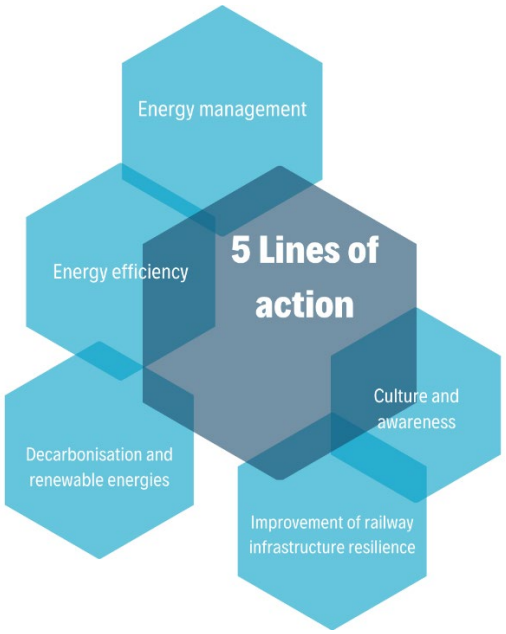


Figure 1. Lines of action of the PLCCC

In addition, specific targets encompassing the aforementioned objectives.

Adif-Alta Velocidad, in line with the management entrustment agreement signed by the two entities, advises Adif on energy saving and efficiency and coordinates the implementation and monitoring of the PLCCC.

Several tools have been defined to monitor the implementation of this Plan:

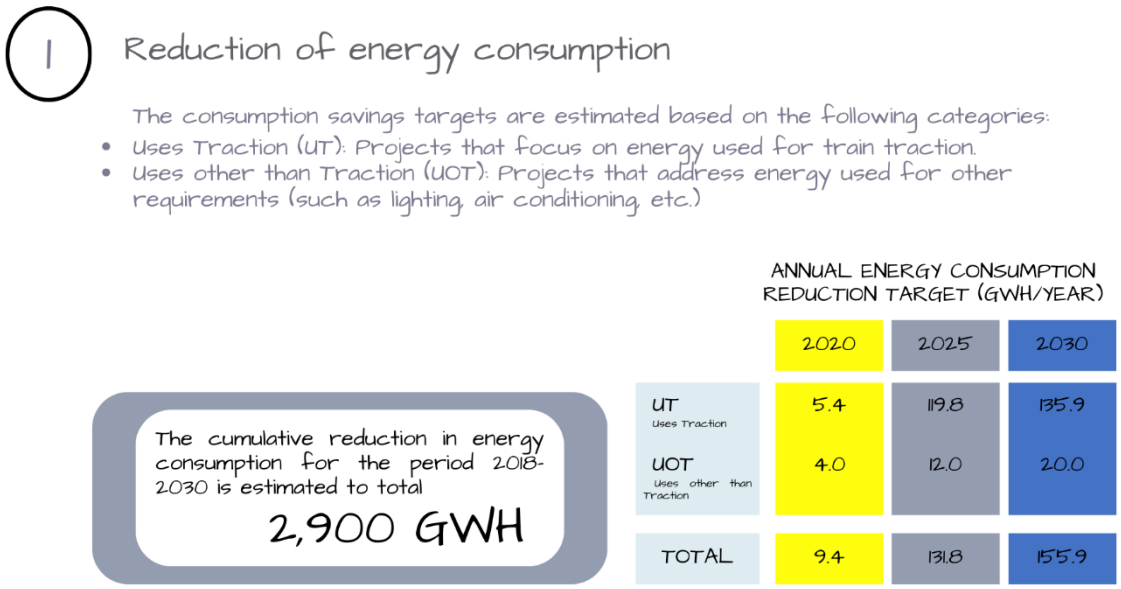
- Joint bi-annual meetings to assess the progress of the various initiatives.
- Completion of the format established by the Corporate Strategic Plan Sub-Department for the strategic initiatives that shape the SP 2030.
- Establishment of a global report, as well as specific reports by area specifying the degree of implementation of the actions included in the PLCCC.

With this Plan, Adif and Adif-Alta Velocidad are aligned with the main existing international commitments in the fight against climate change, contributing both to the achievement of United Nations 2030 Agenda SDGs (specifically goal 13 "Climate Action") and the agreement reached by the signatory countries under the Paris Agreement. Likewise, the ultimate goal is to achieve carbon neutrality by 2050. Adif and Adif-Alta Velocidad have pursued this objective since they joined the International Union of Railways (UIC) 2019 Climate Responsibility Pledge.

The PLCCC is a living document. The main projects under development are: the Energy Self-consumption Plan (installation of photovoltaic solar panels for self-consumption with and without surplus), the installation of charge points for electric vehicles, the implementation of railway lines, the replacement of diesel C boilers with less polluting technology and energy guidelines, among others.

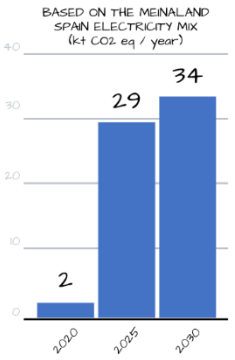
In addition, in 2022, ***a climate risk related to the adaptation of railway infrastructure to combat the adverse effects of climate change*** was identified and included in the Risk Map, both at Adif and Adif-Alta Velocidad level.

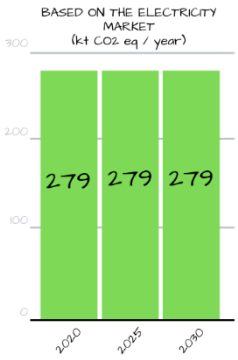
Adif and Adif-Alta Velocidad are preparing Adaptation Studies regarding the adverse effects of climate change of the entire railway network, through the implementation of a methodology developed to analyse the risk and adaptation to the effects of climate change in projects (internal standard NAG 4-0-0.0). In this methodology, a vulnerability analysis and a risk assessment are carried out for both the railway infrastructure components and the railway service. It identifies the impacts associated with different climate variables and their future projections. In this way, depending on the risks identified, measures of adaptation to be undertaken are proposed. These analyses are carried out with a triple time horizon: current time, in 30 years' time, and in 80 years' time.



2 Reduction of GHG emissions

To define the GHG **reduction target for the railway system**, a dual calculation was made: one based on the meinaland Spain electricity mix and the other based on the electricity market with the purchase of green energy. In 2019, both Adif and Adif Alta Velocidad chose to purchase green energy with Guarantee of Origin Certificates (GoO).





The cumulative emissions reduction by 2030 is projected to be

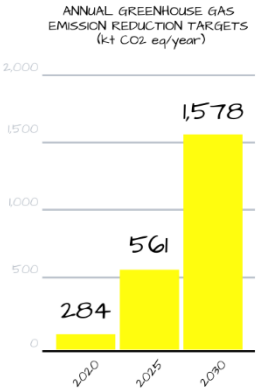
777 kt CO2 eq

BASED ON THE MEINALAND SPAIN ELECTRICITY MIX

3,700 kt CO2 eq

BASED ON THE ELECTRICITY MARKET WITH THE PURCHASE OF GREEN ENERGY

To calculate the GHG emissions avoided through modal shift, increases in the modal shares of both freight and passenger rail transport have been estimated. This estimation is based on a scenario aligned with the objectives of the White Paper on Transport, as well as those established by the European Union and the International Energy Agency. It also takes into account all planned actions included in the Plan that are expected to support these increases.



Cumulative emission reductions from modal shift by 2030 are estimated to exceed

8,400 kt CO2 eq

TOTAL CUMULATIVE GREENHOUSE GAS EMISSION REDUCTION (2030)

9,100 kt CO2 eq

BASED ON THE MEINALAND SPAIN ELECTRICITY MIX

12,000 kt CO2 eq

BASED ON THE ELECTRICITY MARKET

PURCHASE OF GREEN ENERGY (GoO)

3 Improvement of railway infrastructure resilience

In relation to adapting to the adverse effects of climate change, the targets set refer to the number of railway infrastructure projects that include a specific section for assessing vulnerability to these impacts.

		2020	2025	2030
% of major projects with climate change adaptation assessment		100%	100%	100%
% of projects subject to monitoring with climate change adaptation assessment	New construction	75%	90%	100%
	Renovation, stations, and terminals	50%	75%	100%
	Maintenance	25%	50%	100%
% of maintenance works not subject to supervision, where maintenance specifications include climate change adaptation assessment		25%	50%	100%

4 Culture to combat climate change

The targets for raising awareness and engaging our stakeholders, both internal and external, are based on the progress of various planned actions in this area.

	2020	2025	2030
% of parking spaces equipped with electric vehicle charging points available to employees	3%	5%	10%
% of contracting specifications that include clauses related to climate change, where applicable	50%	100%	100%
% of investment allocated to cultural projects compared to the total planned investment	20%	60%	100%

Figure 2. Objectives and targets of the PLCCC 2018-2030 (base year used for the quantification of targets: 2016).

Monitoring the implementation of actions to Combat Climate Change

302-4 | 305-5

Adif and Adif-Alta Velocidad work together in the implementation of energy efficiency and climate change actions derived from successive plans. Therefore, the results shown in this section might occasionally be the same for both entities.

From 2009 to 2023, a total of seven hundred and twenty measures have been implemented in Adif and Adif-Alta Velocidad for energy saving and efficiency, renewable energy generation systems, and the fight against climate change.

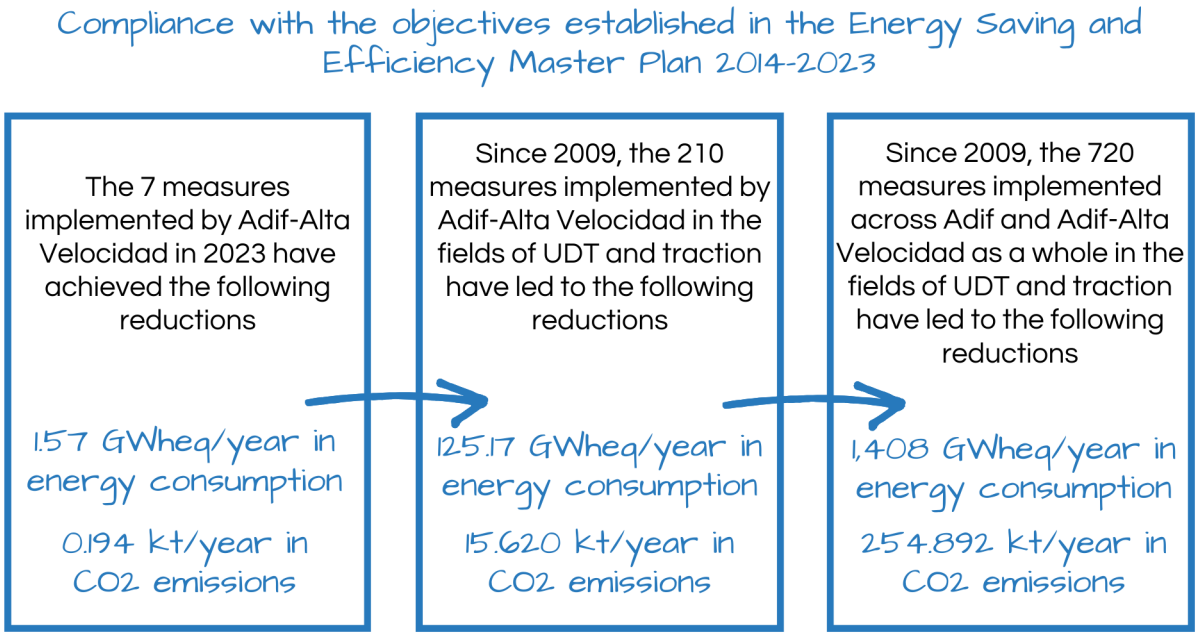


Figure 3.Reductions achieved with the implementation of actions to improve energy efficiency and to combat climate change in Adif and Adif-Alta Velocidad since 2009.

Source: Adif-Alta Velocidad, Corporate Planning, Strategy and Project Management Department, Corporate Business Strategy Department, Corporate Responsibility, Sustainability and Branding Sub-department

The actions carried out within the framework of the successive energy saving and climate change plans focus on energy efficiency and renewable energy actions in specific areas: stations, offices, logistics facilities and other facilities. In addition, six hundred and sixty-one vehicles for railway infrastructure maintenance operations have been renewed.

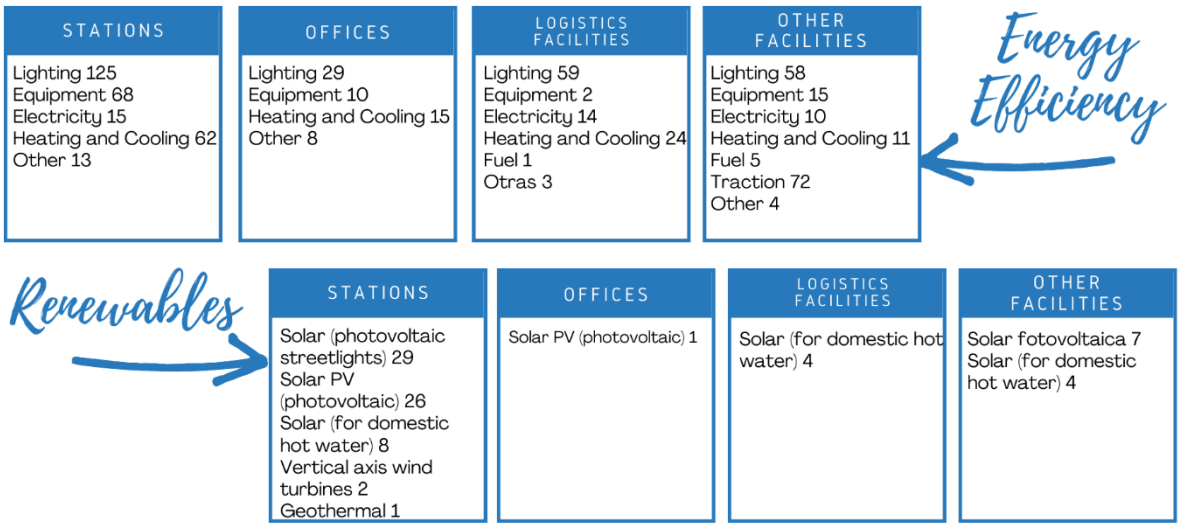
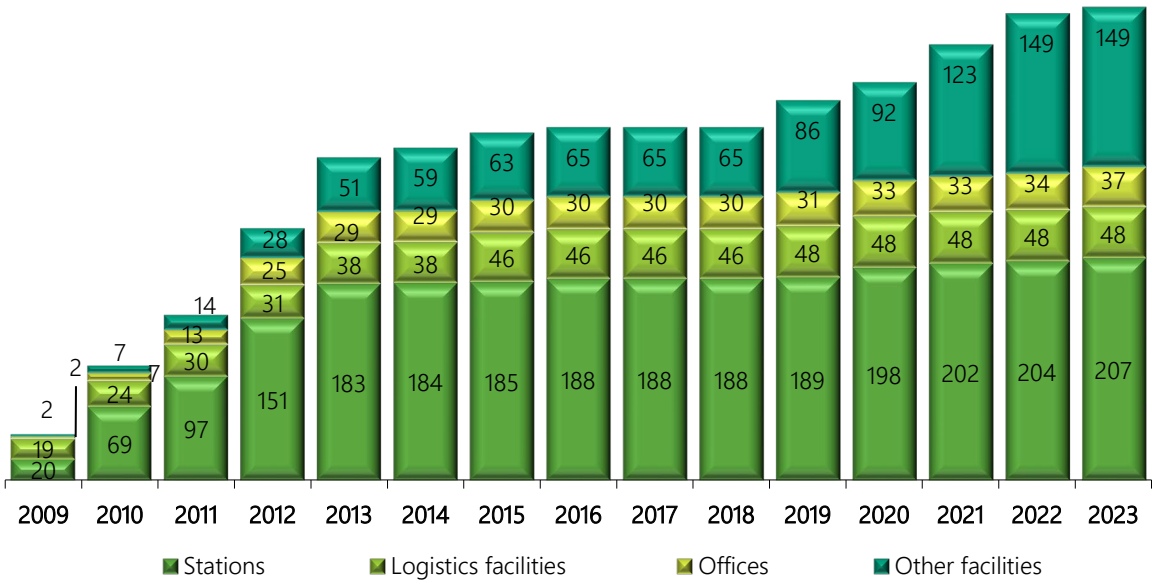


Figure 4.Actions carried out by 31 December 2023 within the framework of Adif and Adif-Alta Velocidad's Action Plan for Energy Saving-Efficiency and Renewable Energy Generation Systems.

Source: Adif-Alta Velocidad, Corporate Planning, Strategy and Project Management Department, Corporate Business Strategy Department, Corporate Responsibility, Sustainability and Branding Sub-department

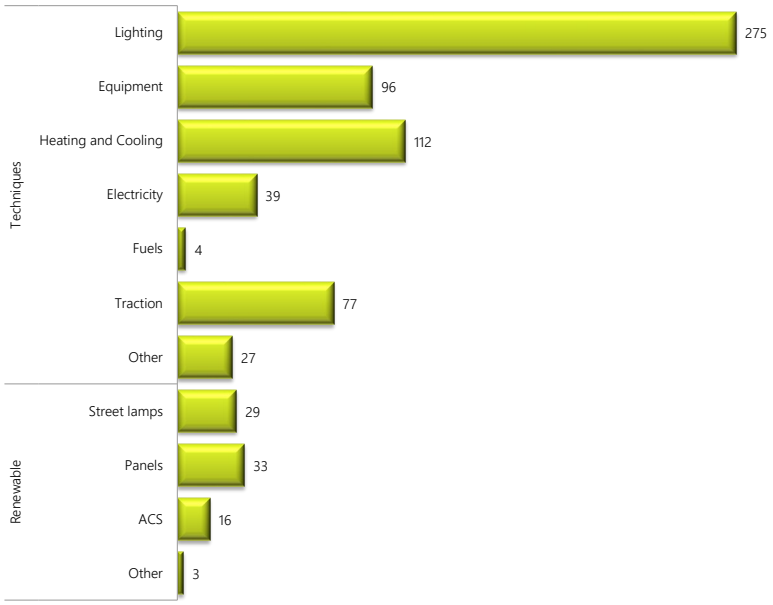
Chart 1. Facilities where technical or renewable measures have been implemented in Adif and Adif-Alta Velocidad (No. of facilities)



** Data for 2022 modified in relation to the 2022 Environmental Report.*

Source: Adif-Alta Velocidad, Corporate Strategic Planning and Projects Department, Business Strategy Department, Corporate Responsibility, Sustainability, and Brand Sub-Department

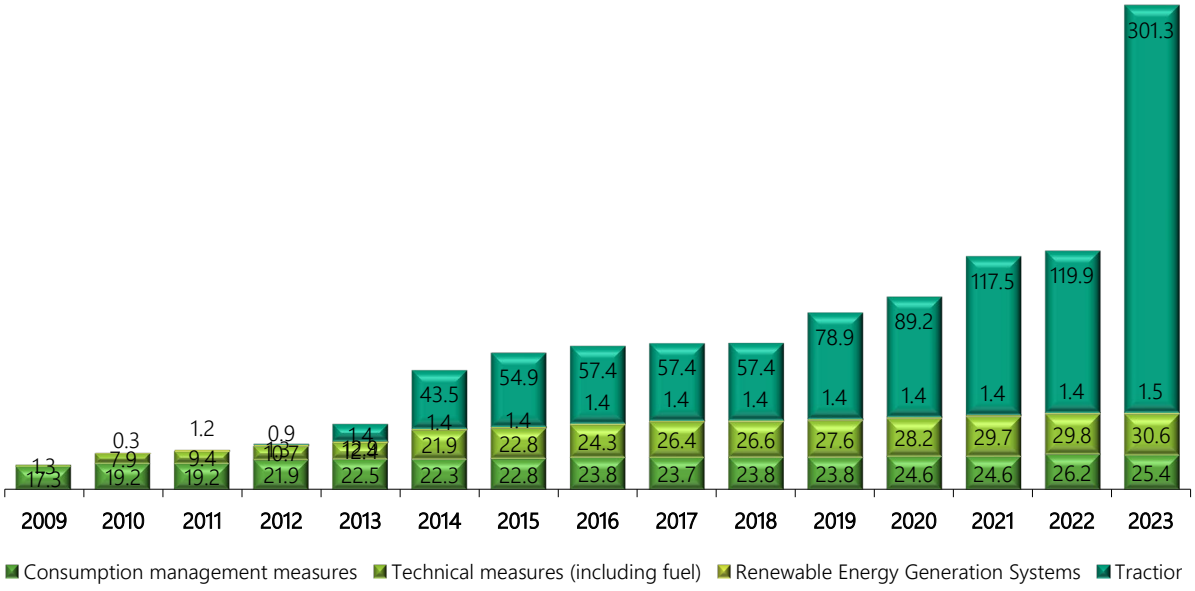
Chart 2. Energy saving and efficiency measures and renewable energy generation systems implemented between 2009-2023 in Adif and Adif-Alta Velocidad



Source: Adif-Alta Velocidad, Corporate Strategic Planning and Projects Department, Business Strategy Department, Corporate Responsibility, Sustainability, and Brand Sub-Department

The set of actions carried out by Adif and Adif-Alta Velocidad between 2009 and 2023, within the framework of the successive energy saving and climate change plans, made it possible to avoid a total of 254,892 kt of CO_2 by 2023.

Chart 3. Energy savings and efficiency achievements (in GWh/year) as of December 31 each year under the Implementation Plans for Energy Saving, Efficiency Actions, and Renewable Energy Generation Systems in Adif and Adif-Alta Velocidad. *

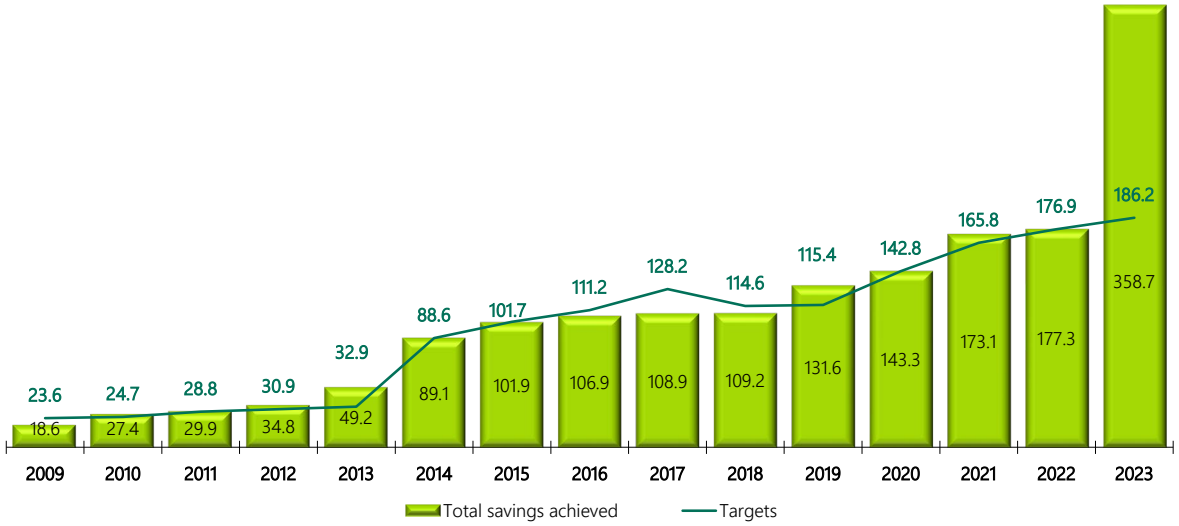


**Management measures represent: fuel savings (fleet and generators renewal) and traction energy savings, as well as fleet management and electricity consumption management measures.*

*** Data for 2009 and 2021 was modified in relation to the 2022 Environmental Report.*

Source: Adif-Alta Velocidad, Corporate Strategic Planning and Projects Department, Business Strategy Department, Corporate Responsibility, Sustainability, and Brand Sub-Department

Chart 4. Energy savings and efficiency achievements (in GWh/year) as of December 31 each year under the Implementation Plans for Energy Saving, Efficiency Actions, and Renewable Energy Generation Systems in Adif and Adif-Alta Velocidad. *

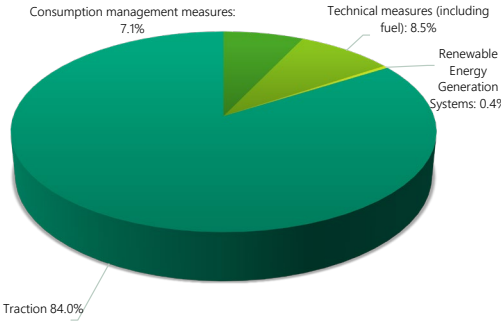


** Data for 2009 and 2021 was modified in relation to the 2022 Environmental Report.*

Source: Adif-Alta Velocidad, Corporate Strategic Planning and Projects Department, Business Strategy Department, Corporate Responsibility, Sustainability, and Brand Sub-Department

As of 31 December 2023, the main contribution of the different types of measures implemented to the annual savings in energy consumption achieved was due to traction measures (84.0%), followed by technical measures (8.5%), and consumption management measures (7.1%).

Chart 5. Percentages of annual savings in energy consumption achieved by the different types of measures implemented by 31 December 2023 in Adif and Adif-Alta Velocidad



Source: Adif-Alta Velocidad, Corporate Planning, Strategy and Project Management Department, Corporate Business Strategy Department, Corporate Responsibility, Sustainability and Branding Sub-department

PRIME BENCHMARKING ANALYSIS

In 2013 PRIME (Platform of Rail Infrastructure Managers in Europe) was created as a platform for cooperation between the European Commission and European Rail Infrastructure Managers (EIM) with the aim of providing an effective and efficient rail service. Thirty-nine organisations participate in PRIME, including Adif-Alta Velocidad.

Periodic benchmarking analyses are among the tasks carried out within the framework of this platform. These aim at providing a comprehensive view of actions on the railway network, so that infrastructure managers can exchange practices and actions and identify areas in which there is room for improvement.

These analyses cover various dimensions of railway infrastructure management, such as punctuality, costs, resilience, sustainable development, environment, safety, etc.

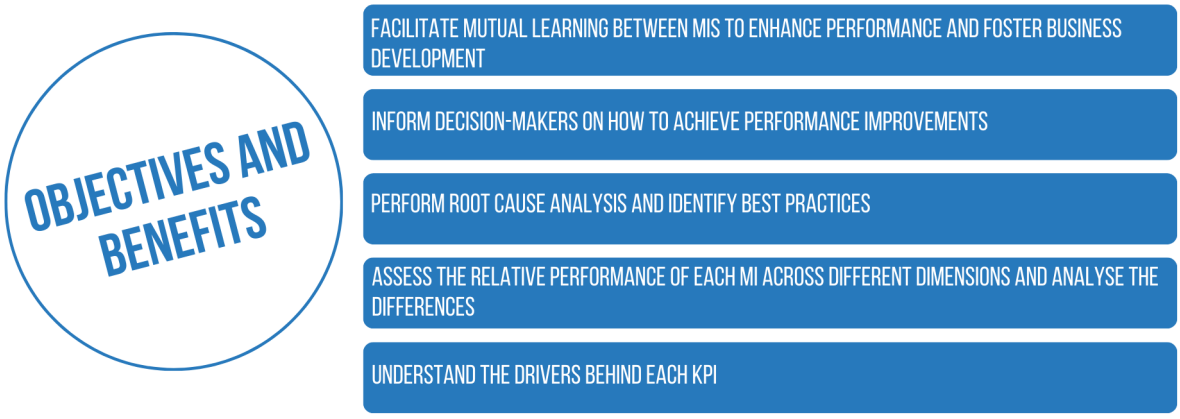


Figure 5. Objectives and identified benefits of the PRIME partnership.

The fourth benchmarking analysis is currently being prepared. For this purpose, 49 key performance indicators (KPIs) corresponding to different areas have been selected and their evolution between 2012 and 2019 has been analysed.

In the environment section, this fourth review focuses on two aspects:

- The influence of railway infrastructure managers on the effects and improvements of the environmental impact of railway.
- The direct environmental impact of its own activities.

PRIME's next challenges in relation to these analyses are to increase participation, to improve data quality and conduct exhaustive data studies, and to prepare and share the results among railway infrastructure managers.

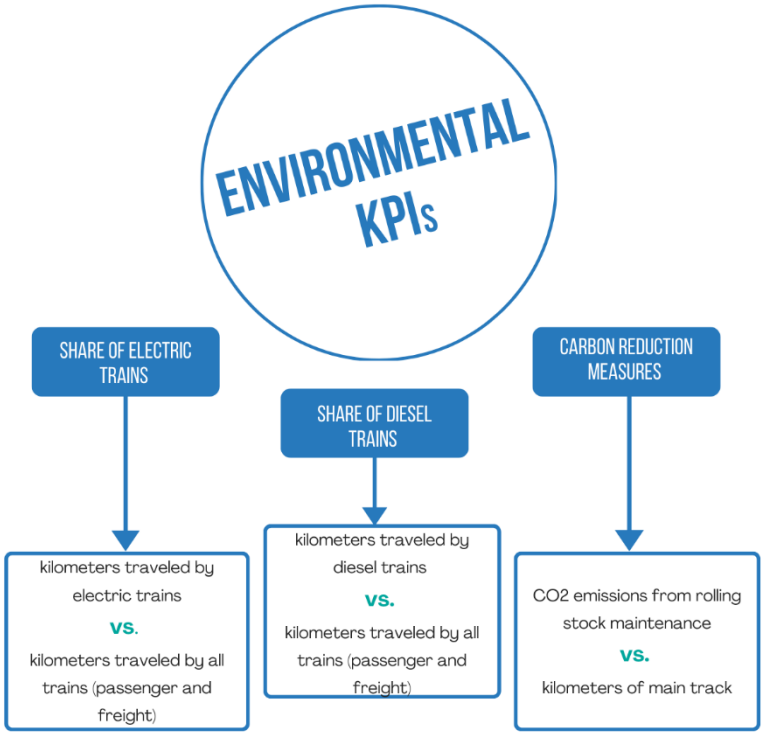


Figure 6. Defined environmental KPIs in the PRIME benchmarking report (safety and environment pillar)

GREEN BOND

3-3 | 302-4 | 305-5

In the financial sphere, Adif-Alta Velocidad made its seventh issue of fixed-income securities under the 'green bonds' format in April 2023, reaffirming its commitment to sustainable development, environmental protection, and the fight against climate change.

With this seventh issue, Adif-Alta Velocidad continues to contribute to the development of the green bond market as a sustainable financing option. It also actively participates in various forums, such as the Spanish Observatory for Sustainable Financing and the Corporate Forum for Sustainable Finance. The latter consists of entities from various sectors that together account for more than two-thirds of the total issuance of green and sustainable bonds in Europe.

Adif-Alta Velocidad issues its bonds under the new Green Funding Framework, updated in August 2022. This framework aligns with the Green Bond Principles (GBP) of the International Capital Market Association (ICMA) and received an 'excellent' rating from Sustainable Fitch in 2022.

Additionally, this Framework demonstrates Adif-Alta Velocidad's commitment and strong alignment with the principles outlined in the European Taxonomy for climate change mitigation.

Consolidating its position as a leading socially responsible public issuer in the European market, Adif-Alta Velocidad was ranked in 2023 by Sustainability's ESG Risk Rating as the second-best company in the transport infrastructure sector (out of 187 entities analysed) and the third-best globally (out of more than 15,000 companies

analysed). Furthermore, ISS ESG rated Adif-Alta Velocidad as 'Prime,' indicating that it meets the stringent sustainability requirements in its sector and placing it among the top 10% of companies in that sector.

> ***! Adif-Alta Velocidad, the first Spanish company to issue green bonds (since 2017), is now the second-largest green bond issuer in Spain and one of the leading references at the European level with its latest issuance.***

Continuing its commitment to transparency, Adif-Alta Velocidad presented its annual report in 2023 on the use of funds from its 2022 issuance. These funds were allocated to Eligible Green Projects (EGPs), including the construction of new high-speed lines, the extension of existing lines, and the maintenance and improvement of energy efficiency on these lines.

These EGPs include new or ongoing projects, with disbursements spanning from two years before the bond issuance to three years after.

Adif-Alta Velocidad carries out its work while minimizing the environmental impact of its activities. To this end, it has a Certified Environmental Management System (ISO 14001), making it the first European infrastructure manager to achieve this certification.

The entity aims to play a key role in sustainable development and to enhance its involvement in Spain's transition to a low-carbon and climate-resilient economy.

> ***! In the seventh green bond issuance, 71% of the investors were socially responsible investors.***

SUSTAINABLE DEVELOPMENT GOALS IN ADIF-ALTA VELOCIDAD'S STRATEGY

Adif-Alta Velocidad focuses on providing a safe, reliable and efficient railway network for all, with sustainability as one of its fundamental pillars. Some of the challenges Adif and Adif-Alta Velocidad proposed to be addressed are: the need for a low-emission and more efficient mobility model, the preservation of natural resources, the promotion of socially inclusive economic development, and the improvement of citizens safety and health.

By analysing the contribution of strategic initiatives to the achievement of the United Nations Sustainable Development Goals (SDGs), it is possible to determine which Goals are prioritized in the development of SP 2030. Furthermore, the progress on specific targets can be assessed through indicators from Adif and Adif-Alta Velocidad.

The SDGs which are most impacted by the implementation of the strategic initiatives are the following:

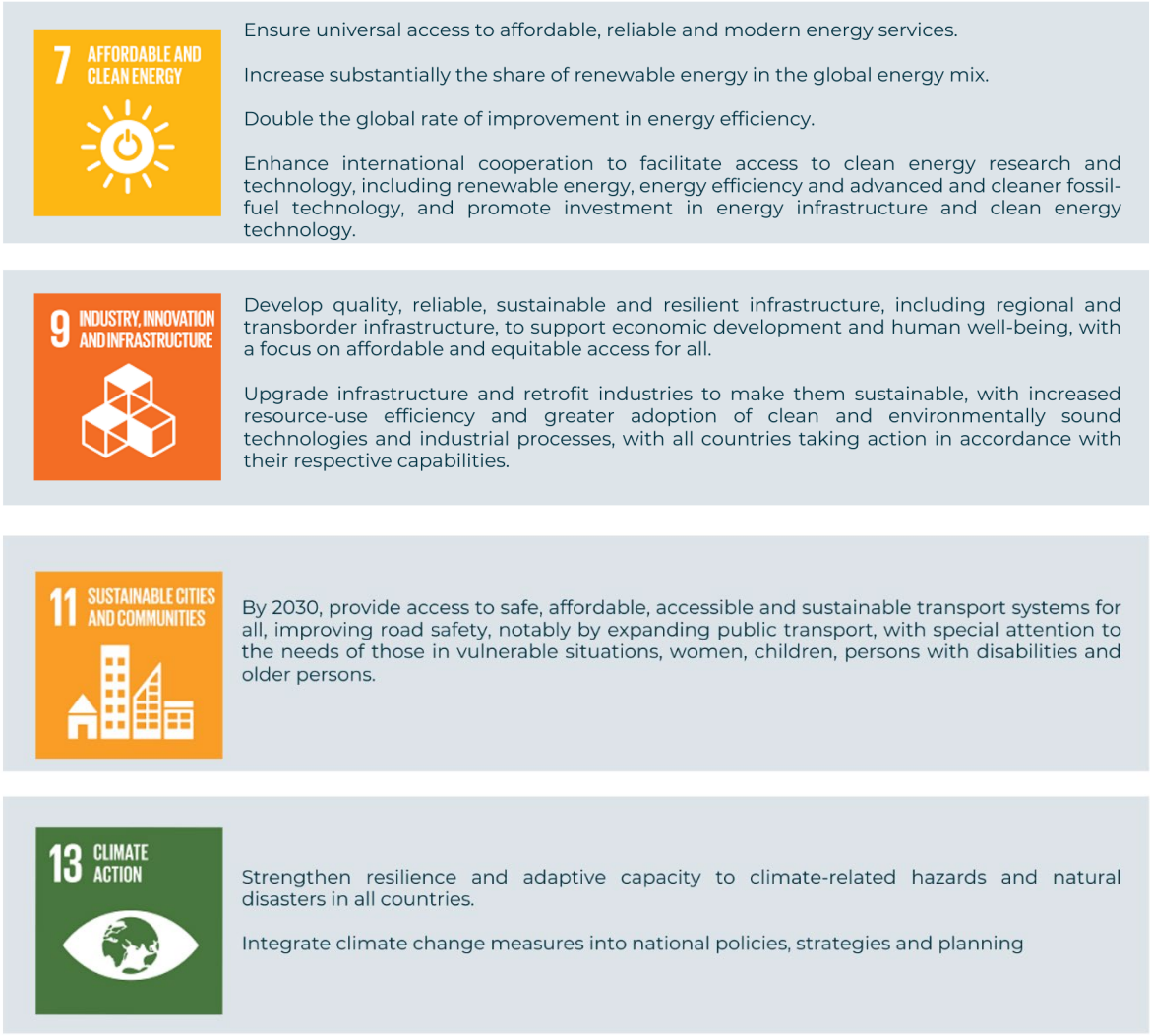


Figure 7. SDGs which are most impacted by the implementation of Adif-Alta Velocidad's strategic initiatives

Aligning the strategy with the SDGs offers a competitive advantage for Adif-Alta Velocidad, enabling the identification of future business opportunities, the strengthening of stakeholder relationships, efficient management, and a positive impact on society across the three crucial pillars: social, environmental, and economic.

The Plan is designed to align with the United Nations 2030 Agenda, which encompasses 169 integrated and indivisible goals across the economic, social, and environmental spheres.

In addition, three priority sustainability challenges are addressed: climate emergency, corporate governance, and social inequality. In this line, Adif and Adif-Alta Velocidad set the following objectives:

- Achieve net zero greenhouse gas emissions by 2050.
- Shape strategic initiatives that integrate support for inclusion, equality, diversity, and the elimination of all forms of discrimination.

In updating the activities of Adif and Adif-Alta Velocidad, a framework agreement has been signed with the Secretary of State for the 2030 Agenda, along with 16 other public entities and companies, to strengthen its implementation and advance towards the fulfilment of the SDGs of the 2030 Agenda.

This scope of collaboration includes the exchange of good practices in the implementation of the SDGs and their targets,

and the development of joint projects in this area, including certification of goods and services. Additionally, it involves sharing dissemination activities and implementing training on the SDGs, among other measures.

In addition, Adif and Adif-Alta Velocidad together with other UIC (International Union of Railways) organisations have set up the SDG Rail Index Working Group. This group aims to create an international scoring system to rate railway companies, ensuring each one's alignment with the SDGs and the 2030 Agenda.

In the group, the determined indicators and methodology, based on the applicable regulations, enable the establishment of homogeneous comparisons to obtain a compliance rating for each organisation.

This process is automated using a tool that incorporates various KPIs provided by organizations, ultimately determining the level of SDGs alignment for the international railway sector and each individual company or sector.

In 2022, for the first time, the UIC accredited the Rail Sustainability Index rating, which evaluates the progress of railway companies towards sustainable development using a comparability index based on the most relevant SDGs for the railway sector.

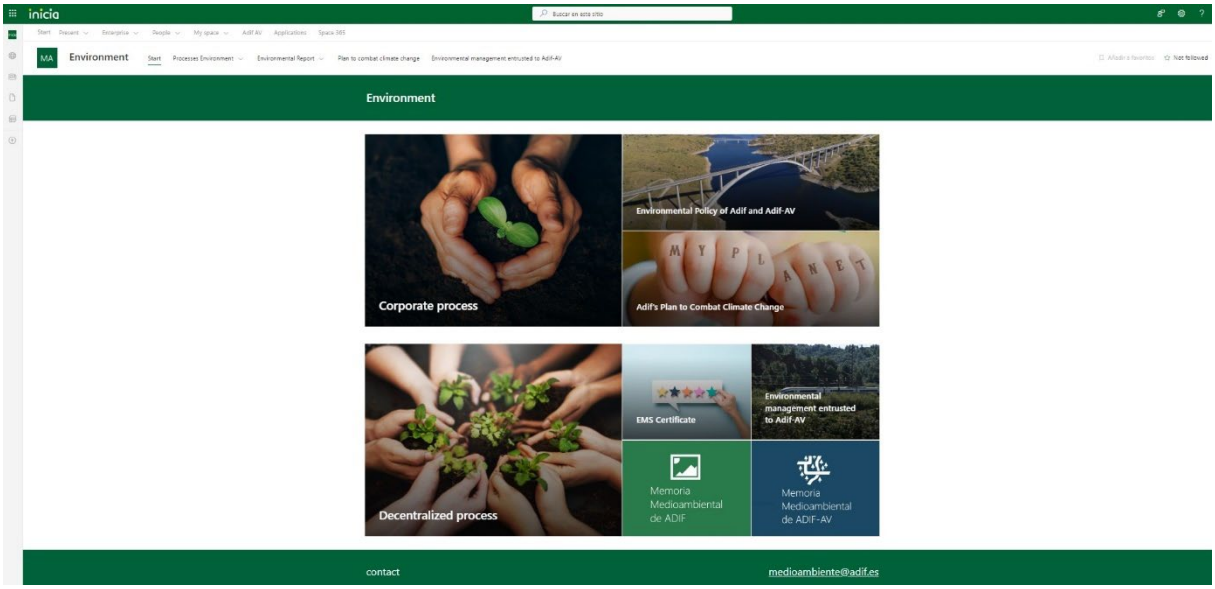
Adif and Adif-Alta Velocidad jointly obtained the highest score in three of the seven SDGs analysed: affordable and clean energy (SDG 7), climate action (SDG 13) and sustainable cities and communities (SDG 11).

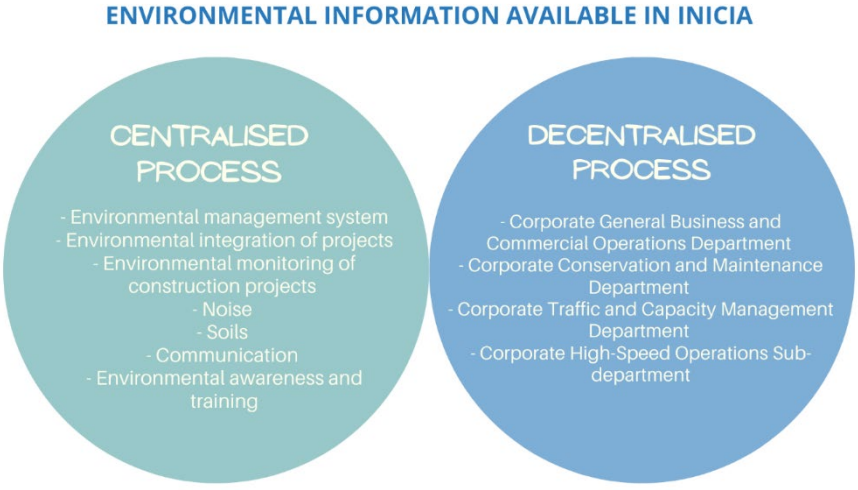
Adif and Adif-Alta Velocidad's performance reaches 74.00%, compared to an average sector performance of 42.38%

ADIF AND ADIF-ALTA VELOCIDAD INTERNAL COMMUNICATION PORTAL

In 2019, the Environment section was created in the *Inicia* corporate portal with the aim of improving internal communication and sharing corporate information on aspects related to the environment. In this way, the management and coordination of environmental activities could be improved by taking advantage of existing synergies. All areas of activity involved can contribute content and a mailbox is available for environmental communications.

The homepage provides access to Adif and Adif-Alta Velocidad's Environmental Policy, Adif-Alta Velocidad's environmental management information, and the Environmental Reports for both entities. The rest of the content is structured based on whether the aspects belong to centralised or decentralised management processes. Within each of these sections, all environmental aspects are detailed with links to the relevant documents and current procedures.





FRAMEWORK COLLABORATION AGREEMENT BETWEEN RENFE OPERADORA AND ADIF-ALTA VELOCIDAD ON ENVIRONMENTAL MANAGEMENT AND THE PROMOTION OF SUSTAINABLE MOBILITY

In February 2007, Adif signed a framework collaboration agreement on Environmental Management and Sustainable Mobility, which is still in effect. This agreement acknowledges the need to properly manage various environmental aspects related to the interaction between infrastructure and railway operations.

Since its separation from Adif, Adif-Alta Velocidad has upheld the commitments made under this agreement.

The purpose of the Agreement is to define the basis for collaboration between Renfe Operadora an Adif and Adif-Alta Velocidad in environmental management and the promotion of sustainable mobility:

- Establishing a framework for cooperation between companies.
- Developing environmental management actions related to the interrelationship between railway infrastructure and operation.
- Facilitating the exchange of information and experiences to achieve the proposed objectives.
- To establish the objectives, define the terms and conditions of the Agreement, and coordinate and implement the resulting actions, a Joint Monitoring Committee has been set up.

The Collaboration Agreement on soil decontamination, formalized in October 2008 and still in effect, is notable for its economic significance and the importance of its content. Likewise, positive and relevant contributions have been made in the rest of the actions which, given their specific nature, require additional information to be approved and implemented.

4. ENERGY AND EMISSIONS

4. ENERGY AND EMISSIONS

ENERGY CONSUMPTION

Energy consumption in Adif's own activities

302-1

The main source of energy consumption in Adif-Alta Velocidad's operations is electricity from the mainland Spain Electricity System, which accounted for 93.9% of the total energy consumed in 2023.

According to the Inventory of Fixed Assets available as of 31 December 2023, Adif-Alta Velocidad has assigned a Talgo High-Speed electric traction set for testing and measurement work on high-speed infrastructure, as well as two diesel self-propelled trains, all of which are owned by Adif.

Other, less significant energy consumptions were also recorded: natural gas (2.6%) used for hot water production and heating; diesel B (3.3%) used in track maintenance equipment and workshop operations; and diesel A and gasoline (0.2%) used in vehicles.

Additionally, Adif-Alta Velocidad continues to develop solar energy initiatives.

Table 2. Energy and fuel consumption recorded in Adif-Alta Velocidad's activities

Type of energy	2017	2018	2019	2020	2021	2022	2023
Electrical power (kWh/year)	**147,655,608**	**158,552,298**	**162,045,501**	**154,047,271**	**153,298,309**	**181,283,190**	**200,474,421**
Uses Traction (UT)	60,648,958	70,663,199	74,193,925	72,652,432	73,597,366	64,030,746	68,736,254
Uses Other than Traction (UOT)	87,006,650	87,889,099	87,851,576	81,394,839	79,700,943	117,252,444	131,738,167
Diesel (l/year)	**804,349**	**751,983**	**804,176**	**701,366**	**735,052**	**785,318**	**731,545**
Diesel A Automotive	36,247	34,030	39,346	19,652	22,028	13,013*	9,922
Diesel B Rail Maintenance	739,688	238,095	281,829	199,022	232,008	289,477*	222,452
Diesel B Railway yards shunting	0	471,853	483,001	482,692	481,016	482,828*	499,171
Diesel C Heating	28,414	8,005	0	0	0	0*	0
Petrol (l/year)	**25**	**5,626**	**11,421**	**17,511**	**21,199**	**27,083**	**30,698**
Natural Gas (m^3/year)	**1,063,722***	**937,835***	**1,004,710***	**900,462***	**940,798**	**841,855**	**526,105**

** Data revised in relation to the 2022 Environmental Report.*

Source: Adif-Alta Velocidad, Corporate Strategic Planning and Projects Department, Business Strategy Department, Corporate Responsibility, Sustainability, and Brand Sub-Department

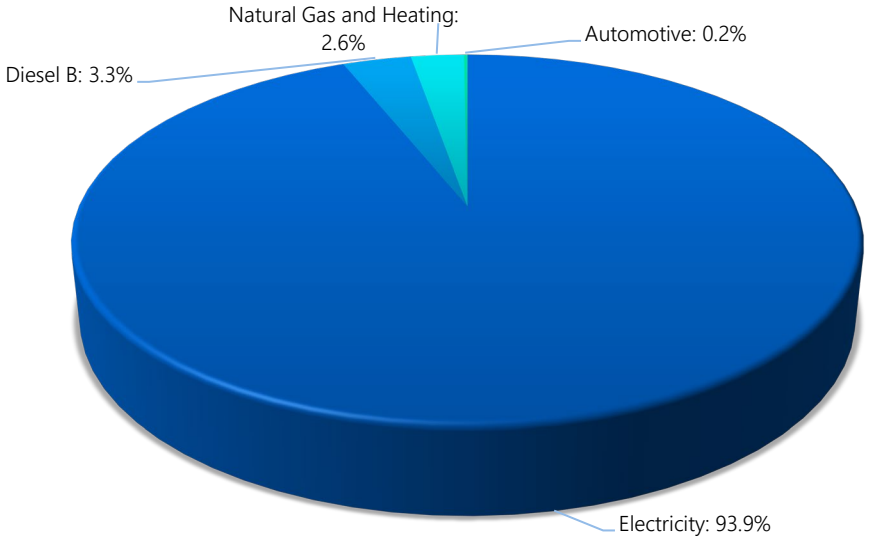
Table 3. Energy and fuel consumption recorded in our own activities (TJ/year)

Type of energy	2017	2018	2019	2020	2021	2022	2023
Electrical Power (TJ/year)	**531.56**	**570.79**	**583.36**	**554.57**	**551.87**	**652.62**	**721.71**
Uses Traction (UT)	218.34	254.39	267.10	261.55	264.95	230.51	247.45
Uses Other than Traction (UOT)	313.22	316.40	316.27	293.02	286.92	422.11	474.26
Diesel fuel (TJ/year)	**28.60**	**26.73**	**28.59***	**24.93**	**26.13**	**27.92**	**26.01**
Diesel A Automotive	1.29	1.21	1.40	0.70	0.78	0.46*	0.35
Diesel B Rail Maintenance	26.30	8.46	10.02	7.08	8.25	10.29*	7.91
Diesel B Railway yards shunting	0.00	16.77	17.17	17.16	17.10	17.16*	17.75
Diesel C Heating	1.01	0.28	0.00	0.00	0.00	0.00*	0.00
Petrol (TJ/year)	**0.001**	**0.183**	**0.371**	**0.568***	**0.688**	**0.879**	**0.996**
Natural Gas (TJ/year)	**40.67**	**35.85**	**38.40**	**34.12**	**35.54**	**31.81**	**19.80**
Total	**600.82**	**633.56**	**650.72**	**614.19**	**614.24**	**713.22**	**768.51**

** Data revised in relation to the 2022 Environmental Report.*

Source: Adif-Alta Velocidad, Corporate Strategic Planning and Projects Department, Business Strategy Department, Corporate Responsibility, Sustainability, and Brand Sub-Department.

Chart 6. Distribution of energy consumption recorded in Adif-Alta Velocidad in the year 2023 (% of total amount of energy consumed)



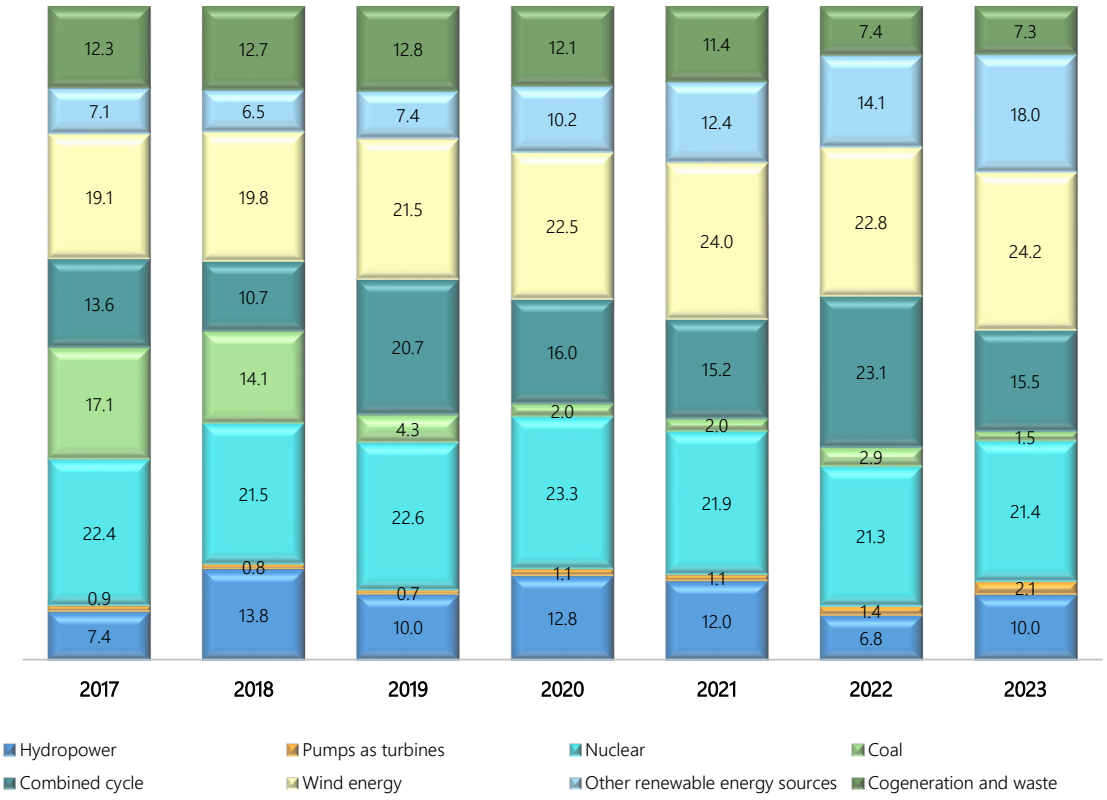
Origin of the energy in the Spanish Peninsular Electricity System

The electricity used is sourced from the Spanish Peninsular Electricity System, which in 2023 primarily derived from wind generation (24.2%), nuclear power (21.4%), other renewable sources (18.0%), combined cycle plants (15.5%), hydroelectric sources (10.0%), cogeneration and waste (7.3%).

In 2023, hydro, wind and other renewable energy sources accounted for 52.2%, which is more than 30 percentage points higher than that of nuclear power.

The contribution of the different sources varies, primarily influenced by weather conditions and the output of existing hydropower facilities.

Chart 7. Power generation scheme in the Spanish Peninsular Electricity System (%) *



** Data for 2022 was updated in relation to the 2022 Environmental Report*

Source: Red Eléctrica, Electricity System Data, 2024.

Primary energy consumption

302-2

The primary indirect energy consumption at Adif-Alta Velocidad mainly comes from recorded electricity usage.

In 2023, indirect primary energy consumed from non-renewable sources accounted for 1,410.22 TJ, compared to 298.79 TJ from renewable sources. These values have increased in both cases compared to the previous year.

It should be noted that, since 2019, Adif-Alta Velocidad has been purchasing green electricity, which, in other words, comes with a Renewable Guarantee of Origin Certificate (GoO). When applying international standards for calculating the carbon footprint, it is convenient to perform a double calculation. On the one hand, considering the electricity market where the energy is purchased, i.e. the purchase of energy with GoO. On the other hand, considering the primary energy associated with the electricity consumed according to the generation mix (in this case, the Spanish peninsular electricity mix).

Therefore, under this assumption, the following table presents the indirect consumption from final electricity use by each type of primary energy source for the period 2017-2023:

Table 4. Indirect primary energy consumption which could be attributed to recorded electricity consumption (TJ/year)

	2017	2018	2019	2020	2021	2022	2023
Coal	267.49	263.86	80.22	39.89	41.84	66.45	44.54
Natural gas and fuel oil	-	-	-	-	0.00	0.00	0.00
Combined cycle	212.74	200.23	386.18	318.22	318.18	523.59	457.78
Nuclear	350.39	402.34	421.63	462.56	457.52	484.01	632.40
Cogeneration and non-renewable waste	193.97	233.92	238.80	240.45	238.39	168.52	215.03
Pumps as turbines	14.08	14.97	13.06	22.51	22.43	32.64	60.47
Fossil resources	**1,038.67**	**1,115.32**	**1,139.89**	**1,083.63**	**1,078.36**	**1,275.22**	**1,410.22**
Hydropower	48.32	81.32	61.93	64.55	56.61	42.16	57.14
Wind energy	124.73	116.68	133.14	113.27	113.25	141.18	138.55
Solar energy (photovoltaic and thermal)	35.26	28.29	35.30	41.01	48.17	74.14	93.37
Other renewable energy sources	11.75	10.02	11.15	10.75	10.45	12.71	9.73
Renewable energy sources	**220.07**	**236.31**	**241.51**	**229.58**	**228.48**	**270.18**	**298.79**
Total	**1,258.73**	**1,351.63**	**1,381.41**	**1,313.22**	**1,306.84**	**1,545.40**	**1,709.01**

Source: Own preparation based on REE and Adif-Alta Velocidad, Corporate Strategic Planning and Projects Department, Business Strategy Department, Corporate Responsibility, Sustainability, and Brand Sub-Department

If the primary energy derived from electricity is added to the consumption of the other fuels, the total primary energy would be as follows:

Table 5. Total primary energy consumption (electricity + other fuels) (TJ/year)

	2017	2018	2019	2020	2021	2022	2023
Total primary energy	1,328.00	1,414.40	1,448.76	1,372.84	1,369.20	1,606.01	1,755.81

Source: Own preparation based on REE and Adif-Alta Velocidad, Corporate Strategic Planning and Projects Department, Business Strategy Department, Corporate Responsibility, Sustainability, and Brand Sub-Department

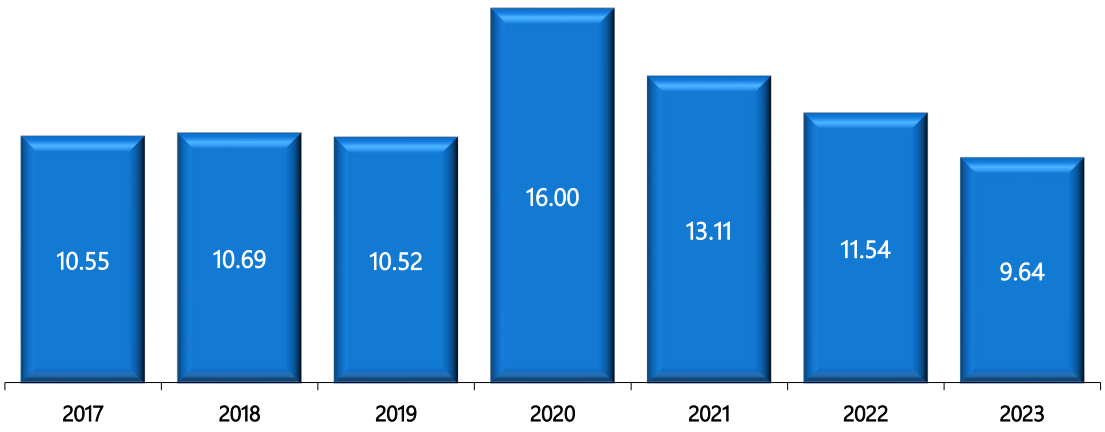
Final and primary energy intensity

302-3

The final and primary energy intensity – energy consumption (in MJ) per unit of production representing Adif-Alta Velocidad's activity (managed traffic in train-km) – are two indicators that measure not only the entity's energy management efficiency but also the dependency of energy consumption on activity growth.

In 2023, the final energy intensity was 9.64 MJ/train-km, which, despite a decrease (9.3%) compared to 2017, still reflects a very high energy dependency.

Chart 8. Final energy intensity (managed MJ/train-km)

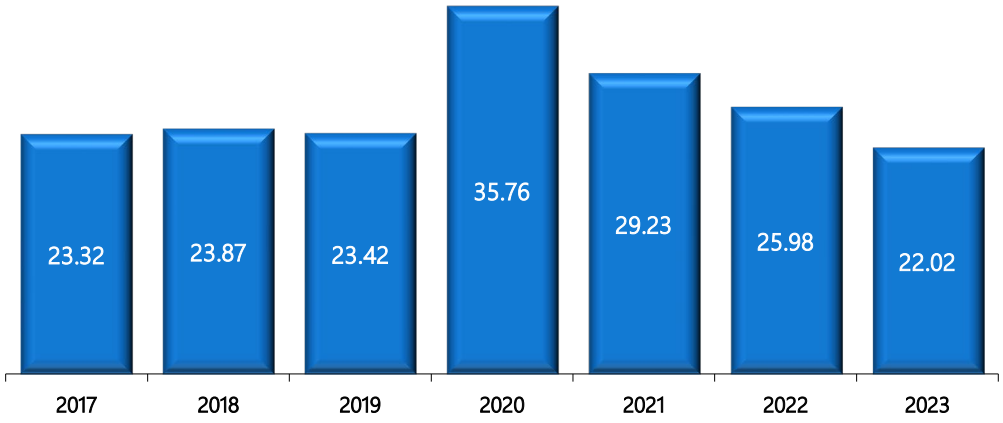


* Ratio between final energy consumption in Adif-Alta Velocidad's own activities and managed traffic in train-km.

Source: Adif-Alta Velocidad, Corporate Planning, Strategy and Project Management Department, Corporate Business Strategy Department, Corporate Responsibility, Sustainability and Branding Sub-department

In 2023, Adif-Alta Velocidad's primary energy intensity was 22.02 MJ/train-kilometre managed, which is 15.2% lower than the previous year.

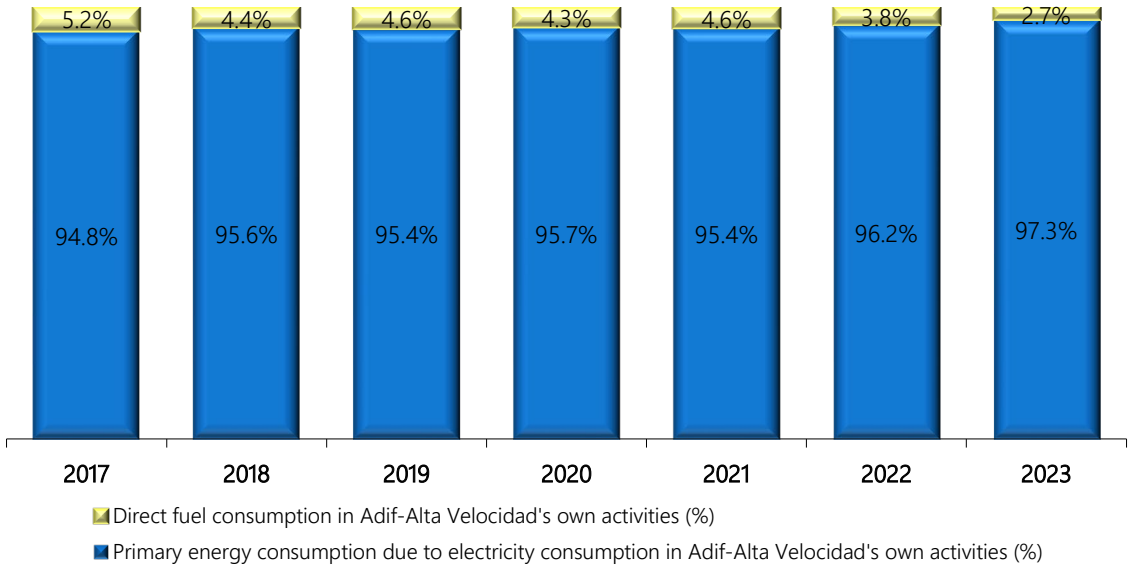
Chart 9. Primary energy intensity (managed MJ/train-km)



Source: Own preparation based on REE and data from Adif-Alta Velocidad, Corporate Strategic Planning and Projects Department, Business Strategy Department, Corporate Responsibility, Sustainability, and Brand Sub-Department

Primary energy intensity at Adif-Alta Velocidad is significantly influenced by the contribution of renewable energies to the electricity produced by the national grid. The primary energy consumption from electricity at Adif-Alta Velocidad was 97.3%, which is very similar to previous years. Dependence on electricity has remained relatively constant from 2017 to 2023.

Chart 10. Distribution of primary energy consumption in Adif-Alta Velocidad's own activities (% of total primary energy consumed)



Source: Own preparation based on REE and data from Adif-Alta Velocidad, Corporate Strategic Planning and Projects Department, Business Strategy Department, Corporate Responsibility, Sustainability, and Brand Sub-Department

CARBON FOOTPRINT

305-1 | 305-2 | 305-4

GHGs emissions to the atmosphere due to Adif-Alta Velocidad's own activities are related to:

- Indirect emissions originating in the generation of electrical energy, emissions which, in addition to consumption, depend on the generation scheme of the peninsular electricity system.
- Direct emissions from oil and natural gas boilers.
- Direct emissions from traction motor equipment and machinery used in rail maintenance, shunting, and auxiliary operations.
- Direct emissions from the road vehicle fleet used.

These emissions are tracked by calculating the carbon footprint, which provides information on GHG emissions associated with an organisation's activities. These emissions are categorized into two scopes:

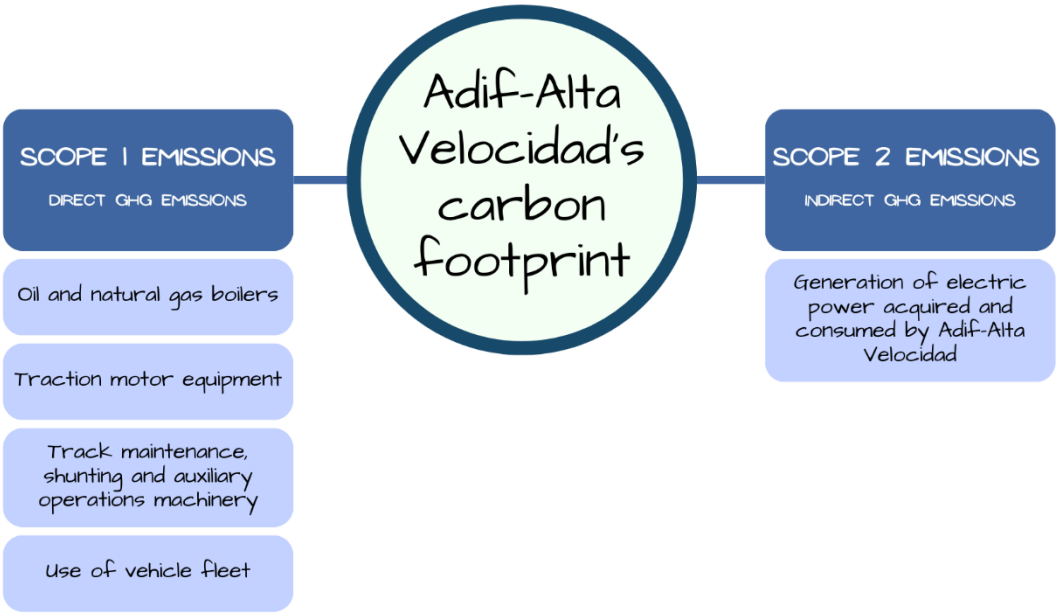


Figure 8. List of activities generating Scope 1 and 2 emissions.

Table 6. GHG emissions to the atmosphere derived from Adif-Alta Velocidad's own activities (t/year)

Compound	2017	2018	2019	2020	2021	2022*	2023
Indirect emissions due to registered electricity consumption (Scope 2) (a)							
Carbon dioxide (CO_2)	38,095.15	34,648.43	27,547.74	-	-	-	-
Methane (CH_4)	1.42	1.29	1.28	-	-	-	-
Nitrous oxide (N_2O)	0.00	0.00	0.00	-	-	-	-
CO_2-equivalent (CO_{2eq})	38,135.11	34,684.49	27,583.74	19,040.24	18,089.20	25,923.50	20,047.44
Direct emissions from combustion plants (oil and natural gas boilers) (Scope 1) (b)							
Carbon dioxide (CO_2)	2,374.61	2,044.69	2,165.42	1,923.90	1,796.91	-	-
Methane (CH_4)	0.04	0.04	0.04	0.03	0.04	-	-
Nitrous oxide (N_2O)	0.00	0.00	0.00	0.00	0.00	-	-
CO_2-equivalent (CO_{2eq})	2,377.07	2,046.72	2,167.51	1,925.76	1,798.85	1,607.93	1,000.98
Direct emissions from rail maintenance, shunting and ancillary operations (Scope 1) (c)							
Carbon dioxide (CO_2)	1,864.01	1,789.07	1,927.37	1,717.92	1,915.18	-	-
Methane (CH_4)	0.11	0.10	0.11	0.10	0.11	-	-
Nitrous oxide (N_2O)	0.01	0.01	0.02	0.01	0.01	-	-
CO_2-equivalent (CO_{2eq})	1,870.99	1,795.76	1,934.58	1,724.34	1,921.90	2,105.30	1,954.88
Direct emissions from vehicles used (Scope 1) (d)							
Carbon dioxide (CO_2)	91.40	98.02	124.05	87.70	148.72	-	-
Methane (CH_4)	0.00	0.00	0.01	0.01	0.01	-	-
Nitrous oxide (N_2O)	0.00	0.00	0.00	0.00	0.00	-	-
CO_2-equivalent (CO_{2eq})	92.09	99.01	125.48	89.11	150.40	118.66	100.83
Total emissions from Adif's own activities							
Carbon dioxide (CO_2)	42,425.16	38,580.22	31,764.57	-	-	-	
Methane (CH_4)	1.58	1.43	1.44	-	-	-	
Nitrous oxide (N_2O)	0.02	0.02	0.02	-	-	-	
CO2-equivalent (CO_{2eq})	42,475.25	38,625.98	31,811.32	22,779.47	21,960.36	29,755.39	23,104.13
Scope 1 emissions							
CO_2-equivalent (CO_{2eq})	4,340.15	3,941.49	4,227.58	3,739.22	3,871.16	3,831.90	3,056.69
Scope 2 emissions							
CO_2-equivalent (CO_{2eq})	38,135.11	34,684.49	27,583.74	19,040.24	18,089.20	25,923.50	20,047.44

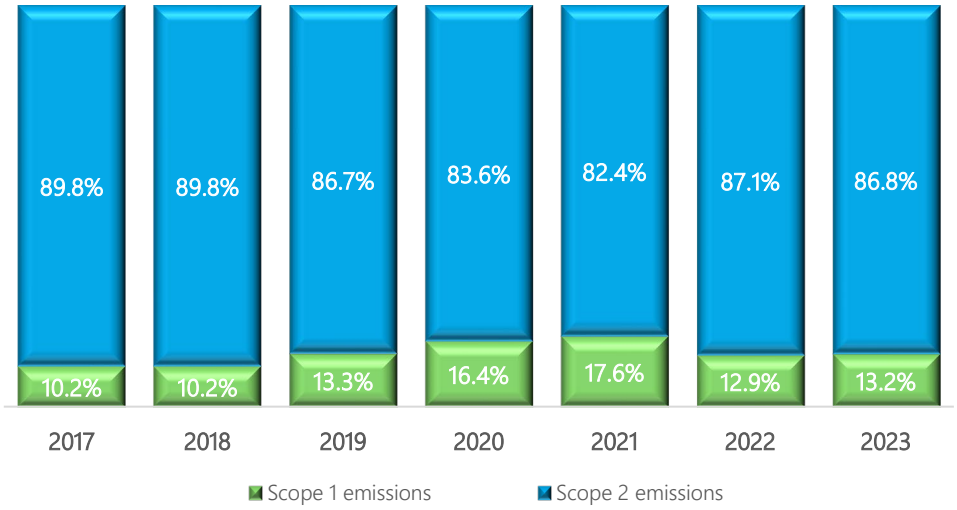
** Data revised in relation to the 2022 Environmental Report.*

Source: Adif-Alta Velocidad, Corporate Planning, Strategy and Project Management Department, Corporate Business Strategy Department, Corporate Responsibility, Sustainability and Branding Sub-department

In calculating GHG emissions CO_2, CH_4 and N_2O, emissions have been considered, using the following equivalences: 1 for CO_2, 28 for CH4 and 265 for N2O. Equivalences used in the IPCC Fifth Assessment Report.

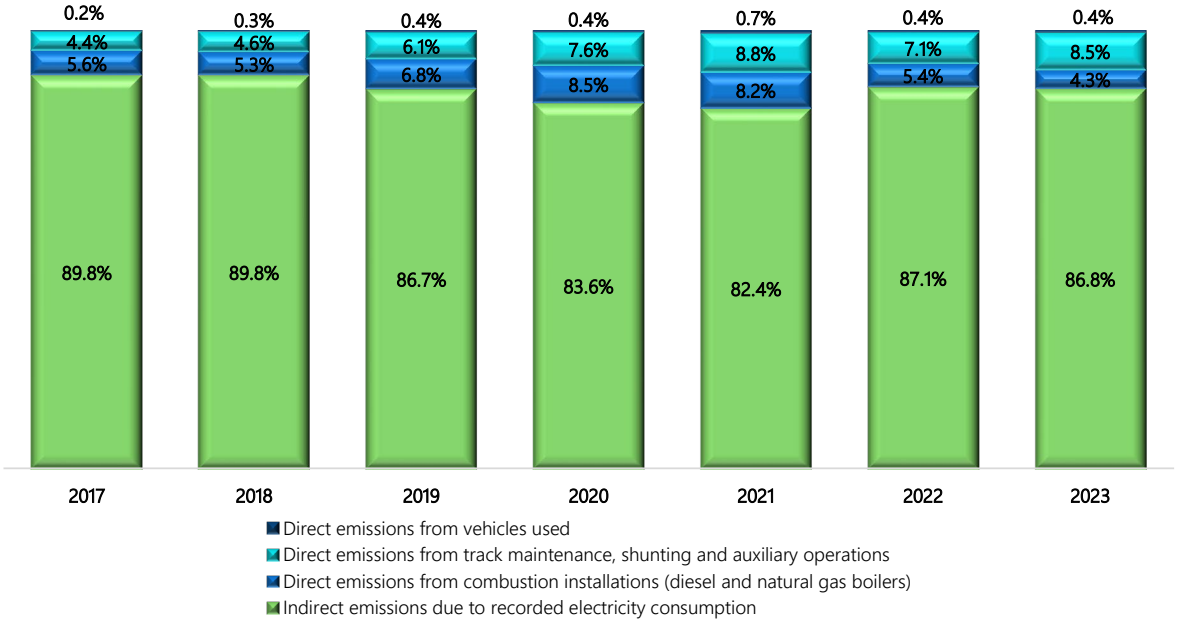
Adif-Alta Velocidad's Carbon Footprint decreased by over 22.3% in 2023 compared to the previous year

Chart 11. Scope 1 and 2 emissions of total GHG emissions (%)



Within Scope 1, the largest direct GHG emitters in 2023 were track maintenance, shunting, and auxiliary operations, followed by combustion installations.

Chart 12. Contribution of different sources to GHG emissions (%)



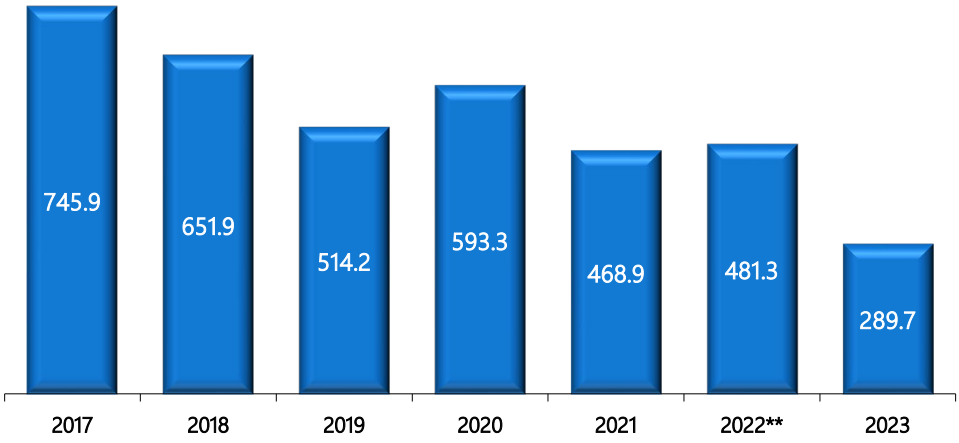
The intensity of GHG emissions (in t of CO_{2eq}/million managed train-km) from our activities is an indicator that measures how dependent the company's growth is on GHG emissions. It also reflects the energy and environmental efficiency of the operations performed.

In the specific case of Adif-Alta Velocidad's case, with GHG emissions from electricity consumption contributing 86.8%, this is also related to the reliance on fossil fuels in the generation structure of the mainland electricity sector.

Between 2017 and 2023, Adif-Alta Velocidad's GHG emissions intensity has been reduced by 61.2%

The reduction in GHG emissions intensity is due to both a decrease in emissions and an increase in traffic handled by the entity.

Chart 13. GHG emissions intensity (t CO2-eq/million train-km managed) *



** Ratio between total GHG emissions due to Adif-Alta Velocidad's own activities (including indirect emissions due to recorded electricity consumption) and managed traffic train-km*

*** Data revised in relation to the 2022 Environmental Report.*

Source: Adif-Alta Velocidad, Corporate Planning, Strategy and Project Management Department, Corporate Business Strategy Department, Corporate Responsibility, Sustainability and Branding Sub-department.

Since 2019, Adif-Alta Velocidad has committed to purchasing Green Energy with Guarantees of Origin (GoO) for all the electricity consumed in the rail system, ensuring that 100% of the greenhouse gas (GHG) emissions associated with electricity consumption are effectively considered null (according to the electricity market).

The Guarantee of Origin (GoO) is an electronic certification issued by the National Commission for Markets and Competition that confirms the energy comes from renewable sources

OTHER AIR EMISSIONS

305-7

Emissions of acidifying substances, ozone precursors, and particulate matter into the atmosphere from Adif-Alta Velocidad's activities have the same sources as GHG emissions

Table 7. Emissions to the atmosphere derived from Adif-Alta Velocidad's own activities (t/year)

Compound	2017	2018	2019	2020	2021	2022*	2023
Indirect emissions due to registered electricity consumption (a)							
Carbon monoxide (CO)	18.60	17.72	14.30	15.06	15.83*	21.25*	17.06
Non-methane volatile organic compounds (NMVOCs)	2.78	3.00	3.13	3.37	3.73	4.28*	3.44
Nitrogen oxides NO_x (as NO_2)	65.28	52.97	43.47	33.14*	31.16*	37.12*	29.80
Sulphur oxides SO_x (as SO_2)	50.04	39.39	18.04	7.84	5.46	6.64*	5.33
$PM_{2.5}$	2.49	2.18	1.76	1.75	1.81*	2.11*	1.70
PM_{10}	3.33	2.92	2.22	2.24	2.29*	2.68*	2.15
TSP	4.33	3.83	2.93	3.10	3.18*	3.70*	2.97
Direct emissions from combustion plants (oil and natural gas boilers) (b)							
Carbon monoxide (CO)	1.27	1.07	1.11	0.99	1.03	2.52	2.22
Non-methane volatile organic compounds (NMVOCs)	0.96	0.83	0.88	0.78	0.82	1.07	0.81
Nitrogen oxides NO_x (as NO_2)	3.32	2.74	2.84	2.52	2.63	7.61	6.90
Sulphur oxides SO_x (as SO_2)	0.07	0.04	0.03	0.02	0.02	0.82	0.84
$PM_{2.5}$	0.05	0.03	0.03	0.03	0.03	0.33	0.33
PM_{10}	0.05	0.03	0.03	0.03	0.03	0.39	0.39
TSP	0.05	0.03	0.03	0.03	0.03	0.39	0.39
Direct emissions from rail maintenance, shunting, and auxiliary operations (c)							
Carbon monoxide (CO)	6.73	6.46	6.96	6.20	6.48	7.02*	6.56
Non-methane volatile organic compounds (NMVOCs)	2.92	2.81	3.02	2.69	2.82	3.05*	2.85
Nitrogen oxides NO_x (as NO_2)	32.95	31.62	34.07	30.36	31.76	34.40*	32.14
Sulphur oxides SO_x (as SO_2)	0.01	0.01	0.01	0.01	0.01	0.01*	0.01
$PM_{2.5}$	0.86	0.83	0.89	0.79	0.83	0.90*	0.84
PM_{10}	0.91	0.87	0.94	0.83	0.87	0.95*	0.88
TSP	0.96	0.92	0.99	0.88	0.92	1.00*	0.93
Direct emissions from vehicles used (d)							
Carbon monoxide (CO)	0.22	1.15	2.16	3.08	3.71	4.65	5.25
Non-methane volatile organic compounds (NMVOCs)	0.04	0.12	0.22	0.28	0.34	0.41	0.46
Nitrogen oxides NO_x (as NO_2)	0.46	0.54	0.71	0.58	0.68	0.68*	0.71
Sulphur oxides SO_x (as SO_2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$PM_{2.5}$	0.04	0.04	0.04	0.02	0.02	0.01	0.01
PM_{10}	0.04	0.04	0.04	0.02	0.02	0.01	0.01
TSP	0.04	0.04	0.04	0.02	0.02	0.01	0.01
Total emissions from Adif's own activities							
Carbon monoxide (CO)	**26.83**	**26.40**	**24.53**	**25.32**	27.06*	35.45*	**31.09**
Non-methane volatile organic compounds (NMVOCs)	**6.70**	**6.76**	**7.25**	**7.13**	**7.71**	8.83*	**7.57**
Nitrogen oxides NO_x (as NO_2)	**102.00**	**87.86**	**81.09**	66.61*	66.23*	79.81*	**69.55**
Sulphur oxides SO_x (as SO_2)	**50.13**	**39.44**	**18.08**	**7.88**	**5.49**	7.47*	**6.18**
$PM_{2.5}$	**3.44**	**3.08**	**2.73**	**2.59**	2.69*	3.36*	**2.88**
PM_{10}	**4.33**	**3.86**	**3.23**	**3.13**	3.22*	4.02*	**3.43**
TSP	**5.38**	**4.82**	**3.99**	**4.03**	4.16*	5.09*	**4.30**

In 2023, indirect emissions from generation plants related to electricity consumption in Adif-Alta Velocidad's own activities were the main sources of sulphur oxides (86.2%), particulate matter with a diameter of less than 2.5 microns (58.9%), carbon monoxide (54.9%), and non-methane volatile organic compounds (45.5%).

Direct emissions from track maintenance, shunting, and auxiliary operations at Adif-Alta Velocidad accounted for 46.2% of nitrogen oxide emissions in 2023.

5. SUSTAINABLE USE OF RESOURCES AND CIRCULAR ECONOMY

5. SUSTAINABLE USE OF RESOURCES AND CIRCULAR ECONOMY

CONSUMPTION

Adif-Alta Velocidad periodically calculates indicators related to its consumption of railway material, water, energy, and fuels.

Consumption of railway materials

3-3 | 301-1

The main material consumption at Adif-Alta Velocidad is railway materials (such as sleepers, rail, and ballast) used in infrastructure maintenance operations.

Ballast, with a consumption of 255,012 t in 2023, accounted for 96.7% of the railway material used in infrastructure maintenance. It is sourced from quarries approved by Adif-Alta Velocidad that have the necessary Environmental Impact Studies and Restoration Plans.

Chart 14. Distribution of material consumption in infrastructure maintenance activities. Year 2023 (%)

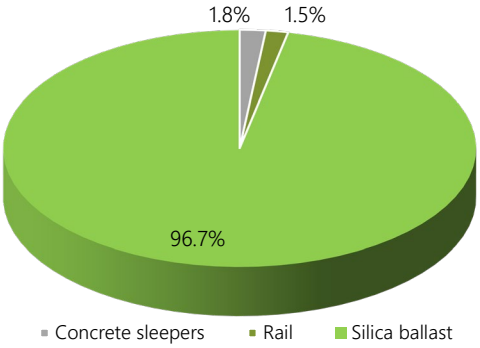


Table 8. Consumption of railway equipment in infrastructure maintenance operations *, **

	2014	2015	2016	2017	2018	2019	2020	2022	2023
Wooden sleepers									
Total (units)	-	24	-	-	-	-	-	81	0
Total (t)	-	1	-	-	-	-	-	5	0
Concrete sleepers									
Bi-block	-	400	-	72	554		9,360	-	4,209
Monoblock	99,938		-			66,621	45,372	101,100	12,737
Total (units)	99,938	400	-	72	554	66,621	54,732	101,100	16,946
Total (t)	29,981	100	-	18	139	19,986	15,484	30,330	4,663
Rail									
Rail 60 kg (m)	60,733	1,679	503	1,756	1,771	34,949	7,150	22,969	66,701
Rail 54 kg (m)			-			1,062	11,898	4,350	-
Rail 45 kg (m)			-				-	-	-
Total (m)	60,733	1,679	503	1,756	1,771	36,011	19,048	27,319	66,701
Total (t)	3,657	89	30	93	94	2,162	1,082	1,621	4,016
Silica ballast									
Total (m^3)	97,353	50,196	60,861	45,557	52,274	80,474	16,317	96,185	170,008
Total (t)	150,897	77,804	94,334	70,613	81,025	124,734	25,291	144,277	255,012
Total (t/year)	**184,535**	**77,995**	**94,364**	**70,725**	**81,257**	**146,883**	**41,857**	**176,233**	**263,691**

** No consolidated data for the year 2021.*

** Data revised in relation to the 2022 Environmental Report.*

Source Adif, Corporate Conservation and Maintenance Department, Technical Sub-Department, Operations and Stores Department; Adif, Rail Area Management, Infrastructure and Rail Deputy Sub-Department, Technical Sub-Department.

The construction of new railway infrastructure also involves significant consumption of railway equipment, with quantities varying widely depending on the construction phase.

Table 9. Rail consumption recorded during the construction of new high-speed lines (HSLs)

	2017	2018	2019	2020	2021	2022	2023
Rail (t)	11,815	21,638	45,824	26,049	6,327	4,550	12,492
Monoblock sleepers (units)	91,181	213,324	219,118	106,129	40,969	71,128	77,472
Bi-block sleepers (units)	0	2,137	236,703	4,485	25,731	1,728	33,121
Ballast (t)	416,773	638,051	728,806	453,026	67,444	204,828	244,599
Total (t)	**455,942**	**723,686**	**887,706**	**511,811**	**91,208**	**231,062**	**286,957**

Source: Adif-Alta Velocidad, Corporate Technical Planning Sub-Department for Rail Assembly and Supplies

Consumption of hazardous substances

Substances that deplete the ozone layer

305-6

Chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs), which are regulated under Regulation 1005/2009 on substances that deplete the ozone layer, are used in existing stationary air conditioning and refrigeration equipment and systems.

Adif-Alta Velocidad has inventoried a total of fifteen (15) pieces of equipment in the stations managed by the Passenger Stations Sub-Department.

The use of such equipment is still permitted, albeit with some limitations. Equipment cannot be recharged with new CFCs and HCFCs. Regenerated or recycled HCFCs cannot be used for the maintenance or servicing of these equipment since 31 December 2014. HCFCs in air-conditioning and refrigeration equipment should be recovered during maintenance and servicing, or before dismantling, disposal, destruction, recycling, or reclamation.

Table 10. Inventory of equipment containing HCFCs as of 31 December 2023*

Sub-Department of Passenger Stations	Stations	Equipment containing HCFCs (no.)	HCFC load (kg)
North-west	-	-	-
West	-	-	-
North	-	-	-
North-east	1	1	6
East	-	-	-
Centre	-	-	-
South-west	-	-	-
South	1	14	46.82
Total	**2**	**15**	**52.82**

*Inventory corresponding to all stations managed by the Stations Sub-directorate.

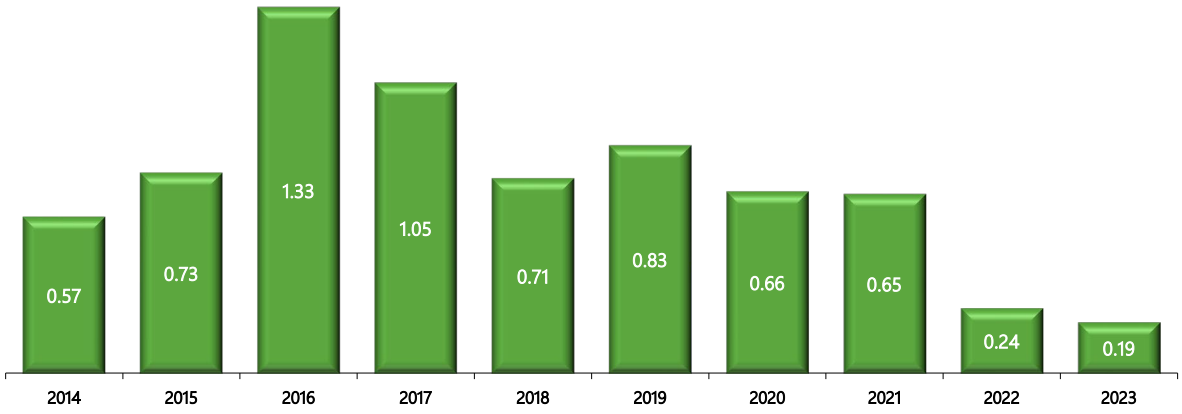
Source: Adif, Corporate Safety, Processes, and Corporate Systems Department, Quality and Environment Division.

Herbicide consumption

To prevent the growth of herbaceous plants that could affect traffic safety and to reduce the risk of fires along the tracksides, herbicide treatments are carried out periodically. These treatments are applied using automated irrigation systems on the tracks and in stations, as well as with autonomous mobile equipment in stations and other areas.

In the past year at Adif-Alta Velocidad, while the surface area treated with herbicides on railway surfaces has increased compared to the previous year, the total amount of herbicides used has decreased.

Chart 15. Herbicide application rate on railway surfaces (application unit/m^2) *, **



* Unit = (l+kg)/10^3

Source: Adif, Corporate Conservation and Maintenance Department, Technical Department, Resource Sub-Department; Adif, Corporate Conservation and Maintenance Department, Maintenance Department; Adif-Alta Velocidad, Technical Planning for Track Installation and Supplies Sub-Department.

Table 11. Herbicide-treated railway surfaces (m^2) *, **

Type of surface	2014*	2015	2016**	2017	2018	2019	2020	2021	2022	2023
Track treatments	87,925,130	32,679,575	-	87,925,130	89,538,105	79,163,964	103,156,909	107,341,400	98,881,146	110,250,284
Station and other surface treatments	4,245,283	10,585	-	3,491,733	4,399,212	4,250,712	5,717,633	6,432,958	7,211,683	9,018,634
Total	**92,170,413**	**32,690,160**	**53,553,303**	**91,416,863**	**93,937,317**	**83,414,676**	**108,874,542**	**113,774,358**	**106,092,829**	**119,268,918**

* These data only include the areas treated by the herbicide applicator in that year (SINTRA).

** No separate information is available for track treatment versus the treatment of stations and other surfaces.

Source: Adif, Corporate Conservation and Maintenance Department, Technical Department, Resource Sub-Department; Adif, Corporate Conservation and Maintenance Department, Maintenance Department; Adif-Alta Velocidad, Technical Planning for Track Installation and Supplies Sub-Department

Table 12. Products used in herbicide treatments of railway surfaces *

Product type	2014	2015	2016	2017	2018	2019	2020	2021*	2022	2023
Liquid products (l)	51,173	23,636	71,038	88,548	64,352	63,990	71,807	-	23,984	20,549
Solid products (kg)	1,203	136	0	7,770	2,102	4,969	42	-	1,194	1,662
Total (l+kg)	**52,376**	**23,772**	**71,038**	**96,318**	**66,454**	**68,959**	**71,849**	**74,002**	**25,178**	**22,212**

* No differentiated information between liquid and solid products is available.

Source: Adif, Corporate Conservation and Maintenance Department, Technical Department, Resource Sub-Department; Adif, Corporate Conservation and Maintenance Department, Maintenance Department; Adif-Alta Velocidad, Technical Planning for Track Installation and Supplies Sub-Department

Water consumption

303-1 | 303-5

The main water consumption in Adif-Alta Velocidad's activities is for sanitary purposes and facility cleaning. This water is primarily sourced from public water supply networks.

In addition, there is relatively minor consumption from wells, for which no quantitative information is available.

In 2023, **Adif-Alta Velocidad**'s annual water consumption from public networks was equivalent to the amount used in one year by the households of a town with 199 residents, similar to Pinilla del Valle (Madrid).

Adif-Alta Velocidad's annual water consumption accounts for 0.0014% of the volume of water lost due to leaks or breaks in public distribution networks across Spain.

Table 13. Consumption of mains water in Adif-Alta Velocidad's own activities *, **

	2014	2015*	2016	2017	2018	2019	2020	2021	2022*	2023
Water consumption (m^3)	81,676	115,224	109,472	150,234	32,698	24,808	15,697	15,422	12,379	9,648

* Calculated from turnover and based on the average water prices in Spain from the INE (National Statistics Institute) series 2000-2014, 2016, 2018 and 2020. For the years 2015, 2017, 2019, 2021, 2022 and 2023 the average prices of 1.81, 1.96, 2.11, 2.25, 2.33 and 2.40 €/m^3 have been estimated based on the trend of the series 2000-2014, 2016, 2018 and 2020.

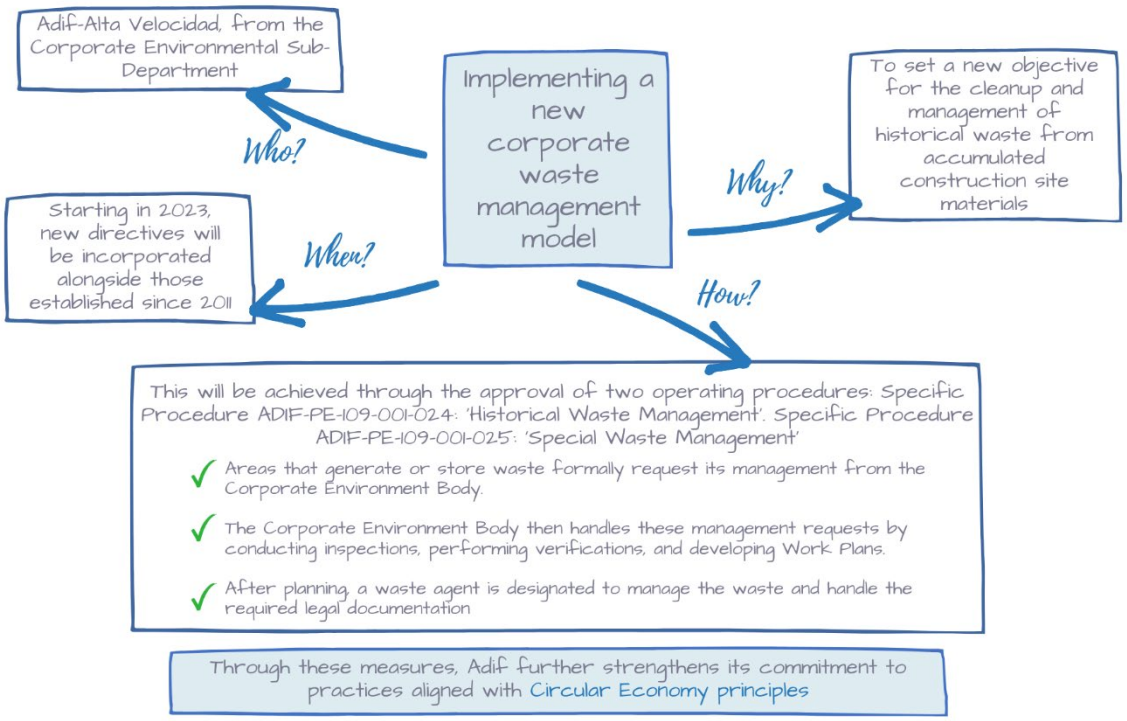
** From 2018 onwards, a reallocation of assets has altered the accounting for water consumption.

Source: Adif, Corporate Finance and Management Control Department, Economic Management and Financing Department, Sub-department of Fees and Tax Relations

WASTE

3-3 | 306-1 | 306-2 | 306-3 | 306-4 | 306-5

Adif carries out the activities related to the 'Comprehensive management of maintenance of operating lines owned by Adif-Alta Velocidad' and the 'Comprehensive management of stations assigned to Adif-Alta Velocidad' based on the 'Management delegation agreement between Adif-Alta Velocidad and *Administrador de Infraestructuras Ferroviarias* (Adif), in which Adif is entrusted with the management responsibilities. Adif oversees the execution of material or technical activities as approved by the Resolution of 10 January 2020, issued by the Presidency of Adif-Alta Velocidad.



Therefore, waste-producing activities related to the maintenance of infrastructure owned by Adif-Alta Velocidad are managed by Adif. No waste management activities by Adif-Alta Velocidad were recorded in 2023. Adif, however, manages waste according to a set of criteria based on a management model aligned with the principles of the Circular Economy:

- In all Adif projects, actions, services, and supplies consider reuse criteria for any surplus materials from the planning and definition phase onward. To this end, the organisation has internal procedures to ensure that reuse is carried out in accordance with current legislation, thereby minimising the risks associates with the improper use of railway materials beyond their intended purpose.
- Construction sites that generate construction and demolition waste (CDW) are typically managed by external contractors, who are responsible for removing the waste during the construction process. To ensure proper management, compliance with the environmental clauses included in the contracts is monitored.
- As of 2023, Adif's corporate waste management model has been expanded beyond the Corporate Environment Sub-Department, which had been handling hazardous waste since 2011. The new model now includes assignments for a Waste Agent, enabling it to address the complex task of cleaning up and managing both historical waste and third-party dumping through authorized waste managers.
- This new waste management model also aims to prevent unnecessary stockpiling and to reduce environmental and safety risks. It requires that all waste generated from actions carried out under third-party contacts be managed by the contracting companies within the scope of these actions.

Commercial and municipal-like waste, which is primarily generated at Adif-Alta Velocidad's stations, logistics centres, and administrative

buildings, is managed either by public cleaning or waste collection services or by waste managers authorized by the regional governments.

For the collection of this waste, a total of 296,842 euros was paid in 2023 in waste collection fees, which were passed on to Adif-Alta Velocidad.

Table 14. Fees paid for waste collection (€/year)

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Fees paid	219,145	118,212	234,752	276,727	260,604	260,006	254,080	244,068	277,786	296,842

Source: Adif, Corporate Finance and Management Control Department, Corporate Economic Management and Financing Department.

ACTIONS IN THE CIRCULAR ECONOMY

3-3 | 306-2

Adif Alta Velocidad's collaboration in the Spanish Circular Economy Strategy

Adif and Adif-Alta Velocidad have collaborated on the development of the Spanish Circular Economy Strategy 2030 prepared by the Ministry for Ecological Transition and the Demographic Challenge and approved by the Council of Ministers in June 2020.

They have also contributed to the development of the 1st Circular Economy Action Plan 2021-2023, which is part of this strategy, by providing six initiatives in the following areas: Consumption, Waste Management, Secondary Raw Materials Market, and Employment and Training.

The projects that were finally selected to be part of the Action Plan are:

- ***Ecomilla*** **Project, a commitment to sustainable mobility in urban environments.**

The aim is to create spaces in railway stations that promote sustainable urban intermodality. The consultancy exercise is ongoing until April 2024, during which work is being done to establish the foundations of the *Ecomilla* model, which will be implemented uniformly across all stations.

At the same time, 42 secure bicycle racks are being installed at Adif and Adif-Alta Velocidad stations, allowing passengers to travel safely from their starting point to the station using a zero-emission means of transport.

The supply, installation, operation, and maintenance of more than 1,000 electric vehicle charging points, powered by renewable energy, across the car parks of 80 Adif and Adif-Alta Velocidad passenger stations has recently been awarded.

- **Creating a catalogue of environmental criteria for the procurement of railway infrastructure**

To facilitate the inclusion of good environmental practices in public procurement processes and in line with the changes introduced by the new Public Sector Contracts Act, work is being conducted to prepare a catalogue of environmental criteria. This catalogue will address aspects such as lower environmental impact, savings and efficient use of water, energy, and materials, environmental life cycle costs, waste generation and management, the use of recycled or reused materials or ecological materials, increased use of renewable energy, and reductions in GHG emissions, carbon footprint. These criteria will be applied during the different phases of the public procurement process.

To this end, a working group has been established to define and review the environmental clauses of the catalogue and to prepare a guide for its use. During 2023, the drafting and technical validation of the Catalogue of Clauses and the Guide to the Use have been completed. It is only pending approval by the Legal Department. Once it is in use, it will be

monitored and updated based on the identified needs.

» The Catalogue outlines clauses by contract type (cross-cutting, services, supplies, projects, and works), categorised into four types: technical solvency and award criteria for the contractor selection phase, and technical specifications and special conditions of execution for the contract execution phase

- **Comprehensive programme for the social recovery of disused railway assets, creating value through entrepreneurial ventures or public service projects**

The aim of the programme is to encourage the reuse of these assets and buildings, integrating them back into the productive cycle.

» 23 properties that have been repossessed and leased under this programme

During the works execution phase[4], **Adif-Alta Velocidad** engages in this Action Plan through two main areas within the 'Waste Management' axis. It develops a series of indicators to measure its contribution to the Plan's objectives, with the results summarised below:

- **Efficient management of surplus land from railway infrastructure works to promote the environmental recovery of degraded areas or its reuse in other projects**

» In 2023, 12.49% of the earth and rocks brought to the site came from the recovery of surplus material from other projects.

» 36.90% of the clean earth and rocks leftover from the works are reused in other projects or in the restoration of degraded areas.

- **Measures to increase the reuse of topsoil on construction sites for restoration and landscape integration resulting from railway works**
- **Promoting the use of sustainable materials and management techniques in railway stations**

Station architecture projects will be encouraged to use sustainably managed materials and

» In 94.93% of the area to be occupied, topsoil is recovered and stockpiled

» 94.91% of the topsoil is properly conserved

» In 92.95% of the area to be restored, topsoil has been spread beforehand

techniques, based on the following requirements: the use of local materials, recycled materials, recyclable furniture and materials, and certification for any wood or forest products used.

» 11 projects have already been completed, with at least 10% of their material execution budget allocated to sustainable solutions

[4] Only sites with substantial surplus land are included.

Optimisation of Water Resources in Semi-Arid Environments Murcia-Almería High-Speed Line

As the Mediterranean High-Speed Corridor travels through the provinces of Murcia and Almería, it passes through areas increasingly impacted by climate change, particularly in terms of water scarcity. Adif-Alta Velocidad committed to achieving climate change adaptation and mitigation objectives and recognizing the need to balance both the execution of works and the subsequent operation of the line, adopts a range of practices to optimise the use of this valuable resource. This includes minimising consumption and promoting reuse wherever feasible.

An example of this is the Pulpí-Vera platform project. A concrete plant equipped with a Concrete Recycling Machine has been installed there.

Figure 9. Recycling machine at the Pulpí-Vera concrete plant.

These devices enable the complete recovery of water used in on-site concreting processes and the cleaning of channels, allowing it to be reused for concrete production. Similarly, they enable the complete recovery of aggregates from rejected or surplus concrete (circular economy) and the recovery of 100% of the waste generated (efficient management).

Thus, it is estimated that adopting this measure has saved approximately 50% of the water supply needed for the plant during the execution of this project. In addition, other measures are being adopted during the execution of the works, such as reusing water from groundwater upwelling in pile caps and rainwater collected in watertight structures and spaces. Its primary use is for irrigating roads and work areas where machinery operates, thus minimising potential dust effects on neighbouring areas.

Figure 10. Rainwater is collected in the pile cap of the Totana-Lorca viaduct.

Additionally, considering the subsequent operation phase, Adif-Alta Velocidad, committed to minimising its impact on biodiversity, designs and implements environmental integration measures that account for current climatic conditions. Therefore, the plantations include species that are climatically adapted to the area, particularly to the availability of water resources in these environments. This approach not only increases the success rate of the restorations but also reduces their water demand.

In this regard, it is worth highlighting the work done so far on the platform between Vera and Los Arejos. This has been achieved in coordination with the regional administration and in collaboration with the *Cátedra de Botánica* (Botany Department) of the University of Almería, focusing on ecological restoration to reconstruct the original ecosystem as faithfully as possible.

Figure 11.Translocation of the endemic species (*Salsola papillosa)* to the site in the Lorca-Pulpí section, conducted as part of the project.

Monitoring of compliance with circular economy objectives in ADIF-Alta Velocidad works outlined in the Recovery and Resilience Plan

The Regulation establishing the Recovery and Resilience Mechanism (RRM), a central element of the NEXT GENERATION EU Programme, stipulates that measures included in the Recovery and Resilience Plans must not cause significant harm to environmental objectives as defined in Article 17 of the Taxonomy Regulation.

The Spanish Recovery, Transformation, and Resilience Plan, approved in April 2021, includes investment of existing railway infrastructure and the construction of new lines under components 3 and 6.

In accordance with the Taxonomy Regulation, the actions included in the Recovery and Resilience Plan must ensure that the activities undertaken by Adif do not have a significant negative impact on the environmental objectives outlined in the Taxonomy Regulation, which include 'the transition to a circular economy, including waste prevention and recycling'.

To achieve this transition to a circular economy, the Recovery and Resilience Plan stipulates, among other measures, that at least 70% of the construction and demolition waste generated (by weight) -excluding soil and stone waste without hazardous substances- should be prepared for reuse, recycling, and recovery. This includes backfilling operations where waste is used to replace other materials.

To ensure compliance with this environmental objective, Adif-Alta Velocidad has developed a waste management monitoring system to identify actions that fall short of the 70% target, allowing for adjustments to meet the goal.

Monitoring begins before the construction starts with the analysis of the data from the project's Waste Management Study. Subsequently, at the start of the works, the data from the Waste Management Plan prepared by the contractor are analysed. Once the material execution of the work has begun, waste management monitoring sheets are prepared on a monthly basis to detect any deviations in the percentage of construction and demolition waste recovered. If deviations are detected, the necessary corrective measures are taken in order to achieve the objectives set.

The results of the monitoring of compliance with the 70% target value, obtained for Adif-Alta Velocidad's works as of December 2023, are summarised in the following table:

Table 15. Number of works monitored and the amount of CDW generated/valued

Status	Number of monitored works	Generated CDW (T)	Recovered CDW (T)	% of CDW recovery
Ongoing	77	373,357	371,842	99.59%
Completed	22	12,086	9,884	81.78%

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

On-site assessment of Construction and Demolition Waste (CDW) during the execution of the works. New Access Channel for Integrating the High-Speed Railway into the City of Valencia

In the first phase of this project, which involves most of the demolition work and thus generates the largest volume of CDW, stone waste has been recovered on-site using a mobile crushing plant.

This treatment produces a product that can be reused on-site, reducing the need for other natural resources. In general, the material obtained is used for constructing roads, building auxiliary facilities, and providing backfill.

In numbers, more than 32,000 t of waste have been recovered on site out of a total of nearly 38,000 t, representing approximately 84% of the CDW generated. The remaining waste, primarily non-stone material, has been sorted on site and sent to an external manager for treatment, with a focus on recovery.

Other projects are currently underway, primarily on the Murcia-Almería line, where similar treatments are being implemented. These include the underground works at La Estación, Barriomar, Nonduermas, Nonduermas-Sangonera, Sangonera-Totana, and Lorca-Pulpí.

6. POLLUTION PREVENTION

6. POLLUTION PREVENTION

DISCHARGING

3-3 | 303-2 | 303-4

The main discharges originating from Adif-Alta Velocidad's activities are sanitary wastewater from the public toilets in the stations.

At busy stations, sanitary wastewater is directed to public sewage networks for treatment at existing wastewater treatment plants.

Fees for sewerage, sanitation, and wastewater treatment amounted to €22,240.41 in 2023.

Table 16. Stations managed by Adif-Alta Velocidad as of 31 December 2023

Operational Sub-Department/Sub-Department	Adif - Alta Velocidad	Circulation and Capacity Management	Passenger Stations
Centre	0	1	4
North-west	0	3	7
South	0	0	7
East	0	0	4
North-east	1	0	5
North	0	0	3
Traffic Management for AV Lines	0	3	13
Total	**1**	**7**	**43**

Source: Adif, Corporate Traffic and Capacity Management Department, Corporate Coordination and Management Sub-Department.

Table 17. Treatment of discharges at Stations, as of 31 December 2023

Sub-department of Operations	No. of stations with sewage treatment system, septic tank, or connection to the public sewage system
Centre	7
North-west	9
South	9
East	10
North-east	7
North	4
Total	**46**

Source: Adif, Corporate Passenger Stations Department.

Table 18. Investments made by the Corporate Traffic and Capacity Management Department in wastewater treatment, septic tanks and/or connections to public sewerage networks (€/year)

Autonomous Community	2021	2022	2023
Andalusia	-	30,190.00	30,190.00
Valencian Community	9,997.77	-	
Castile-La Mancha	23,927.75	-	
Catalonia	-	107,350.12	
Galicia	5,192.92	-	
Total	**39,118.44**	**137,540.12**	**30,190.00**

Source: Adif, Corporate Passenger Stations Department.

CONTAMINATED SOILS

3-3

If contaminated soils are encountered during the execution of a project contracted by **Adif-Alta Velocidad**, the contractor must provide and plan all necessary resources for managing these soils, as stipulated in the construction project or its revised plans.

In 2023, during the execution of high-speed line construction projects, the following environmental actions have been undertaken regarding potentially contaminated soils:

Characterisation of contaminated soils, environmental impact assessments, and the provision of engineering and environmental consultancy services for the execution of the standard gauge connection to the Mediterranean Corridor at the La Llagosta multimodal platform (Barcelona).

The new multimodal terminal at La Llagosta will feature a reception and dispatch yard with five parallel tracks, each over 750 meters long, equipped with mixed gauge and electrified at 3,000V. Additionally, the installation will include a four-track bundle for loading and unloading Unit Load Devices (ULDs) under a gantry crane, as well as another track for loading and unloading general merchandise.

Access to the terminal will also be improved with a standard gauge connection to the Mediterranean Corridor from the viaduct of the Barcelona-French border high-speed line, adaptations to mixed gauge between La Llagosta and the El Papiol-Mollet line, and a southern connection to the local train network.

Finally, to facilitate the operation of the terminal, several ULDs transfer, and storage platforms will be constructed, covering an area of approximately 12 hectares.

The development of the project requires clearing and levelling the existing surface to create a uniform platform.

The plot where the platform is to be built covers an area of approximately 202,500 m^2. Since the mid-1990s, the site has been occupied by a logistics platform primarily focused on the loading, unloading, and storage of vehicles. The area features an asphalt surface with various above-ground facilities, including warehouses, vehicle washes, maintenance and repair workshops, paint shops, lorry parks, offices, and fuel tanks. It also contains several underground

installations, such as additional fuel tanks, hydrocarbon separators, and various types of piping.

At the time of the field investigation, most of the above-ground facilities on the site had been decommissioned, and the pavement had been removed from the western half. The eastern half, which was still in use, remained paved and retained some vehicle washing and maintenance facilities. Underground facilities, such as pits and hydrocarbon separators, remain buried on the site.

The field investigation revealed a central area of the site where the subsoil is affected by a diverse range of waste materials (such as rubble, wood, fabrics, and plastics). The waste is unevenly distributed in terms of depth and thickness and has different characteristics compared to the rest of the site. This area is associated with the presence of a former uncontrolled landfill.

As a result, the site has been divided into the following sectors:

- France Sector: Corresponding to the NE part.
- Barcelona Sector: Corresponding to the SW part.
- Central Sector: Roughly corresponding to the area of the old landfill.
- Vías Mango Sector: Located to the SW of the Barcelona Sector, next to the Riera Seca.

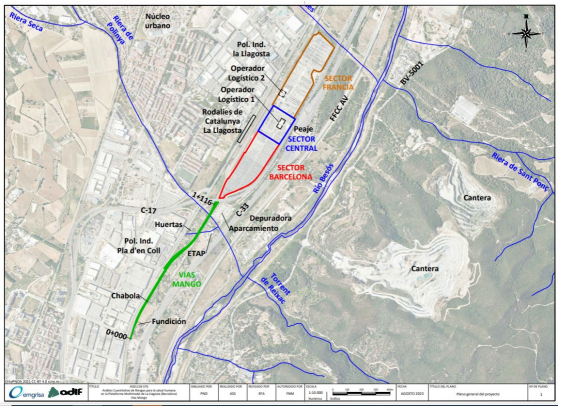


Figure 12.Distinct sectors at the La Llagosta site

The sampling campaign designed for characterising the subsoil and groundwater at the site included an initial inspection, test pits, piezometric soundings, geophysical prospecting (such as refraction seismic and electrical tomography), and waste characterisation in accordance with RD 646/2020 of 7 July, which regulates landfill waste disposal, as well as waste hazard testing.

Figure 13. Excavation of soil pits

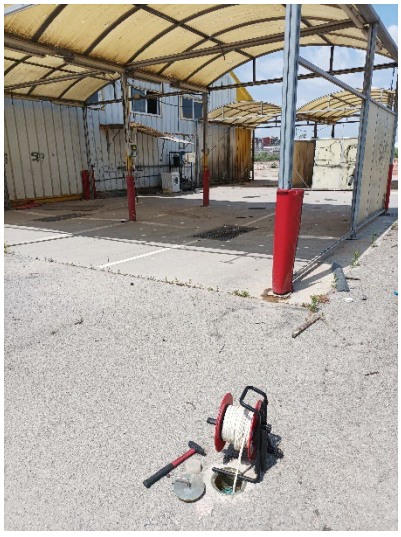


Figure 14. Piezometric monitoring

Figure 15. Drilling of piezometric boreholes

Figure 16. Core boxes

The soil and groundwater samples obtained from the test pits and boreholes were analysed for parameters specified in RD 9/2005, as well as total petroleum hydrocarbons (TPHs) and heavy metals regulated under Catalonia's Decree-Law 1/2009 of 21 July.

Figure 17. Panoramic view of the site.

Based on the evidence from the test pits and boreholes, the following stratigraphic column of the subsoil at the site can be established:

The subsoil of the area under study consists of the following layers:

LAYER I: The subsoil includes brown or yellowish-brown clay fill with some sand and gravel (occasionally containing quartz pebbles). This material was used as backfill to form a base for the asphalt screed that once covered the plot. Most of the backfill was removed prior to the fieldwork being carried out. It is found throughout most of the plot

LAYER II: Beneath this layer, there is a fill layer composed of grey silty clay with the appearance of altered slate and fractured blocks. Occasionally, it contains remnants of wall rubble.

LAYER III: Beneath Layer II, there is occasionally a layer of brown silty clay fill with some debris.

LAYER IV: Waste. Clay fill, black in colour and with a strong smell of hydrocarbons and organic matter, contains remains of plastics, fabrics, drums, bricks, pipes, rubble, and other debris. This layer has been observed only in the Central Sector of the plot and shows a heterogeneous distribution with varying depths and highly variable thicknesses.

It is an uncontrolled dump of various materials from construction sites, urban waste, and industrial activities, deposited directly on the original topography. This filled the void left by aggregate extraction, resulting in an irregular mass of heterogeneous materials, including remnants from industrial, construction, and urban sources. In the mid-1990s, the waste-filled area and its surroundings were covered with fill material, reaching the current level and creating a large-scale levelling for the construction of the logistics platform. It is found at depths ranging from 0.70 to 3.60 m and extends to a maximum

depth of 6.10 m, with an average thickness of 2.20 m. It covers an estimated area of 36,000 m^2, which represents 16.3% of the total plot area.

Detected environmental impacts:

In general, there is little impact on the soils of the site, except in the Central Sector. The generalised presence of arsenic of geogenic origin has been detected in the fill materials that make up Layers I, II, and III. Arsenic levels are similar to the reference value, slightly exceeding the Generic Reference Level.

The soil in the Central Sector is contaminated with a variety of compounds, particularly hydrocarbons, which are present in most samples. Additionally, high concentrations of PCBs are associated with Layer IV samples, along with lead and other heavy metals.

No effects on groundwater have been detected, except in the Central Sector, where a core sample showed the presence of hydrocarbons associated with the hydrocarbon separator and on-site scrubbers, similar to the findings in the soil samples.

Environmental risk assessment:

Based on the results of the investigation, which revealed pollutant concentrations exceeding the values set by RD 9/2005, there is a need to conduct a quantitative risk analysis (QRA) to assess whether these pollutants pose an unacceptable risk to current and future potential receptors.

The QRAs conducted at the site conclude that there is no unacceptable risk to human health from the assessed receptors, except for construction workers. For this group, the risk levels have been calculated to exceed the acceptable limits for exposure through direct contact with contaminated soil and inhalation of volatiles.

From an environmental perspective, these soils can be used in other areas of the site under the conditions specified in the construction project and do not require any treatment.

Excavation Plan and Environmental Supervision:

Finally, an excavation plan has been developed based on the research results, outlining the guidelines for the earthworks specified in the project. It is recommended to carry out selective excavation, segregating materials according to each defined decision unit. Additionally, provide stockpile areas for the excavated soil showing signs of disturbance, ensuring they are properly waterproofed and protected.

Additionally, the excavation plan outlines the criteria for the reuse or management of the excavated material. Excavated earth from surface layers (Layers I, II, or III) can be reused on site as long as contaminant concentrations do not exceed the Site-Specific Target Levels (SSTLs) previously calculated. These levels represent the maximum values for which acceptable risk indices for human health are achieved. Land that is part of the natural terrain (Layer V) is unaffected.

The volume of excavated earth that cannot be reused will need to be managed at a landfill appropriate for inert, non-hazardous, or hazardous waste, depending on the results of the waste characterisation analyses. At first glance, most of this material could be classified as non-hazardous waste.

The excavation plan includes provisions for verifying the remaining soil across the entire site, including the base and slopes of the excavation as well as the top of the embankment, to assess the condition of the site once the planned earthmoving activities are completed.

The selective excavation works, and material management are overseen by an Environmental Department.

Drafting the excavation plan and characterizing materials for the land affected by the remodelling and extension of the Júndiz logistics terminal in Vitoria-Gasteiz (Araba).

The remodelling and integral expansion project of the Júndiz logistics terminal involves land included in the inventory of soils that support or have supported activities or facilities potentially contaminating the soil. Therefore, it was necessary to prepare an excavation plan and characterize the materials to be excavated, as well as to supervise the execution of the excavation plan and investigate the quality of the remaining soil.

The characterisation of the materials began with the collection of composite samples every 500 m^3. The parameters outlined in Annex II of Decree 49/2009 of 24 February for the characterisation of waste destined for landfill, and in Annex II of Royal Decree 646/2020 of 7 July which regulates waste disposal by landfill, were analysed to determine their external management.

Subsequently, for the materials characterised as inert, simple samples were taken by material type, with decision units established at 500 m^3. In this second characterisation, the parameters defined in Law 4/2015, of 25 June, for the *Valores Indicativos de Evaluación* A and B (Indicative Assessment Values, VIE-A and VIE-B) for the prevention and correction of soil contamination by the Basque Government, as well as total TPH (C6-C40), were analysed with the aim of reusing the materials on-site.

Figure 18. Execution of test pits for sample collection.

Based on the results of these characterisations, the excavation and management of the materials are carried out.

Figure 19.Loading of lorries for the reuse of soil at authorised landfill sites.

Construction and restoration of the V-9 reservoir (Viator, Almería) using inert materials and clean soil from the construction of the Murcia-Almería high-speed Mediterranean Corridor platform. Níjar-Río Andarax section.

In the Adif-Alta Velocidad project for the construction of the Murcia-Almería Mediterranean Corridor platform, specifically in the Níjar-Río Andarax section, an illegal landfill was detected in the municipality of Viator (Almería), between KP 722+100 and 722+300 of the railway platform Most of the volume of this

landfill consisted of construction and demolition waste (CDW).

Figure 20.Illegal landfill in Viator (2020)

Historically, the common practice for managing illegal landfills along the routes of linear infrastructures was to excavate the waste and transfer it to external landfills and treatment plants. In this case, due to the enormous volume of waste, a more environmentally and economically sustainable solution was needed. This solution involved on-site recovery and treatment of the soil and stone fractions of the CDW, with the resulting inert material being deposited in the nearby authorised V-9 soil deposit. For this purpose, an authorised portable treatment unit was installed with a specific configuration to handle the large quantity of plastic from the greenhouses in the area.

Figure 21.Overview of the process and the treatment plant (September 2022)

After eighteen months of work (October 2021 - March 2023), the former illegal landfill site at Viator was completely decommissioned, and a total of 175,000 m^3 of waste was treated. The treatment unit's flow rate was 550 m^3/day.

As a result of the on-site treatment, 160,500 m^3 of waste were recovered in the authorised V-9 deposit (a mixture of soil and stone fractions from CDW), representing 92% of the volume of waste stored in the old landfill site The remaining 8% (14,500 m^3) consisted of plastic waste, wood, metals, end-of-life tyres, and other rejects, which were segregated during the triage process in the treatment unit. This waste was transported to and processed at external facilities, with recovery operations (53%) prioritised over disposal operations.

The decommissioning of the landfill and the site's final condition have allowed construction work on the Mediterranean Corridor platform to proceed.

Figure 22.The dismantled landfill. Final condition of the site (March 2023)

NOISE POLLUTION

3-3 | 308-2

Noise pollution is one of the adverse environmental effects of railway activity, with passenger and freight train movements being the primary sources of noise and vibration.

Additionally, the operation of infrastructures and facilities managed by Adif-Alta Velocidad may primarily produce noise emissions in:

- Passenger stations, announcement systems, train shunting, air conditioning in buildings, and vehicle movement in and out of parking areas.
- Infrastructure maintenance operations carried out by mechanised rail equipment.
- Works and interventions in railway infrastructure.

Environmental noise is regulated by Directive 2002/49/EC on the Assessment and Management of Environmental Noise, which main provisions have been incorporated into Law 37/2003 of 17 November on Noise.

Law 37/2003, developed by Royal Decrees 1513/2005 and 1367/2007, regulates both the emission and immission of airborne noise and vibrations generated by means of transport. It also establishes limitations on urban development and the need to adopt preventive and corrective measures to avoid or reduce damage to human health, property, or the environment resulting from noise pollution.

This Law, along with Royal Decree 1513/2005, which partially implements it, requires the preparation of Strategic Noise Maps (SRMs) and Noise Action Plans (NAPs) for major railway routes, defined as those railway sections with more than 30,000 trains/year.

SRMs are tools designed to assess the noise exposure of the population and identify receptors exposed to levels exceeding the Acoustic Quality Objectives (AQOs) established in the aforementioned legislation. As for the NAPs, these documents analyse various corrective measures that could be considered to achieve the AQOs.

SRMs and NAPs are reviewed and, if necessary, revised at least every five years.

Article 4 of Law 37/2003 outlines the powers for the preparation, public consultation, and approval of these documents. For Railway Infrastructures, these powers lie with the Ministry of Transport and Sustainable Mobility.

In this regard, in 2005, 2012, and 2017, the Ministry entrusted Adif with the preparation of the SRMs and NAPs for each of the first three phases. The Ministry retained the authority for provisional approval, public consultation, and final approval of the documents, as well as for addressing any objections.

Since its creation, Adif-Alta Velocidad has been responsible for drawing up the SRMs and NAPs for state-owned railway sections managed by Adif and Adif-Alta Velocidad.

The data from the completed SRMs and NAPs phases are summarised below:

Table 19. Data from Phase I, II and III SRMs and NAPs.

Phase	Phase I	Phase II	Phase III
Developing period	2007-2010	2015-2017	2019-2022
Kilometres studied	685 km	1,456 km	1,277 km
Strategic Map Units	19	30	28
SRM Public Information	BOE No. 99 of 24 April 2008	BOE No. 242 of 06 October 2016	BOE No. 262 of 03 October 2020
SRM approval	Resolution of the Spanish Directorate General of Railways of the Ministry of Public Works, dated 31 May 2013	Resolution of the Deputy Directorate General for Railway Planning. BOE no. 206 of 28 July 2017	Resolution of the Deputy Directorate General for Railway Planning. BOE No. 64 of 16 March 2022
NAP Public information	BOE No. 286 of 28 November 2011	BOE No. 38 of 12 February 2018	BOE No. 117 of 17 May 2022
NAP Approval	Resolution of the Spanish Directorate General of Railways of the Ministry of Public Works, dated 31 May 2013	Resolution of the Deputy Directorate General for Railway Planning. BOE No. 235 of 28 September 2018	Resolution of the Deputy Directorate General for Railway Planning. BOE No 283 of 25 November 2022

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department.

Information on the SRMs and NAPs is available in the Acoustic Pollution Information System of the Ministry for the Ecological Transition and the Demographic Challenge:
http://sicaweb.cedex.es

The measures outlined in the Noise Action Plans are preliminary proposals that will need further development and specification.

Regarding the construction of acoustic screens for these action plans, contracts were awarded in 2018 and 2019 for the preparation of construction projects for the acoustic screens specified in the Phase I and II action plans. These plans addressed the areas with the greatest impact and were divided into the following areas:

- Site: Area 1: Madrid and Castile-La Mancha.
- North: Area 2: Basque Country, Asturias, Aragon, and Castile and Leon.
- East:
  - Area 3A: Valencia and Castellon.
  - Area 3B: Tarragona.
  - Area 3C: Barcelona and Tarragona.
- South: Area 4: Madrid, Castile-La Mancha, and Andalusia.
- RAM Area 5: Asturias and Cantabria.

Once the projects in the Central, North and South areas were completed, tenders for the works in the Central and South areas were issued in 2022 and started in 2023. The tender for the North area and the adaptation of the projects in the East area are still pending and currently being prepared.

Regarding Phase IV of the SRMs and NAPs, a Protocol was signed between MITMA and **Adif-Alta Velocidad** on 16 December 2021 for the development of this phase's works of the infrastructures managed by Adif and **Adif-Alta Velocidad**.

On 18 November 2022, contracts were awarded for the drafting of the SRMs and NAPs for Phase IV. This phase will involve recalculating existing maps and updating situations that were not previously considered.

During 2023, this work will analyse 1,320 km of the railway network, divided into four geographical lots and 30 Strategic Map Units (UMES):

- Centre Lot: in blue.

- North Lot: in red.
- East Lot: in yellow.
- South Lot: in green.

Figure 23.Strategic Noise Maps of the major railway axes Phase IV. Railway sections with more than 30,000 circulations/year

This Phase IV SRMs will be the first to use the European Union 's common calculation method for assessing industrial noise, aircraft noise, train noise, and road traffic noise, known as CNOSSOS-EU, in accordance with PCI 1319/2018 and PCM 80/2022.

The new CNOSSOS method defines two sources of railway noise, representing the railway line at two heights above ground -0.5 and 4 metres, respectively- and outlines six types of railway noise generation phenomena applied to these sources, as illustrated in the following image:

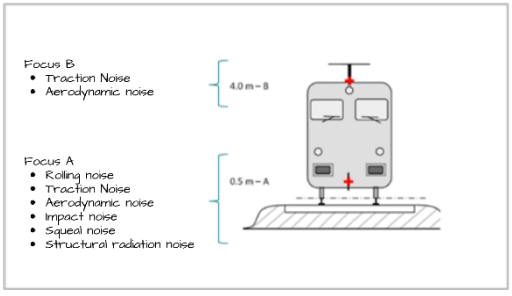


Figure 24. Factors contributing to emissions.

To apply this method with quality assurance, Adif-Alta Velocidad conducted a study in 2020 and 2021 that involved the acoustic characterisation of both rolling stock and railway infrastructure, as well as defining the configuration parameters for the models. This work led to the publication of the Guide for the Application of the CNOSSOS-EU Method in the modelling of noise produced by traffic on Adif and Adif-Alta Velocidad railway infrastructures.

An updated version of the guide was published in November 2023 to include the characterisation of new rolling stock (OUIGO and IRYO trains), a new monoblock rail transfer function with super-soft damping, and clarifications on issues that had raised concerns since its March 2022 release (which concerns mainly related to the effects of squeal, aerodynamic noise, and speed trampling when approaching stations).

The most recent version of the guide can be downloaded from the Adif website in the Noise

Pollution Management section: https://www.adif.es/gestion-de-contaminacion-acustica.

This Phase IV also introduces the following new features compared to previous phases:

- This will be the first phase to estimate the risk of adverse health effects from exposure to railway noise (such as severe discomfort and sleep disturbance).
- The new data model from the European Commission comes into force, which is mandatory for Spain, comes into effect. Its purpose is to ensure compliance with both the Noise and INSPIRE Directives in the provision of information related to Strategic Noise Maps and Action Plans.

Additionally, in line with Adif-Alta Velocidad's Environmental Policy commitment to adopt all technically and economically feasible measures to reduce noise and vibration impact during the design, construction, and operation phases of railway infrastructures and facilities, the following reference guides have been prepared:

- *Catálogo de medidas de Protección frente al Ruido en Fase de Construcción (Catalogue of Noise Protection Measures for the Construction Phase), to apply the best available technologies to minimise the noise nuisance associated with construction works.*
- *Protocolo de Buenas Prácticas de Actuación Acústica en Obras no sometidas a Declaración de Impacto Ambiental (DIA) (Protocol for Best Practices in Acoustic Management for Projects Not Subject to Environmental Impact Statement (EIS)). It defines the criteria to be followed by Adif Alta Velocidad and by the awarded companies for the effective management in acoustic matters of all works that do not have an EIS.*
- *Protocolo de Buenas Prácticas de Tratamiento de Ruido y Vibraciones en Situaciones de Explotación de Tráfico e Instalaciones Ferroviarias (Protocol of Best Practices in Managing Noise and Vibration in Railway Traffic and Facility Operations).*
- *Agreement-Type of cooperation with administrations for noise mitigation measures (Model Cooperation Agreement with Authorities for the Adoption of Noise Mitigation Measures)*
- *Metodología para la realización de mediciones acústicas en obra (Methodology for conducting acoustic construction sites).*
- *Metodología para la determinación de actividades ruidosas en obra (Methodology for identifying noisy activities on construction sites).*
- *Especificación Técnica 03.305.010.5. (Technical Specification 03.305.010.5.) Pantallas Acústicas (Acoustic Screens).*

In January 2023, General Standard NAG 4-0-0.1 was published, titled *Metodología para Estudios Acústicos* (Methodology for Acoustic Studies), which outlines the methodology for conducting acoustic studies related to the preparation of projects within the scope of the General Interest Railway Network (*Red Ferroviaria de Interés General*, RFIG), managed by Adif and Adif Alta Velocidad.

Similarly, during 2023, work began on drafting a new Standard to define the methodology for conducting vibration studies.

Vibrations are an environmental aspect whose analysis and prediction are more complex than for noise, and there is no established methodology for their modelling. The aim of this standard, which will be made available for public review before it enters into force, is to establish consistent criteria to serve as a reference in studies and provide minimum technical specifications for defining anti-vibration measures.

Additionally, it is worth noting that during 2023, collaboration with MITERD took place on the revision of Royal Decree 1367/2007 of 19 October, which implements Law 37/2003 of 17 November on Noise, with a focus on acoustic zoning, quality objectives, and acoustic emissions.

Finally, it is worth mentioning the Environmental Diagnosis conducted at Adif Alta Velocidad Stations and Facilities to identify all environmental aspects, including those related to noise, resulting from both internal and external management.

Based on these diagnoses, plans are made for environmental improvements and best practices to be implemented in various activities, with the goal of establishing an Environmental Management System in the future.

7. CONTRIBUTION TO BIODIVERSITY CONSERVATION

7. CONTRIBUTION TO BIODIVERSITY CONSERVATION

LAND USE

3-3 | 304-1

The active railway network managed by **Adif-Alta Velocidad** spans a total length of 3,973.7 km. The total area occupied is estimated at 12.716 hectares, with the affected area potentially extending to 37.033 hectares.

The 1,079.06 km of active construction work for line construction in 2023 covers an area of 3,453 ha, with an impact zone of 10,791 ha[5].

This assessment considers the average platform widths, the minimum width occupied by cuttings and embankments, and the average width of land affected (excluding expropriations) for the different types of roads listed in the following table:

Railways are a more land-efficient mode of transport compared to roads. The land use per transport unit (in ha/unit) for railway infrastructure is 3.51 times less than that required for roads

European Environment Agency. Indicator fact sheet.TERM 2002 08 EU + AC. Land take by transport infraestructure

The area affected by the active railway network managed by **Adif-Alta Velocidad** is **37,033 ha**, which includes the **12,716 ha** occupied by the platform, cuttings, and embankments.

The area affected by active construction throughout 2023 for the lines under construction is approximately **10,791 ha**, with over **3,453 ha** occupied by the platform, cuttings, and embankments.

In addition to the area occupied by the under construction and active network, **Adif-Alta Velocidad** also owns land used for railway enclosures, stations, housing, commercial premises, warehouses, docks, offices, and other buildings.

Table 20. Average occupancy widths and railway network widths (m)

Type of track	Platform width (1)	Minimum width, including cuttings and embankments	Impact width (2)
Electrified double-track international gauge line (AVE)	16	32	100
Electrified double-track Iberian gauge line	16	32	64
Mixed gauge line (Iberian Gauge width - International gauge width)	16	32	100

(1) Including the sub-ballast and formation layer.

(2) Including slopes, embankments, and other requirements.

[5] The length of active construction is calculated together for Adif and Adif-Alta Velocidad.

NATURAL AREAS

304-1 | 304-2 | 304-3

The Natura 2000 Network is a European ecological network dedicated to biodiversity conservation. It consists of Special Protection Areas (SPAs) established under the Habitats Directive and Special Protection Areas (SPAs) for Birds designated under the Birds Directive.

It aims to ensure the long-term survival of species and habitats in Europe to help halt the loss of biodiversity. It is the main tool for nature conservation in the European Union. Spain is one of the European Union countries with the largest area covered by the Natura 2000 Network, encompassing approximately 26% of its territory.

In 2023, some of the high-speed works carried out took place in areas belonging to the Natura 2000 Network. At that time, a total of 18 projects were underway, occupying this type of space, including 9 platform works and 5 superstructure works. This accounts for 7.3% of projects occupying space within the Natura 2000 Network.

Table 21. Natura 2000 Network works

	Platform	Superstructure	Total
No. of Natura 2000 Network works	9	5	14
No. of active works	58	134	192
% if Natura Network works	**15.5%**	**3.7%**	**7.3%**

Additionally, a total of 14 maintenance projects were carried out on high-speed rail infrastructure in areas within the Natura 2000 Network.

In 2023, the gauge rail network managed by Adif-Alta Velocidad in operation reached a length of 3,973.7 kilometres. Of these, nearly 233.8 kilometres run through Natura 2000 areas, representing 5.9% of the rail network. These intersections are often achieved using large-scale structures (such as tunnels and viaducts), which helps minimise their impact on these areas during the operational phase. Approximately 39% of the high-speed rail lines that traverse Natura 2000 areas do so using these types of structures.

Table 22. Length of lines managed by Adif-Alta Velocidad in Natura 2000 Sites

Autonomous Community	Adif AV length (km)*	Adif AV Natura 2000 Network length (km)	Adif AV % in Natura 2000 Network	Adif AV Natura 2000 Network length (km)	% of Adif AV in Natura 2000 areas occupied by large-scale structures	Adif AV length (km)
Andalusia	29.3	487.7	32.8	6.7%	14.3	43.7%
Aragon	28.5	273.2	47.9	17.5%	11.0	22.9%
Castile and León	26.2	706.6	26.0	37%	8.0	30.8%
Castile-La Mancha	23.1	752.9	21.7	2.9%	4.0	18.3%
Catalonia	28.1	460.0	11.8	2.6%	6.5	54.9%
Community of Madrid	39.8	206.1	35.2	17.1%	32.5	92.3%
Valencian Community	36.9	391.2	1.8	0.5%	1.6	87.3%
Extremadura	30.3	323.6	38.2	11.8%	1.7	4.1%
Galicia	11.1	235.6	1.3	0.6%	1.0	75.8%
Principality of Asturias	25.2	24.0	11.4	47.4%	11.3	99.2%
Region of Murcia	20.3	86.1	5.6	6.5%	0.0	0.0
Basque Country		26.6	0.0	0.0%	0.0	0.0
Total		**3,973.7**	**233.8**	**5.9%**	**91.9**	**39.3%**

* Length as reported in the tram network expansion document effective as of 31 December 2023.

Source: Nature Databank Ministry for Ecological Transition and the Demographic Challenge. Updated as of December 2022. Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

FIRE PREVENTION

3-3 | 308-2

Between 2013 and 2023, no fires were reported along the high-speed rail network's tracks.

The measures and actions to prevent forest fires, along with complementary actions adopted in 2023, are defined in the Plan of actions for the prevention and fight against forest fires for 2023 approved by the Council of Ministers on 20 June 2023. This plan involves numerous ministerial departments, including the Ministry of Transport and Sustainable Mobility, which oversees the railway sector and to which Adif-Alta Velocidad is attached.

Since 2006, Adif-Alta Velocidad, in compliance with the provisions of Royal Decree-Law 11/2005 of 22 July approving urgent measures on forest fires, has signed collaboration agreements with the Autonomous Communities. These agreements aim to develop joint actions for the prevention and, if necessary, extinguishing of forest fires in areas near the railway network.

In 2022, these Agreements were formalised as Protocols. This change reflects their role as declarations of intent, expressing the commitment of the parties to coordinate their respective responsibilities and undertake joint actions to prevent and extinguish forest fires in areas near the railway network within the RFIG.

Under these four-year protocols, Adif-Alta Velocidad also commits to implementing Self-Protection Plans designed to safeguard the integrity and conservation of its facilities and to mitigate the potential impacts of fires in forested areas or within the municipal perimeters through:

- The identification and assessment of fire risk areas.
- The mechanical weed and debris removal programmes on roadside verges (irrigation campaigns included in maintenance programmes).
- Chemical treatment programme using a herbicide applicator train.

In 2022, Adif-Alta Velocidad sent the draft of this Protocol to the following autonomous communities for review and signature: Aragon, the Government of Catalonia, the Valencian Community, Castile and León, the Community of Madrid, Castile-La Mancha and Andalusia.

Specific measures for preventing the risk of forest fires at Adif-Alta Velocidad are outlined in the current Fire Prevention Plan, which is effective from 2023 to 2024 and is updated periodically. This specific plan is developed within the framework of the Adif and Adif-Alta Velocidad Contingency Plan, as Appendix VII, and the *'Plan Director de Medidas Preventivas de Verano'* (Master Plan for Summer Preventive Measures), as well as the Contingency Plans of railway operations and the Appendix *'Manual de actuación en caso de perturbaciones de tráfico'* (Manual for action in case of traffic disruptions), agreed upon with Adif-Alta Velocidad.

The Fire Prevention Plan, developed in accordance with fire prevention regulations, identifies risks and risk areas, outlines preventive and corrective actions, and provides recommendations for typical cutting and welding operations, as well as the operation of hot shaft detectors. It is applicable throughout the RFIG, both on lines owned by Adif and Adif-Alta Velocidad.

Coordination between the Deputy Directorate of Network Management Centre H24, the areas of Adif and Adif-Alta Velocidad responsible for infrastructure maintenance and traffic management, and transport companies is essential in developing and monitoring of the Plan to minimise the risk of railway operation generating fires.

Figure 25.Fire protection measures on tracksides.

Fire Prevention Actions included in the 2023-2024 Fire Prevention Plan for the road and its vicinity.

- **Monitoring of train braking systems**

Ensure regular monitoring of the brake systems' condition and position and confirm that braking tests are properly conducted both at the origin of the train and at intermediate stations where materials are added.

- **Monitoring of rail work with ignition sources**

Identification in the Works Act; restrictions on work with ignition sources on the rail; and monitoring and communication of work involving ignition sources.

- **Monitoring of the proper functioning of Hot Box Detectors and Stuck Brake Detectors**

Monitoring the proper functioning of Hot Box Detectors (HCD) or Stuck Brake Detectors (SBD) installed in the infrastructure and taking regulatory action in response to alarms from either type of equipment.

- **Chemical and mechanical cleaning of track edges**

At stations and terminals: Identification and assessment of fire risk areas detected at stations; management of control of fire risk areas; and chemical and mechanical treatment of combustible materials on and near tracks.

On the track: identification and assessment of risk areas on the RFIG lines; chemical treatment using herbicide applicator trains; and mechanical weed control programs along the track margins.

- **Monitoring trains as they pass through stations**

Attention to passing trains and identification of any anomalies or signs of issues with their running gear, brakes and exhaust pipes (combustion engines).

- **Coordination and participation committees for railway operations**

Multi-conferences for coordinating and monitoring the Plan; meetings, multi-conferences, or communications between **Adif-Alta Velocidad** and railway operators, or between **Adif-Alta Velocidad** areas and train managers for Plan follow-up; and Dissemination of awareness campaigns.

-

On the other hand, the State Meteorological Agency (*Agencia Estatal de Meteorología*. AEMET), through an agreement with both entities, provides Adif and Adif-Alta Velocidad with updated weather forecast for each line. This allows for traffic restrictions on certain route locomotives and transports in the event of extreme weather risk (such as high temperatures and low humidity), to mitigate the risk of fires.

Regardless of the measures taken by Adif-Alta Velocidad, the railway track and the driving and

traffic management staff play a crucial role not only in detecting but also in extinguishing forest fires near the infrastructure. Thus, the track acts as a firebreak, and railway staff can often detect fires early, allowing Adif-Alta Velocidad's command posts and the H24 Network Management Centre to alert firefighting agencies of the various administrations.

Summer Preventive Measures Master Plan

From 1 June and 30 September each year, Adif-Alta Velocidad implements the Summer Master Plan for Preventive Measures, though it may be extended if circumstances warrant. It applies throughout the RFIG, covering both Adif-owned and Adif-Alta Velocidad lines, and aims to prevent fires on and around the track.

The Master Plan complements the Contingency Plan in its preventive measures, guidelines, measures, elements, and resources needed to manage seasonal risks and maintain service quality. It aims for active and coordinated collaboration among all parties involved in railway operation to prevent and address risks arising from adverse weather conditions.

The Master Plan outlines a series of preventive measures to be implemented by railway operators on rolling stock and infrastructure. Among the preventive measures for infrastructure, the plan includes special vigilance for maintenance work that creates ignition sources, as well as for the following:

- Preventive surveillance on routes with the highest fire risk
- Cleaning of tracksides and their facilities (including vegetation removal, clearing, cutting, and pruning)
- Herbicide application and chemical defoliation
- Construction of firebreaks

NOTABLE ACTIONS TAKEN DURING THE CONSTRUCTION OF HSLS

3-3 | 304-2 | 304-3

General aspects of biodiversity protection

In terms of biodiversity protection, point 3 of Adif's environmental policy is noteworthy. Adif-Alta Velocidad aims to 'achieve the environmental integration of the railway while maintaining maximum respect for natural spaces and cultural and archaeological heritage, protecting biodiversity and ecosystems, preserving all their values and recovering those environments that may have been affected'.

∎ All significant projects drafted by Adif and Adif-Alta Velocidad undergo a thorough analysis of their potential environmental impact, with particular attention to effects on unique species of fauna and flora, habitats of community interest, and protected natural areas

Once priority areas have been identified early on, as required by the Adif's General Standard 'Type index and content of the environmental integration annex of projects' (NAG 3-0-1.0), a

description of protected natural areas and other areas of interest (Natura 2000 Network, Protected Natural Areas, Habitats of Priority Interest, etc.) must be provided. This is to identify those potentially affected by the execution of the project and establish specific measures to ensure their protection.

Subsequently, the territory is classified into three categories: excluded areas, restricted areas, and eligible areas, as recommended by the PGI 6. 'Instructions and recommendations on environmental integration'. In excluded areas of higher quality and environmental sensitivity, the placement of any temporary or permanent installation is prohibited, except for those essential for the execution of the works, provided they are properly justified and, if required, have the necessary authorisations from the competent authority.

In addition, when work is conducted in a sensitive area, studies or assessments of fauna and flora are carried out before the start of the project to identify highly sensitive sites (such as nesting and breeding areas, resting and refuge areas, etc.). This allows for the implementation of necessary measures to minimise impact on biodiversity, always following the hierarchy of impact mitigation (prevention, correction, and compensation).

Adif-Alta Velocidad applies the principle of hierarchy to mitigate impacts on biodiversity

Thus, the new high-speed rail lines undergo an Environmental Impact Assessment (EIA) according to current regulations, which involves selecting corridors with the least impact on high-value environmental areas, thereby avoiding impacts in these areas.

During the construction phase, an Environmental Site Manager (ESM) is appointed to oversee and monitor environmental aspects of the construction work and ensure compliance with both the Environmental Impact Assessment (EIA) and current environmental regulations. This work is documented in regular reports that are provided to the environmental agencies. Similarly, before work begins, an Pre-Construction Report (PCR) is prepared to analyse the presence of priority areas and verify whether the project documentation includes the necessary measures and controls to minimize impacts on biodiversity.

Currently, work is being conducted under the 'Contract for Advisory, Research, and Technological Development Services in Various Railway and Construction Techniques,' commissioned by Adif-Alta Velocidad to the Centre for Studies and Experimentation of Public Works (CEDEX). This work addresses various issues identified in monitoring the effectiveness of shadow restoration for viaducts, borrow pits, and embankments. The work, currently in its initial phase, focusing on analysing the survival of plantings in embankments in the Basque Country and the shading of viaducts in the Valladolid–Burgos section, commenced in March 2023 and is expected to be completed by July 2026. Once this first phase is completed, the proposed improvements will be applied to the restoration of currently active works to assess their effectiveness compared to the treatments used so far.

It is worth noting Adif and Adif-Alta Velocidad's participation in discussion and knowledge forums focused on the protection of biodiversity in transport infrastructures:

- The 'Group on Habitat Fragmentation Caused by Transport Infrastructures' fosters collaboration between government agencies, environmental organizations, and the scientific community to implement measures that prevent or mitigate the primary effects of transport infrastructure on fauna.
- ECOV4R (Ecosystem Evaluation for Railways), developed by the

International Union of Railways, aims to methodologically assess the ecosystem values provided by railway infrastructure.

Key actions for the protection of biodiversity

➢ Fauna

The length of the High-Speed Rail [6] Lines completed between January 2006 and December 2023 totals 2,196.85 km, with 504.30 km (23%) consisting of tunnels and viaducts that allow wildlife to pass through. In estimating this indicator, large-scale structures that cannot be used by wildlife are excluded, either because they pass through urban areas unsuitable for fauna or because they serve purposes incompatible with the movement of terrestrial species. Methodologically, when two parallel large-scale structures are present, only the shorter one is included in the calculation of the indicator Finally, it should be noted that although monitoring has been conducted since 2005, the attached table only shows the evolution over the last 10 years

In the remaining sections of the route deemed non-permeable, especially in areas of high wildlife value, specific crossings for large animals (such as ungulates) are built, and cross-drainage structures are adapted for use by other wildlife. This includes enlarging purely hydraulic sections, creating dry sidebanks, and planting vegetation around the entrances and flanks.

Table 23. Wildlife crossings

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Wildlife-friendly cross-drainage structures (number)	856	911	978	1010	1091	1140	1157	1216	1273**	1282
Crossings specifically for ungulates (number)	176	193	205	205	236	258	263	284	289	290

* Data for each year accumulated from the beginning

** 2022 data updated from the 2022 Environmental Report due to a recalibration of completed projects during the period.

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

These measures are complemented by the installation of a perimeter fence around the infrastructure, which restricts wildlife access to the track and guides animals towards the crossings The base of this fence is buried in areas of wildlife interest and includes a reinforcing mesh at the bottom to prevent small wildlife from accessing. Additionally, escape devices are installed in the fencing to help animals that may have entered the railway area to find their way out.

Additionally, in areas identified as having high bird habitat value, the railway infrastructure is fitted with features to reduce the risk of electrocution and collisions. These measures include deterrent devices for perching, markings for feeder cables, and collision barriers.

[6] For this calculation, only new platform constructions have been considered, excluding urban sections.

Figure 26.Anti-nesting devices on the overhead wires Madrid-Extremadura Line

- Project for compensatory measures for the Greek tortoise (*Testudo graeca*) in the Mediterranean High-Speed Corridor Construction Section: Murcia-Almería.

The construction of the Mediterranean High-Speed Corridor in the Murcia-Almería section passes through one of the few populations of Greek tortoises (*Testudo graeca*) in Spain. This species is listed as 'Vulnerable' in the *Catálogo Español de Especies Amenazadas* (Spanish Catalogue of Threatened Species) and as 'Endangered' in the *Catálogo Andaluz de Especies Amenazadas* (Andalusian Catalogue of Threatened Species).

Following the environmental assessment process for the Mediterranean High-Speed Corridor between Murcia and Almería, the environmental authority required the implementation of measures to mitigate the potential impacts of this infrastructure on the Greek tortoise.

To ensure that these measures were based on the latest scientific knowledge and were as effective as possible, in 2022 Adif-Alta Velocidad hired the Miguel Hernández University of Elche, which has top experts on this species, to carry out fieldwork and studies that would form the basis for drafting and implementing the compensatory measures.

These studies are carried out through various subprojects that require fieldwork and aim to assess: i) the distribution of the species, ii) patterns of population abundance and demographic structure, iii) spatial genetic structure, iv) the health status of the species, v) practices related to the consideration of *Testudo graeca* as a domestic animal, vi) loss of genetic structure due to the release of domestic animals and translocation between populations, vii) diseases, parasites, and intestinal endobiont communities in wild populations resulting from the management of captive populations, viii) the impact of fires on population viability, ix) the impact of linear infrastructure on the species, and x) the effects of predation.

The first of the two planned field campaigns was conducted throughout 2023, with a particular focus on the Special Conservation Areas (SCA Sierra de Cabrera-Bédar -ES6110005-, SCA Sierra del Alto de Almagro -ES6110011-, and SCA Sierras Almagrera, de los Pinos, and el Aguilón -ES6110012-). These protected areas are crucial for the species' conservation on a regional scale.

Once the fieldwork and results analysis are complete, two documents will be prepared:

- Assessment of the Greek Tortoise's Conservation Status
- Basis for Its Recovery in the Province of Almería

These documents will serve as the foundation for drafting the Compensation Measures Project for the Greek Tortoise, resulting from the construction of the Mediterranean High-Speed Corridor. Section: Murcia-Almería.

Figure 27.A Greek tortoise specimen, located during monitoring to assess the impact caused by linear infrastructure. July 2023

- Study and relocation operations for Greek tortoise (*Testudo graeca*)

populations impacted by the Mediterranean Corridor construction.

The Greek tortoise (*Testudo graeca*) is a terrestrial, ectothermic species, meaning its periods of activity are dependent on the temperature. When temperatures drop (in late autumn) or become excessively high, this species takes refuge underground, where it undergoes aestivation and hibernation. These are, therefore, extremely critical periods for this species.

To minimise the impact on this species, Adif-Alta Velocidad has developed an Action Protocol, which includes the following tasks:

Before starting the construction work:

- Conduct an initial survey during a favourable period to determine the density of loggerhead tortoises in the various affected areas.
- In areas with medium or high turtle density, carry out rescue operations and relocate the tortoises to unaffected habitats with suitable conditions. Fence off the construction area to prevent relocated tortoises from returning.

Figure 28.Sampling team carrying out a rescue operation for loggerhead tortoises at the Lorca-Pulpí construction site.

In parallel with the construction work:

- Rescue any specimens that appear accidentally during the ongoing construction.

The Lorca-Pulpí project, part of the Mediterranean High-Speed Corridor, began in 2022 with the Action Protocol already implemented. During surveys conducted in the spring of 2023, a total of 5 tortoises were rescued, along with additional 3 that appeared accidentally near the construction site. All specimens were relocated to locations authorised by the environmental authority after biometric data was collected.

Figure 29. Fieldwork. Biometric data collection

Protection of endangered species in the Adif-Alta Velocidad construction area

The European mink (*Mustela lutreola*) is the most endangered mammal in Europe, with its population in Spain dwindling to just 143 individuals. This critical situation has led to the species being classified as 'Endangered' at the national level.

Adif-Alta Velocidad is developing some of its projects near the distribution area of this species. Therefore, in coordination with the competent authorities on endangered species protection, a series of measures and monitoring actions are being implemented, involving highly specialized personnel, aimed at minimising potential impacts on the species. The main work carried out in 2023 has primarily consisted of:

- Analysis of populations and construction site measures (biological pauses), in coordination with the governments of La Rioja, the Foral Community of Navarra, and the Foral Deputation of Álava.
- Study of populations and mobility associated with the platform project for connecting the Burgos-Vitoria Line with the

integration of the railway into the city of Vitoria-Gasteiz, and assessment of the potential impact of construction activities on the European mink (*Mustela lutreola*) through monitoring in the Special Conservation Area (SCA) Zadorra. Two sampling campaigns were conducted in 2023:

- Campaign during the pre-breeding season of the species, in spring (February-April)
- Campaign during the post-breeding period, in autumn (September-October)

The monitoring work included a combination of live trapping (sampling 23 km of rivers with a total of 26 traps) and camera trapping campaigns (covering 50 km of the middle-upper Zadorra basin with 31 sampling points and a total of 37 cameras used), with substantial sampling efforts for both campaigns.

Figure 30. European mink captured in the Zadorra River area

The results obtained from this study allowed for an analysis of the compatibility of European mink populations with construction activities, both in terms of reproductive success (proximity to construction) and mobility during the breeding period.

- New methods for wildlife monitoring during the railway operation phase: Application in the Otero de Bodas Eco-duct.

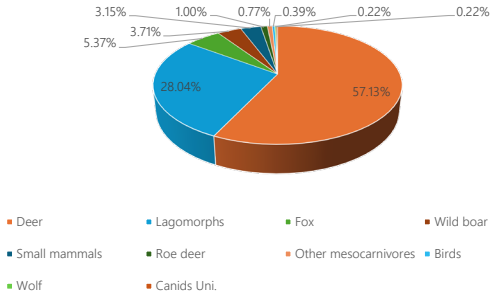
Adif-Alta Velocidad, in its ongoing efforts to develop and implement new methods to enhance Environmental Monitoring for wildlife protection, has introduced an innovative wildlife tracking system during the operational phase using video surveillance technology.

A video surveillance system has been installed to monitor wildlife on an eco-duct along the Zamora–Pedralba High-Speed Line, which is now in operation. It is an eco-duct measuring 135 metres wide by 78 metres long, located near the town of Otero de Bodas in the province of Zamora. Two infrared cameras, positioned to face each other, were installed to detect nocturnal movements, along with a dynamic DOMO camera that tracks any detected movement. They continuously record using an automatic recording system that marks and logs events when movement is detected. Additionally, the system is interconnected, so when the infrared cameras detect movement, they send a signal to the DOMO camera to track it.

Figure 31.Infrared Camera Used in the Video Surveillance System

Since December 2022, monthly reviews of the recordings have been carried out, covering footage from 67 full days. Approximately 2,000 events have been recorded, with 9 species identified (red deer, roe deer, wild boar, red fox, European badger, stone marten, European rabbit, Iberian hare, and Iberian wolf). Additionally, 5 broader taxonomic groups have been identified (lagomorphs, canids, other mesocarnivores excluding foxes, small mammals, and birds) but not specified down to the species level.

Chart 16. Species or Taxonomic Groups in Recorded Data



Overall, more than 94% of the recorded events involve four species or taxonomic groups: deer (over 57%), lagomorphs (over 28%, primarily rabbits), foxes (over 5%), and wild boar (over 3.5%). Notably, there have been over 3,600 deer recorded, which represents approximately 77% of the animals logged over these 67 days. This data yields an average of 55 deer records per day, with approximately 94% of these animals crossing the eco-duct.

Figure 32.Pair of Stags Detected by the Video Surveillance System

This underscores, on the one hand, the excellent connectivity (permeability) of the eco-duct, especially for stags, but also for other species. On the other hand, it confirms the effectiveness of this innovative surveillance system as a method for wildlife monitoring and highlights the potential of continuous tracking systems.

- Wildlife Monitoring During the Operational Phase Palencia-León High-Speed Line

To assess the effectiveness of various biodiversity protection measures implemented during infrastructure construction, as well as to detect residual impacts, systematic monitoring is conducted on high-speed lines once they are operational. In September 2020, wildlife monitoring began on the High-Speed Line between Palencia and León and was completed in the spring of 2023. This work followed the *Guía Metodología Básica para la realización de Seguimientos Faunísticos en Fase de Exploración de las Líneas de Alta Velocidad* (Basic Methodological Guide for Wildlife Monitoring During the Operational Phase of High-Speed Lines), which Adif and Adif-Alta Velocidad have systematically applied since 2012, with a team of highly respected experts. The detailed objectives of applying this guide can be summarised as follows:

- To determine how wildlife use crossing structures (e.g., the extent of transit, frequency of crossings, effectiveness of measures, etc.).
- To assess the mortality caused by the infrastructure among different wildlife groups and evaluate the effectiveness of anti-mortality measures implemented on the line. To evaluate the risk of mortality for wildlife.
- To assess the effectiveness of fencing and escape devices in relation to wildlife.

After the completion of the fieldwork, the results have been analysed, with key findings including the following:

- In terms of the effectiveness of crossing structures as mitigation measures for barrier effects, it is noted that wildlife frequently uses these structures. Ungulates and large mammals prefer larger structures (oversized ODTs and underpasses), although they also use smaller ones (even 2x2 m). The detailed study of wolves indicates that the railway infrastructure has a minimal barrier effect on this species, with frequent crossings observed from one side of the infrastructure to the other (one crossing every 2.4 days, one every 3.7 days, and one every 5 days for each tagged wolf).

Figure 33.Otter Crossing Through an Adapted Optimal Crossing Structure (OCS)

- Regarding estimated mortality, few incidents have been recorded in the monitored mortality sectors, with Sector 1, located more than 2 km from the ZEPA Otero-Campos, showing the highest number of incidents. It has also been observed that the flow of birds through high-risk areas accounts for 15% (collision risk) and 22% (run-over risk) of the total number of birds crossing the infrastructure.
- Escape devices are used only sporadically, indicating that these structures are underutilised by wildlife, which aligns with findings from previous studies.

Development of internal regulations for the protection of birdlife in overhead contact lines

In line with our commitment to sustainability and considring Spain's rich natural heritage, Adif and Adif-Alta Velocidad published the NAE 121 ADIF Electrification Standard in June 2023. This standard, titled '*Medidas para la protección de la avifauna en la línea aérea de contacto*' (Measures for the protection of birdlife on the overhead contact line), represents a significant milestone at European level. It defines the risks to birdlife associated with overhead contact lines and standardise the measures to mitigate these risks. This document has a strong preventive focus and holds the status of a Standard, making it mandatory for all projects undertaken by Adif-Alta Velocidad.

The purpose of this Standard is to establish a methodology for analysing the risks to birdlife associated with overhead contact lines and to propose the necessary protective measures for both direct current and alternating current lines. It includes a detailed analysis of the risk of collision, electrocution (with a classification of the most common configurations), entrapment, and general risks associated with the nesting of certain species on elements of the overhead contact line. It also includes a detailed description of the elements required for the effective implementation of corrective measures on the overhead contact line, tailored to various configurations.

Additionally, in August 2023, Adif and Adif-Alta Velocidad approved the Technical Instruction (ADIF-IT-301-001-LAC-20) *'Gestión de Electrocuciones de la Avifauna en la Línea Aérea de Contacto'* (Management of Electrocution of Birds on the Overhead Contact Line). This document outlines the procedures to be followed in cases of bird electrocution on the overhead contact line.

This Technical Instruction (TI), which focuses on corrective actions, outlines mechanisms for implementing measures to address electrocution in affected areas. It is unique in that it provides immediate action in response to an incident.

This TI begins with identifying the incident and determining the species involved. Depending on the protection status of the species and its habitat, a corrective area is established that is proportional to these factors.

Figure 34. Anti-collision Devices on the Overhead Line Feeder

➢ Flora

▪ Transplanting of gypsum species before the earthworks for connecting the Madrid-Levante Line with the Madrid-Barcelona Line

Work is ongoing to construct the platform that will link the Madrid-Levante and Madrid-Barcelona High-Speed Lines via a direct bypass near Perales del Río. This will allow all trains on the Madrid-Barcelona Line to access the new Atocha through station and the Atocha-Chamartín tunnel in international gauge.

The area of intervention is characterised by the presence of gypsum vegetation, which is of significant interest due to its specificity, endemism, and status as a Habitat of Community Interest (HCI). This has required the implementation of measures to prevent the construction work from impacting these valuable areas.

In 2023, efforts to protect and conserve important plant species, initiated the previous year, continued. However, these efforts have primarily focused on the land occupied for the construction of the El Mayoral Viaduct.

Relocation work for endemic species has begun with a preliminary survey before starting earthworks within the project area. This survey aimed to characterise and identify plots with gypsum substrates that might support gypsum vegetation. Once the protected specimens were identified, they were marked for transplantation, considering both technical feasibility and the direct and unavoidable impact of the construction work.

The transplants of specimens incompatible with the development of the works, carried out during the 2022 and 2023 campaigns, are detailed in the following table, which lists the species and number of affected specimens:

Table 24. Transplants by Species and Relocation Campaign

Species	Number of Specimens		Campaign/Date of Relocation
	Total	By relocation campaign	
Gypsophila struthium	5,752	5,305	November 2022 – January 2023
		447	December 2023 (26, 27 and 28 December 2023)
Lepidium subulatum	7,557	6,881	November 2022 – January 2023
		676	December 2023 (26, 27 and 28 December 2023)
Limonium dichotomum	48	48	February 2023
Helianthemum squamatum	6	6	November 2022 – January 2023
TOTAL	**13,363**		

Source: Adif-Alta Velocidad, Corporate Management, Corporate Environmental Sub-Department.

The transplanted specimens were relocated to an adjacent area owned by Adif-Alta Velocidad, which has the suitable conditions to support this type of vegetation.

The transplanting work involved manually digging planting holes, filling them with excavated soil, creating planting pits, and providing initial irrigation and mineral fertiliser.

Figure 35.Destination Plot for the Relocated Specimens of *Lepidium subulatum* and *Gypsophila struthium* in 2023

Following these actions, meticulous monitoring of the specimens' progress continues. The transplanted specimens have been observed to be progressing well, particularly the *Lepidium subulatum* specimens.

Figure 36.Regrowth and flowering of *Lepidium subulatum* specimens relocated during the previous campaign.

Additionally, strict protection measures were applied to the areas around the construction site, even though they were not directly affected by the works.

- Measures for controlling and eradicating invasive exotic species in Adif-Alta Velocidad work sites

Aware of the problem caused by invasive alien species [7] and in accordance with Adif-Alta Velocidad 's policy on the protection of biodiversity and ecosystems, numerous actions are being undertaken to prevent the proliferation of invasive alien species on construction sites.

The species being targeted are primarily pampas grass (*Cortaderia selloana*) and butterfly bush (*Buddleja davidii*), which are very abundant in the transport corridors in the northern part of the peninsula.

Figure 37.Mechanical removal operations of *Cortaderia selloana* on the Vitoria-Bilbao-San Sebastián Line

The implemented measures focus primarily on elimination treatments, including both mechanical and manual methods, as well as chemical treatments, to prevent the proliferation of the species. These actions are carried out outside the propagation period of the target species. Additionally, the plant material collected has been disposed of either by burying or shredding and then delivered to an authorized waste manager.

[7] According to the definition included in Law 42/2007 on natural heritage and biodiversity.

In the absence of technical references confirming their effectiveness, Adif and Adif-Alta Velocidad have initiated the creation of a 'Catalogue of Measures for the Eradication of Invasive Alien Species on Land Affected by Railway Infrastructure Works.' This catalogue, based on an initial review of strategies, action plans, and recommendations from public administrations (such as MITERD, Autonomous Communities, and other entities), characterizes all the treatments carried out.

During 2023, work was carried out to monitor the effectiveness of the various treatments. The treatments assessed are shown below:

Table 25. Treatments involving invasive exotic species

Section	Sub-section code and name		Type of track	*Cortaderia selloana*	*Buddleja davidii*
Vitoria-Bilbao-San Sebastián	PV-OTR-02	Pre-maintenance work on the Vitoria-Bilbao-San Sebastián Line	High-Speed	X	X
	PV-OTR-03	New Emergency Exits in the Vitoria-Bilbao-San Sebastián Line Tunnels	High-Speed	X	X
	Y-08	Elorrio-Atxondo	High-Speed	X	X
	Y-09	Atxondo-Abadiño	High-Speed	X	X
	Y-11	Durango-Amorebieta	High-Speed	X	X
	Y-14	Lemoa-Galdakao	High-Speed	X	X
	Y-C2	Mondragón-Elorrio-Bergara. Sector 2	High-Speed		X
	Y-C3	Mondragón-Elorrio-Bergara Sector 3	High-Speed	X	

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

➢ Water

▪ Protective Measures for the Sierra Gorda Aquifer

Construction Project for the Platform of the High-Speed Line - Antequera to Granada Section: Viaduct over the Bobadilla-Granada Railway - Loja Bypass Riofrío positions its activities within the Sierra Gorda – Zafarraya hydrogeological unit, which is composed of Jurassic white zoolitic limestones. This karst formation is characterised by its high permeability, which, combined with the proximity of the saturated area of the aquifer and the land surface, could allow potential contaminants to reach the aquifer's saturated area.

Additionally, it should be noted that at the end of this subsection, and downstream according to the underground flow, lies the Riofrío spring source. Its waters are used to supply the population of Riofrío and for other activities requiring high water quality, such as trout and sturgeon farming. Due to its significant biotic, abiotic, and socio-cultural values, this spring was declared a Natural Monument in April 2019 and is part of the *Red de Espacios Naturales Protegidos de Andalucía* (Protected Natural Spaces Network of Andalusia).

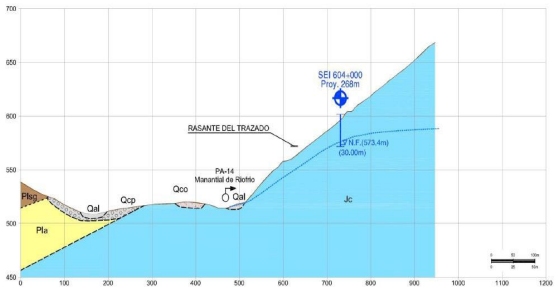


Figure 38. Hydrogeological Profile at the Riofrío Spring

In this context, the project's design includes a range of measures to prevent potential contaminants from reaching the various levels of this hydrogeological system, thereby minimising the impact on the aquifer and biodiversity, and protecting the values of this unique area. The system consists of the following elements:

- A waterproofing system for the platform, which includes a combination of drainage geocomposite and drainage geomembrane placed between the sub-ballast layer and the formation layer. This setup prevents water falling on the platform from seeping into the embankment and redirects it to the platform ditches, between kilometre points 1+020 and 1+680.
- Ditches on both sides of the platform to intercept water collected by the waterproofing system and channel stormwater to a hydrocarbon retention basin.
- A hydrocarbon retention basin equipped with a degreaser and hydrocarbon trap before discharging the water into the natural drainage network.

Figure 39.Platform Waterproofing Before Sub-ballast Installation

The implementation of these measures ensures minimal impact on the water quality of the hydrogeological system and the Riofrío Spring.

8. INTEGRATION OF HIGH-SPEED LINES INTO THE SURROUNDINGS

8. INTEGRATION OF HIGH-SPEED LINES INTO THE SURROUNDINGS

ENVIRONMENTAL INTEGRATION OF PROJECTS

3-3 | 304-2 | 308-2

The construction of railway infrastructure is one of the most environmentally significant activities. The length of active construction work in 2023 was 1,079.06 km.

The Ministry of Transport and Sustainable Mobility has delegated the approval of projects assigned to this public business entity to the president of Adif-Alta Velocidad. Additionally, according to Adif-Alta Velocidad's Statute, this entity has the authority to oversee the projects it approves and to certify compliance with the EIS/EIR, if applicable.

Although each action has its own unique characteristics and circumstances, the implementation of new railway lines, or modifications to existing lined –including conditioning, improvement, remodelling, adaptation, and maintenance– can generate environmental impacts. These impacts must be properly characterised, evaluated, and considered both during the planning and project drafting phases, as well as during the execution of the works. Thus, all necessary preventive, corrective, complementary, and compensatory measures to minimise the environmental impact of these infrastructures are planned and subject to ongoing control and monitoring.

All environmental integration appendices of the projects are reviewed to ensure compliance with current environmental regulations, Adif-Alta Velocidad's internal rules and recommendations, and, where applicable, with the EIS/EIR.

To ensure compliance with Environmental Impact Assessment (EIA) legislation, all projects undergo screening. This determines whether or not they require an EIA. If this procedure is not required, an exemption note, and an environmental suitability report are issued as a preliminary step before approval.

For projects requiring an EIS/EIR, a validation document is issued after the review, correction, and supervision process (depending on the case: EIS/EIR compliance certificate or EIS/EIR adequacy report), as a prior and necessary step before the project can be approved.

Table 26. Environmental Supervision of Projects at Adif-Alta Velocidad (Number of Reports per Year)

Type:	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023*
Notes of Exemption from Environmental Impact Assessment Procedures	16	7	17	3	28	15	18	22	11	8
Environmental Compatibility Reports	12	5	8	3	28	15	18	22	11	8
Adequacy reports to EIA	31	40	25	28	48	24	13	28	30	58
Certificate of compliance with the EIA	12	10	0	9	26	17	18	12	12	11
Environmental review report	142	194	152	162	265	227	207	225*	296	417
Total	**214**	**256**	**202**	**205**	**395**	**298**	**274**	**309**	**360**	**502**
Environmentally completed projects	**nd**	**nd**	**39**	**40**	**100**	**54**	**49**	**62**	**53**	**77**
Documents Submitted for Review	**nd**	**nd**	**72**	**85**	**107**	**94**	**86***	**86**	**105**	**419**

*Total data from Adif, Corporate Maintenance and Upkeep Department, Corporate Technical Department, Corporate Resources Sub-Department are not included.

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department.

ENVIRONMENTAL MONITORING OF THE WORKS

3-3 | 304-2 | 308-2

To ensure compliance with the requirements set out in Environmental Impact Assessments (EIAs) and Environmental Impact Reports (EIRs) as well as other regulations, and to prevent potential environmental impacts, **Adif-Alta Velocidad** implements a rigorous system of environmental monitoring and oversight for construction projects.

The main objective is to ensure and document that environmental actions, or those with potential environmental effects, comply with environmental legislation, internal environmental commitments, and the requirements outlined in EIAs and EIRs, and other resolutions. Additionally, as part of this process, efforts are made to ensure that the work is carried out in accordance with the project and the conditions under which it was authorised. The effectiveness of the implemented measures is also assessed, and any necessary supplementary measures are recommended to the project management team if needed.

For projects subject to EIAs or EIRs, this environmental monitoring process covers both the construction phase (for which an Environmental Site Manager, or ESM, is appointed) and the first three years following its completion/commissioning. During this period, specialised teams monitor the effectiveness of corrective measures, focusing primarily on wildlife, noise, and ecological-landscape restorations.

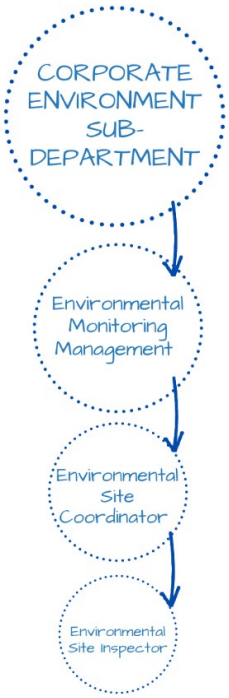


Figure 40.Organisation of Environmental Monitoring for projects requiring EIS/EIR

In each section of the various lines under construction, the Environmental Site Manager (ESM) is responsible for environmental monitoring and control, in line with the specifications derived from Adif-Alta Velocidad's internal environmental standards.

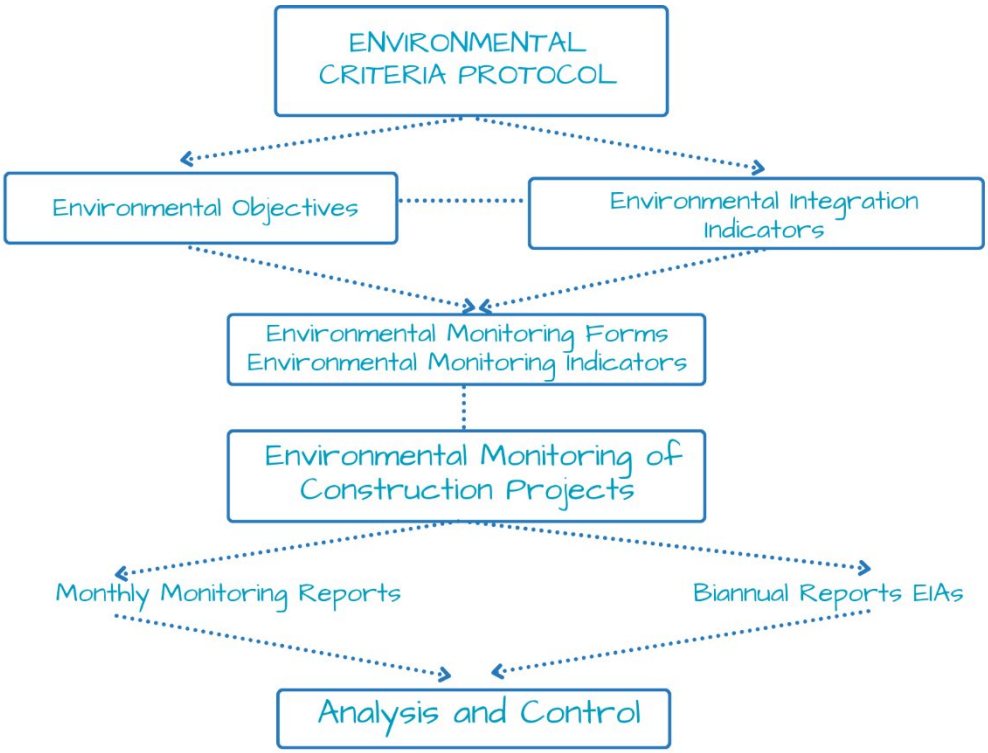


Figure 41. Procedure for Environmental Monitoring of Construction Projects

For projects not subject to EIAs/EIRs and with lower environmental impact, only the construction phase is covered. For this purpose, the Corporate Environmental Sub-Department appoints an Environmental Site Inspector (ESI), who is responsible for implementing the preventive and corrective measures specified in the Construction Project and the contract documentation, as well as ensuring compliance with applicable environmental regulations.

During 2023, environmental monitoring was carried out for 34 active construction projects, resulting in 296 monitoring reports.

Table 27. Environmental Oversight During the Construction Phase for Modified Projects, Supplementary Projects, and Emergency Works at Adif-Alta Velocidad (No./year)

Type:	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Environmental Review Reports (ERR)	36	31	44	77	68	17	42	56	52	63
EIA Compliance Reports for Modified Projects	26	26	27	54	58	18	33	47	41	48
EIA Compliance Reports for Modified Projects	5	4	7	12	6	3	2	1	*N/A*	N/A
Emergency construction works	0	3	6	5	1	1	3	6	4	5
Notes of Exemption from Environmental Impact Assessment Procedures	0	1	2	0	1	1	6	8	10	10
Environmental Suitability Reports	0	1	2	0	1	1	4	2	5	5
Total	**67**	**66**	**88**	**148**	**135**	**41**	**90**	**120**	**112**	**131**

N/A: Not Applicable (Under the current Public Procurement Act, processing complementary projects during the construction phase is no longer permitted)

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department.

Table 28. Environmental Monitoring Reports Required by EIA During the Construction Phase (No. of reports/year)

Type of report	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Before Work Commences	32	57	11	32	12	41	39	29	46	41
Parallel to the Site Layout Verification Report	37	60	17	21	12	35	26	37	44	44
Periodic	247	286	333	352	225	248	412	241	286	362
Prior to the Acceptance of the Work	18	35	10	23	45	55	50	46	25	45
Addenda, Summary Reports, or Other Annual Reports	0	1	0	0	0	0	0	7	1	0
Total	**334**	**439**	**371**	**428**	**294**	**379**	**527**	**360**	**402**	**492**

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department.

Table 29. Environmental Monitoring Reports Required by EIA in Post-Acceptance Phase (No. of reports/year)

Type of report	2015	2016	2017	2018	2019	2020	2021	2022	2023
Landscape Integration Reports	14	7	4	3	10	11	13	7	5
Wildlife Monitoring Reports	1	4	5	5	1	2	4	7	7

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department.

Table 30. Monthly Environmental Monitoring Reports for Construction Works as Required by Internal Procedures (Projects with EIA/EIR)

Type of report	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Monitoring reports	-	-	-	-	-	-	950	1,054	1,187	1,361
Monthly Average (No.)	84	97.3	88	106	76	87	79	88	99	113
Annual Total (No.)	1,008	1,168	1,058	1,272	910	1,041	950	1,054	1,187	1,361

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department.

Table 31. Environmental Monitoring Reports for Construction Works as Required by Internal Procedures (Projects not requiring EIA/EIR)

Type of report	2018	2019	2020	2021	2022	2023
Initial Reports	5	5	5	6	34	23
Visit Reports	65	39	94	264	317	296
Periodic	0	4	1	10	16	22
Final Reports	13	9	7	5	11	2
Annual Total (No.)	83	57	107	285	378	343

* A single report is counted for short-term works (HSR maintenance).

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department.

Environmental Objectives and Environmental Integration Indicators

Since 2005, the current Corporate Environmental Sub-Department has defined the systematic monitoring of environmental aspects in the construction of railway lines subject to EIAs and the compliance with established environmental objectives. This system allows for:

- Synthesising and standardising information on key issues, making it comparable across different scales (sections, lines, overall).
- Assessing the results and progress made in relation to previously established priority objectives.
- Establishing new courses of action in a process of continuous improvement.
- Communicating and disseminating the results both internally and externally.

This monitoring is conducted based on common foundations and uniform criteria for all projects, which allows for the comparison of information obtained from each one. Consequently, this enables the drawing of overall conclusions and, where appropriate, the establishment of new measures or guidelines to enhance the environmental management to be implemented.

The indicator system currently in place is organised around two categories of indicators:

Environmental Integration Indicators

BASIC INDICATOR OR ENVIRONMENTAL PARAMETER

These measure the extent to which previously selected environmental measures and activities have been adopted Currently, there are 79 parameters defined that apply to all projects.

KEY INDICATOR

Based on the basic indicators, Environmental Integration Indicators for the projects are established. These summarise key information related to the objectives set by the Environmental Department, focusing on two fundamental aspects of sustainable construction: minimising environmental impact and ensuring effective integration of the projects.

Table 32. Environmental Objectives and Environmental Integration Indicators

Environmental Objective	Environmental Integration Indicators
1.- Preserve the Natural Environment	– Minimise land use – Reduce encroachment on protected natural areas – Minimise impact on areas of high natural value
2.- Preserve Cultural Heritage	– Area occupied under archaeological supervision – Proper management of archaeological finds
3.- Preserve Soils	– Removal of topsoil from the construction area – Conservation of topsoil
4.- Preserve River Systems and Riparian Vegetation	– Fully restored riverbanks – Respect for natural river dynamics – Main rivers unaffected
5.- Prevent Pollution	– Suitable equipment for the collection and treatment of wastewater – Proper disposal in line with required standards – Effectiveness of noise control measures in residential areas – Effectiveness of measures to protect air quality
6.- Promote Circular Economy	– Reuse and optimisation of natural materials excavated during construction – Utilisation of surplus natural excavation materials – Recycling of construction and demolition waste
7.- Protect Wildlife	– Respect for sensitive periods of key species – Ensure infrastructure allows access for ungulates – Ensure infrastructure allows access for small and medium-sized animals – Proper fencing in areas with ungulates
8.- Restoration of the Environment with Ecological and Landscape Criteria	– Decommissioning and clearing of occupied land – Geomorphological re-shaping of occupied areas – Vegetation restoration of surfaces

**Includes the following two basic indicators: Spreading topsoil on occupied areas and sowing and planting on affected areas*

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

Level of compliance with the established environmental objectives

304-1 | 304-2 | 304-3

The monitoring of environmental integration and compliance with established environmental objectives is based on the quarterly values obtained for environmental integration indicators across the different high-speed rail lines under construction. The length of both active and completed projects subject to environmental monitoring, along with the environmental integration indicators, is calculated jointly for Adif and Adif-Alta Velocidad.

Thus, the scope of the monitoring, which is reflected in the key Environmental Integration indicators, mainly covers platform works, track laying and gauge changing works, as well as the construction of High-Speed Network Access Points (*Puntos de Acceso a la Red de Alta Velocidad,* PAET), stations, and related environmental measures and supplementary works to completed Platform Projects (such as overpasses, emergency exits, and ventilation shafts), as undertaken by Adif and Adif-Alta Velocidad.

The results of this monitoring show the values obtained for each of the mentioned Environmental Indicators, considering the total amount of active or completed work during the year, as well as its progress over time.

This type of analysis offers a general overview of the environmental performance achieved in the projects. It also highlights the overall trends of the established priority environmental objectives and helps identify areas where existing mechanisms may need to be strengthened or where new actions might be proposed as part of a continuous improvement process.

> *The length of projects monitored over the three quarters of 2023 was 1,079.06 km, of which 604.31 km were platform works.*

Since the launch of Environmental Monitoring by lines, a total of 3,724.9 km of projects have been completed, with 110.6 km finished in 2023.

In 2023, 110 projects were monitored, of which 18 started this year and 15 were completed during the year.

Table 33. Length of ongoing projects monitored for environmental purposes by quarter (km). Year 2023 *

	January – April	May – August	September – December
Almería - Granada	2.60	2.60	2.60
Bobadilla - Algeciras	30.80	0.00	0.00
Bobadilla - Granada	1.70	1.70	1.70
Centre	4.00	4.00	23.40
Córdoba - Málaga	8.45	8.45	8.45
Mediterranean Corridor	243.00	247.20	313.24
North-Northwest Corridor	12.01	12.01	12.01
Atlantic Corridor	5.57	5.57	5.57
Madrid-Cartagena Railway Corridor	0.00	0.00	17.75
Madrid - Extremadura	116.07	122.87	122.87
Madrid - Zaragoza - Barcelona - Fra. French	13.97	13.97	18.63
Madrid-Castilla La Mancha- Valencian Community-Region of Murcia.	19.53	19.53	19.53
Medina del Campo - Salamanca - Fuentes de Oñoro	1.49	1.49	1.49
North-east	19.68	19.68	20.53
New Railway Network in the Basque Country	47.92	47.92	48.37
New Railway Access to Asturias	17.99	17.92	1.97
New Railway Access to Galicia	20.55	20.55	20.55
New Railway Access to Northern and North-Western Spain	0.20	0.20	0.20
Other Actions in Conventional Network	42.47	42.47	42.47
Ourense - Monforte de Lemos - Lugo	251.70	251.70	262.56
Palencia-Santander	72.13	73.83	73.85
Seville-Cádiz	4.40	4.40	4.40
Length of active projects for the quarter	**936.23**	**918.06**	**1,022.14**
Length of active projects for the year		**1,079.06**	

* To calculate lengths by quarter, the total is based on the sum of the lengths of projects that have been administratively active for at least one day within that quarter. Similarly, for annual length calculations, the total is based on the sum of the lengths of projects that have been administratively active for at least one day during the year 2023. As a result, some projects may be active in one quarter but not in another, depending on their start and end dates and the execution period.

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department.

Table 34. Length (km) of completed projects annually that have been subject to environmental monitoring *

Line	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Almería - Granada	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.6	**2.6**
Córdoba - Málaga	19.9	30.7	-	-	17.9	-	3	-	-	-	-	-	-	-	-	-	-	-	-	**71.5**
Bobadilla-Granada	-	-	-	-	-	6.2	5.1	15.7	20.6	15.9	10.7	-	22.6	52.8	32.6	27	-	2.7	1.7	**213.6**
Madrid-Segovia-Valladolid	-	-	18.8	102.7	-	-	-	-	5.4	-	-	-	-	-	-	-	-	-	-	**126.9**
Madrid-Castilla La Mancha-Valencian Community-Region of	0.8	51.5	116.7	88.9	254.1	46.7	37.2	104.5	28.2	23.1	39.3	23.6	-	65.6	36.1	-	10.3	1	-	**927.6**
Madrid-Zaragoza-Barcelona-French border	9.6	16.6	38.1	20.3	19.6	40.4	25.2	11.1	3.4	10.4	10.3	-	-	0.4	2.6	78.7	1.2	0.3	10.9	**299.1**
New Railway Access to Galicia	-	-	-	-	5.3	57.1	24.7	-	-	60.2	-	32.6	119.6	75.7	53.1	209.4	13.8	0.1	-	**651.6**
New Railway Network in the Basque Country	-	-	-	-	-	5.2	2.5	3.5	11.3	5.6	8.4	-	-	-	5.4	5	5	4.9	-	**56.8**
New Railway Access to Asturias	-	-	-	-	-	-	34.4	4.9	16.5	-	-	0.5	-	-	4.3	-	49.2	-	16	**125.8**
Mediterranean Corridor	-	-	-	-	-	-	-	6.3	35.4	-	-	-	-	-	0.5	61.9	3	-	22	**129.1**
North-Northwest Corridor	-	-	-	-	-	-	14.5	87.7	63.1	14.6	191	32.1	36.5	-	24.8	39.2	1.6	-	-	**505.1**
Madrid-Centre	-	-	-	-	-	-	-	0.7	-	7.4	-	-	32	-	-	-	-	-	3	**43.1**
Madrid-Extremadura	-	-	-	-	-	-	-	36.2	24.2	37.3	8.5	-	-	21.5	27.5	95.1	68.9	60.2	-	**379.4**
North-east	-	-	-	-	-	-	-	-	2.8	-	-	-	-	-	-	-	11.1	-	5	**18.9**
Ourense-Monforte de Lemos - Lugo	-	-	-	-	-	-	-	-	-	-	-	-	-	8.6	-	-	-	14.2	18.6	**41.4**
Seville - Cádiz	-	-	-	-	-	-	-	-	-	-	-	-	-	26.4	-	-	-	-	-	**26.4**
Madrid-Cartagena Railway Axis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27.5	0.5	-	-	-	**28**
Bobadilla - Algeciras	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.7	-	-	30.8	**47.5**
Other Actions In Conventional Network	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.1	-	18.3	-	**22.4**
Madrid - Alcázar de San Juan - Jaén	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.1	-	-	-	**8.1**
Medina del Campo - Salamanca - Fuentes de Oñoro	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03	-	**0.03**
Total	**30.3**	**98.8**	**173.6**	**211.9**	**296.9**	**155.6**	**146.6**	**270.6**	**210.9**	**174.5**	**268.2**	**88.8**	**210.7**	**251**	**214.4**	**545.7**	**164.1**	**101.7**	**110.6**	**3724.9**

* Only projects with environmental relevance are included.

** Revised in relation to the 2022 Environmental Report.

Source: Adif-Alta Velocidad, Corporate Management, Corporate Environmental Sub-Department, Level of compliance with the established environmental objectives in High-Speed Lines construction, 2023 (June 2024)

Objective 1: Preserve the Natural Environment

Minimise land use (ha/km)

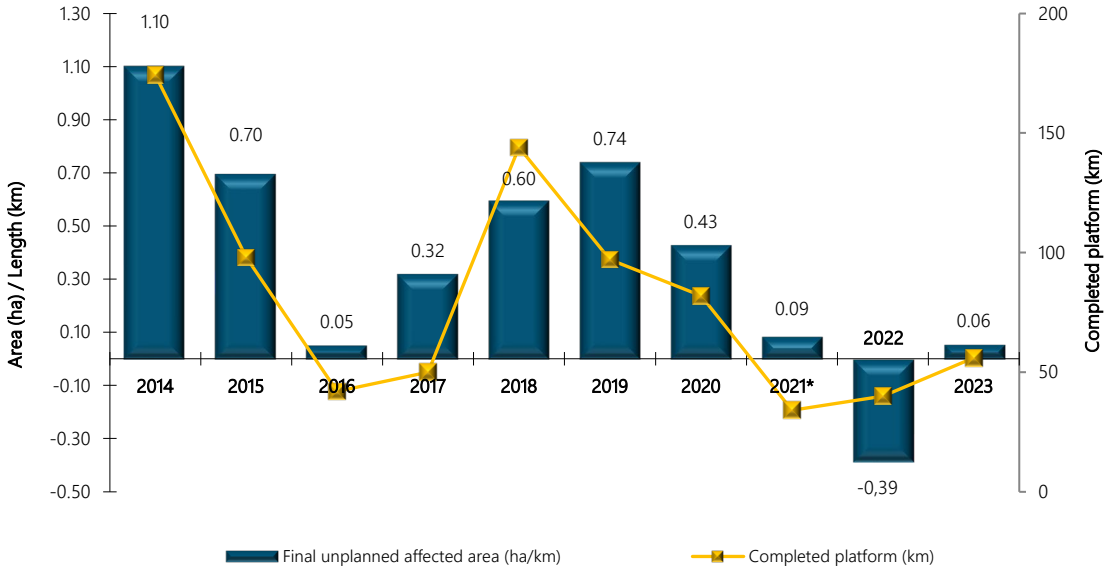
During the construction process, discrepancies were noted between the intended footprint specified in the plans (whether original or revised) and the actual area impacted during execution. The main cause is the use of different borrow pits and dump sites than those initially planned, along with the need to expand access routes and auxiliary facilities.

The following chart shows the length of completed platform work since 2014, along with the final unplanned affected area per kilometre of platform work completed each year.

In 2023, the overall discrepancy between the final occupied area and the initially projected area was 556 m^2 per kilometre of completed work, the lowest recorded in the past 10 years, alongside 2016.

In 2022, the value for this indicator across all completed platform works was -0.39 hectares per kilometre. This exceptional situation was due to the completion of two projects on the Madrid-Extremadura line, where some of the auxiliary elements[8] outlined in the construction plans were not used.

Chart 17. Unplanned Affected Area (ha/km) (2014-2023)



** Data updated in relation to the 2022 Environmental Report.*

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

Minimise Occupation on Protected Natural Areas (m^2/km)

Minimising impact on protected Areas of High Environmental Value is a priority for integrating the projects promoted by Adif and Adif-Alta Velocidad. This consideration is taken into account from the early stages of planning and project design, and throughout the entire construction phase. However, sometimes the routes need to navigate around extensive protected areas, or even cross through them. As a result, it is inevitable that certain areas will be

[8] Auxiliary elements of construction include borrow pits and earthfills, site access roads, and areas for auxiliary facilities (AFAs).

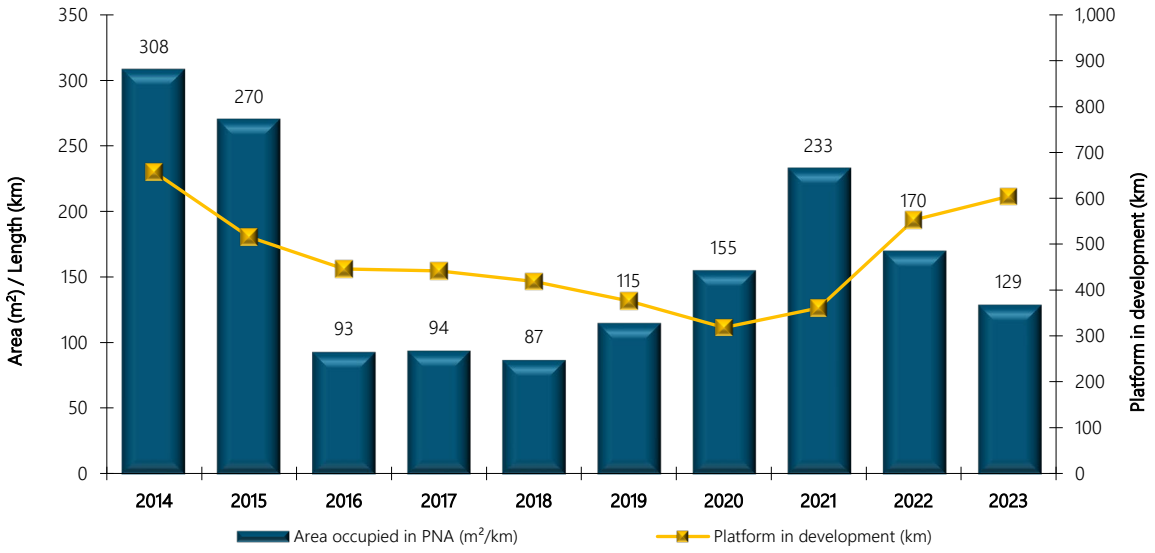
occupied by auxiliary elements, especially in the case of large tunnels on the edge of Protected Areas. In these cases, the area occupied is kept to the minimum necessary, and coordination is maintained with the regional authority and the managing body of the respective area.

The following graph shows the average area occupied by auxiliary elements in Protected Natural Areas relative to the platform lengths in active projects over the past ten years. The indicator is calculated by adding up the areas of Protected Natural Areas occupied by auxiliary elements in active platform sections and dividing this total by the overall length of those sections.

In 2023, despite the significant increase in the average lengths of active works since 2021 (from 361 to 604 km), the value of this indicator has decreased substantially, falling from 233 to 129 m^2 per kilometre of active platform work occupied in Protected Natural Areas.

This represents a total area of 7.79 hectares occupied in 2023, which, apart from the areas used for permanent access routes to serve the infrastructure, is restored at the end of the project through geomorphological reshaping and revegetation following ecological and landscape principles.

Chart 18. Average Area Occupied by Auxiliary Elements in Protected Natural Areas (m^2/km) (2014-2023) *



** Data updated in relation to the 2022 Environmental Report.*

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

Minimise Occupation in Areas of High Natural Value (m^2/km)

The principle of minimising impact on legally protected areas during railway construction is also extended to other Areas of High Environmental Value

The following are considered Areas of High Environmental Value:

- Listed archaeological sites
- Lagoons, wetlands, and floodplains
- Rivers, streams, and channels with natural vegetation
- Areas with well-preserved and developed natural woodland
- Highly permeable recharge zones

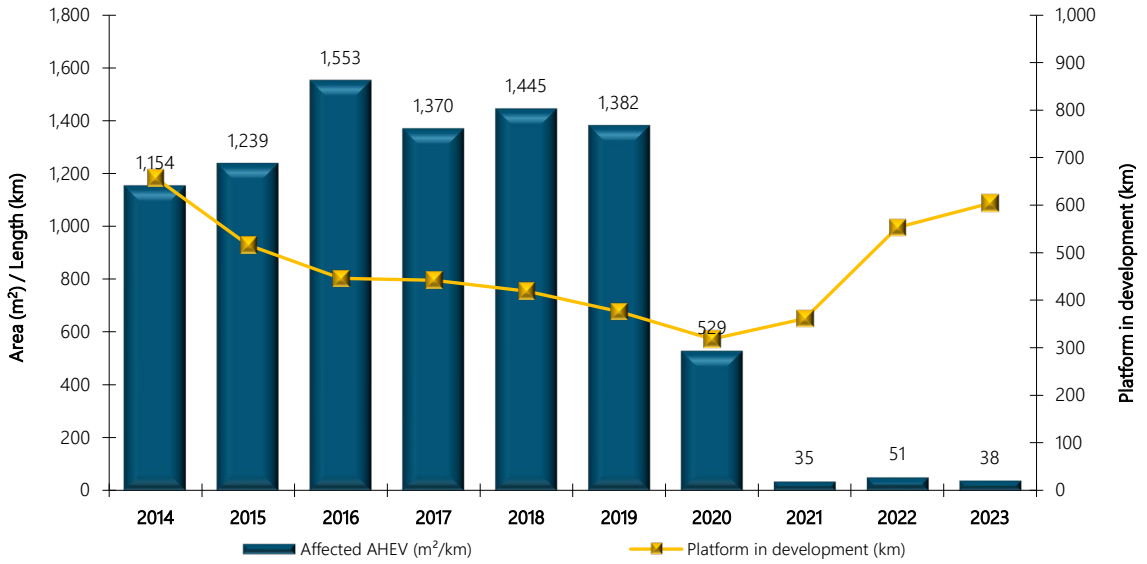
The following graph illustrates the ongoing platform length work over the past ten years, along with the area occupied by auxiliary elements per kilometre of platform under construction, for Areas of High Natural Value each year.

In 2023, the total Areas of High Environmental Value affected by the auxiliary elements required for the execution of works was 2.30 hectares, which equates to 38 square metres per kilometre of active platform work for that year.

This value, similar to 2021 and 2022, reflects a low level of occupation of such spaces during infrastructure construction. In most cases, these areas involve occupation in areas of natural wooded vegetation or along watercourse margins, which are necessary for constructing viaducts. This type of occupation is generally carried out in coordination with the relevant River Basin Authority or the appropriate Environmental Administration.

Finally, it should be noted that, just as with the occupation of Protected Natural Areas, this surface is restored at the end of the project through geomorphological reshaping and revegetation following ecological and landscape criteria.

Chart 19. Average Area Occupied by Auxiliary Elements in Areas of High Natural Value (m^2/km) (2014-2023) *



** Data updated in relation to the 2022 Environmental Report.*

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

Objective 2: Preserve Cultural Heritage

Percentage of the area occupied by the works that is subject to archaeological monitoring and supervision (%)

Before starting work on the projects, surface surveys and other preventive measures for potential archaeological finds are conducted, as required by the relevant regional heritage authority.

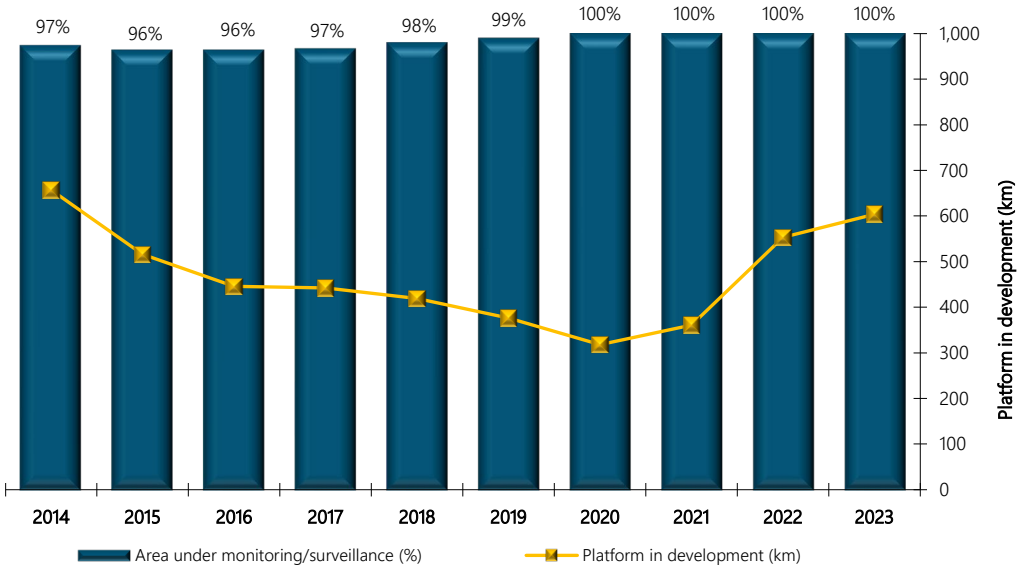
These cultural heritage protection measures are implemented across the entire area to be occupied by the works (including the route and auxiliary elements). It is extremely rare to start work in areas where the possibility of archaeological finds has not been previously ruled out.

The following graph shows the length of ongoing platform work over the past ten years, along with the annual average percentage of the area under archaeological monitoring and supervision relative to the total area occupied.

This year, 100% of the project area has been subjected to archaeological monitoring and the preventive measures prescribed by the Competent Authority, maintaining the same standard as in previous years.

Since the compliance value for the specified indicator is 100%, it can be concluded that archaeological monitoring in railway projects is a well-established and controlled practice by the project team. The trend has remained steady since monitoring began, with consistently high compliance percentages.

Chart 20. Percentage of Occupied Area Under Archaeological Monitoring and Supervision (%) (2014-2023) *



** Data for active platform was updated in relation to the 2022 Environmental Report*

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

Implementation of required measures by the competent authority in the event of archaeological and palaeontological finds (%)

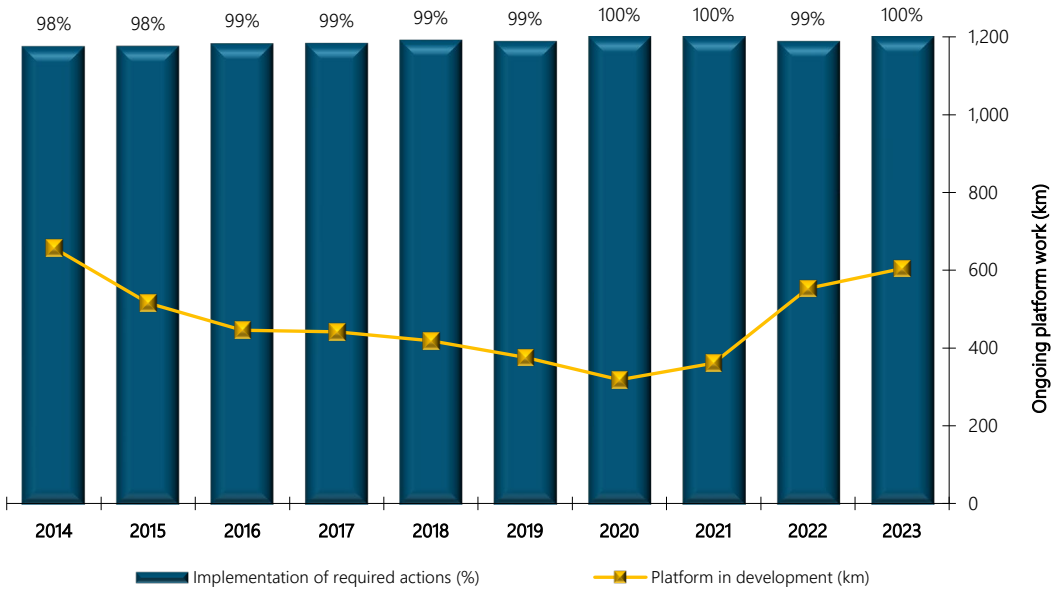
During the execution of the works, archaeological and/or palaeontological finds of varying significance may be encountered. From the moment they are discovered on site, work is carried out in collaboration with the Department of Culture of the relevant regional government, following the measures prescribed by that authority. These actions can include anything from cataloguing and subsequently covering the remains to relocating the archaeological artefact, displaying it in a museum, or even modifying the layout if more significant finds are discovered.

The following graph illustrates the platform lengths work over the past ten years, along with the average annual percentage of findings with no recorded incidents relative to the total number of discoveries.

This indicator has consistently exhibited very high values from the outset of monitoring, reflecting the emphasis and importance placed on heritage preservation during the execution of the works.

It is worth noting that the number of discoveries accumulated during ongoing works in 2023 totals 350 new archaeological and palaeontological finds, with all necessary actions prescribed by the relevant authority being implemented.

Chart 21. Percentage of archaeological and palaeontological finds on which actions prescribed by the relevant authority have been implemented (2014-2023) *



** Data for active platform was updated in relation to the 2022 Environmental Report*

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

Objective 3: Preserve Soils

Area affected by works where topsoil is removed for subsequent use in restoration tasks (%)

Topsoil provides the physical, chemical, and biological support necessary for the existence and development of vegetation. This surface layer of soil plays a crucial role in the environmental integration of areas affected by construction work, as well as in their stabilisation and protection against erosion.

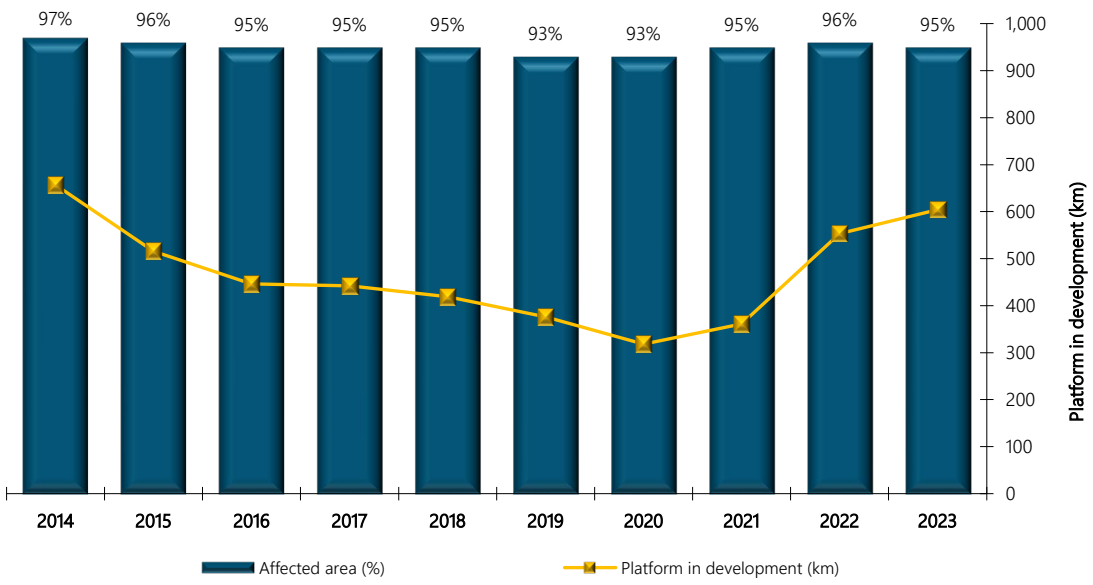
Given that it is considered a unique and slowly renewable natural resource, within the framework of Adif and Adif-Alta Velocidad's commitments to environmental protection and biodiversity, all railway infrastructure construction projects, as well as the environmental monitoring programmes for these works, include the recovery, storage, and maintenance in good condition of the existing topsoil on all areas impacted by the construction. This topsoil is subsequently reused in the soil and vegetation restoration tasks for the affected areas.

The following graph shows the length of ongoing platform work over the past ten years, along with the annual average percentage of surface area from which topsoil has been removed relative to the area occupied.

In 2023, 95% of the area affected by the works had the topsoil properly removed to ensure the correct restoration and landscape integration of the alignment and associated ancillary elements. This value remains more or less constant compared to previous years, with figures exceeding 90% in all cases, reflecting that this activity is a very common practice, systematically carried out in nearly all of the projects that have remained active to date.

The lowest values are found in sections that traverse areas with little topsoil, or where the topsoil is of poor quality or contaminated. In these situations, the decision is made not to remove topsoil from part of the surface. Instead, the deficiency is addressed either through amendments or by providing topsoil from external sources for use in restoration work.

Chart 22. Surface area of works from which topsoil is removed (%) (2014-2023) *



** Data for active platform was updated in relation to the 2022 Environmental Report*

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

Topsoil volume retained for restoration in the works (%)

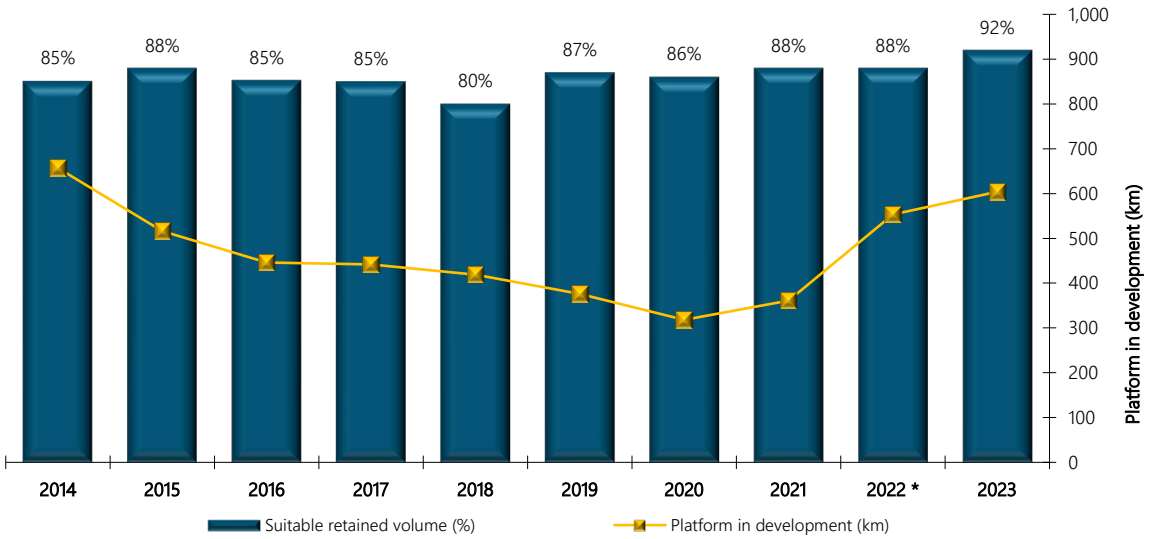
Just as important as removing the topsoil at the start of the project for later use is its proper preservation until it is reused. Well-preserved topsoil retains the physical and chemical properties that allow vegetation to develop on it.

The following graph shows the length of the platform in progress over the past ten years, as well as the average annual percentage of topsoil volume that is in suitable condition for restoration in the works.

The accumulated volume of stripped topsoil in ongoing works during 2023 has been 4,804,563 cubic metres, of which 95% has been preserved for restoration according to data from December 2023. The remaining topsoil (240,228 cubic metres) was discarded due to being compacted, mixed with other materials, waterlogged, or, simply, having lost the properties suitable for supporting vegetation in the work area.

It follows that, during 2023, the value of this indicator improved by 4% compared to the previous year and continues the upward trend of the last three years.

Chart 23. Topsoil volume retained for restoration in the works (%) (2014-2023) *



** Data updated in relation to the 2022 Environmental Report.*

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

Objective 4: Preserve River Systems and Riparian Vegetation

Riversides fully restored after impact (%)

Riversides are considered fully restored when the conditions are returned to their state prior to the start of the work.

The integration of affected waterways into natural terrain must include, at least, the following actions:

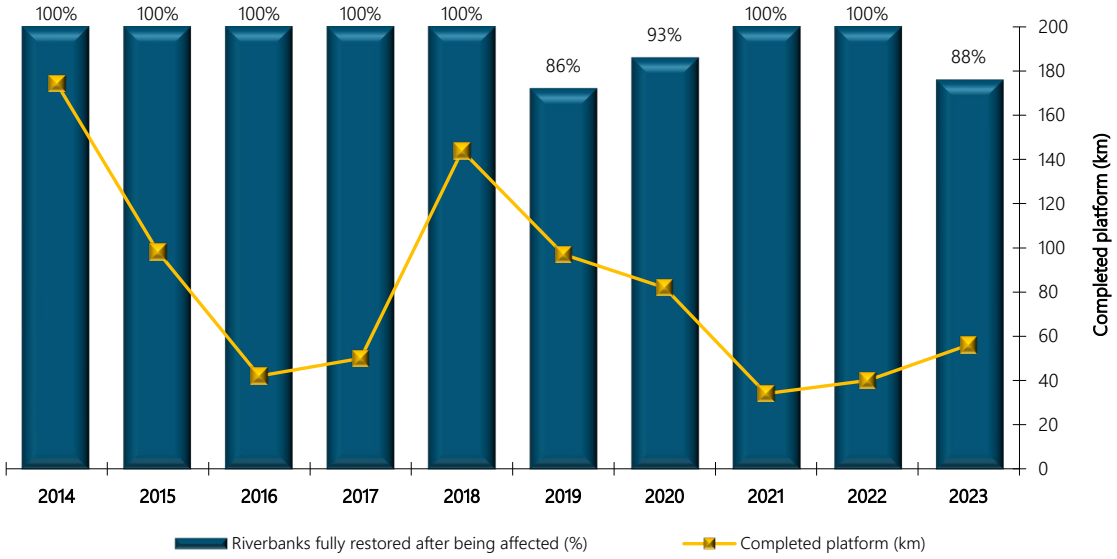
- Geomorphological reconfiguration of the area following ecological and landscape criteria
- Complete removal of construction debris
- Spreading of topsoil
- Hydroseeding and/or plantings appropriate to the surrounding environment

This indicator is only recorded for completed works to avoid the influence of the execution pace on the final result obtained. It counts the number of waterways that have their riversides fully restored, according to the previous criteria, relative to the total number of affected waterways.

The following graph shows the length of completed platform work, as well as the evolution of this indicator over the past ten years during which it has been monitored.

In 2023, 8 areas of altered watercourses were recorded among the total completed works. All of them have had their riversides fully restored, except for the riverside of the Hozgarganta River (Cádiz). In this case, new works are planned within its scope during Phase II of the track renewal project between Ronda and Algeciras, with full restoration expected upon the completion of all the planned activities.

Chart 24. Complete restoration of the affected area (2014-2023)



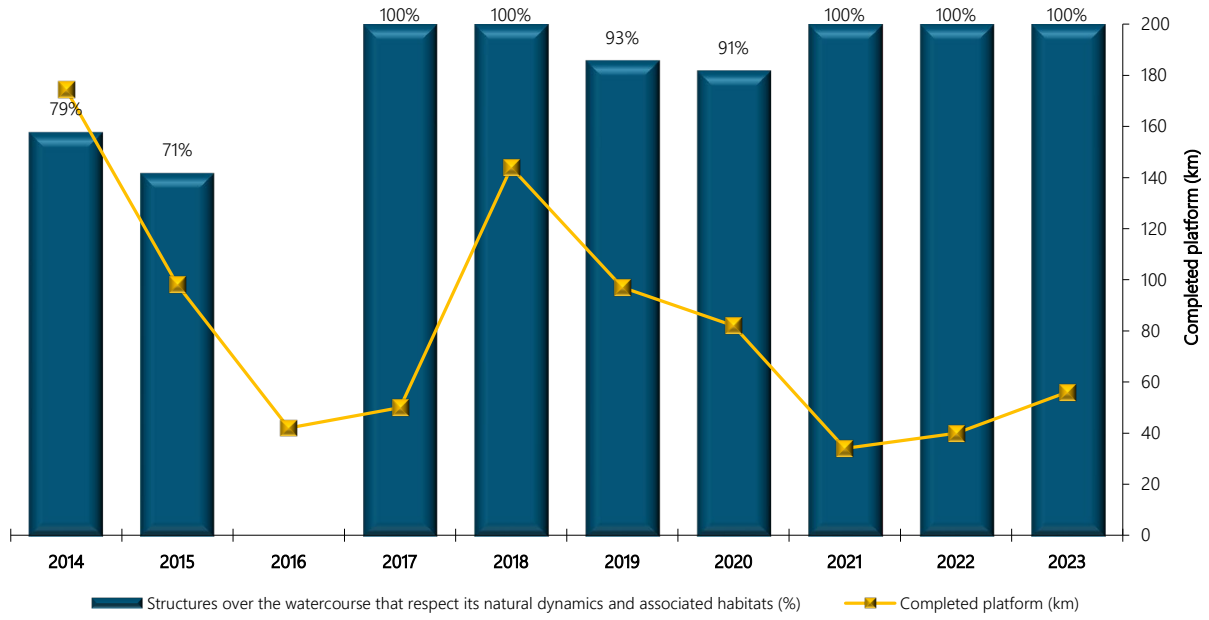
Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

Structures over watercourses that preserve their river dynamics and associated habitats (%)

The objectives for minimising the impact on watercourses crossed by the alignment primarily involve preserving the space of their banks as local ecological corridors (maintaining a minimum distance of 5 metres between the supports and the banks of the watercourse) and avoiding permanent alteration of the hydraulic regimes using piers or other structures within the watercourse.

The evolution of the indicator over the last ten years is detailed in the following graph. In 2023, only one project involving viaducts over watercourses was completed. This structure did not place piers in the watercourse, and its abutments were located more than 5 metres from the watercourse, achieving a 100% compliance with the environmental integration objective.

Chart 25. Structures over watercourses with piers outside the watercourse and abutments more than 5 metres away (2014-2023) *



** In 2016, no projects involving viaducts over watercourses were completed.*

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

Major rivers unaffected by infrastructure (%)

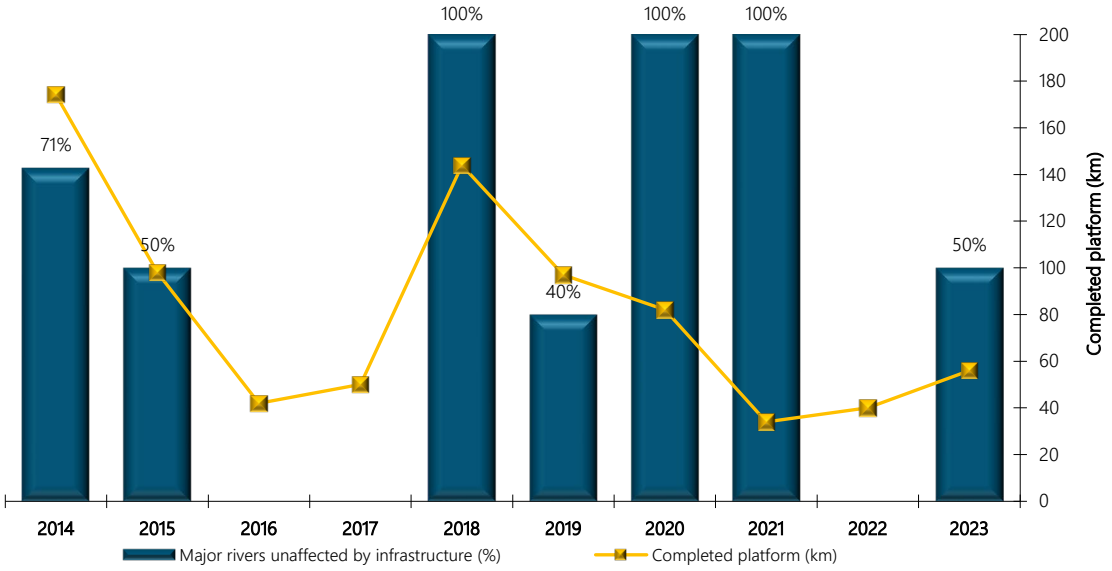
'Major rivers' are defined as those specified in Article 3 of the Water Framework Directive (Directive 2000/60/EC), and a river is considered unaffected when, after the completion of the project, it is restored and ecologically and aesthetically integrated as follows:

- No permanent straightening, diversion, or channelisation executed during the work
- No piers within the watercourse
- No abutments within 5 metres on either side of the watercourse
- No permanent occupation due to the construction of the line

It should be noted that in 2023 only two of these major rivers were intersected during the infrastructure construction and, as previously mentioned, restoration work on the riverside of the Hozgarganta River is still pending because further actions are required in the execution of subsequent projects. Full restoration is planned once all the actions scheduled within its scope are completed.

Below is a comparative graph for the last ten years that analyses the percentage of major rivers unaffected by infrastructure, based on the length of completed platform work.

Chart 26. Major rivers unaffected by infrastructure (%) ((2014 -2023) *



** In 2016, 2017, and 2022, no projects crossing 'major rivers' were completed*

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

Objective 5: Prevent Pollution

Areas properly equipped for the collection, treatment, or drainage of construction wastewater (%)

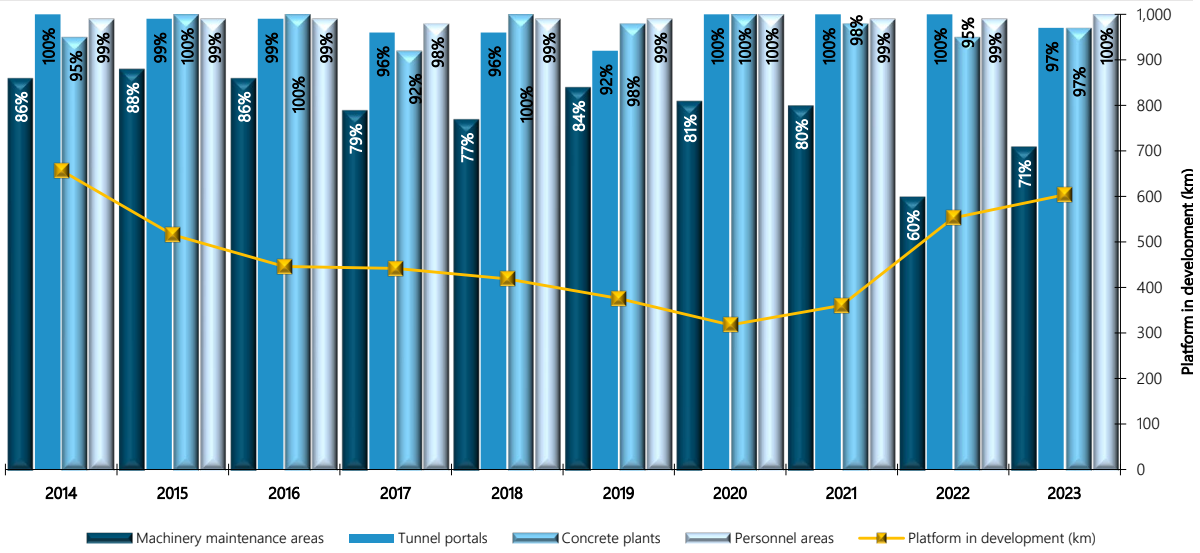
Certain activities during construction generate wastewater. These activities mainly include tunnel drilling, concrete mixing, machinery cleaning and maintenance, and the presence of temporary facilities set up for construction personnel. The goal in this regard is to ensure that all areas where wastewater is generated are equipped with collection and treatment systems that are operational before the start of the activity, allowing for subsequent reuse, specific management, or disposal in compliance with legal limits.

The monitoring of this indicator is conducted separately based on the origin of the wastewater to be treated:

- Machinery maintenance areas
- Tunnel entrances
- Concrete plants and similar facilities
- Personnel areas

For each of these cases, the results from active projects over the past ten years are shown in the following graph:

Chart 27. Areas with proper water treatment facilities (%) (2014-2023) *



** Data for active platform was updated in relation to the 2022 Environmental Report.*

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

In 2023, the parameters for water treatment from tunnel entrances, concrete plants, and personnel areas remain stable, with compliance rates at or very close to 100%. The average result is considered positive, as only one tunnel entrance and one concrete plant were found to have deficiencies, while the number of elements deemed satisfactory were: 36 maintenance areas, 29 tunnel entrances, 37 concrete plants or similar facilities, and 329 sanitary installations in personnel areas.

The deficiencies noted in the machinery maintenance areas all involve maintenance being carried out on surfaces that are not permanently waterproofed to prevent spills onto the ground. However, alternative measures are generally adopted, such as using mobile workshops, placing portable containment trays, and putting absorbent mats under the engine.

Discharge in accordance with the thresholds and analytical requirements set by the relevant authority (%)

In cases where treated water is discharged as an effluent into public water bodies, the appropriate permission is first obtained from the river basin authority, and the necessary monitoring is conducted to ensure that the discharge complies with the limits set in the authorization.

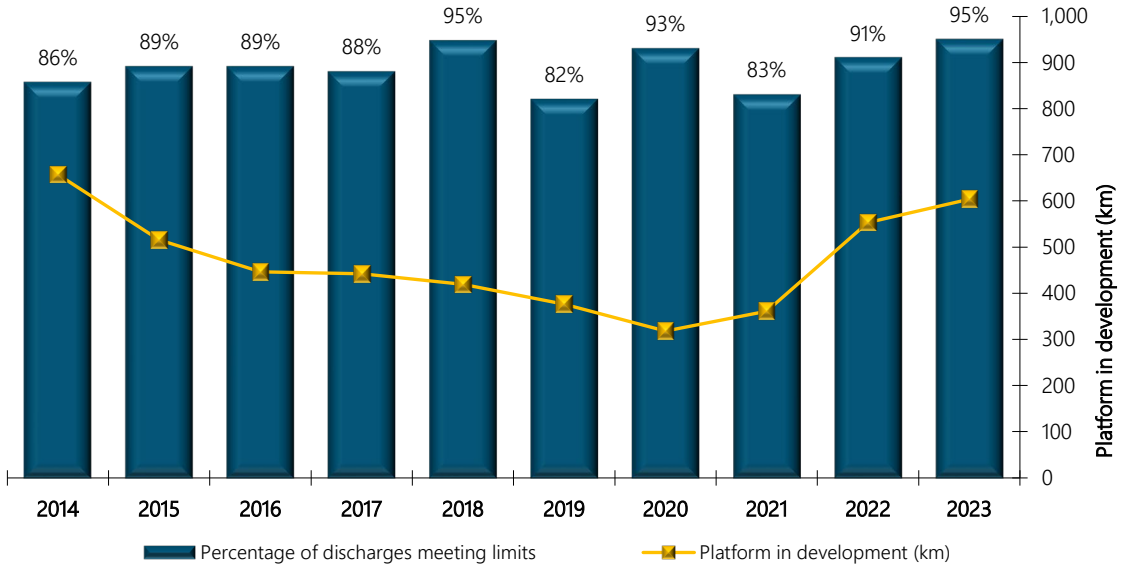
The following graph illustrates the length of ongoing platform work over the past ten years, as well as the average annual percentage of discharges with parameters below the maximum allowable levels compared to the total number of discharges.

In 2023, 95% of the treated water discharged into public water bodies met the criteria set by the competent authority, marking a 4% improvement over the previous year.

Deficiencies in this regard typically arise in the more humid regions of Spain, where the volume of water to be treated is very high, and occasionally, exceptional rainfall can lead to the

treatment systems being temporarily undersized. However, no significant issues have been reported in the receiving watercourses.

Chart 28. Discharges into public water bodies that meet the limits imposed by the competent authority (%) (2014-2023)



** Data for active platform was updated in relation to the 2022 Environmental Report*

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

Compliance with night-time curfews near inhabited areas (%)

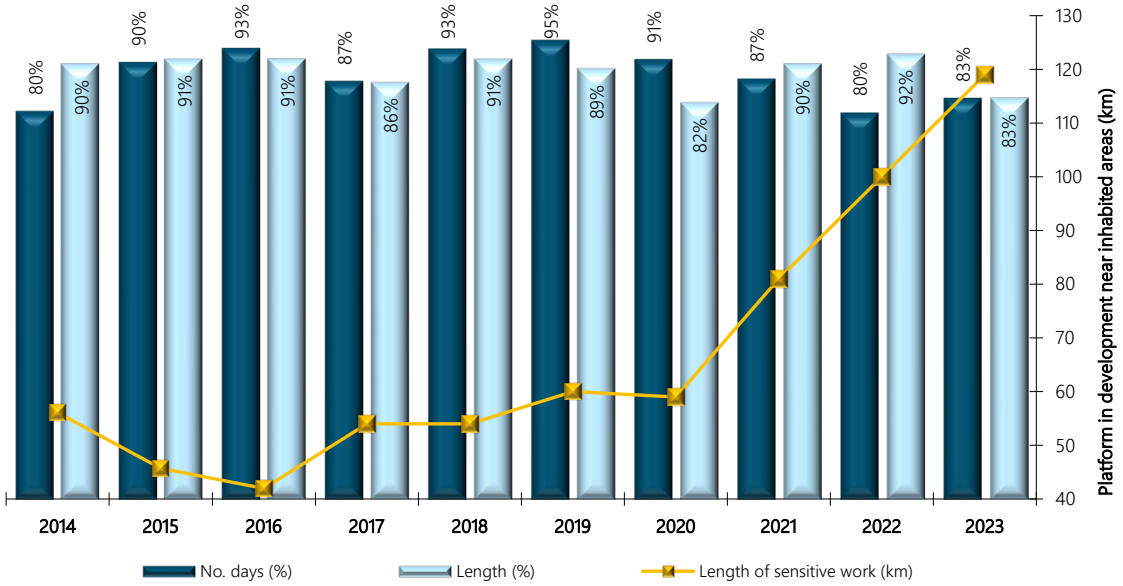
The conditions for carrying out construction work and noisy activities near residential areas take into account both the Environmental Impact Reports and the acoustic quality standards set out in current legislation. In railway construction projects, necessary controls and preventive measures are put in place to minimise acoustic disturbances. However, the most effective approach is to avoid carrying out work at night in these areas.

The following graph illustrates the annual trend of this indicator for the length of active construction projects near residential areas over the past ten years.

The following graph shows that in 2023, 83% of both the days and the length of the route complied with night-time curfews in residential areas. The number of days meeting this parameter increased by 3 percentage points compared to the previous year, while compliance with respect to the length of the route decreased by 9 percentage points from the levels recorded in 2022. This is related to the fact that the different construction projects have widely varying lengths.

The decrease in the values for this indicator is typically linked to the execution of superstructure works, where night-time work is necessary to avoid disrupting the railway service operating in each area. It is worth noting that before carrying out these works, particularly in large towns, prior notification is given to the local council, and appropriate preventive and corrective measures are put in place to minimise acoustic disturbance.

Chart 29. Compliance with night-time curfews near inhabited areas (%) (2014-2023)



Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

Effectiveness of Dust Control Measures (%)

Generally, during construction works, dust control measures are implemented, such as watering roads used by vehicles and machinery, limiting the speed of construction vehicles and machinery to 30 km/h, and covering the load area of lorries transporting soil. In more specific cases, typically at concrete plants, conveyor belts are enclosed, and sprinklers along with other supplementary measures are installed.

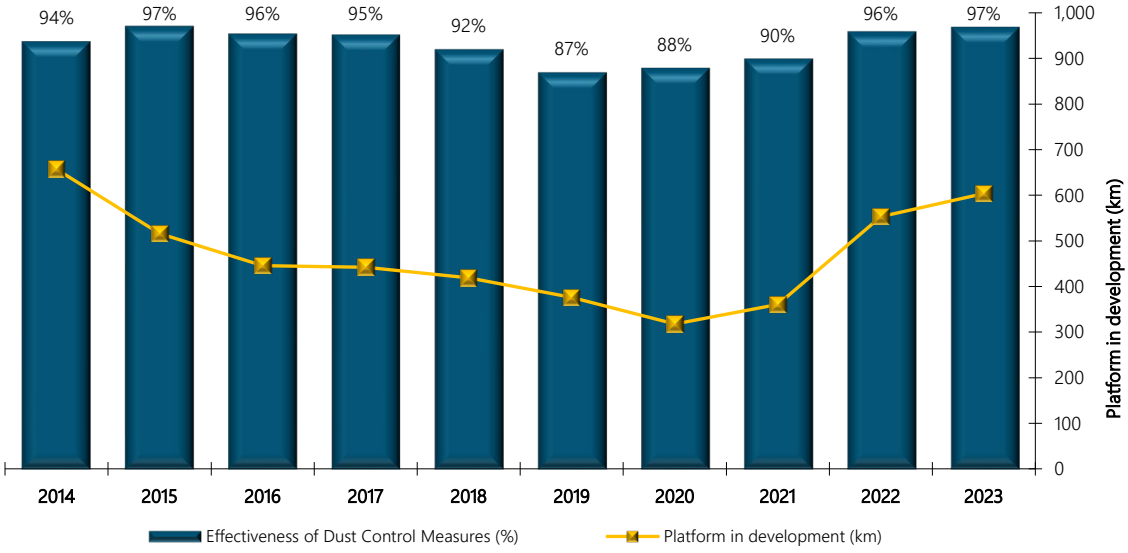
This indicator estimates the percentage of open 'work sites' each quarter where dust control measures are effective. Annual results are somewhat affected by the weather, with the least favourable values occurring during the driest months.

The following graph shows the average annual trend of this indicator for all active projects over the past ten years.

Regarding the trend in the indicator's performance, the positive trend observed in recent years continued in 2023, reaching a 97% compliance rate. It should be noted that both the use of watering and the implementation of measures in material loading areas are common practices on most active sites.

On the other hand, in projects taking place in urban areas, dust and mud control measures are especially important. Overall, the projects directly affect 66.09 kilometres of streets in urban areas or access roads, and in 96.2% of this length, the impact from truck and machinery traffic is minimised through street sweepers, frequent watering, and other measures.

Chart 30. Effectiveness of Dust Control Measures (%) (2014- 2023) *



** Data for active platform was updated in relation to the 2022 Environmental Report*
Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

Objective 6: Promote Circular Economy

In line with the principles of the circular economy, Adif and Adif-Alta Velocidad promote the efficient use of resources in their projects, aiming to minimise the negative environmental impact of waste generation and management. This supports the achievement of the Sustainable Development Goals outlined in the 2030 Agenda, particularly Goal 12: Ensure sustainable consumption and production patterns.

These principles are applied in the following order of priority:

a) Prevention,

b) preparation for reuse,

c) recycling,

d) other forms of recovery, including energy recovery, and

e) disposal.

Additionally, *Order APM/1007/2017 of 10 October, which outlines general regulations for the recovery of natural excavated materials for use in filling operations and other projects beyond those where they were originally generated,* facilitates the on-site recovery of these materials. In accordance with this Order, natural excavated materials generated from construction and demolition works (such as earth, clay, silt, sand, gravel, or stone) can be recovered for use in filling operations and other construction projects for specific purposes, provided they are not mixed with other materials or objects, and do not come from a contaminated or potentially contaminated sites.

Below are the results of managing the different types of activities conducted in 2023.

Reutilisation of non-contaminated natural excavated materials in active sites (%)

In projects where the volumes of excavated earth are substantial, and provided that technical conditions permit, the excavated earth is reused in the construction of the project itself.

The volume of natural excavated material from projects completed in 2023 was 2.81 million cubic metres, with 50.3% being reused in the construction of the infrastructure itself. The remaining material has been managed either because it does not meet the technical quality standards for construction use or because it is an actual surplus in the project's earth balance.

Table 35. Reused natural excavated material

		2022	2023
Reused earth	%	62.1%	50.3%
	m^3	2,229,524	1,411,967
Total excavated earth	m^3	3,589,950	2,807,783

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department.

It is worth noting that recording this data began with the environmental monitoring of the 2022 projects. The average results over the past two years indicate that more than 50% of the natural excavated materials are reused in the construction of the infrastructure itself.

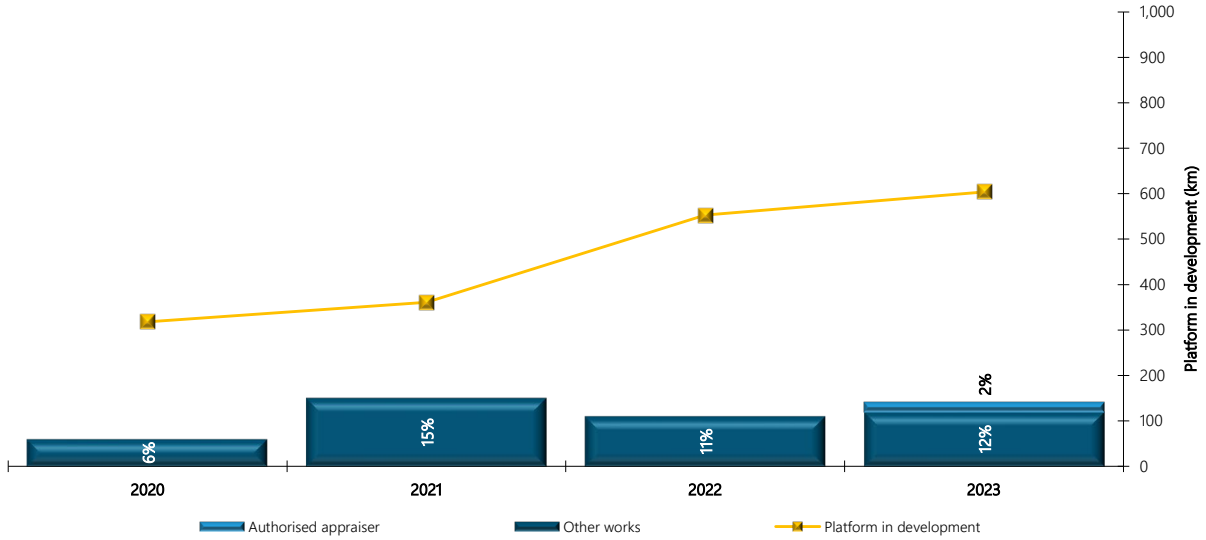
On-site use of external natural materials (%)

Frequently, external materials are required for platform construction when the project's earth balance is insufficient, or when the excavated materials do not meet the required quality standards. Since the introduction of *Order APM/1007/2017 of 10 October, which outlines general regulations for the recovery of natural excavated materials* for use in filling operations and projects other than those from which they originated, Adif and Adif-Alta Velocidad have been encouraging the use of such materials from other projects or authorised recovery facilities. This aims to minimise the need for new land (mainly new borrow pits) and to promote Circular Economy practices and resource optimisation.

Given the introduction of the regulation, data recording on earth recovery under this Order was introduced in Adif and Adif-Alta Velocidad projects in 2020. However, it was not until 2022 that data recording was expanded to include earth recovered from authorised waste managers.

In 2023, the total volume of natural excavated material from external sources entering active projects, including material from legal borrow pits or quarries and recovered earth, amounted to 9.04 million m^3. Of this total, 1.12 million m^3 (approximately 12%) come from surplus material from other projects, while 163,680 m^3 (just under 2%) are from a recovery operator.

Chart 31. On-site recovery of external earth (2020-2023)



Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

Although the accumulated data is limited, the graph shows a gradual increase in these indicators, establishing them as a good environmental practice in the projects. In 2023, a total of 1.29 million cubic metres of recovered earth was used in Adif and Adif-Alta Velocidad projects, representing 14% of the total external earth. The remainder came from licensed quarries or authorised borrow pits.

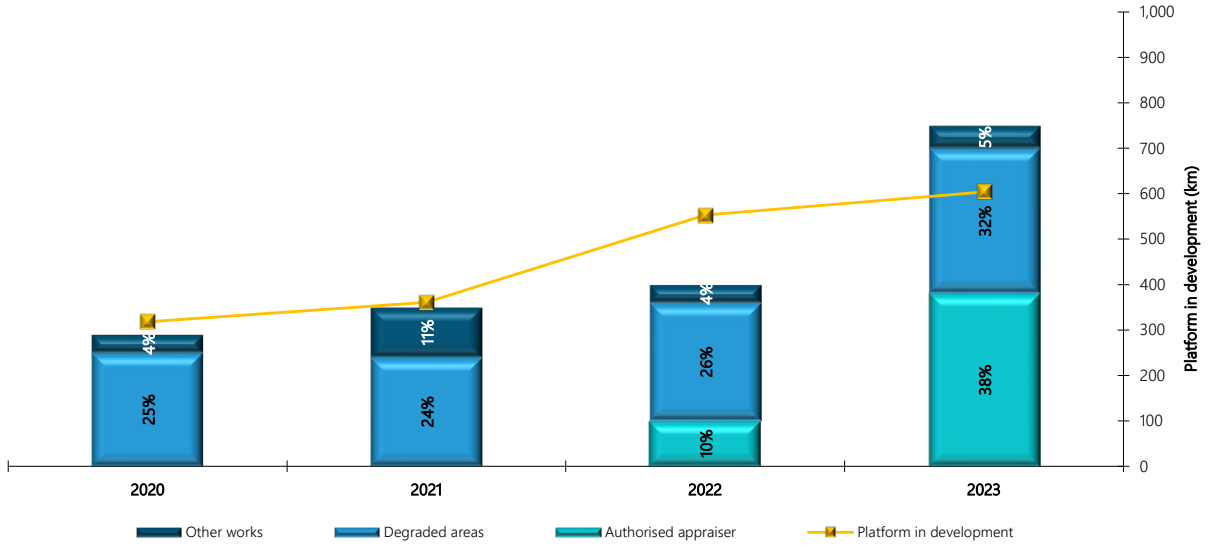
Utilisation of surplus natural excavation materials (%)

To minimise the use of new land, promote the Circular Economy, and optimise resources, when a project has an excess of earth or when the earth does not meet the technical quality requirements for reuse, the surplus is to be recovered by an authorised waste manager or, preferably, in accordance with *Order APM/1007/2017 of 10 October. This order sets out general regulations for the recovery of natural excavated materials for use in filling operations and other projects beyond those from which they originated*. This means the earth is to be delivered for use in other construction projects or for the restoration of degraded areas.

When this is not possible, the fill is placed in alternative deposit areas according to the guidelines set by the regional environmental authority.

As mentioned in the previous section, due to the newness of the regulation, data registration for land recovery under this Order was introduced in Adif and Adif-Alta Velocidad projects in 2020. However, it was not until 2022 that the data registration was expanded to include details on its transfer to an authorised recovery operator.

Chart 32. Utilisation of Excavation Surpluses (2020-2023)



Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

As illustrated in the graph, the increase in this indicator has been gradual, establishing itself as a good environmental practice in the projects.

The total volume of surplus earth managed in active projects in 2023 was 24.21 million m^3. Of the indicated material, the portion allocated for recovery in other construction projects amounts to 1.15 million m^3 (almost 5% of the total), while the volume used for the restoration of degraded areas totals 7.78 million m^3 (approximately 32%). As a result, nearly 37% of the clean surplus earth has been used for recovery in accordance with Order APM/1007/2017.

Alternatively, if a suitable location for recovery under this Order cannot be found, the earth is handed over for recovery to authorised managers. In this context, during 2023, 9.32 million m^3 were handed over to recovery managers, representing just over 38% of the total.

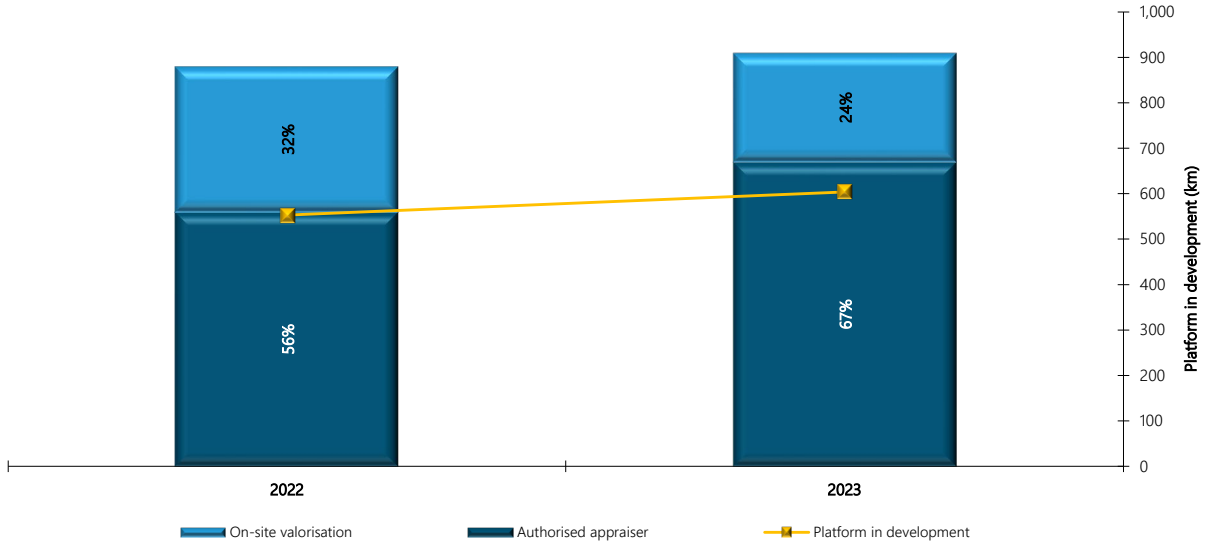
Consequently, in 2023, a total of 18.26 million m^3 of surplus excavated natural material were utilised, representing just over 75% of the total

Recycling of Construction and Demolition Waste (%)

The recent Law 7/2022 of 8 April, concerning waste and contaminated soils for a circular economy, together with Adif and Adif-Alta Velocidad, aims to ensure that at least 70% by weight of non-hazardous construction and demolition waste is prepared for reuse, recycling, and other forms of material recovery, including backfilling operations, excluding materials in their natural state as defined in category 17 05 04 (clean soil and stones) of the waste list.

In 2022, the recording of the total weight and destination of non-hazardous Construction and Demolition Waste (CDW), excluding soil, generated by the works began. The following graph illustrates the percentages of waste recovery in projects where environmental integration objectives are being monitored.

Chart 33. Construction and Demolition Waste Recovery 2022- 2023



Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

As shown in the graph, waste recovery is a common practice in construction projects, with 91% of Construction and Demolition Waste (CDW) being recovered in 2023.

It is worth noting that 550,368 t of construction and demolition waste were recovered directly on-site, primarily for use as road base, for adapting areas for auxiliary facilities, and as concrete aggregate. This means that on-site waste recovery has nearly reached 24% of the total waste generated on-site.

The methodology used in these cases primarily involved treatment with an licensed mobile crusher, producing material with the aggregate grading required for its final use. It is important to highlight the advantages of this on-site waste treatment, as it not only promotes waste circularity but also helps reduce the carbon footprint and mitigate climate change.

Finally, the remaining waste is handed over to an authorised waste manager for disposal, with all percentages in this category remaining below 10% of the total.

Objective 7: Protect Wildlife

Compliance with construction restrictions that protect periods of high sensitivity for threatened or particularly vulnerable wildlife species (%)

During the construction phase, the key parameter for monitoring protective measures for wildlife is adherence to biological break periods, which are essential to prevent disturbances to certain protected or particularly important species, especially during their breeding and nesting seasons. This generally involves bird species.

In general, except for very specific cases, the temporary restrictions related to certain types of work due to the presence of sensitive wildlife are adhered to.

The following graph illustrates the estimated annual length of active construction subject to Biological Break periods and how this has changed over the past ten years, in terms of the

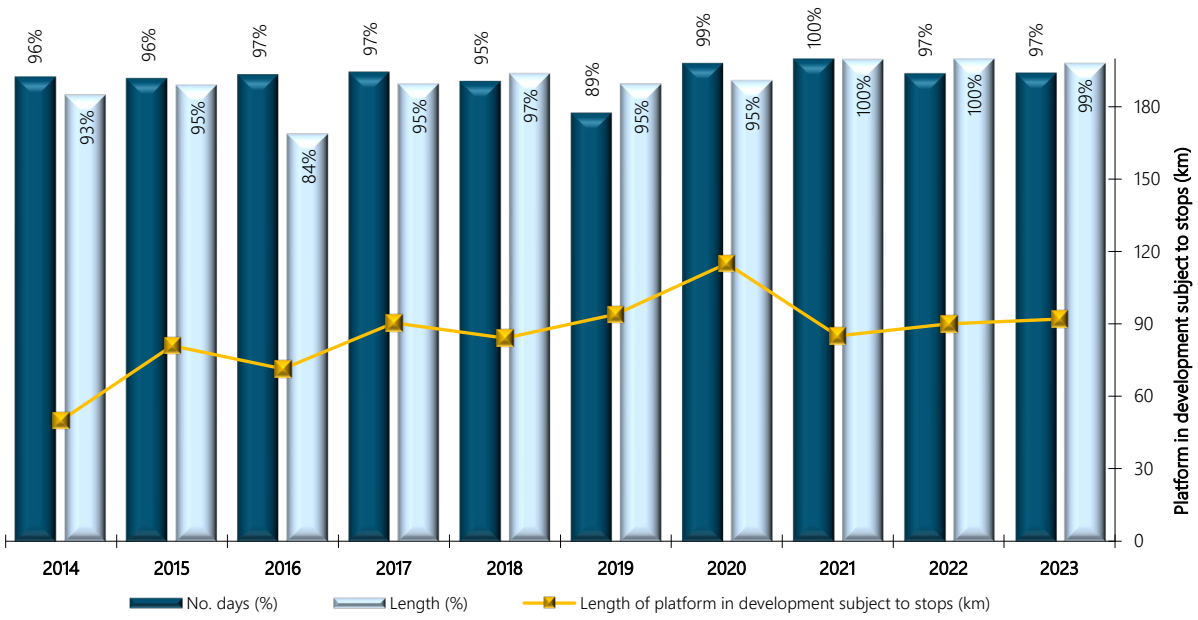
number of days and the length of construction where the established restriction periods are observed.

The results obtained this year show that adherence to wildlife-related activity restriction periods remains close to 100% compliance, both in terms of the number of days and the length of construction where the established Biological Break periods have been observed. This year, the length of construction subject to Biological Break periods has been 92 km, which is 2 km more than the length recorded in 2022.

The main challenge in adhering to Biological Break periods is interpreting and adapting the restrictions outlined in EIAs and those imposed by the relevant authorities during construction when unexpected sensitive species are detected.

To address this, wildlife studies are conducted at construction sites to confirm the presence or absence of sensitive species that may inhabit the area, ensuring that measures align with the actual biological conditions and aiming to avoid impacting species during their breeding periods.

Chart 34. Compliance with wildlife-related activity restriction periods (%) (2014-2023)



Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

Permeability of infrastructure for wildlife passage – ungulates (No./km)

Isolation of wildlife populations and the barrier effect are among the most significant impacts of constructing linear infrastructure across the landscape. Therefore, designing wildlife-permeable structures is one of the most effective ways to mitigate this impact.

The indicator used to estimate permeability for ungulates is measured in terms of adequate wildlife crossings, relative to the kilometres of the route where this group of fauna is present. In cases where the route passes through a tunnel or viaduct longer than half a kilometre across natural environment, its length is considered equivalent to that of an embankment with two suitable wildlife crossings per kilometre of infrastructure.

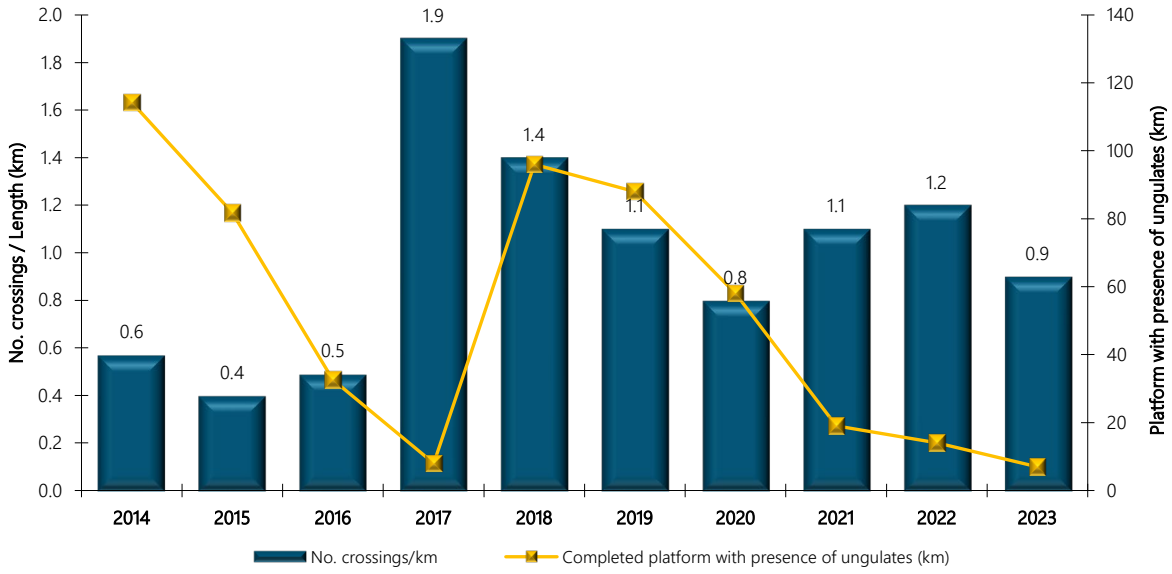
Passages of suitable dimensions are those that meet the requirements set out in the 'Technical prescriptions for wildlife crossing and fence

design (second edition)' [9] from the Ministry of Agriculture, Food, and the Environment (2015).

The following graph shows the evolution of results from completed platform works with ungulates present, from 2014 to 2023. In the most recent year, projects were completed with a total route length of 7 km in areas where ungulates are present. A specific crossing of suitable dimensions was constructed, and the length of permeable sections through tunnels and viaducts is 2.2 km. After applying the necessary corrections for calculating the indicator, the permeability value for ungulates is 0.9 crossings per kilometre. This level of permeability is roughly equivalent to having a suitable crossing every 1.1 kilometres of route, which meets the recommended density range specified in the Ministry's Technical Specifications.

From the project phase, the number of required structures to achieve this ratio is determined, including their dimensions and characteristics tailored to the species present in the area.

Chart 35. Permeability of infrastructure for ungulates (2014- 2023)



Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

Permeability of infrastructure for wildlife passage – small and medium-sized species (No./km)

To ensure that drainage structures and other elements are suitable for allowing wildlife to pass through and cross from one side of the infrastructure to the other, these structures are designed according to the recommendations outlined in the 'Technical prescriptions for wildlife crossing and fence design (second edition)' from the Ministry of Agriculture, Food, and Environment (2015)." The most common modifications are:

- Enlarging the drainage structure to make it more inviting to wildlife.
- Adding a dry side strip (pathway) to prevent animals from having to wade through the water in the drainage system.

[9] This document also specifies minimum recommended densities according to the type of terrain crossed and the various wildlife groups. These densities range from one crossing per kilometre to one crossing every three kilometres, depending on the habitat and the wildlife interest in the area.

- Ensuring a smooth transition at both ends between the base of the drainage structure and the surrounding terrain.

The indicator used to measure permeability for medium and small-sized wildlife is also expressed in terms of suitable passage units relative to the length of the route. Similarly to ungulates, for routes that pass through a tunnel or viaduct longer than half a kilometre across natural terrain, the length is treated as equivalent to that of an embankment with two suitable crossings per kilometre. Structures of this type shorter than half a kilometre are considered to provide one suitable crossing for wildlife. For this calculation, all completed platform works, whether urban or not, are included, regardless of their location[10].

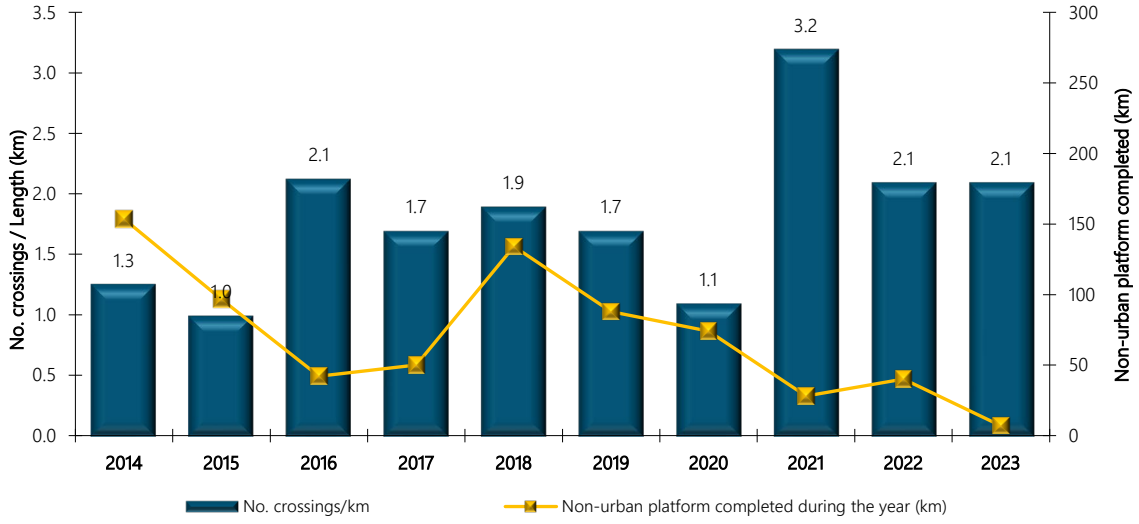
Similarly to ungulates, the 'Technical prescriptions for wildlife crossing and fence design' recommend specific densities per kilometre for these structures, depending on the surrounding habitat and the area's importance as a biological connector. For small and medium-sized wildlife, a minimum density of one crossing per kilometre is recommended.

In 2023, the total length of completed routes in areas with wildlife was 7 km, including 2.2 km of tunnels and viaducts across natural terrain. In the remaining 7 km, 8 crossing structures with dimensions and features suitable for small and medium-sized animals were installed. Additionally, the crossing built for ungulates is also deemed suitable for these animals.

Calculating the indicator yields a permeability rate of 2.1 crossings per kilometre. This figure remains consistent with the previous year but exceeds the recommendations outlined in the Ministry's Technical Prescriptions

The following graph illustrates the evolution of infrastructure permeability for small and medium-sized wildlife from 2014 to 2023:

Chart 36. Permeability of Infrastructure for Small and Medium-Sized Wildlife (2014–2023)



Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

[10] For calculating permeability for small and medium-sized wildlife, completed works are excluded if they involve urban development, track renewals, overhead structures, or buildings.

Fencing with Mesh Base Buried in the Ground (%)

The purpose of the fencing is to prevent medium and large terrestrial vertebrates from accessing the railway, as their presence could pose a safety risk to trains if they were struck. Additionally, in areas where wild boar is present, it is necessary to bury the fencing in the ground. This practice has been implemented in high-speed rail projects since 2006, and it has yielded very positive results. The most common method for installing this buried fencing involves attaching a second, finer mesh to the lower third of the standard fence and burying it in a trench 30-40 cm deep. This approach also helps prevent rabbits from entering the fenced area.

This indicator is calculated exclusively from completed projects in the year when wild boar presence is estimated, using the following formula:

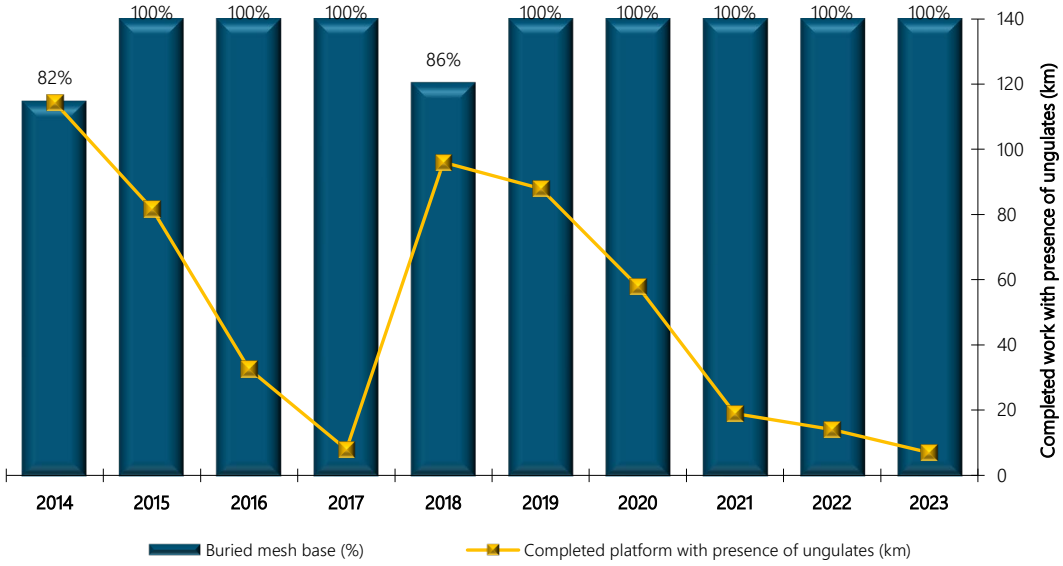
$$\frac{length\ of\ buried\ fencing\ in\ works\ where\ ungulates\ are\ present}{length\ of\ erected\ fencing\ in\ works\ where\ ungulates\ are\ present}$$

The following graph shows the percentage of compliance with this indicator since 2014.

In 2023, this indicator maintained the 100% compliance rate recorded in previous years. Except for data from 2014 and 2018, it is observed that in recent years, reinforcement of fencing has been a standard practice in all completed projects with wild boar presence.

Furthermore, regardless of the presence of ungulates, five escape devices were installed in the fencing of projects completed in 2023 to facilitate the exit of animals that may have accidentally entered the track.

Chart 37. Fencing with Buried Mesh Base (%) (2014-2023)



Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

Objective 8: Restoration of the Environment with Ecological and Landscape Criteria

The ultimate goal of the environmental restoration of a planned project is to restore, as much as possible, the original conditions of the affected site. This involves initially providing a certain level of stability that, together with natural regenerative processes, will allow its final integration into the surrounding environment.

With this objective, the environmental restoration of an area or section of linear infrastructure consists of two phases:

1.- The removal of any temporary structures, clearing of the land, and preparation of the affected surfaces.

2.- The restoration of vegetation in all areas affected by the works, with the design considering the ecological and landscape characteristics of the surrounding environment.

Therefore, for the purposes of Environmental Monitoring, an area is considered properly restored if all phases of environmental integration have been completed. These phases are:

1.- Geomorphological conditioning according to ecological and landscape criteria

2.- Spreading of topsoil

3.- Seeding and/or planting

Additionally, as previously mentioned, areas with auxiliary structures must undergo dismantling and cleaning of the entire temporarily occupied surface beforehand.

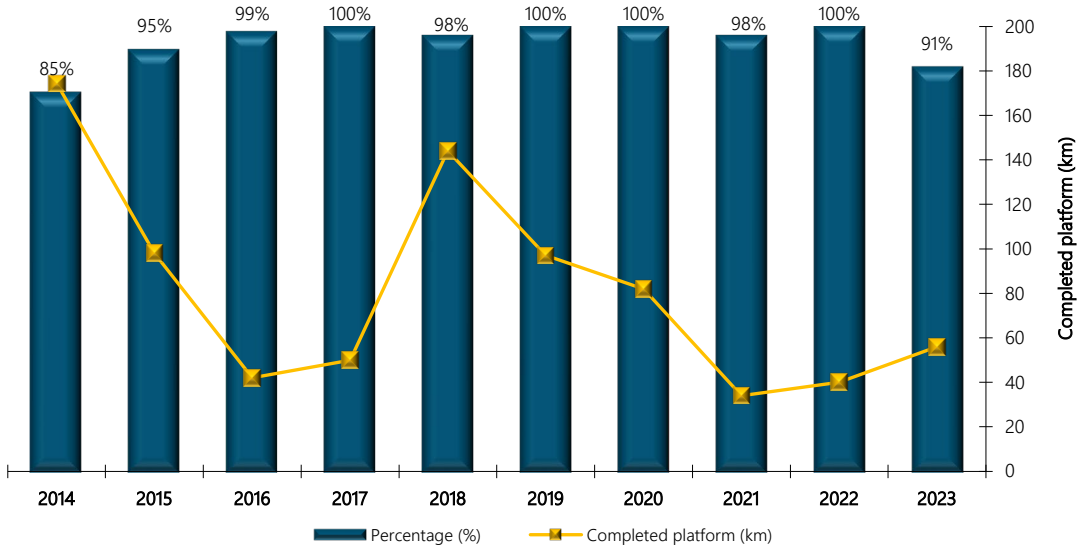
Decommissioning and cleaning of surfaces occupied by auxiliary structures (%)

Generally, the final information for each project is received at the time of its official provisional acceptance. As a result, there are sometimes surfaces temporarily occupied by auxiliary structures that still need to be decommissioned and cleaned.

In projects completed during 2023, a total of 146,112 m² was temporarily used for auxiliary structures, of which 91% has been decommissioned and cleaned. The remaining area is occupied by rail decommissioning equipment awaiting removal under a specific waste management contract.

Below is a graph illustrating the trend in compliance values for this indicator since 2014.

Chart 38. Decommissioning and cleaning of surfaces occupied by works auxiliary structures (%) (2014-2023)



Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

Geomorphological remodelling of the area following ecological and landscape criteria (%)

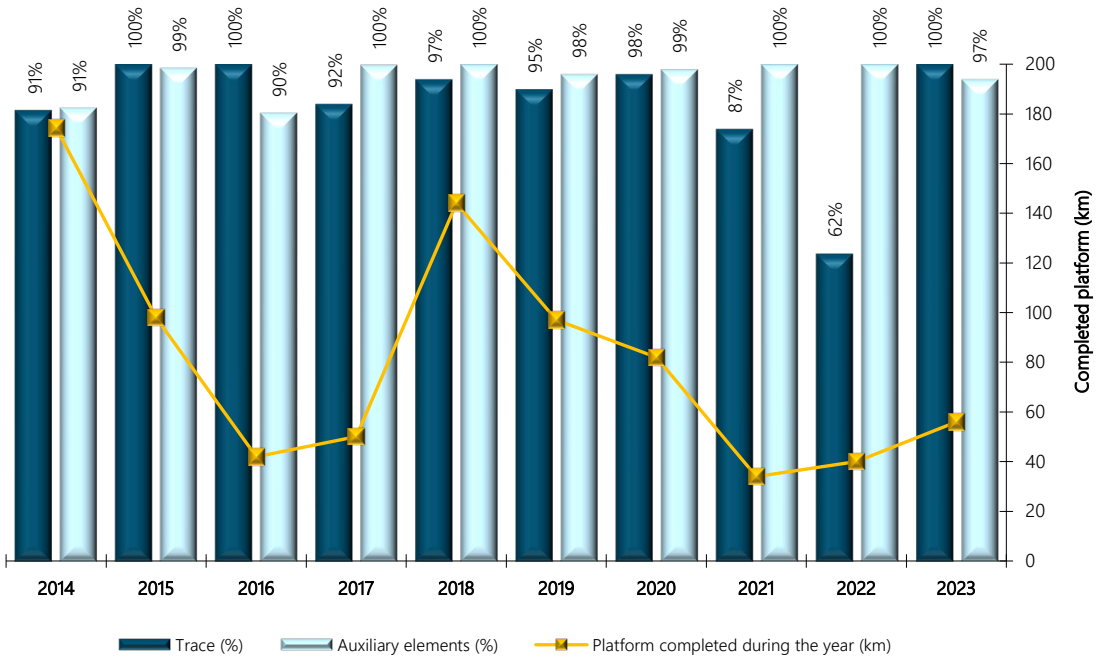
Proper geomorphological remodelling is essential for the successful final restoration of the project. The criteria for proper geomorphology are based on ecological and landscape principles. These ensure that temporarily occupied surfaces are restored to relief forms similar to their pre-existing conditions, and that final alignment surfaces are left loose with a geometry that supports the application of topsoil for establishing herbaceous, shrub, and/or tree cover.

A surface —whether part of the alignment or an auxiliary element— is considered properly remodelled if it maintains a continuous topography free of sharp edges, with slopes of 3H:2V or gentler, where such slopes are applicable.

In 2023, this value improved from the previous year, achieving 100% compliance for the alignment slopes, covering 183,526 m². However, 21% of the surfaces that did not meet geomorphological criteria received specialised bioengineering treatments for restoration, totalling 7,517 m².

By the end of 2023, the total area occupied by auxiliary construction elements in the 15 completed sections was 465,752 m². Of this, 97% of the surface has been restored to its original landform in accordance with ecological and landscape criteria. The remaining area, as mentioned earlier, is occupied by rail dismantling equipment awaiting removal under a dedicated waste management contract.

Chart 39. Geomorphological Remodelling of Occupied Surface Area (%) (2014-2023)



Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

Vegetation restoration of surfaces (%)

To ensure the proper restoration of surfaces affected during the construction of High-Speed Rail projects, in areas that have been remodelled according to established ecological and landscape criteria, the following activities are planned:

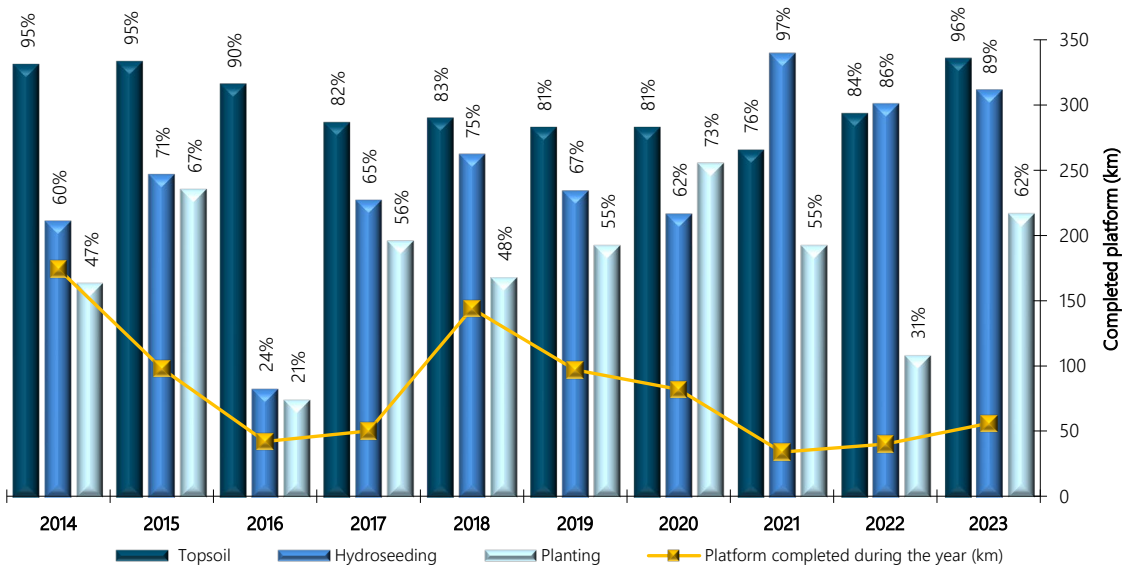
- Spreading of topsoil
- Hydroseeding
- Planting

Depending on the characteristics of the affected areas, different restoration methods are applied. Some areas may require only landform remodelling and, generally, the spreading of topsoil. Others may also include seeding and planting of plant species in addition to these processes.

It is important to note that while the percentage of topsoil spreading is based on the morphologically suitable surface, the percentages for hydroseeding and planting are calculated based on the area where topsoil has been applied. As a result, the indicators for hydroseeding and planting may show higher values than those for topsoil spreading.

Below, the completion percentages for the three environmental integration indicators, which cover the concepts previously detailed, are presented graphically:

Chart 40. Vegetation restoration of surfaces (%) (2014-2023)



Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

Spreading of topsoil

96% of the landform-remodelled surface has been covered with topsoil (61.3 hectares out of a total of 63.6 hectares) This value has increased significantly compared to the previous year and also to earlier years, when it was approximately 80%.

The areas lacking topsoil are primarily the steep cut slopes and certain areas with installations. On the cut slopes, spreading topsoil is avoided to reduce the risk of soil erosion into ditches before vegetation is established.

Hydroseeding and planting

A key aspect of the restoration is the replanting of areas affected by the construction, including both the railway platform slopes and the auxiliary elements. However, it should be noted that not all auxiliary surfaces receive this treatment, as some are returned to agricultural use.

Overall, in the projects completed during 2023, the area suitable for replanting, which has been properly remodelled and covered with topsoil, amounts to 61.3 hectares. Of this, 89% has been hydroseeded, and 62% has been planted, marking an increase in both cases compared to the results from projects completed in 2022.

The explanation for the values obtained partly lies in the reversion of some auxiliary areas of the project to agricultural or grazing use, as well as the constraints imposed by railway legislation on planting tree species in areas that might obstruct railway operations In any case, to understand these values, it is important to note that some of the land occupied by the project reverts to agricultural or grazing use and, therefore, does not require additional restoration measures.

In total, throughout 2023, seeding or hydroseeding was carried out on 55.2 hectares, and 223,012 native plants were planted across a total area of 113.3 hectares. Of this area, 38.1 hectares were dedicated to restoring surfaces directly affected by the infrastructure construction, while the remaining 75.2 hectares were planted as a supplementary measure in coordination with the environmental authorities of the regional governments.

The execution indices show that, quite frequently, planting and hydroseeding are not carried out on temporary auxiliary structures initially situated on

agricultural land. As mentioned earlier, this is because of the commitment to return the land to its original condition so it can be used again for its intended agricultural purposes.

In contrast, it should be noted that seeding and planting have been completed on all embankment slopes, portals, and false tunnels. For the excavations, while no planting has been carried out, hydroseeding has been applied to those where topsoil has been spread. Additionally, specific treatments (such as organic mats, three-dimensional mats, and geocells) have been used on some of the areas that lack this layer.

PRESERVATION OF ARCHAEOLOGICAL HERITAGE

The construction of high-speed rail lines uncovers a significant number of archaeological, ethnographic, or palaeontological finds each year. These are managed, documented, studied, and excavated in detail in collaboration with the relevant authorities. The current inventory of such sites or locations, maintained by the Cultural Heritage section of Adif's Corporate Environmental Sub-Department and still under development, already lists 3,194 entries, with new ones being added daily.

Among these, a particular type of structure frequently appears, representing, by category, the most common feature in the archaeological record documented in public works. These are known as 'pit fields' —negative features excavated into the ground and filled with sediment centuries before the high-speed rail works reached them. The current appearance of these 'fields' is very distinctive and reflects a highly complex process of enormous historical value, offering invaluable insights into our past as a species, even though their interpretation remains highly complex.

In 2023, various interventions revealed contexts of significant interest related to these structures, including notable excavations at Cerro Perales-La Gavia-Casas del Canal, which uncovered 1,396 structures spanning from the Neolithic to the Middle Ages, as well as at La Ceda, Estación de Salou, and PK. 60+200, among others.

Figure 42. Structures and materials from the 'Cerro Perales' and 'Casas del Canal' pit fields, Madrid.

This evidence, with its distinctive characteristics, prompts reflection on the motivations behind their creation by these societies, the processes involved, their initial and secondary uses, and the significance of the evidence they hold. The pits themselves narrate a story of use, abandonment, reuse, and decommissioning, reflecting the smaller cycles in the history of the communities that created them. In essence, they form a vast archaeological palimpsest.

The study of the evidence found in these contexts allows us to gain some insight into the complex process that led to their creation and to develop a four-dimensional view that, while limited,

provides a meaningful glimpse into an important segment of our Prehistory and History.

These pits, dug into the ground, appear to have been primarily used for storing food and delicate materials since the earliest documented instances of agriculture and livestock farming at the beginning of the Neolithic (c. 8000 BCE). Although from that time, a few structures among the pits seem to offer conditions more suited to direct habitation, known as 'floor surfaces,' indicating that these ground modifications might have been used within the dwellings themselves. In most cases, however, the pits were used as rubbish dumps, with some intentionally filled to the top. Inside, the remnants of daily life offer an endless source of information about what people ate, the tools they used, their manufacturing techniques, trade, industry, and more. Only in very exceptional cases and at certain points in history were these pits reused as graves, ritual deposits, or final resting places for pets such as dogs.

The pits vary greatly in shape and size, but are generally bucket-shaped, sack-like, or pear-shaped, and their presence suggests they were part of a habitation area. We encounter settlements of various sizes, or rather, numerous settlements developed over hundreds, or even thousands, of years. These settlements utilised hunting grounds, grazing areas, and seasonal farming. In later periods (Iberian, Roman, or medieval), certain areas were used for systematic pre-industrial storage.

In the early stages of Prehistory, these groups ground grain and fruits collected from their surroundings using hand mills, cleaned their huts, which were equipped with clay hearths and mud mortar, crafted flint tools, and made polished axes. They also produced ceramics, decorating them with iron oxide dyes and even painting them. People who bring with them both local and exotic materials and, for some reason, occasionally bury their dead (and sometimes their dogs) with considerable attention.

The landscape of these 'pit fields,' mapped out at the end of any excavation, is the result of a process that may have spanned many generations. For centuries, these areas served as a stopping point on the seasonal routes of prehistoric groups, who reused some locations while opening new ones.

These archaeological findings are complex to interpret, as their stratigraphic analysis, detailed studies of material typologies, and dating analyses (when samples permit) are essential for establishing chronological sequences. At first glance, these sequences appear in a flat, horizontal view, which can give a misleading impression of simultaneity.

The systematic appearance of these structures along railway lines is deliberate, as railways are often routed through accessible, flat areas and natural passes that align with the topography sought by many of these groups for resource gathering and settlement. Furthermore, the tendency to return repeatedly to certain locations, rather than settling in the same spot each time, has led to significant horizontal expansion, making it more likely for linear infrastructure to intersect these sites.

So far, and while still conducting a thorough analysis of the historical records from Adif's Corporate Environmental Sub-Department, we have identified over 10,000 archaeological pit structures excavated during Adif's works, dating from the Neolithic to the Middle Ages. These structures provide an extraordinary resource for understanding the ways of life over these 9,000 years of human history. These sites provide remains of seeds and mills, stone tools, textiles, ceramics, fauna, and evidence of metallurgy—shedding light on what people ate, raised, and wore, what they manufactured, and how they did it. This offers a detailed picture of life during those times.

The study of these 'pit fields' is a crucial aspect of scientific archaeological research. Adif has made significant contributions to this field, working

closely with relevant cultural and heritage authorities and often achieving exceptional results.

Figure 43. For instance, the Silo or 'sitja' of La Torrassa, from the Iberian-Roman period, located near the L'Hospitalet train station in Barcelona, was discovered and investigated in 1934 and was restored and consolidated by Adif in 2021.

9. RESPONSIBLE ENVIRONMENTAL MANAGEMENT

9. RESPONSIBLE ENVIRONMENTAL MANAGEMENT

ENVIRONMENTAL MANAGEMENT

The environmental aspect at Adif-Alta Velocidad is managed by the senior Corporate Management team through the Corporate Environmental Sub-Department.

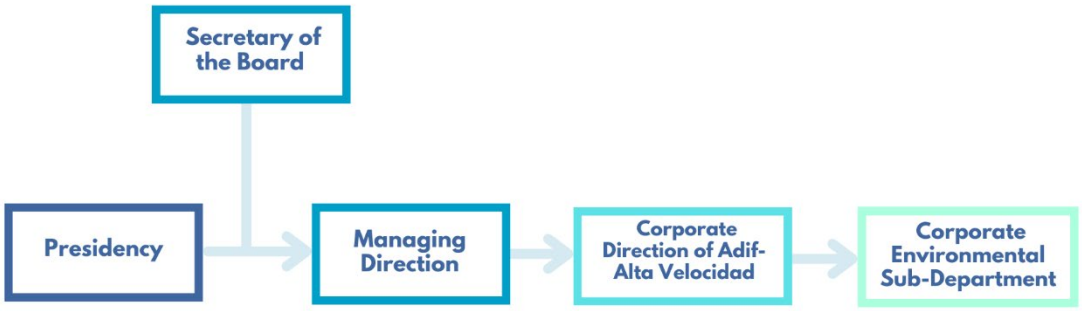


Figure 44. Extract from the organisational structure in force as of 31 December 2023

By resolutions of the President of Adif and the Managing Director Adif-Alta Velocidad dated 31 December 2013, these entities entrusted each other with the performance of certain tasks, stipulating that the terms and conditions of this entrustment would be set out in agreements signed between the two entities. In 2019, both entities signed a new management entrustment agreement for the execution of activities of a material or technical nature[11], under which Adif-Alta Velocidad is entrusted with providing, among others, the following services:

- Integrated environmental management.
- The drafting of supervision reports for conventional line projects.
- Advice on environmental sustainability, energy efficiency, and the fight against climate change.
- Management of the maintenance of operating lines owned by Adif in geographical areas where it does not have its own human resources to do it.
- The supply of energy for use other than traction.

The Corporate Environmental Sub-Department, part of the Corporate Management of Adif-Alta Velocidad, is responsible for directing the global environmental policy of Adif and Adif-Alta Velocidad. It coordinates and supervises its implementation in the organisational units and directly manages the environmental aspects linked to the interrelation between Adif and Adif-Alta Velocidad, and railway operations, ensuring environmental protection and compliance in the project, construction, maintenance, control, and profitability of railway infrastructure.

[11] Resolution of 9 July 2019 by the Public Business Entity Administrador de Infraestructuras Ferroviarias, publishing the management entrustment agreement to the Public Business Entity Adif-Alta Velocidad, for executing a material and technical activities. (BOE No. 189 of 08 August 2019).

The responsibilities assigned to the Corporate Environmental Sub-Department include:

- Ensuring the environmental suitability of projects and works developed by Adif and Adif-Alta Velocidad, both on high-speed and conventional lines.
- Managing issues related to noise, vibrations, soil contamination, and hazardous waste at both at Adif and Adif-Alta Velocidad.
- Handling environmental emergencies from the alarm phase, including those resulting from incidents and accidents related to train operations, machinery use, depots, fuel supply facilities, freight logistics facilities, stations, and other Adif-owned facilities.
- Enhancing the added value of Adif and Adif-Alta Velocidad services through the environmental variable by promoting certified environmental management systems.
- Managing corporate environmental information and serving as the Unit Responsible for Environmental Information within Adif and Adif-Alta Velocidad, in accordance with current legislation on freedom of access to environmental information. In this regard, developing and maintaining the essential environmental information systems (such as legal compliance, natural areas, environmental accounting, waste management, etc.) to respond to information requests from agencies, institutions, and stakeholders, as well as periodically preparing the Adif and Adif-Alta Velocidad Environmental Report.
- Institutionally representing Adif and Adif-Alta Velocidad before the competent environmental administrative bodies at state, regional, and local level, as well as holding representation in specialised international technical bodies such as EIM (European Rail Infrastructure Managers), UIC *(Union Internationale des Chemins de fer*), and CER (Community of European Railway).
- Analysing the impact of environmental legislative developments on Adif and Adif-Alta Velocidad at the European, national, and regional levels.
- Carrying out and coordinating the appropriate response of Adif and Adif-Alta Velocidad to complaints, reports, and administrative proceedings related to environmental issues.
- Preparing and updating internal environmental regulations for Adif and Adif-Alta Velocidad, as well as the environmental processes outlined in Adif and Adif-Alta Velocidad process map and environmental policy.
- Providing training and awareness courses on the organisation and management of environmental aspects at Adif and Adif-Alta Velocidad.
- Developing and implementing new environmental legal obligations related to public procurement, environmental risks, liability and/or other areas.

Adif-Alta Velocidad has a General Procedure ADIF-PG-109-001-001 for the Management and Coordination of Environmental Activities.

The Procedure outlines the responsibilities and individuals accountable for implementing various internal environmental management processes, ensuring:

- The optimisation of the economic management of resources by leveraging synergies between different areas of activity.
- The avoidance of divergent interpretations of the same problem by third parties.
- The reduction of risks derived from legal non-compliance, through the establishment of regulated guidelines for action and management control.

EMS CERTIFICATION

Promoting commitments to continuous environmental improvement through the implementation, certification, and periodic auditing of management systems based on the ISO 14001 'Environmental management systems. Requirements with guidelines for its use' standard is one of the elements of the Environmental Policy of Adif and Adif-Alta Velocidad.

Since Adif was established in 2005, Renfe's environmental certification has been maintained, and the Management System has been enhanced. This certification resulted from the implementation of a certified Management System starting in 1999. Since then, both the scope of the environmental actions and the physical application of the system have significantly expanded. As of 2023, the situation is as follows:

2023 Milestones

By the end of 2023, two hundred and four (204) Adif and Adif-Alta Velocidad centres had achieved environmental certification under ISO 14001.

Two out of every five conventional network* travellers use stations with environmental certification.

* at stations managed by Adif's Corporate Business and Commercial Operations Department

The coordination of the Management System for Adif and Adif-Alta Velocidad according to UNE-EN ISO 14001 Standard is the responsibility of the Corporate Environmental Body, in this case, the Adif-Alta Velocidad Corporate Environmental Sub-Department.

Table 36. ISO 14001 certification. Certifications obtained by Adif and Adif-Alta Velocidad as a whole

Scope	Outreach	Certificate
Adif	- Managing the maintenance of railway platforms, tracks, and facilities. - Operating passenger stations and freight logistics centres. - The management of train operations and capacity on the General Interest Railway Network. - Managing fuel depots.	AENOR GA-1999/0142-001/00
Adif-Alta Velocidad	- Controlling and monitoring compliance with the environmental conditions established in the EIS, in the Environmental Monitoring Plans, and requirements applicable to the construction of railway infrastructure and facilities. - Managing and coordinating the preparation of studies and projects for railway infrastructure and facilities.	AENOR GA-1999/0142-002/00

* Following the segregation of Adif and Adif-Alta Velocidad, the environmental management system certificate was reorganised in 2015 to differentiate the two entities.

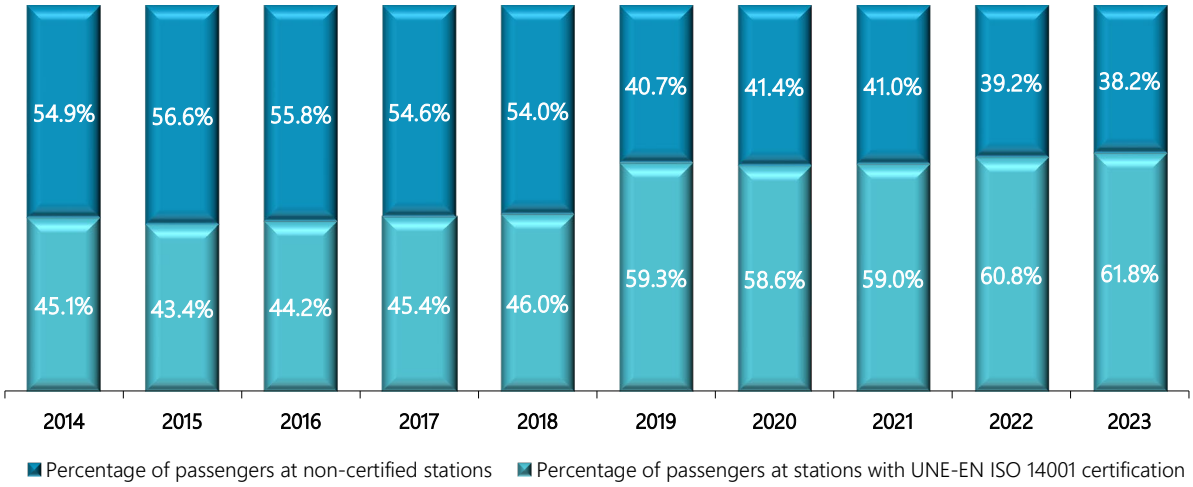
Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department:

Figure 45. Vilagarcía de Arousa Station.

This certification implies the integration of environmental considerations into the management of Adif and Adif-Alta Velocidad. It covers most operational activities with territorial distribution related to the maintenance and operation of railway infrastructure, where the most significant environmental impacts occur. In addition, environmental management guidelines are already being implemented at locations not yet covered by either of the two certificates, with the aim of including them in the near future.

As a result of this approach, 61.8% of passengers use certified stations, a figure that has increased in recent years at stations managed by Adif-Alta Velocidad.

Chart 41. Relevance index of ISO 14001 certifications in passenger stations.



Source: Adif, Corporate Safety Department, Corporate Processes and Corporate Systems, Quality and Customer Sub-Department.

The coordination of the Management System for Adif and Adif-Alta Velocidad according to UNE-EN ISO 14001 Standard is the responsibility of the Corporate Environmental Body, in this case, the Adif-Alta Velocidad Corporate Environmental Sub-Department.

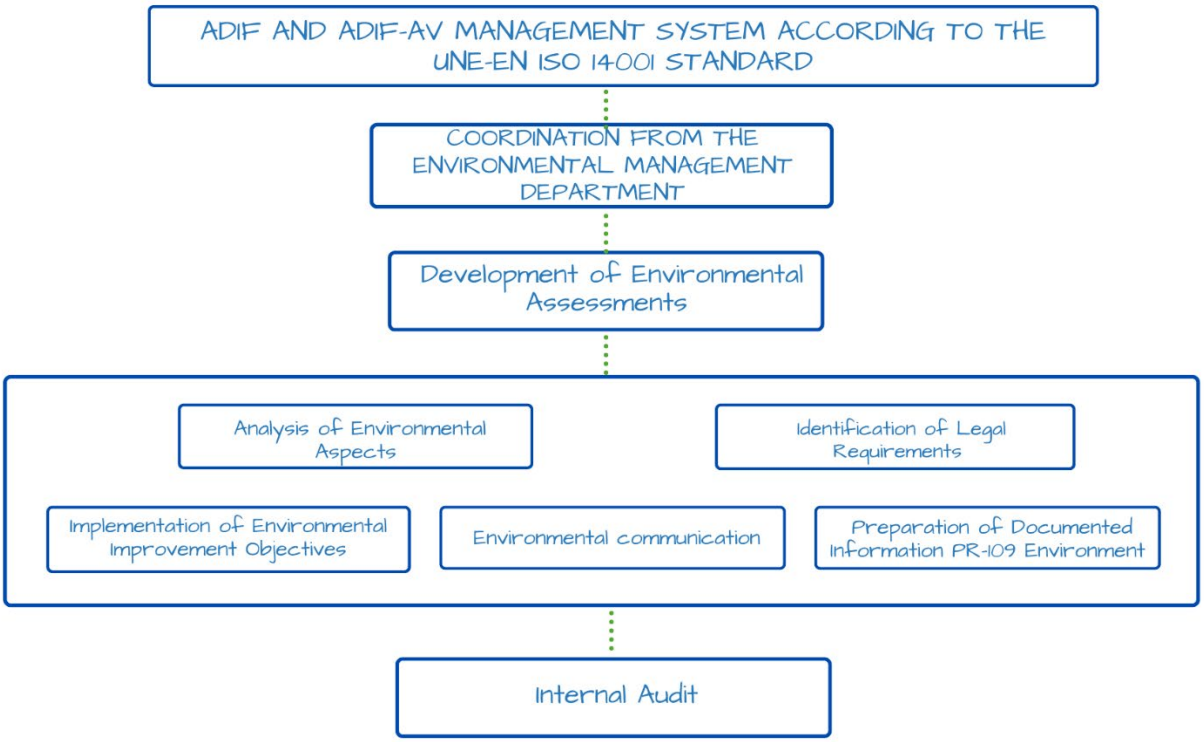


Figure 46. Centralised management of the EMS for Adif and Adif-Alta Velocidad

To support the implementation and development of the Adif and Adif-Alta Velocidad Management System in accordance with the UNE-EN ISO 14001 Standard, the following Documented Information is currently available within the framework of the Corporate Environmental Management Process:

Information documented within the framework of Process ADIF-PR-109-001-001 Corporate Environmental Management

To support the implementation and development of the Adif and Adif-Alta Velocidad Management System in accordance with the UNE-EN ISO 14001 Standard, the following Documented Information is currently available within the framework of the Corporate Environmental Management Process:

- ADIF-PG-109-001-001. General Procedure for Managing and Coordinating Environmental Activities.
- ADIF-PG-109-001-002. Identification and Evaluation of Environmental Aspects.
- ADIF-PG-109-001-003. Identification and Assessment of Environmental Requirements.
- ADIF-PG-109-001-004. Response to Minor Environmental Incidents.
- ADIF-PG-109-001-005. Operational Control and Monitoring and Measurement of Environmental Performance.
- ADIF-PG-109-001-006. Environmental Information Management.
- ADIF-PG-109-001-007. Development of Environmental Assessments.
- ADIF-PG-109-001-008. Contaminated Soil Management.
- ADIF-PG-109-001-022. Waste Management at Adif and Adif AV.
- ADIF-PE-109-001-002. Environmental Site Management.
- ADIF-PE-109-001-020. Environmental Integration of Projects.
- ADIF-PE-109-001-022. Centralised Hazardous Waste Management at Adif and Adif AV.
- ADIF-PE-109-001-023. Environmental Management: Maintenance and Operation of Installations and High-Speed Lines.
- ADIF-PE-109-001-024. Historical Waste Management at Adif and Adif-AV.
- ADIF-PE-109-001-025. Special Waste Management at Adif and Adif-AV.
- ADIF-IT-109-001-001. Identification of Accredited Fuel Dispensing Personnel.
- ADIF-IT-109-001-002. Regulation of the Scope of the Definition of the System according to UNE-EN ISO 14001.
- ADIF-IT-109-001-003. Notification of Opening and Closing of an Environmental Non-Conformity.
- ADIF-IT-109-001-004. Approval of the Environmental Management Plan for Works Subject to an EIS.
- ADIF-IT-109-001-005. Preparation and Submission of Preliminary Situation Reports / Progress Reports (PSR/PR).

Determination of the scope of the Adif and Adif-Alta Velocidad Management System

The UNE-EN ISO 14001 Standard requires determining the limits of applicability of the Environmental Management System. To this end, Adif and Adif-Alta Velocidad have established a documented system for the Regulation of the Definition of the Scope of the System. In accordance with this systematic approach, the Activity Areas of Adif and Adif-Alta Velocidad document the Scope Sheets for certified centres within their responsibility, to define the applicable physical and organisational limits.

In the case of Adif-Alta Velocidad, certification according to the UNE-EN ISO 14001 standard focuses on activities undertaken by the Environmental Sub-directorate, specifically related to the environmental monitoring of projects subject to EIS and the Environmental Integration of Projects. As such, the audited centres include the headquarters of the Corporate Environmental Sub-Department, and the environmental control managed by Environmental Project Managers at various projects undergoing EIS.

Environmental aspects resulting from activities carried out by Adif and Adif-Alta Velocidad

Within the defined scope of the Environmental Management System, the various Activity Areas of Adif and Adif-Alta Velocidad identify the environmental aspects associated with their activities and services. In this context, once the Identification and Assessment of Environmental Aspects have been completed by the different Areas, the Corporate Environmental Sub-Department conducts a comprehensive study of the data. This ensures an optimal evaluation of the information at a global level, draws key conclusions from the process, and identifies any significant issues.

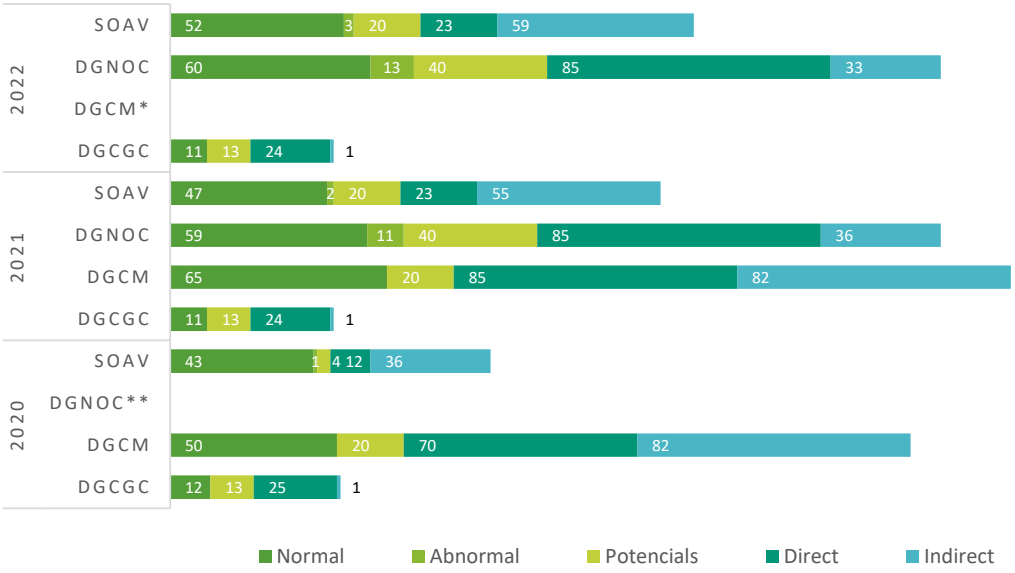
This process of uniformly Identifying Environmental Aspects for Adif and Adif-Alta Velocidad is complex due to the diverse range of activities conducted. Likewise, structural changes within the organisation further complicate the comparison of environmental aspects across different activity areas, as the restructuring alters the number of certified centres associated with the various Corporate Departments.

To promote consistency in Identification and Evaluation of Environmental Aspects, the Corporate Environmental Sub-Department is working to enhance coordination in these processes. This aims to optimise their control, analysing the information provided by the various Activity Areas of Adif and Adif-Alta Velocidad, as outlined in the General Procedure for Identification and Assessment of Environmental Aspects. It should be noted that, in 2023, it was not possible to determine the number of centres studied by the Corporate Conservation and Maintenance Department because data (for to the 2022 period) was not available at the time of analysis. Additionally, the increase in the number of centres assessed in 2022 by the Corporate Business and Commercial Operations Department is due to the expansion of the Management System's scope, specifically the addition of two new passenger stations (Elche AV and Palencia).

In relation to projects subject to an Environmental Impact Statement (EIS), environmental aspects identified during the EIA process are considered, and the Environmental Impact Assessment of the Project outlines measures for environmental protection, including preventive, corrective, or compensatory actions. Therefore, the significance of these aspects is assessed using the methodology outlined in the Environmental Assessment Procedure, in line with current legislation. Thus, significant environmental aspects are those for which the EIS specifies particular requirements for environmental protection, through the reduction and/or mitigation of potential impacts. Operational controls are implemented for all significant environmental aspects. Since the significant environmental aspects fully align with the requirements outlined in the EIS for each project, the monitoring of compliance with these aspects, and thus their associated operational controls, is reflected in the technical reports required by the respective EISs.

Finally, it is important to note that these environmental aspects are considered indirect, as they are addressed and managed through the management systems of the contracted companies providing technical assistance for the performance of the relevant tasks.

Chart 42. Typology of environmental aspects (2020-2022)



* Data not available for the DGCM in 2022
** Data not available for DGNOC in 2020

DGNOC: Corporate Business and Commercial Operations Department.

DGCM - RC: Corporate Conservation and Maintenance Department (Conventional Network).

DGCM - SOAV: Corporate Conservation and Maintenance Department (Corporate High-Speed Operations Sub-Department).

DGCGC: Corporate Traffic and Capacity Management Department.

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department.

In 2023, the Direct Environmental Aspects most frequently assessed as significant in each of the analysed areas are as follows:

- In the centres of the Corporate High-Speed Operations Sub-Department (SOAV), the most significant aspects analysed by the Corporate Environmental Sub-Department are related to the consumption of electricity, paper, and water.
- In the Corporate Traffic and Capacity Management Department (DGCGC), the most significant aspect is the consumption of electrical energy, followed by toner waste generation and water consumption (which are typical of administrative activities).
- In the Corporate Business and Commercial Operations Department (DGNOC) the most significant aspects, depending on the type of centre, are as follows:
  - Stations: commercial waste, paper and cardboard waste, water consumption, plastic waste, and discharge of polluted water.
  - Depots: wastes such as contaminated absorbent materials, oil sludge, and soil contaminants.
  - Logistics services: water consumption, and electricity consumption.

Of particular relevance is the consumption of electrical energy, which is a key aspect across all areas. Measures should continue to be promoted to help reduce this consumption in the areas of Adif and Adif-Alta Velocidad. In this regard, it should be noted that several actions have been implemented to improve and increase efficiency as part of Adif's Plan to Combat Climate Change at Adif and Adif-Alta Velocidad. Likewise, the Corporate Environmental Sub-Department shall plan the delivery of training sessions for the Activity Areas of Adif and Adif-Alta Velocidad,

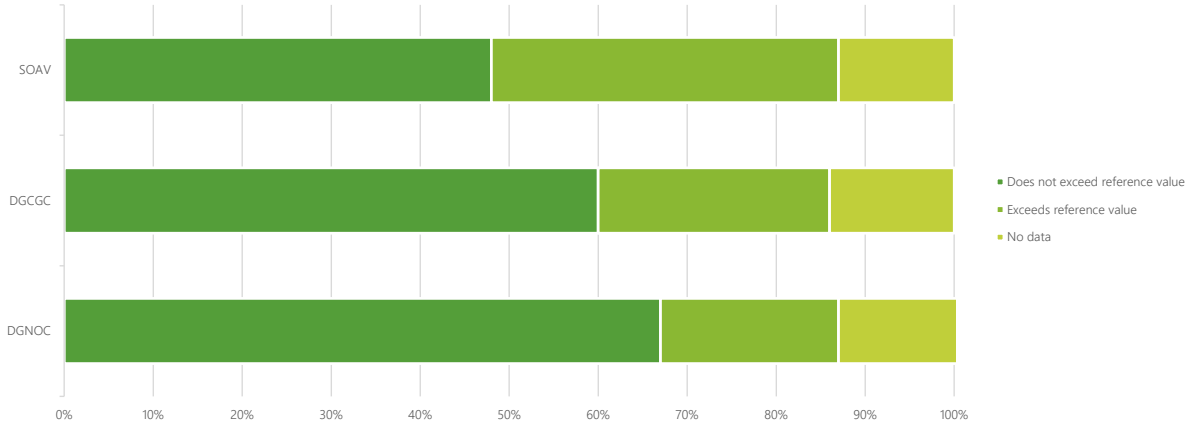
focusing on key issues such as systematic identification and assessment of aspects, implementation of new procedures, and results of internal audits, among others. During 2022-2023, environmental awareness training was conducted within the Corporate High-Speed Operations Sub-Department. Work is underway on a Welcome Pack for dissemination to contractors. That pack will include procedures, records, policies, and documentation from Adif and Adif-Alta Velocidad that are relevant to the execution of works.

Finally, to enhance the management of potential environmental issues arising from emergencies during Adif and Adif-Alta Velocidad activities, a general system for handling minor environmental incidents has been established. This system provides common guidelines for action and analysis, to prevent or mitigate potential adverse environmental impacts and ensure an adequate and effective response.

Environmental performance in Adif and Adif-Alta Velocidad

As outlined in procedure ADIF-PG-109-001-005 Operational Control, Monitoring and Measurement, the Corporate Environmental Sub-Department is responsible for conducting an overall analysis of the information provided by each Activity Area, which is detailed below:

Chart 43. Percentage of compliance with the reference values by Activity Area in 2022.



Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department.

The overall analysis of Adif-Alta Velocidad's environmental performance indicates positive progress, with a high level of compliance with the reference values established for environmental aspects across all Activity Areas that reported information. While it is true that efforts should focus on addressing aspects where the reference value is exceeded and for which no generation information is available.

Legal requirements and other obligations applicable to activities conducted by Adif and Adif-Alta Velocidad

Regarding the process of identifying and evaluating environmental requirements, each Activity Area of Adif and Adif-Alta Velocidad is responsible for updating, reviewing, and assessing compliance with applicable legal requirements related to the identified environmental aspects, as well as with additional

commitments of the Management System. This is done in accordance with the documented procedures for Adif and Adif-Alta Velocidad in the General Procedure for Identification and Assessment of Environmental Requirements.

To support the process of identifying applicable environmental requirements, Adif and Adif-Alta Velocidad have a legislative update service that identifies legal requirements relevant to activities in municipalities with over 50,000 inhabitants. This service is managed and coordinated at the corporate level by the Corporate Environmental Sub-Department.

After identifying Environmental Requirements, each Activity Area performs an Environmental Requirements Assessment at least once a year, following the review of identified Environmental Aspects and whenever there is a regulatory change. Any non-compliances detected in this assessment are managed through the Non-conformity tool, if necessary.

Planning Environmental Objectives at Adif and Adif-Alta Velocidad

To improve the Management System of Adif and Adif-Alta Velocidad, an annual plan is defined for General Objectives in line with corporate policies and strategies (SP 2030). In addition, each Activity Area establishes and monitors its own plan of Specific Objectives aimed at improving significant environmental aspects and addressing other relevant issues within the implemented Management System.

At a general level, during 2023 the objective set by Adif and Adif-Alta Velocidad has been the Improvement of Environmental Performance by implementing measures that promote and reinforce environmental respect and reduce the negative impacts of operational activities. This objective is addressed through the following actions:

- Continue expanding the scope of environmental certification to include two new centres (Elche and Palencia Stations). The long-term goal is to achieve environmental certification for all Adif and Adif-Alta Velocidad work centres that have environmental impacts. This target comprises five actions, all of which were completed following the external audit process for certifying the proposed centres in 2023.
- Leverage the potential of contracts with both entities to promote the achievement of environmental actions. To this end, the Corporate Environmental Sub-Department is coordinating a working group to develop a Catalogue of Environmental Clauses to be included in the contracting documents of both entities, along with a guide with indications for their use and dissemination to the various activity areas of Adif and Adif-Alta Velocidad. During 2023, the drafting and technical validation of the Catalogue of Clauses and the Guide to the Use have been completed. It is only pending approval by the Legal Department. Once it is in use, it will be monitored and updated based on the identified needs.
- To enhance the environmental culture and awareness among Adif and Adif-Alta Velocidad staff, efforts are focused on monitoring and optimising the Environmental Training Plan established for the organisation's employees. The degree of compliance with the Training Plan at Adif and Adif-Alta Velocidad for 2023 was 107%, exceeding the target of 80%. Note that the Environmental Training Plan is monitored on a bimonthly basis. Regarding the analysis of training activities corresponding for 2023, a total of 5,907 hours of environmental training was conducted, with 558 participants. Additionally, to enhance the existing information

materials, a new edition of the Welcome Package for new maintenance contracts has been produced, along with new environmental awareness materials: a fire safety awareness poster (May 2023) and two water saving posters for facilities and offices (December 2023).

- Improvement of the Environmental Monitoring system during the execution of works not subject to EIS by Adif and Adif-Alta Velocidad. To this end, the end-of-work reports are monitored. A total of 172 EIS works were monitored during 2023.
- Improvement of environmental control in the certified activities of the Corporate High-Speed Operations Sub-Department. To this end, a platform has been created for managing the documentation related to the operational control of identified environmental aspects, as well as for overseeing the environmental control of certified facilities and works on the High-Speed Lines. By the end of the 2023, the document management platform was already in use for documentation management. Regarding environmental monitoring at certified facilities, 75 visits were conducted in 2023, representing 95% of the planned schedule (exceeding the target value of 90%). The number of visits is slightly lower than in previous years because the new environmental monitoring contracts were incorporated in November 2023 and January 2024, respectively. During 2023, 56 works on High-Speed Lines were monitored, of which 6 were completed within the year. This resulted in 5 final reports and 1 single report being issued. Finally, the format of the environmental report has been improved by introducing a new visit report template in the latest Technical Assistance contracts.
- Improving the process of identifying legal requirements applicable to the certified scope of Adif and Adif-Alta Velocidad by updating of inventories of existing equipment and facilities in the scope of the Corporate High-Speed Operations Department. By the end of 2023, the inventories of 11 maintenance bases have been updated in the Legislative Update Service, with 5 centres still to be updated. The first legislative bulletin on the new requirements set out in Royal Decree 487/2022 of 21 June, which establishes the health requirements for the prevention and control of legionellosis (Published in *Inicia* in September 2023), has also been drafted.
- Improving the waste management model of Adif and Adif-Alta Velocidad. To this end, it is proposed to centralise the collection of various types and flows of waste through the Corporate Environmental Sub-Department and establish a centralised waste register based on the information in the Identification Documents. This register would include all information related to hazardous operational waste, as well as historical and special waste collected during 2023. Subsequently, the analysis and presentation of the data on waste production by different types (both hazardous and non-hazardous) from Adif and Adif-Alta Velocidad, as well as the annual centralised management reports for both for hazardous waste management and historical and special waste, are now available.
- Improvement of contaminated soil management, for which the Contaminated Soil Management Plan 2023-2025 was developed and approved by the Corporate Environmental Sub-Department in May

2023. In addition, an annual review of both the actions forecast and the objectives of the Contaminated Soil Management Plan 2023-2025, as well as the Monitoring Programme, is planned.

- Improvement of the Environmental Management documentation: the following procedures are scheduled for revision: ADIF-PE-109-001-023 'Maintenance and Operation of High-Speed Lines and Facilities': a first draft has been prepared, revising the procedure's content to align it with the current system. It is pending approval by the Head of Division. Regarding the General Procedure ADIF-PG-109-001-002 'Identification and Evaluation of Environmental Aspects', work has been done to update the evaluation criteria tables and record formats. The changes are currently awaiting transfer to the relevant areas within Adif and Adif-Alta Velocidad for their assessment and comments. Regarding General Procedure ADIF-PG-109-001-004 'Minor Environmental Incidents', a new sheet has been drafted to address fauna entanglement and electrocution. The content of the rest of the minor environmental impact action sheets remains to be reviewed. As of the end of 2023, the Special Waste Procedure was still pending revision.

Of the nine targets proposed for Improving Environmental Performance during the 2023-2024 period, one has been completed, and eight are wither partially completed or in progress. At the end of 2023, the implementation percentage of the actions proposed to achieve these targets was 77%.

Internal Management System Audits in accordance with UNE-EN ISO 14001 Standard for Adif and Adif-Alta Velocidad

Environmental improvement actions within the Adif and Adif-Alta Velocidad Management System are controlled through internal and external audits, certification, and monitoring. From these, findings are generated that are considered for the continuous improvement of the system (including non-conformities, observations, and opportunities for improvement).

The Internal Audit process of the Environmental Management System according to ISO 14001 at Adif and Adif-Alta Velocidad is coordinated at the corporate level by the Corporate Environmental Sub-Department. For its implementation, it relies on the collaboration of an external consultancy with extensive experience in the railway sector, ensuring the highest possible level of impartiality throughout the audit process.

Internal audits must cover one-third of the sites in the certified area each year (ensuring that the entire certified area is audited over a 3-year cycle) and are, therefore, an excellent tool for Adif and Adif-Alta Velocidad to identify opportunities for improvement in the environmental field.

The external validation of the EMS Certification according to ISO 14001 Standard for Adif and Adif-Alta Velocidad is conducted by the Certification Body AENOR.

Due to the COVID-19 pandemic, the Internal Audit of Adif and Adif-Alta Velocidad for 2020 was deferred to 2021 because the External Audit was postponed to the end of 2020.

The results from the audited centres associated with Adif-Alta Velocidad are shown below.

Table 37. Results of the ISO 14001 environmental management system audits at Adif-Alta Velocidad.

	2016		2017		2018		2019		2020		2021		2022		2023	
	Aud. Int.	Aud. Ext.	Aud. Int.	Aud. Ext.	Aud. Int.	Aud. Ext.	Aud. Int.	Aud. Ext.	Aud. Int.	Aud. Ext.	Aud. Int.	Aud. Ext.	Aud. Int.	Aud. Ext.	Aud. Int.	Aud. Ext.
Non-conformities (No.)	0	1*	0	0	0	0	2*	0	-	0	0	0	0	0	0	0
Remarks (No.)	2	9**	1	4	1	1	4	3**	-	2	2	6	0	3	4	1
Audited headquarters (No.)	2	2	2	1	1	1	2	2	-	2	2	2	2	2	2	2
Certified sites (No.)	2	2	2	2	2	2	2	2	-	2	2	2	2	2	2	2
Certified sites that have been audited (%)	100	100	100	50	50	50	100	100	-	100	100	100	100	100	100	100

* One of which is common to Adif and Adif-Alta Velocidad

** Two of which are common to Adif and Adif-Alta Velocidad

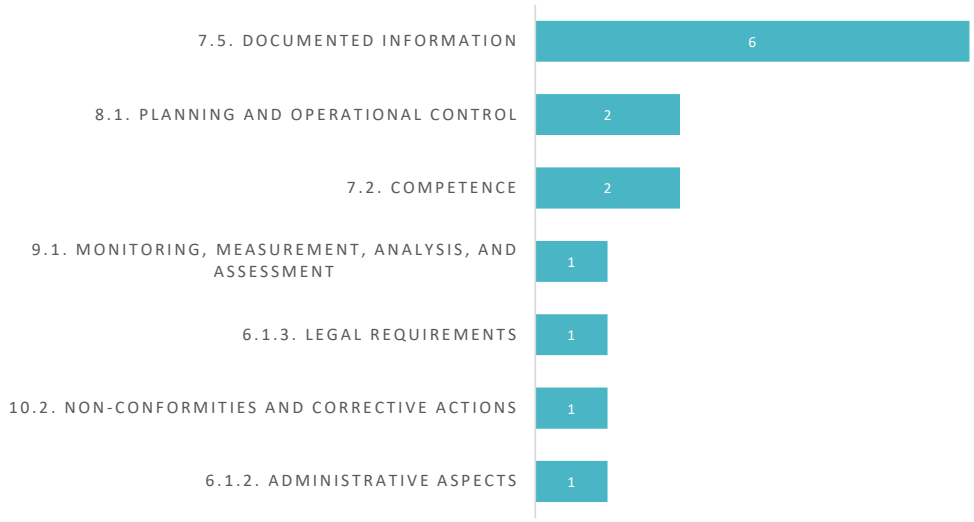
Source: Adif-Alta Velocidad. Corporate Management. Corporate Environmental Sub-Department. 2023 External Audit Reports and External Audit Plans

The results obtained in 2023 remain consistent with those from recent years of certification for Adif and Adif-Alta Velocidad, demonstrating that the management system is mature and well-established.

Detecting deviations and non-conformities from auditing processes or day-to-day monitoring of the Management System, and resolving them through immediate and corrective actions, when necessary, are activities that enable Adif and Adif-Alta Velocidad to continuously improve the effectiveness of its Management System.

Regarding the Internal Audit of the Management System according to the UNE-EN ISO 14001 standard for the 2023 period, no non-conformities were found, and a total of 4 observations were recorded. Below is a breakdown of the total findings by section of the UNE-EN ISO 14001 Standard:

Chart 44. Breakdown of total findings detected by section of the ISO 14001 Standard during the Internal Audit process for Adif and Adif-Alta Velocidad.



Source: Adif Alta Velocidad. Corporate Management. Corporate Environmental Sub-Department. 2023 Internal Audit Statistical Results Report.

Additionally, in 2023, no non-conformities were detected from the External Audit, and a total of one observation was recorded regarding the Management System according to the UNE-EN ISO 14001 standard. This observation concerned aspects of Corporate Environmental Management developed by the Corporate Environmental Sub-Department, which is responsible at the corporate level for the Environmental Management System of both entities.

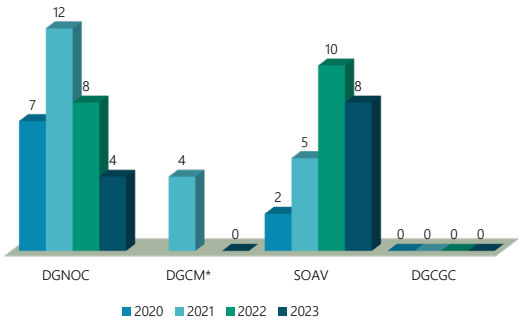
Minor environmental incidents

Among other activities related to the management control of the Environmental Management System at Adif and Adif-Alta Velocidad, the Corporate Environmental Sub-Department monitors Minor Environmental Incidents at corporate level in Adif and Adif-Alta Velocidad, in accordance with General Procedure ADIF-PG-109-001-004 'Action against Minor Environmental Incidents'.

The Corporate Environmental Sub-Department conducts a joint analysis of Minor Environmental Incidents within the scope certified under the UNE-EN ISO 14001:2015 Standard for Adif and Adif-Alta Velocidad, using data provided by the heads of the different Activity Areas: Corporate Business and Commercial Operations Department, Corporate Conservation and Maintenance Department (Conventional Network), and Corporate Traffic and Capacity Management Department, as well as incidents occurring in the Facilities and Maintenance Activities of High-Speed Lines of the Corporate High-Speed Operations Sub-Department (SOAV).

The following figure shows the distribution of minor environmental incidents by Activity Area for the period 2023, compared to those recorded in previous years:

Chart 45. Minor environmental incidents at Adif and Adif-Alta Velocidad. Year 2023



* No information available from DGCM for 2020 and 2022

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department.

According to these results and based on the documents provided by each of the aforementioned Activity Areas at Adif and Adif-Alta Velocidad, a total of 12 Minor Environmental Incidents occurred in 2023. These were specifically in the Activity Areas of the Corporate Business and Commercial Operations Department (4) and the Corporate High-Speed Operations Sub-Department (8). No Minor Environmental Incidents were reported in the Corporate Traffic and Capacity Management Department or the Corporate Conservation and Maintenance Department (Conventional Network) for the year 2023.

The total number of recorded incidences decreased from 18 in 2022 to 12 in 2023. All recorded environmental incidents have been closed, representing 100% of the total incidents Generally, immediate corrective actions are taken. However, one incident remains under review for cause analysis and the application of corrective measures.

In general, there has been an improvement in the information recorded in the Corporate Minor Environmental Incident Record Form (ADIF-PG-109-001-004-F-01).

The decrease in records may be attributed to the implementation of drills and/or questionnaires on incidents, which are part of the environmental awareness improvements across the various areas of Adif and Adif-Alta Velocidad.

However, among the recorded incidents, those related to *Legionella* detection (33%) and water consumption due to breaks or leaks (33%) stand out. Therefore, it is advisable to implement preventive measures to reduce the frequency of these incidents, such as executing the tasks specified in each centre's *Legionella* control plans, updating them if necessary, and conducting regular water consumption monitoring to detect leaks as soon as possible.

In any case, it is considered that none of the environmental incidents recorded during 2023 had a significant impact on the environment

Environmental communication in Adif and Adif-Alta Velocidad

In relation to the Communication process and in accordance with Law 27/2006, which regulates the right of access to environmental information, the Corporate Environmental Sub-Department serves as the point of contact for Adif and Adif-Alta Velocidad with environmental administrative bodies at community, state, regional, and local levels. It also manages interactions with individuals and official bodies that submit requests for information and/or demands for environmental actions. In this capacity, as the Unit Responsible for Environmental Information, it provides information, advice, and counselling on any environmental inquiries, ensuring prompt processing and resolution.

Additionally, Adif and Adif-Alta Velocidad have a general system in place for the managing and processing of relevant environmental information. This system was developed by the Corporate Environmental Sub-Department in collaboration with all the Activity Areas of Adif and Adif-Alta Velocidad.

After analysing the relevant environmental reports collected by each area for 2023, the following conclusions can be drawn: within the Corporate Environmental Sub-Department, the highest number of relevant environmental reports in 2023 corresponds to environmental

acoustics department, with 305 complaints related to noise and vibrations. Upon analysing data from other areas, it is noted that the Corporate Conservation and Maintenance Department (DGCM) has the second highest number of environmental reports, with 207 recorded. 66.13% of these reports correspond to complaints or claims about pruning, weeding, and issues concerning fauna or waste. The third highest number is 69 records of relevant environmental information from the Corporate Business and Commercial Operations Department (DGNOC). 67% of these records are related to complaints from residents near passenger stations, primarily concerning noise and vibration issues.

ENVIRONMENTAL TRAINING

The Annual Training Plan of Adif and Adif-Alta Velocidad outlines the training scheduled for the year, tailored to the needs of the various operational areas. Among the subjects covered in this Plan is the environment.

Training activities

In 2023, Adif-Alta Velocidad conducted a total of 4 environmental courses for 12 participants, amounting to 80 hours of training. Two thirds of the training courses were delivered online.

The course with the highest attendance was *'PG109 Actuaciones, incidencias ambientales menores CFV (centro de formación virtual)'* (PG109 Minor Environmental Incidents Actions VTC (Virtual Training Centre)), which was delivered online. This course accounted for over 70% of both the total participation and the training hours completed.

Table 38. Courses on the environment delivered in 2022.

Name	Modality	No. of sessions
PG109 Actions Minor Environmental Incidents VTC (Virtual Training Centre)	E-learning	2
Virtual classroom Environment	E-learning	1
International Fight Against Climate Change	On site	1
TOTAL		**4**

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

Training for different areas and professional groups

During 2023, the compliance with training plans by Adif and Adif-AV Activity Areas, as well as by professional groups, significantly exceeded the target value set for the evaluation of the effectiveness of the goal (compliance reached 99% for participant numbers and 107% for planned hours), compared to the target of 80%.

Notably, training for the personnel of the Corporate Conservation and Maintenance Department involved 408 participants and 3,617 hours, with the majority in the course *'PG109 Actuaciones Incidencias Ambientales Menores'* (PG109 Minor Environmental Incident Actions)

Table 39. Environmental training for management at Adif and Adif-Alta Velocidad in 2023

Scope	Average staff	Planned participation	Actual participations	Planned hours	Completed hours	Participant compliance (%)	Compliance with hours (%)
Department of the President's Office and Internal Audit	136	0	3	0	15	100	100
Corporate Department	216	1	3	6	18	300	300
Corporate People Management Department	662	2	30	16	363	1,500	2,269
Corporate Department Financial and Management Control	228	1	5	6	25	500	417
Corporate Department Construction	105	5	2	30	12	40	40
Corporate Department Conservation and Maintenance	5,231	472	408	4,204	3,617	86	86
Corporate Department Circulation and Capacity Management	3,890	6	53	617	1,348	883	218
Corporate Department Business and Commercial Operations	1,462	3	32	18	178	1,067	989
Corporate Department Strategic Planning and Projects	133	4	3	218	210	75	96
Corporate Department Security Corporate Processes and Systems	536	4	4	32	23	100	72
Adif-Alta Velocidad	276	18	12	122	80	67	66
Default*	0	46	3	276	18	7	7
TOTAL	**12,875**	**562**	**558**	**5,545**	**5,907**	**99**	**107**

* Includes staff who relocate during the year.

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

Table 40. Environmental training for professional groups at Adif and Adif-Alta Velocidad in 2023

Position	Average workforce	Planned participation	Actual participations	Planned hours	Completed hours	Participant compliance (%)	Compliance with hours (%)
Operational staff	8,060	489	440	3,919	3,802	90	97
Middle-level management	2,467	17	70	908	1,187	412	131
Support structure	1,220	8	35	436	837	438	192
Management structure	925	2	10	12	63	500	525
Default*	0	46	3	270	18	7	7
TOTAL	**12,672**	**562**	**558**	**5,545**	**5,907**	**99**	**107**

* Includes staff who relocate during the year.

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

ENVIRONMENTAL PROCESS MANAGEMENT

Responsible purchasing

3-3 | 308-1 | 308-2

Adif-Alta Velocidad seeks to use public procurement as a tool to advance sustainability goals.

Therefore, for each contracting process, Adif-Alta Velocidad conducts a supplier selection process where suppliers must demonstrate their business solvency as well as their compliance with social and environmental requirements. Additionally, the contracting specifications detail the environmental prerequisites that suppliers must meet and be accredited before the respective contracts are awarded.

The environmental criteria used to select suppliers are based on the aforementioned solvency and award criteria, as well as other contract-related clauses such as technical specifications and special execution conditions. All these categories of criteria are outlined by the contracting authority in the contract documents and are made available to tenderers before they submit their bids.

In addition, the purchasing managers in the various Adif-Alta Velocidad departments must also include environmental obligations for contractors, considering maintenance activities, supplies, or services under contract. These environmental clauses should be tailored to the subject matter of the contract.

Since 2021, a specific working group, coordinated by the Corporate Environmental Sub-Department and including all the areas affected in the procurement process, particularly Purchasing and Contracting and the Legal Department, has been established to develop a catalogue of environmental clauses and criteria for inclusion in the various phases of the procurement process. These environmental criteria will be established by contract type (cross-cutting clauses, services, supplies, projects, and works) and will be made available to both the technical areas as well as to the contracting authorities.

These environmental clauses aim to go beyond legal compliance, leveraging Adif-Alta Velocidad's contracting power to promote sustainable public procurement among its suppliers.

Adif-Alta Velocidad is developing a Catalogue of Environmental Clauses to be included in the various phases of the contracting process, incorporating environmental criteria into Public Procurement as required by the *Public Sector Contracts Act*.

Thus, clauses are defined at three levels:

- Requirements for tenderers in the design, preparation, and drafting phase of the contract and its specifications.
- Clauses to be used as evaluation criteria during the contractor selection phase.
- Special conditions to be considered during the execution phase of the contract.

As a result of all this work, **Adif-Alta Velocidad** has defined the environmental criteria for assessing suppliers of goods, services, projects, and works submitted in its procurement processes.

The environmental criteria, related to the nature of the contract, cover: waste and emissions, environmental management systems, works contracts, cleaning services, security services, consultancy and engineering services, project and works execution, maintenance services, food and catering services, courier and logistics, gardening, fleet vehicle supply, energy supply, works and office supply, and more.

Environmental risk management

308-2

Adif-Alta Velocidad has established an Integrated Risk Management System. It is a set of policies, procedures, and practices that enables the identification, analysis, and management of risks associated with the activities of the two entities, providing a reasonable level of assurance for the achieving their objectives.

Both the Catalogue of Clauses and the Guide to Use of the Catalogue have already been drafted and validated at a technically, pending only the approval of the Legal Department. Once it is in use, it will be monitored and updated based on the identified needs.

The objective is to integrate environmental criteria at the appropriate stages of the procurement process (subject matter, solvency, assessment, and performance conditions), in a manner that aligns with the principles of public procurement: competition, freedom of access, transparency, non-discrimination, and equal treatment.

The procurement system in place allows for:

- To promote and encourage the procurement of environmentally friendly goods and services.
- To provide a reference for adapting purchasing processes to comply with environmental legal requirements.
- To provide technical support to suppliers and contractors on environmental risk prevention related to the procurement of goods and services and the execution of works.

The scope of this management system includes, among other factors, the environmental risk. For **Adif-Alta Velocidad** this pertains to non-compliance with current environmental regulations and, therefore, the potential for resulting sanctions.

[12] Law 9/2017 of 8 November on Public Sector Contracts, transposing into Spanish law Directives 2014/23/EU and 2014/24/EU of the European Parliament and Council, dated 26 February 2014 (BOE No. 272 9 November 2017).

To minimise and control the risk of environmental damage and non-compliance with environmental regulations, indicators have been established that focus on:

- The efficiency in the supervision of projects and works.
- The extension of the scope of environmental certification for Adif-Alta Velocidad's activities.
- A thorough control of activities with the highest risk of soil contamination.

With this system, Adif-Alta Velocidad meets the requirements for identifying environmental risks as outlined by the ISO 14001:2015 standard.

Environmental complaint management

3-3

Adif-Alta Velocidad has a procedure in place to receive, document, and respond to complaints regarding noise generated by its activities.

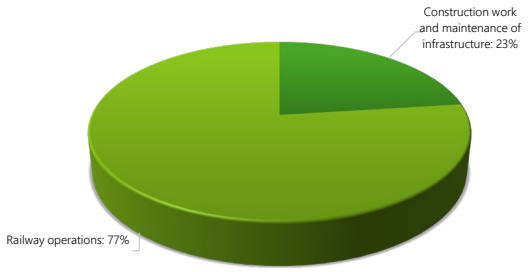
Environmental complaints received. Year 2023

In 2023, a total of thirteen (13) environmental complaints related to noise were received and addressed through the established communication methods.

Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

According to the sources of the noise and vibration complaints, their distribution was as follows:

Chart 46. Source of noise and vibration complaints in 2023 (%)



Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department

ENVIRONMENTAL EXPENDITURE AND INVESTMENTS

In 2023, Adif-Alta Velocidad's expenses and investments (excluding construction) reached over 5.4 million and 6 million euros, respectively.

Table 41. Expenditure on environmental protection (€)

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
A. Exploitation	**442,482**	**2,932,827***	**3,331,232***	**1,102,824**	**1,240,144**	**2,675,356***	**3,187,383***	**3,335,859**	**3,275,305**	**5,497,337**
Waste*	34,045	37,469	36,003	27,413	26,822	44,819	80,171	88,645	135,153	0
Water treatment**	26,670	24,425	95,076	8,981	3,751	13,398.40	22,038	24,809	32,553	22,240
Noise and vibration	-	16,834	145,619	-	-	-	120,400	0	6,940	18,492
Environmental Management Systems and Specific Programmes	266,491	92,773	36,909	24,696	23,255	37,413	31,617	78,457	63,661	32,147
Decontamination of contaminated soils or water	-	2,471	-	-	-	-	-	-	-	-
Fire prevention	-	2,611,469	2,833,756	886,392	1,027,737	2,230,719	2,897,854	3,088,059	3,003,741	5,224,952
Environmental integration	-	52,023	90,020	76,838	76,838	32,016	0	0	0***	0
Environmental monitoring of works not subject to an EIA	115,276	95,363	93,849	78,504	81,741	316,991	35,303	55,889*	33,257	42,379
Environmental monitoring of HSL maintenance activity	-	-	-	-	-	-	-	-	-	157,127
B. Investment	**50,037,020**	**44,034,450***	**32,270,052**	**73,205,446**	**58,641,398**	**40,323,662**	**44,724,540***	**43,714,885***	**83,218,990***	**104,637,783**
Water treatment	-	-	-	-	-	-	119,841	39,118	137,540	30,190
Noise and vibration	-	-	-	-	-	-	156,703	115,627	90,933	132,008
Decontamination of contaminated soils or water	-	259,150	4,872,428	-	-	-	-	-	5,229,304	1,544,392
Energy saving	1,717,882	331,406	638,439	241,176	9,135	2,418,354	357,917	4,305,255	1,490,852	434,153
Fire prevention	-	-	-	-	-	-	-	-	-	-
Environmental monitoring of works not subject to an EIA	-	-	-	-	-	50,896	161,610	291,576	222,553	379,010
Environmental monitoring of HSL maintenance activity	-	-	-	-	-	-	126,749	380,248	340,442	-
EIA Compliance	1,514,833	1,706,316	1,234,663	1,696,924	1,309,799	2,354,577	2,305,592	2,212,376	2,447,026****	3,552,892
Projects	46,488	36,000	94,239	121,070	144,313	300,810	313,175	321,890	454650***	548943***
Construction	1,468,345	1,670,316	1,140,424	1,575,854	1,165,486	2,053,767	1,992,417	1,890,486	1,992,376****	3,003,949
Works	46,804,305	41,737,578	25,524,522	71,267,346	57,322,464	35,499,835	41,496,128	36,370,685	73,260,340	98,565,138

* This item does not include fees paid for refuse collection.

** This item includes, among other things, sewage treatment charges and other related management costs.

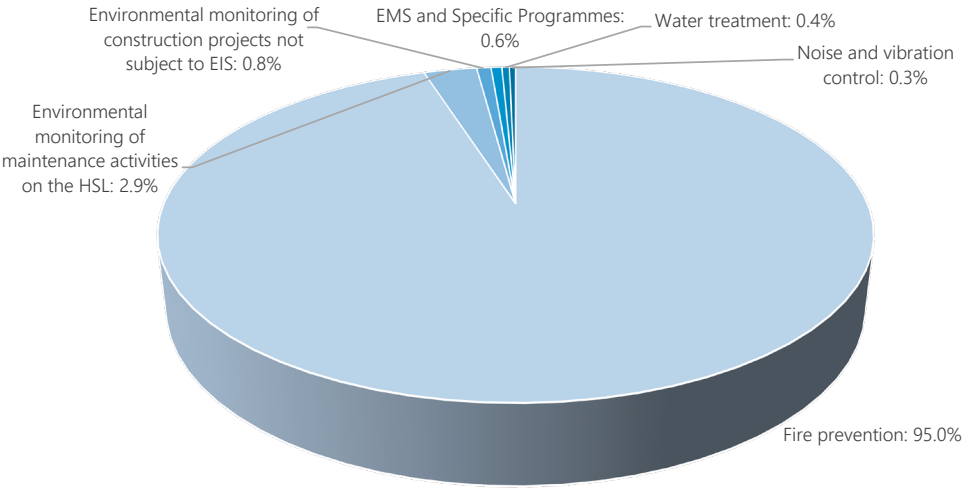
***Total data from Adif, Corporate Maintenance and Upkeep Department, Corporate Technical Department, Corporate Resources Sub-Department are not included.

***** Data revised in relation to the 2022 Environmental Report.*

Source: Adif-Alta Velocidad, Corporate Management, Corporate Environmental Sub-Department; Adif-Alta Velocidad, Corporate Responsibility, Sustainability and Brand Sub-Department, Business Strategy Directorate, Corporate Strategic Planning and Projects Department, Environmental Sustainability and Combating Climate Change Division; Adif, Corporate Passenger Stations Department; Adif, Corporate Treasury and Accounting Department, Corporate Finance and Management Control Department, Administration and Services Division; Adif, Corporate Conservation and Maintenance Department, Corporate Technical Department, Corporate Resources Sub-Department; Adif, Corporate Conservation and Maintenance Department, Corporate Maintenance Department; Adif-Alta Velocidad, Technical Planning for Track Assembly and Supplies Department.

Ninety-five percent of Adif-Alta Velocidad's environmental spending on operations was allocated to fire prevention, while 2.9% was used for environmental monitoring of maintenance activities on the high-speed lines (HSLs). The remaining funds were spent on environmental monitoring of construction projects not subject to environmental impact assessments (EIS), environmental management systems and specific programmes, water treatment, and noise and vibration control.

Chart 47. Expenditure on environmental protection in operation Year 2023



Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department.

In terms of investments made by Adif-Alta Velocidad in environmental protection, the largest share by far is allocated to construction works (94.2%). The remainder is used for soil or water decontamination, compliance with environmental impact assessments (EIS), and to a lesser extent, for energy savings, environmental monitoring of projects not subject to EIS, and noise control.

Chart 48. Expenditure on environmental protection in investment. Year 2023

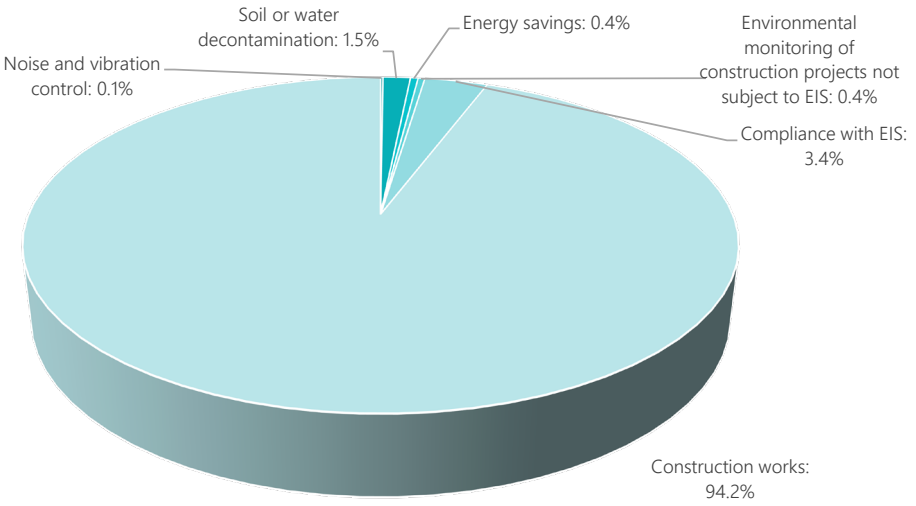


Table 42. Environmental investments in the construction of new railway accesses for the year 2023 (€/year)

	Bobadilla-Granada	Centre	Córdoba-Málaga	Mediterranean Corridor	North-Northwest Corridor	Atlantic Corridor	Madrid-Cartagena Railway Axis	Madrid-Extremadura	Madrid-Zaragoza-Barcelona-Fra. French	Madrid-Castilla La Mancha-Comunidad Valenciana-Region of Murcia	North-east	New Railway Network in the Basque Country	New Railway Access to Asturias	New Railway Access to Galicia	New Railway Access to Northern and North-Western Spain	Palencia-Santander	Total
Land preparation and landscape integration measures for the railway line and infrastructure	0	269,417	19,810	874,558	6,856	147,680	90,269	1,258,021	108,210	296,479	1,278,698	1,524,453	202,364	511,190	0	456,940	7,044,944
Adaptation and landscape integration measures for auxiliary construction elements	0	0	0	428,842	4,618	1,749	0	490,139	0	22	591,769	810,480	72,994	2,649	82,475	378,269	2,864,007
Noise protection	0	89,848	0	3,744	1,323,001	11,206,073	0	0	0	4,739	108,923	12,617	19,333	77,694	0	0	12,845,972
Wildlife protection	0	0	0	3,561,650	1,516	16,079	0	4,058,099	443	10,525	203,980	307,409	83,596	41,094	0	2,500,977	10,785,368
Archaeological protection	0	75,965	0	2,288,224	269	149,618	32,633	855,282	457,243	9,605,272	292,737	290,305	6,743	116,916	0	112,697	14,283,903
Protection of water and soil quality	0	0	0	81,824	0	146,840	0	4,515	273,952	0	321,509	1,698,062	864,826	18,922	1,607,373	4,328	5,022,152
Waste management	11,957	2,179,413	24,269	9,075,163	732,753	425,331	5,031	732,492	1,822,813	6,320,235	64,557	6,621,411	612,532	329,455	0	210,692	29,168,106
Environmental monitoring of the works	0	0	0	11,612	0	0	0	0	5,380	0	10,957	1,224	5	1,153	0	0	30,331
Setting out	277	535	56	15,756	28,825	2,034	13,941	134,192	7,050	143,339	12,020	71,479	2,688	42,007	0	64,599	538,797
Air quality	0	0	0	0	0	0	0	102,866	1,088	0	0	80,297	0	0	0	0	184,251
Structures modified to comply with the EIS	0	0	0	0	17,363	0	0	1,243,005	0	0	0	5,192,798	10,968	0	0	0	6,464,134
Compensatory measures	0	0	0	0	0	0	0	45,044	0	0	265,346	0	11,726	66,662	975,114	0	1,363,892
Various	0	5,122	0	64	1,975	185,805	0	120,314	0	0	7,365,665	277,159	6,138	0	0	7,039	7,969,280
Total Environmental Measures (EM)	**12,234**	**2,620,299**	**44,135**	**16,341,437**	**2,117,175**	**12,281,210**	**141,874**	**9,043,970**	**2,676,179**	**16,380,610**	**10,516,161**	**16,887,695**	**1,893,912**	**1,207,743**	**2,664,962**	**3,735,542**	**98,565,138**
Total work	**2,008,490**	**103,631,235**	**7,402,548**	**316,042,580**	**7,325,917**	**35,218,982**	**1,779,357**	**149,452,853**	**97,009,910**	**87,572,361**	**37,094,062**	**174,185,937**	**50,985,168**	**34,962,902**	**4,019,870**	**28,570,042**	**1,137,262,215**
% EM	**0.61%**	**2.53%**	**0.60%**	**5.17%**	**28.90%**	**34.87%**	**7.97%**	**6.05%**	**2.76%**	**18.71%**	**28.35%**	**9.70%**	**3.71%**	**3.45%**	**66.29%**	**13.08%**	**8.67%**

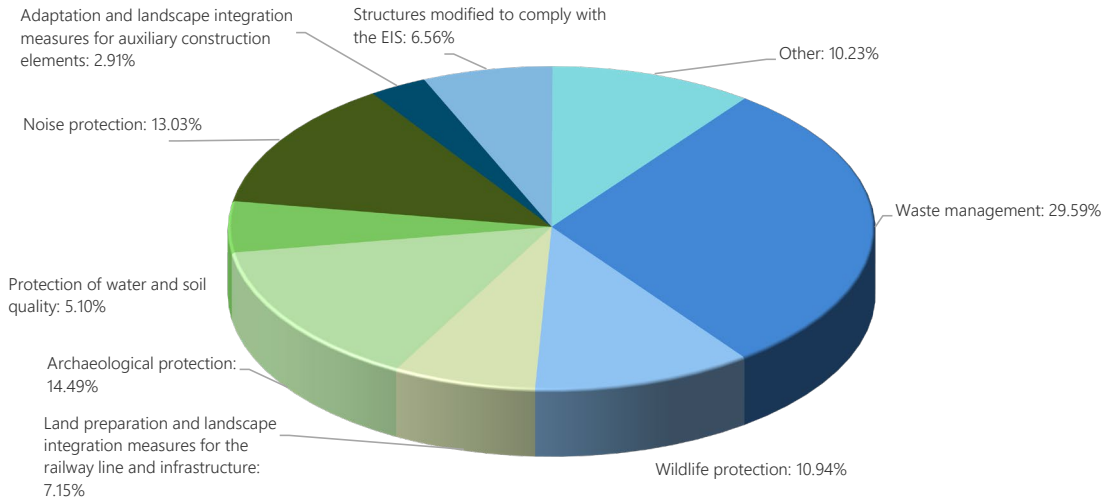
Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department.

In the construction of new railway accesses, environmental investments in 2023 represented 8.67% of the total project certification amount. As shown in the table above, this investment varies significantly between different lines and is largely dependent on the stage of construction for each of the works. In absolute terms, this investment is influenced by the number of open works registered on each line and their level of activity.

The New Rail Network in the Basque Country is where the largest absolute number of environmental investments has been made, totalling over sixteen and a half million euros. The primary environmental investments in this line are for waste management (39.2% of the total environmental investments) and structural modifications to comply with the EIS (30.7%).

Across the whole of Spain, environmental investments in railway infrastructure construction were primarily allocated to waste management (29.59% of the total certified environmental expenditure on all projects), archaeological protection (14.49%), noise control (13.03%), and wildlife protection (10.94%).

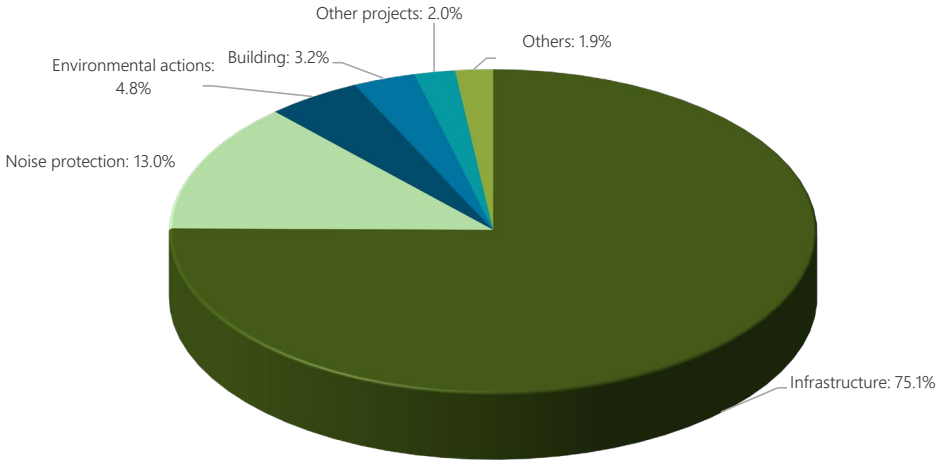
Chart 49. Construction of new railway access points. Allocation of environmental investments in 2023 (%)



Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department.

Regarding environmental investment by type of work, 75.1% was used in the construction of railway platforms in 2023. The remainder was primarily invested in noise protection (13.6%).

Chart 50. Investment in environmental works by type in 2023 (%)



Source: Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department.

Table 43. Investment in environmental projects by type (€/year)

Type	2016	2017	2018	2019	2020	2021	2022	2023
Environmental actions	67,928	2,078,567	169,020	347,470	1,119,960	1,474,122	990,528	4,705,281
Building	259,585	29,631	49,471	34,969	66,228	48,560	667,869	3,105,869
Electrification	50,754	9,762	23,588	22,338	69,818	8,570	307,143	85,230
Infrastructure	19,363,632	62,417,823	53,169,833	31,374,618	31,833,358	27,160,734	63,195,045	74,068,558
Facilities	602,663	627,189	276,149	260,440	402,811	364,774	369,349	75,698
Track installation	1,601,264	2,015,506	1,381,583	1,360,074	2,221,585	961,384	803,194	789,130
Other projects	2,182,322	1,540,154	2,231,087	2,028,723	2,938,609	1,978,479	2,292,139	2,017,884
Noise protection	1,166,762	2,568,888	13,658	0	2,089,547	4,289,965	4,067,308	12,796,913
Substations	229,614	-20,175	8,074	71,101	753,260	84,040	567,764	920,575
Remote control systems	0	0	0	102	953	58	0	0
Total	**25,524,524**	**71,267,345**	**57,322,463**	**35,499,835**	**41,496,129**	**36,370,685**	**73,260,340**	**98,565,138**

Source: Adif-Alta Velocidad. Corporate Department, Corporate Environmental Sub-Department.

ENVIRONMENTAL COMPLIANCE

307-1

Since its separation from Adif, there is no record of Adif-Alta Velocidad being subject to administrative proceedings related to environmental legislation until 2019, when a case was opened regarding improper management of urban waste. In 2023, two administrative cases were opened against Adif-Alta Velocidad concerning water issues. Both resulted in penalties.

Table 44. Administrative Cases and Penalties for Adif-Alta Velocidad

Nature of the Penalty	Year	Violation	Competent authority	Regulations breached	Penalty
Waste	2019	Discharge of urban solid waste at plot 9006 in the Albacete industrial estate 73.	Castile-La Mancha Regional Government (*Junta de Castilla-La Mancha*)	Law 22/2011 of 28 July on waste and contaminated soils (art. 46.3.c)	Not applicable
Water	2021	Diverting watercourses in the municipality of A Estrada	Government of Galicia (*Xunta de Galicia*)	Law 9/2010 of 4 November on Aguas de Galicia (Art. 85, d)	Pending
Fauna	2021	Operation of heavy machinery within a 1,000-metre radius of a pair of griffon vulture nests, in breach of the conditions stipulated in the issued permit.	Provincial Council of Vizcaya (*Diputación de Vizcaya*)	Legislative Decree 1/2014 of 15 April approving the consolidated text of the Basque Country Nature Conservation Act (Art. 75.3.h).	Pending
Water	2023	On 3 and 7 November 2022, the inspector from the Basque Water Agency detected tree felling along more than 100 metres of both banks of the Pulla stream, upstream of the Elorrio bypass.	Basque Water Agency	Regulation of Hydraulic Public Domain (Art. 6 of the consolidated text), approved by Royal Decree 849/1986 of 11 April	€1,500 fine and obligation to restore things to their previous state
Water	2023	Unauthorised discharge of wastewater into an unnamed stream that is a tributary of the Tomeza River, resulting from construction work on the railway being carried out by the party in Cancela-Salcedo, within the municipality of Pontevedra.	Galician Waters	Law 9/2010, on Water of Galicia (Art. 85, e)	€3,000 fine

** Information as of January 2024.*

Source: Adif, Legal Advisory Department, Corporate Litigation Sub-Department; Adif-Alta Velocidad, Corporate Department, Corporate Environmental Department.

10. ADIF-ALTA VELOCIDAD'S CONTRIBUTION TO THE ENVIRONMENTAL SUSTAINABILITY OF TRANSPORT

10. ADIF-ALTA VELOCIDAD'S CONTRIBUTION TO THE ENVIRONMENTAL SUSTAINABILITY OF TRANSPORT

ENERGY CONSUMPTION IN THE RAIL TRANSPORT SYSTEM IN INFRASTRUCTURES MANAGED BY ADIF-ALTA VELOCIDAD

302-5

The energy used in the railway transport system managed by **Adif-Alta Velocidad** primarily comes from electricity generated by the Mainland Spain Electricity System (Electric Traction) and Diesel B (Diesel Traction).

Approximately 90.3%* of the total energy consumed in the railway system managed by **Adif-Alta Velocidad** is used for traction.

**in 2023*

Table 45. Fuel and energy consumption for traction in rail transport infrastructure managed by Adif-Alta Velocidad

Type of energy	2017	2018	2019	2020	2021	2022	2023
Electrical energy (GWh/year)*	1,046.31	1,108.67	1,126.08	736.24	843.82	1,074.85	1,325.85
Diesel B (million l/year)	0.22	0.24	0.28	0.20	0.23	0.29	0.22

** Includes traction-related energy consumption recorded by Adif-Alta Velocidad and all railway operators.*

Source: Adif-Alta Velocidad, Corporate Planning Department. Strategy and Project Management Department, Corporate Business Strategy Department, Corporate Responsibility, Sustainability and Branding Sub-department.

Table 46. Energy consumption for rail traction in Adif-Alta Velocidad-managed infrastructure (TJ/year)

Type of energy	2017	2018	2019	2020	2021	2022	2023
Electric energy*	3,766.71	3,991.21	4,053.88	2,650.48	3,037.75	3,869.47	4,773.07
Diesel B	7.74	8.42	10.02	7.08	8.24	10.29	7.89
Total	**3,774.45**	**3,999.63**	**4,063.90**	**2,657.55**	**3,045.99**	**3,879.76**	**4,780.96**

** Includes traction-related energy consumption recorded by Adif-Alta Velocidad and all railway operators.*

In 2023, nearly all the energy consumed for traction purposes in infrastructures managed by **Adif-Alta Velocidad** was electric power.

In addition to traction-related energy consumption in the rail transport system managed by **Adif-Alta Velocidad** there are other energy uses, primarily for UDT, associated with **Adif-Alta Velocidad**'s own activities, which are detailed in the 'Energy and Emissions' chapter.

Chart 51. Energy consumption for traction (TJ/year)

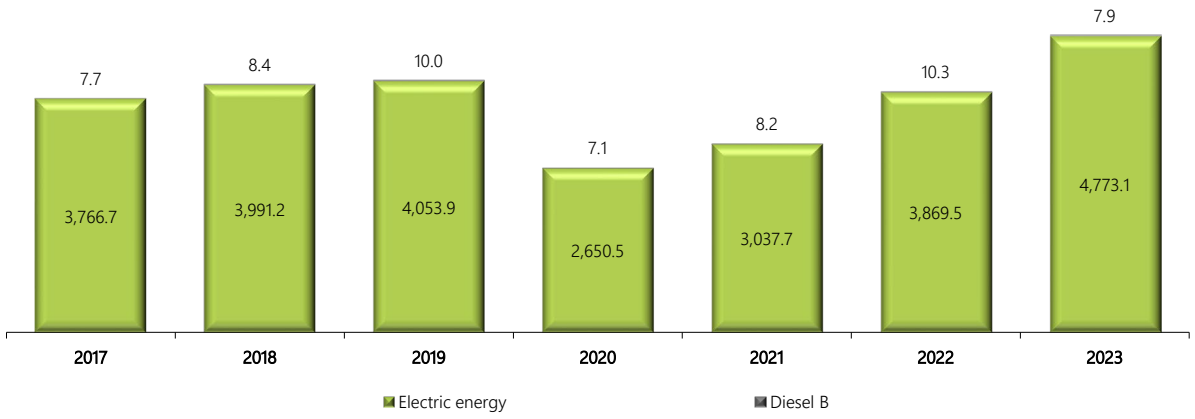


Table 47. Total energy consumption in the railway system managed by Adif-Alta Velocidad (TJ/year)

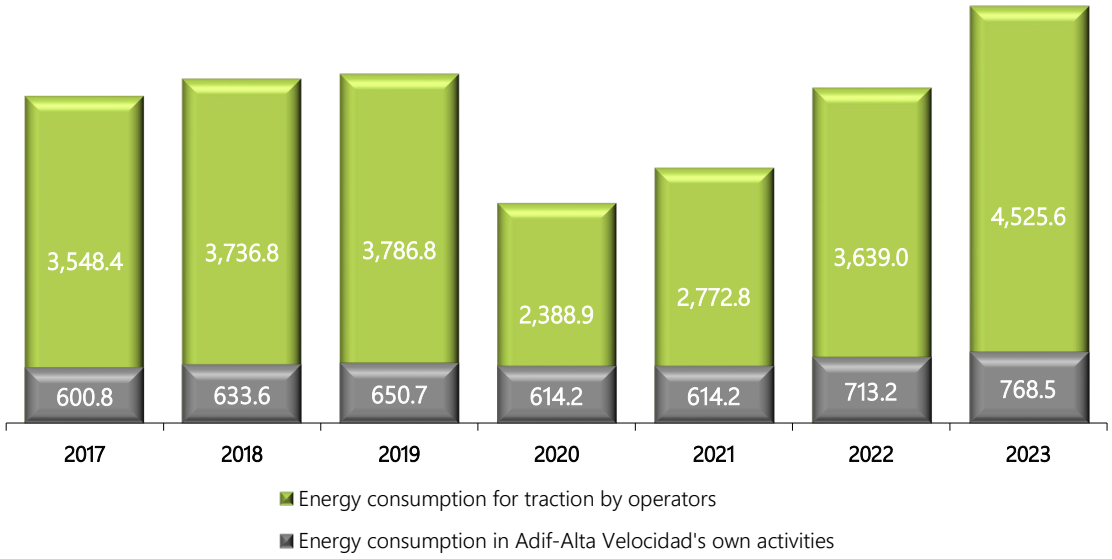
Type of energy	2017	2018	2019	2020	2021	2022	2023
Energy consumption in Adif-Alta Velocidad's own activities (a)	600.82	633.56	650.72	614.19	614.24	713.22	768.51
Energy consumption for traction by operators (b)	3,548.37	3,736.83	3,786.78	2,388.93	2,772.79	3,638.96	4,525.62
Total	**4,149.19**	**4,370.38**	**4,437.50**	**3,003.12**	**3,387.03**	**4,352.18**	**4,780.96**

(a) Includes traction uses.

(b) Electricity consumption for non-traction purposes by Renfe Operadora on infrastructure managed by Adif-Alta Velocidad is minimal, so it is assumed that all electricity consumption occurs on infrastructure managed by Adif.

Source: Adif-Alta Velocidad, Corporate Planning, Strategy and Project Management Department, Corporate Business Strategy Department, Corporate Responsibility, Sustainability and Branding Sub-department.

Chart 52. Total energy consumption in the railway system managed by Adif-Alta Velocidad (Tj/year) *



* Remarks:

- Electric energy consumption for non-traction uses by Renfe Operadora and other minor operators on infrastructure managed by Adif-Alta Velocidad is minimal, so it is assumed that all energy consumption is on infrastructure managed by Adif.
- Energy consumption in Adif-Alta Velocidad's own activities: Includes traction uses.

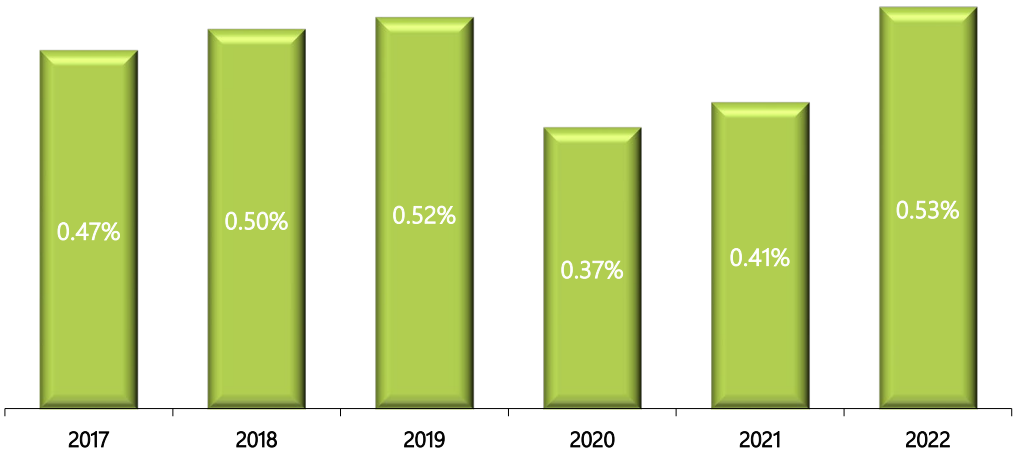
ENERGY CONSUMPTION OF THE RAIL TRANSPORT SYSTEM AS A PERCENTAGE OF SPAIN'S TOTAL

Final energy consumption in Spain in 2022 (the latest year for which information is available) recorded an increase of 1.1% compared to the previous year, although in the case of electrical energy it was a decrease of 1.5%

From 2017 to 2019, the final energy consumption and electric power usage of the railway transport system in the infrastructures managed by **Adif-Alta Velocidad** remained relatively constant compared to the national total for Spain. There was a noticeable decrease in 2020 and 2021 due to the pandemic.

In 2022 (the latest year available), the rail transport system on infrastructure managed by **Adif-Alta Velocidad** accounted for 0.13% of Spain's total final energy consumption and 0.53% of electricity consumption.

Chart 53. Electricity consumption by the rail transport system on Adif-Alta Velocidad-managed infrastructure compared to Spain's total (%) *, **

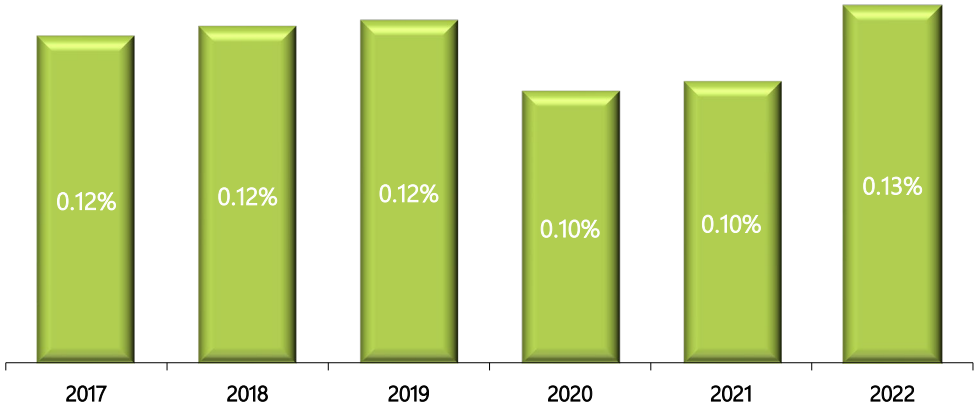


* Energy consumption for non-traction uses by Renfe Operadora and other minor operators on infrastructure managed by Adif-Alta Velocidad is very small. Therefore, it is assumed that all energy consumption occurs on infrastructure managed by Adif, as data for other operators' UDT energy consumption is not available.

** The latest year for which information is available is 2022.

Source: Prepared by the authors based on the final energy consumption balance, excluding non-energy uses, from Spain's Energy Balance 2022 (2024).

Chart 54. Final energy consumption by the rail transport system on Adif-Alta Velocidad-managed infrastructure compared to Spain (%) *, **



* Electricity consumption for non-traction purposes by Renfe Operadora on infrastructure managed by Adif-Alta Velocidad is minimal, so it is assumed that all electricity consumption occurs on infrastructure managed by Adif.

** The latest year for which information is available is 2022.

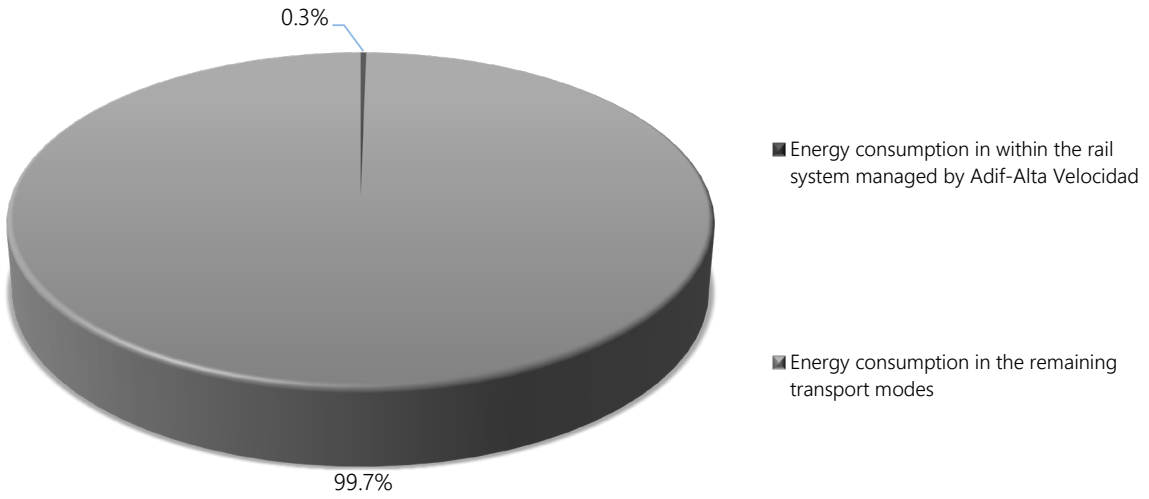
Source: Prepared by the authors based on the final energy consumption balance, excluding non-energy uses, from Spain's Energy Balance 2022 (2024).

TRACTION ENERGY CONSUMPTION AS A PERCENTAGE OF TOTAL TRANSPORT ENERGY CONSUMPTION

The Transport Sector is a major energy consumer. In 2022, the most recent year for which data is available, 38.5% of Spain's final energy consumption was used by the road, rail, and air transport sectors.

In 2022 (most recent year available), the rail transport system on infrastructure managed by **Adif-Alta Velocidad**, which transported 2.8% of passengers and 3.2% of freight, used only 0.3% of the final energy consumed by the transport sector in Spain.

Chart 55. Traction energy consumption by the rail transport system on Adif-Alta Velocidad-managed infrastructure compared to the overall transport sector in Spain. Year 2022 *, **

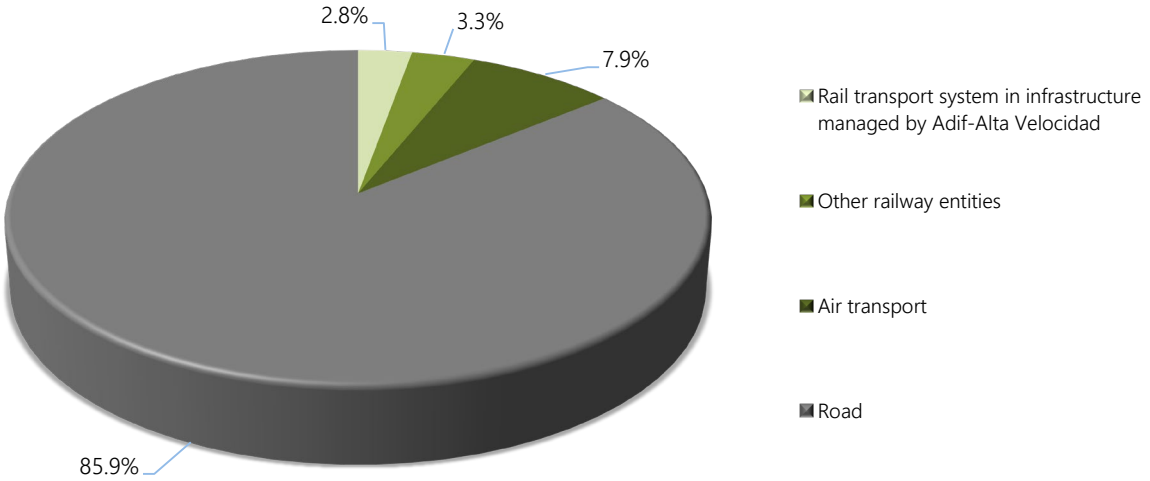


* The most recent year for which data is available.

** In air transport, only domestic flights have been considered.

Source: Prepared by the authors based on the final energy consumption balance in Spain from the Energy Balance of Spain 2022 (2024)

Chart 56. Passenger traffic distribution (%). Year 2022 *, **



* The most recent year for which data is available.

** Rail transport system within infrastructures managed by Adif-Alta Velocidad: this includes the operators Renfe, Ouigo, and Iryo. Trains operated by other operators, which together account for less than 1% of total traffic, are not considered. In air transport, only domestic flights have been considered.

Source: Ministry of Transport and Sustainable Mobility; Transport and Logistics Observatory of Spain (OTLE) 2024, Renfe Operadora

TRACTION ENERGY CONSUMPTION PER TRANSPORT UNIT

302-5

In 2022 (the most recent year for which data is available), the specific traction energy consumption in the rail transport system managed by Adif-Alta Velocidad was 309 kJ per Transport Unit (TU).

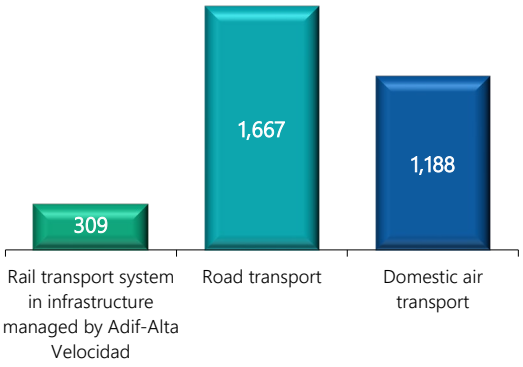
The energy efficiency, measured in terms of energy consumption per unit transported, of the rail transport system is far superior to that of other modes of transport, such as road or air.

To transport one unit, the rail transport system on Adif-Alta Velocidad-managed infrastructure uses 5.4 times less energy than road transport and 3.8 times less than air transport. *

** Data corresponding to 2022 (the most recent year for which data is available).*

Trains operated by operators other than Renfe, Ouigo and Iryo, which together account for less than 1% of total traffic, are not considered. In air transport, only domestic flights have been considered.

Chart 57. Energy consumption per Transport Unit (kJ/UT). Year 2022*.



* The most recent year for which data on energy consumption in road and air transport is available.
Source: Compiled based on the information and data from: Ministry of Transport and Sustainable Mobility, Transport and Logistics Observatory of Spain (OTLE) 2024 and Ministry for the Ecological Transition and the Demographic Challenge (2024), Greenhouse Gas Emissions Inventory in Spain 1990-2022, and Adif-Alta Velocidad.

AIR EMISSIONS FROM TRACTION

305-1 | 305-2 | 305-3 | 305-7

Atmospheric GHG emissions attributable to the rail transport system in infrastructures managed by Adif-Alta Velocidad originate from electric and diesel traction and, to a negligible extent, in diesel.

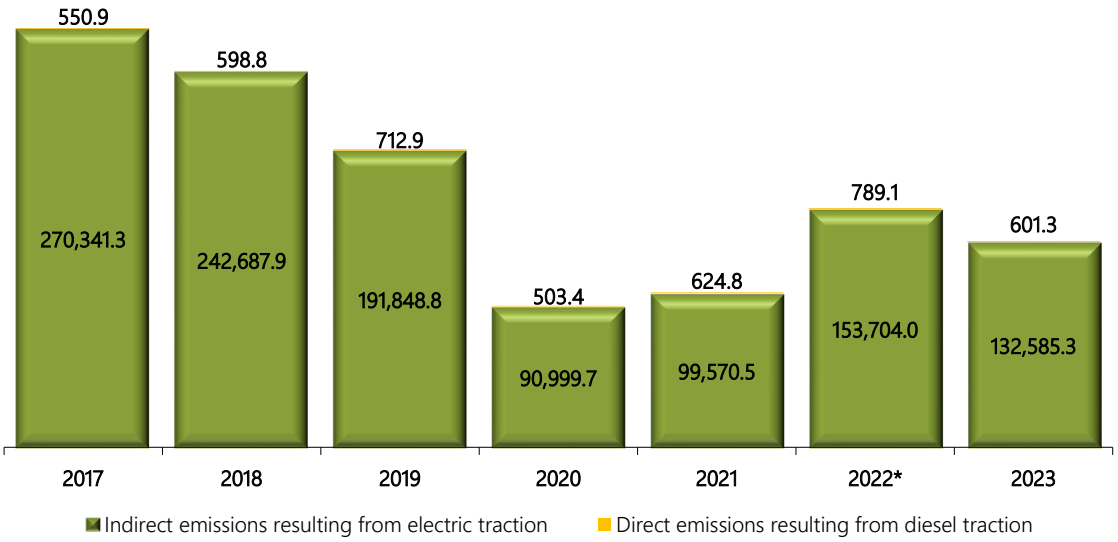
All electricity used for electric traction comes from the mainland electricity grid. The emissions generated are indirect, i.e. they do not occur during railway operations but originate from power generation plants

Indirect emissions from recorded electricity consumption depend not only on the amount consumed but also on the generation mix of the Mainland Spain Electricity System.

Thus, while there has been a 23.4% increase in electricity consumption for traction purposes in the last year, the corresponding indirect GHG emissions have decreased by 13.7%, due to changes in the generation mix of the Mainland Spain Electricity System.

In 2023, nearly all the energy consumed for traction purposes in infrastructures managed by Adif-Alta Velocidad was electric power (99.8%), which resulted in indirect greenhouse gas (GHG) emissions of 132,585.3 t of CO_{2eq}.

Chart 58. GHG emissions from traction activities. Rail transport system on Adif-Alta Velocidad-managed infrastructure (t of CO_{2eq}/year)



** Data revised in relation to the 2022 Report.*

Table 48. Air emissions from traction in the rail transport system on Adif-Alta Velocidad-managed infrastructure (t/year)

Compound	2017	2018	2019	2020	2021	2022	2023
Indirect emissions resulting from recorded electricity consumption							
Carbon dioxide (CO_2) (a)	269,947.43	242,277.75	191,433.31				
Methane (CH_4) (a)	14.05	14.63	14.83				
Nitrous oxide (N_2O) (a)	0.00	0.00	0.00				
Carbon monoxide (CO) (c)	131.83	123.90	99.34	71.96	87.12	126.00	112.84
Non-methane volatile organic compounds (NMVOCs) (c)	19.70	20.96	21.74	16.09	20.54	25.40	22.75
Oxides of nitrogen NO_x (as NO_2) (c)	462.61	370.37	302.07	158.37	171.50	220.11	197.11
Sulphur oxides SO_x (as SO_2) (c)	354.62	275.44	125.38	37.49	30.03	39.35	35.24
$PM_{2,5}$ (c)	17.62	15.23	12.24	8.35	9.94	12.54	11.23
PM_{10} (c)	23.58	20.42	15.43	10.72	12.63	15.87	14.21
TSPs (c)	30.71	26.79	20.34	14.84	17.52	21.91	19.62
CO_{2eq} (a)	270,341.31	242,687.94	191,848.83	90,999.72	99,570.53	153,704.00	132,585.32
Direct emissions resulting from diesel traction							
Carbon dioxide (CO_2) (b)	548.83	596.60	710.21	501.54	622.63		
Methane (CH_4) (b)	0.03	0.03	0.04	0.03	0.03		
Nitrous oxide (N_2O) (b)	0.00	0.00	0.01	0.00	0.00		
Carbon monoxide (CO) (d)	1.98	2.15	2.56	1.81	2.11	2.63	2.02
Non-methane volatile organic compounds (NMVOCs) (d)	0.86	0.94	1.11	0.79	0.92	1.14	0.88
Oxides of nitrogen NO_x (as NO_2) (d)	9.70	10.54	12.55	8.86	10.32	12.89	9.89
Sulphur oxides SO_x (como SO_2) (d)	0.004	0.004	0.005	0.003	0.00	0.00	0.00
$PM_{2,5}$ (d)	0.25	0.28	0.33	0.23	0.27	0.34	0.26
PM_{10} (d)	0.27	0.29	0.34	0.24	0.28	0.35	0.27
TSP (d)	0.28	0.31	0.36	0.26	0.30	0.37	0.29
CO_{2eq} (c) (b)	550.88	598.83	712.87	503.41	624.82	789.11	601.33
Total emissions resulting from traction							
Carbon dioxide (CO_2)	**270,496.26**	**242,874.35**	**192,143.52**				
Methane (CH_4)	**14.08**	**14.67**	**14.87**				
Nitrous oxide (N_2O)	**0.01**	**0.01**	**0.01**				
Carbon monoxide (CO)	**133.81**	**126.05**	**101.91**	**73.77**	**89.23**	**128.64**	**114.86**
Non-methane volatile organic compounds (NMVOCs)	**20.56**	**21.90**	**22.85**	**16.88**	**21.46**	**26.55**	**23.63**
Nitrogen oxides NO_x (as NO_2)	**472.31**	**380.92**	**314.62**	**167.23**	**181.82**	**233.00**	**206.99**
Sulphur oxides SO_x (as SO_2)	**354.62**	**275.45**	**125.38**	**37.49**	**30.03**	**39.36**	**35.24**
$PM_{2.5}$	**17.88**	**15.50**	**12.57**	**8.58**	**10.21**	**12.87**	**11.48**
PM_{10}	**23.84**	**20.71**	**15.78**	**10.97**	**12.91**	**16.22**	**14.48**
TSP	**31.00**	**27.09**	**20.71**	**15.09**	**17.82**	**22.29**	**19.91**
CO_{2eq}	**270,892.20**	**243,286.77**	**192,561.69**	**91,503.13**	**100,195.35**	**154,493.12**	**133,186.64**

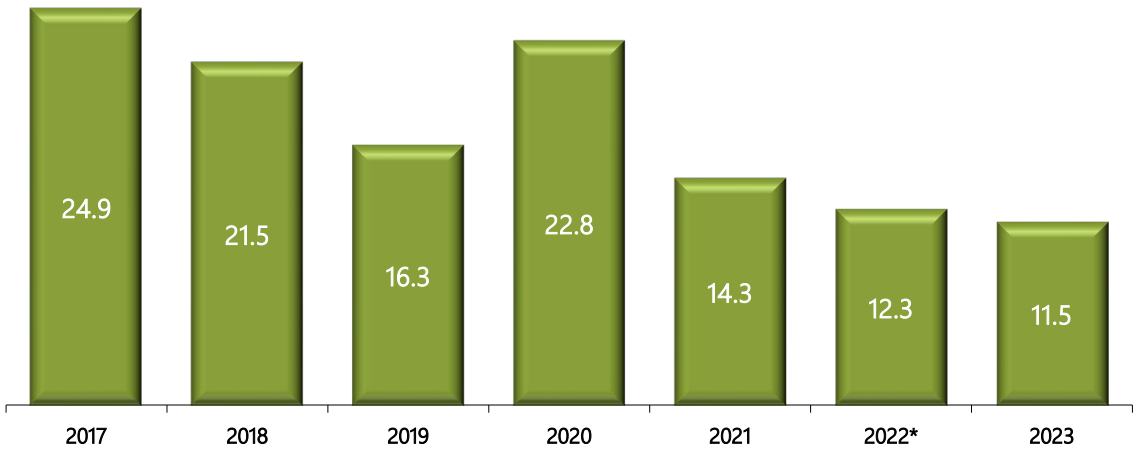
** Data modified with respect to the 2022 Report.*
(a) Source: Adif-Alta Velocidad, Corporate Strategic Planning and Projects Department, Business Strategy Department, Corporate Responsibility, Sustainability, and Brand Sub-Department.
(b) Source: Adif-Alta Velocidad, Corporate Strategic Planning and Projects Department, Business Strategy Department, Corporate Responsibility, Sustainability and Brand Sub-Department with additional elaboration based on the methodology used by this department
(c) Estimated using recorded electricity consumption and air emissions data from generation facilities for 2005 to 2023, provided by the Ministry for Ecological Transition and the Demographic Challenge (2024).
(d) Estimated based on reported diesel fuel consumption and emission factors from the National Inventory of Emissions to the Atmosphere 1990-2022. Chapter 3: ENERGY (NFR 1A, 1B) (Ministry for Ecological Transition and Demographic Challenge, 2024).

GHG EMISSIONS PER TU

305-1 | 305-2 | 305-3

GHG emissions per TU for **Adif-Alta Velocidad** exhibit slight fluctuations, largely due to the electricity generation mix in the Mainland Spain System, as previously mentioned.

Chart 59. GHG emissions per TU. Rail transport system on Adif-Alta Velocidad-managed infrastructure (g of CO_{2eq}/UT) *, **



* Includes both direct emissions from diesel traction and indirect emissions from electric traction.

** Reviewed data in relation to the 2022 Environmental Report.

GHG EMISSIONS COMPARED TO THE TRANSPORT SECTOR

305-1 | 305-2 | 305-3

In terms of GHG emissions, rail transport for both passengers and freight is more environmentally efficient than other modes of transport.

To transport one unit, the rail transport system on **Adif-Alta Velocidad**-managed infrastructure produces 9.5 times fewer GHGs than road transport, and over 7.1 times fewer than air transport*.

** Data for the year 2022*

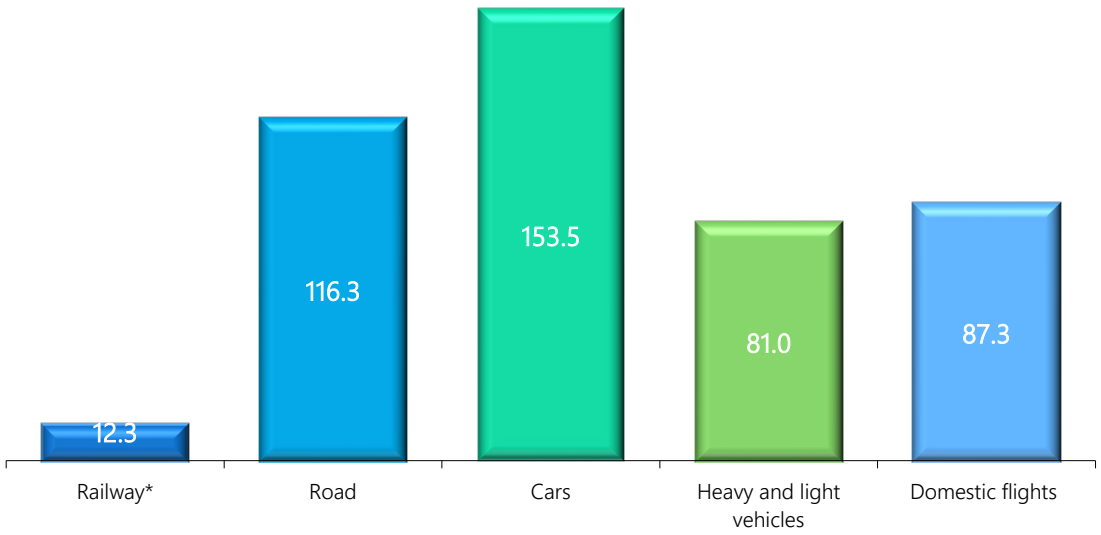
Each TU that travels by train instead of by road saves 104 g of CO_{2eq} per km.

** Data for the year 2022*

In 2021, the rail transport system on **Adif-Alta Velocidad**-managed infrastructure, which handles 2.8% of passengers is responsible for less than 0.2% of the total GHG emissions from the transport sector in Spain*.

** Data for the year 2022*

Chart 60. GHG emissions per TU across different modes of transport. Year 2022 (g of CO_{2eq}/UT) *, **

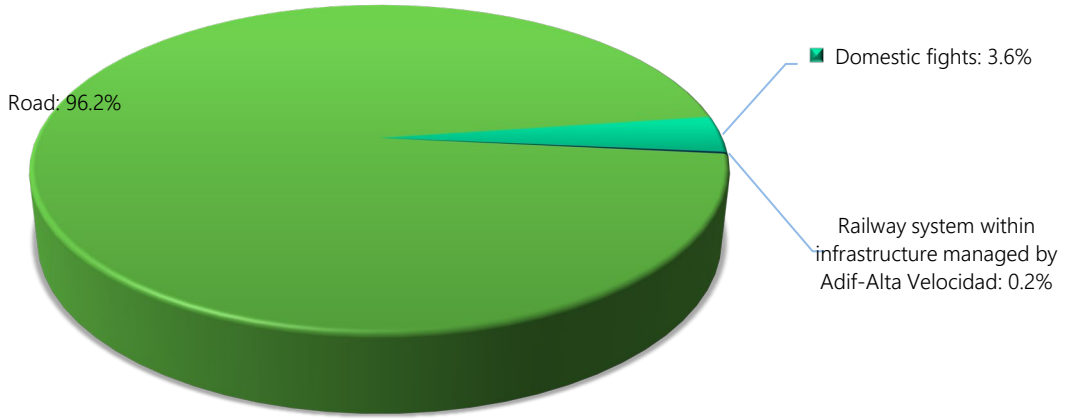


* The rail transport system on managed infrastructure includes emissions from Adif-Alta Velocidad and the major operators (trains operated by operators with less than 1% of the total traffic are not included).

** The comparison is based on 2022, the most recent year for which official data on GHG emissions and TU or different modes is available.

Source: *Prepared based on information from: Ministry of Transport and Sustainable Mobility. Transport and Logistics Observatory of Spain (OTLE), 2024; Ministry for the Ecological Transition and the Demographic Challenge (2024). Spain's GHG Emissions Inventory, 1990-2022; Renfe and Adif-Alta Velocidad*

Chart 61. GHG emissions from freight and passenger transport in Spain. Year 2022 (% of CO_{2eq})



* The most recent year for which data is available.

Source: Prepared based on information from: Ministry of Transport and Sustainable Mobility, Statistical Yearbook 2019; Transport and Logistics Observatory of Spain (OTLE), 2023; Greenhouse Gas Emissions Inventory of Spain 1990-2022, Ministry for the Ecological Transition and the Demographic Challenge (2024); Renfe and Adif-Alta Velocidad.

EXTERNAL COSTS

Like any productive sector, the transport sector is associated with various externalities, the costs of which, beyond production expenses, are borne by society.

These external costs, primarily resulting from the sector's environmental impact, directly affect the sustainability of the system. The following assessment of the external costs for different modes of transport is based on the European Commission's and CE Delft's study, 'Handbook on the External Costs of Transport,' updated in 2020. This study provides a quantification of total external costs by country and transport mode for each of the EU-28 member states for the year 2016. It also includes an assessment of the average unit external costs (per vehicle-kilometre or per ton-kilometre) by cost component and transport mode for the EU-28 as a whole

Importance of transport

As recognized in the *Roadmap to a Single European Transport Area: Towards a competitive and resource efficient transport system* [COM(2011) 144 final], the transport sector represents a significant part of the economy. In the EU, it directly employs nearly 10 million people and accounts for almost 5% of Gross Domestic Product (GDP). The challenge is to reduce dependence on oil without sacrificing efficiency or compromising mobility. To this end, the Roadmap outlines the following targets for 2050, among others:

- Achieve a 50% modal shift from road to rail or inland waterways for medium interurban distances, for both passengers and freight.
- Complete the development of a European high-speed rail network. Triple the length of the existing high-speed rail network by 2030 while maintaining a dense rail network across all Member States. By 2050, rail should carry most of the medium-distance passenger transport.
- Connect all airports in the core network to the rail network, ideally through high-speed rail.
- Ensure that all major seaports are well-connected to the rail freight system.
- Achieve a 20% reduction in GHG emissions from the transport sector by 2030 and a 60% reduction by 2050, which implies a 70% reduction in oil consumption by 2050 compared to 2008 levels.

In the *TERM 2014* report: *Transport indicators tracking progress toward environmental targets in Europe*, the European Environment Agency (EEA) analyses the extent to which some of these targets have been achieved at the European level.

In 2012, GHG emissions from the transport sector at the European level decreased by 3.3%, with the most significant reductions occurring in road transport and international air travel. So far, progress on this indicator has been better than expected; however, emissions in 2012 are still 20.5% higher than they were in 1990.
Oil consumption in Europe decreased by approximately 4% in 2012 and 1.7% in 2013. These figures align with expectations; however, the EEA believes that much work remains to be done.
In the EU-28, road freight transport in 2012 still accounted for 75% of inland transport, while rail transport had stabilised, with figures only slightly higher than those in 2000. Rail passenger transport experienced a significant decline in many EU countries between 2008 and 2012, with reductions ranging from 6.2% in Spain to 19.8% in Greece.

In Spain...

From 2000 until the onset of the crisis in 2008, both passenger and freight transport grew notably and steadily, with annual averages of 2.4% and 3.9%, respectively. Despite this growth, road transport remained the dominant mode, accounting for 90.4% of domestic passenger traffic and 86.8% of freight transport in 2009.

Regarding rail passenger traffic, 29 million passengers used the Spanish Long Distance and High-Speed (*Alta Velocidad Española*, AVE) services in 2011. In 2011, nearly 27 million people traveled on Media Distancia services. In terms of rail freight transport, Spain has the lowest modal share among major EU countries and has also experienced the most significant decreases compared to these countries over the last decade. This share represents about 4% of the t-km in road transport, compared to the European average of 17%.

Intermodality is another key factor in providing effective service within a transport system. In rail transport, there is a significant lack of intermodal options. However, in certain corridors with high-speed rail, there is notable intermodality, particularly between conventional trains and high-speed trains at key network stations.

The transport sector accounts for the largest share of energy consumption in Spain, exceeding 40% of the total. Over the past five years, its growth has nearly doubled the average increase in the country's overall energy consumption. By mode of transport, road transport accounted for 65% of total energy consumption in 2011.

Rail transport is significantly more energy efficient and, with appropriate occupancy, can achieve lower emissions per unit of traffic compared to other modes—especially road transport, with a ratio of 1 to 3. This makes rail a more sustainable transportation alternative. However, freight traffic has declined over the past five years, and passenger traffic has been irregular, though showing a positive trend.

Source: European Commission (2011). *Roadmap to a Single European Transport Area: Towards a competitive and resource efficient transport system* [COM(2011) 144 final]
European Environment Agency (2014). TERM 2014: transport indicators tracking progress toward environmental targets in Europe
Ministry of Public Works (2012). Infrastructure, Transport, and Housing Plan (PITVI) 2012 - 2024.

Table 49. External costs per unit for different modes of passenger transport. Data for EU-28* (€). Year 2016.

Cost component	Travellers (€ / 1.000 VKM)			
	Railway	Aircraft	Bus	Car
Accidents	5.0	0.2	10.0	45.0
Air pollution	1.2	2.0	7.0	7.0
Climate change	0.5	22.0	5.0	12.0
Noise	9.0	2.0	3.0	6.0
Well-to-Tank	7.0	9.0	2.0	4.0
Damage to habitats	6.0	0.1	1.0	5.0
Congestion	0.0	0.0	9.0	49.0
Delay costs	0.0	0.0	8.0	42.0
Efficiency loss costs	0.0	0.0	1.0	7.0
Total high-level scenario for the EU-28 rail network without congestion	**28.7**	**35.3**	**28.0**	**79.0**

* EU-28 countries are included.

** Delay costs, which are used as a leading indicator of congestion, are primarily internal to the transport sector. Social efficiency loss costs address various aspects of externalities. However, when comparing different modes of transport, this separation of costs into internal and external categories is not relevant.

Source: European Commission (2020). Handbook on the external costs of transport. Delft, CE Delft, 2019.

In 2022, the external costs associated with passenger rail transport on the infrastructures managed by **Adif-Alta Velocidad** amounted to a total of 416.4 million euros.

The cost components vary widely between the different modes of transport.

In rail transport on infrastructure managed by **Adif-Alta Velocidad**, the main external cost is noise (31.4%), followed by emissions from the well-to-tank cycle—emissions resulting from the extraction, processing, and transportation of the energy consumed by **Adif-Alta Velocidad** (24.4%). External costs due to habitat damage (20.9%) and accidents (17.4%) are also relevant in this analysis.

In domestic passenger air transport, the main external costs are climate change (62.3%) and well-to-tank emissions (25.5%)

In road transport, the most impactful mode, the primary externalities are due to accidents (56.2%), climate change (15.3%), and the effects of air pollution (9.5%). This does not include congestion costs, which are particularly significant for this mode and represent the costs associated with delays and inefficient use of existing infrastructure.

The total external costs of transport in Spain in 2022 exceed **47 billion euros**, which represents **3.6% of GDP**. 72.7% is attributed to passenger transport.

Additionally, congestion costs from road transport have surpassed 23 billion euros, accounting for 1.8% of GDP.

Table 50. External costs of different passenger transport modes in Spain. Year 2022 (latest available data for all transport systems), excluding congestion costs (in million euros) *

Cost component	Travellers				
	Railway**	Adif-Alta Velocidad Railway ***	Aircraft****	Bus	Car
Accidents	150.2	72.5	8.1	437.3	17,837.6
Air pollution	36.1	17.4	80.8	306.1	2,774.7
Climate change	15.0	7.3	888.4	218.7	4,756.7
Noise	270.4	130.6	80.8	131.2	2,378.4
Well-to-Tank	210.3	101.5	363.4	87.5	1,585.6
Damage to habitats	180.3	87.0	4.0	43.7	1,982.0
Total without congestion	**862.3**	**416.4**	**1,425.5**	**1,224.4**	**31,315.0**

* Costs updated based on CPI.
** Infrastructure managed by Adif and Adif-Alta Velocidad (excluding trains operated by operators with less than 1% of the total traffic).
*** Infrastructure managed by Adif-Alta Velocidad (excluding trains operated by operators with less than 1% of the total traffic).
**** Domestic air transport by air has been considered
Source: Prepared by the authors, based on data published in the 2019 Statistical Yearbook of the Ministry of Transport and Sustainable Mobility (2021) and the Spanish Transport and Logistics Observatory (OTLE)

Chart 62. External costs of passenger rail transport on infrastructure managed by Adif. Total costs for 2022: 416.35 million euros.

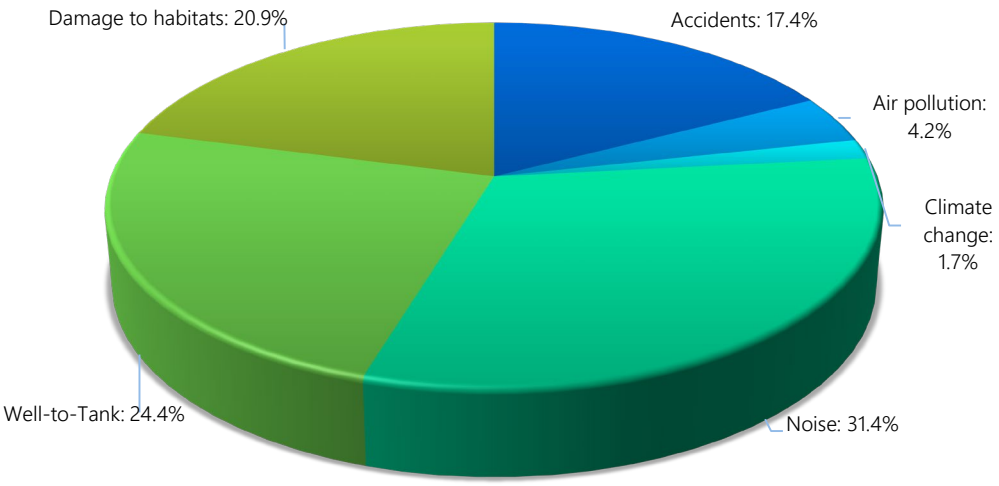


Chart 63. External costs of passenger transport by road Total costs for 2022: 32,539.4 million euros

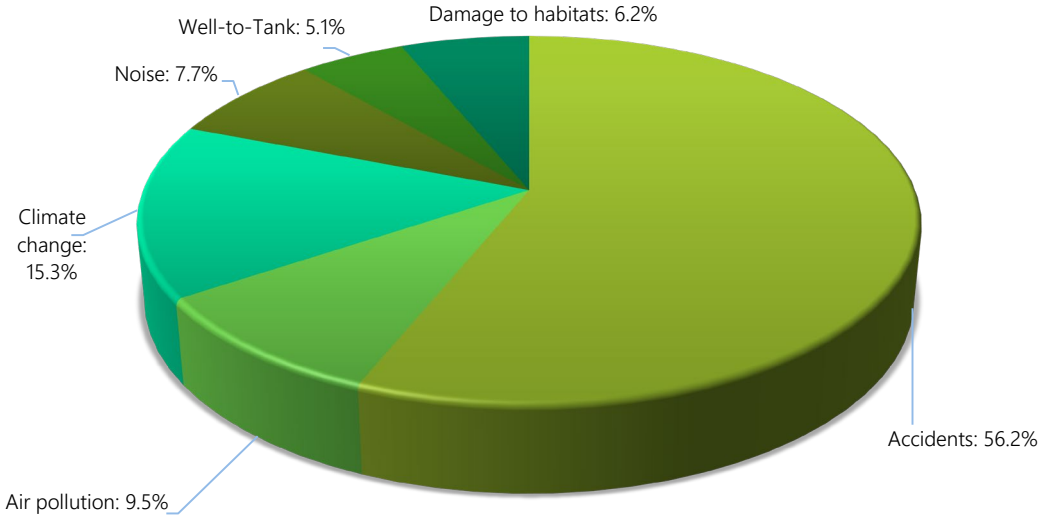
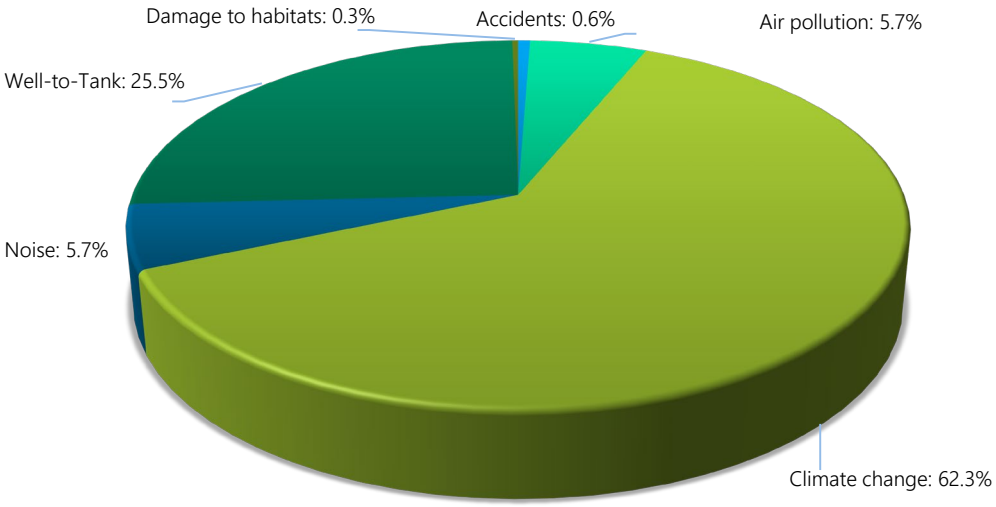


Chart 64. External costs of domestic air passenger transport. Total costs for 2022: 1,425.5 million euros



SAVINGS FROM EXTERNAL COSTS IN THE RAIL TRANSPORT SYSTEM ON INFRASTRUCTURE MANAGED BY ADIF.

3-3

External costs per transport unit are lower for rail transport compared to other modes.

Savings from external costs in 2021 due to rail transport on infrastructure managed by **Adif-Alta Velocidad** are estimated to be between 406.41 and 787.14 million euros.

Table 51. Traffic recorded in the rail transport system on infrastructure managed by Adif-Alta Velocidad (millions of VKM or TKM).

Type of energy	2017	2018	2019	2020	2021	2022*	2023
Freight and logistics,*******	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Travellers	**10,897**	**11,316**	**11,807**	**4,006**	**7,029**	**12,560**	**11,576**
Commuter trains***	0	0	0	0	0	0	0
Medium Distance****	917	1,027	1,056	417	565*	1,072	1,643
High-Speed	9,979	10,289	10,751	3,589	6,464*	11,488	9,934
Total	**10,897**	**11,316**	**11,807**	**4,006**	**7,029***	**12,560**	**11,576**

* Reviewed data in relation to the 2022 Environmental Report.

** It is assumed that all recorded freight and logistics traffic is carried on infrastructure managed by Adif.

*** It is assumed that all commuter services and tourist trains not operated by Renfe use infrastructures managed by Adif. Trains operated by operators with less than 1% of the total traffic are not considered.

**** Includes traffic related to High-Speed and Medium-Distance services.

***** Cross-border trains are not classified as freight trains

Source: Renfe Operadora and OTLE (2024).

The assessment of external costs savings is based on the methodology updated in 2020 by the European Commission, as detailed in the CE Delft document 'Handbook on the External Costs of Transport,' and assumes the modal substitution hypotheses listed in the following table:

Table 52. Savings from externalities due to rail transport on infrastructures managed by Adif-Alta Velocidad (millions €/year)

	Modal substitution hypothesis	2017	2018	2019	2020	2021	2022*	2023
Freight and logistics	100 % Lorry	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Travellers		**316.87**	**333.90**	**350.92**	**119.24**	**220.62**	**417.47**	**406.41**
Commuter trains	20% Bus 80% Car	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Medium Distance**	20% Bus 80% Car	37.19	42.14	43.66	17.16	24.78	49.66	78.46
High-Speed	40% Aircraft*** 10% Bus 50% Car	279.67	291.76	307.26	102.08	195.84	367.80	327.95
Total		**316.87**	**333.90**	**350.92**	**119.24**	**220.62**	**417.47**	**406.41**

* Data modified in relation to the 2022 Environmental Report.

** Includes traffic related to High-Speed and Medium-Distance services.

*** Considering domestic air transport.

Additionally, the following external costs due to congestion can be estimated for the modal substitution scenarios of medium-distance, and high-speed long-distance transport:

Table 53. Additional savings from external costs due to congestion for freight and passenger transport on medium-distance and high-speed long-distance routes (million euros/year).

	2017	2018	2019	2020	2021	2022*	2023
Freight and logistics	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Travellers	**294.29**	**310.43**	**326.18**	**111.08**	**204.79**	**387.80**	**380.73**
Medium Distance**	38.03	43.09	44.64	17.55	25.34	50.78	80.22
High-Speed - Long Distance	256.27	267.34	281.55	93.53	179.45	337.02	300.51
Total	**294.29**	**310.43**	**326.18**	**111.08**	**204.79**	**387.80**	**380.73**

* Data modified in relation to the 2022 Environmental Report.

** Includes traffic related to High-Speed and Medium-Distance services.

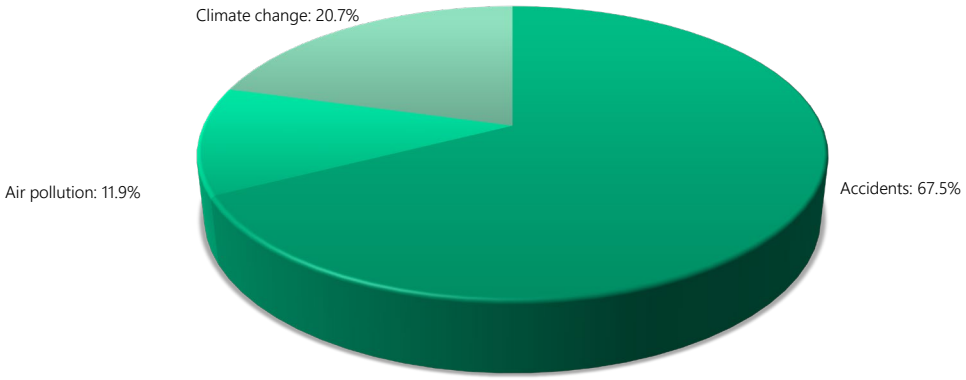
If congestion costs are factored into all modal substitution scenarios, the external cost savings for rail transport on infrastructure managed by Adif and Adif-Alta Velocidad in 2023 are close to 787.14 million euros.

Table 54. Upper estimate of external costs savings, including congestion costs, in all modal shift scenarios (million euros/year)

	2017	2018	2019	2020	2021	2022*	2023
Total	611.16	644.33	677.10	230.32	425.41	805.27	787.14

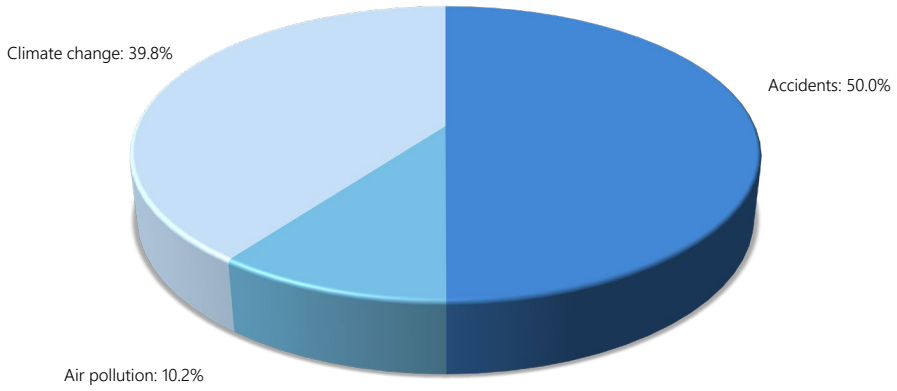
* Data modified in relation to the 2022 Environmental Report.

Chart 65. Medium-Distance services on infrastructures managed by Adif-Alta Velocidad. Savings from external costs 78.46 million euros (year 2023) *



* Excluding marginal city congestion costs.

Chart 66. High-Speed - Long-Distance services on infrastructures managed by Adif-Alta Velocidad. Savings from external costs 327.95 million euros (year 2023) *



* Excluding marginal city congestion costs.

The main advantages of the rail transport system on infrastructure managed by Adif-Alta Velocidad, compared to other modes of transport, are due to the following factors:

- Interurban congestion contributes 41.2% to the total external cost savings.
- Air pollution contributes between 6.1% and 10.5% to the total external cost savings.
- Accidents contribute between 30.5% and 53.1% to total external costs
- Climate change contributes between 22.2% and 36.4% to total external costs.

Chart 67. Distribution of external cost savings in the rail transport system managed by Adif-Alta Velocidad. Total savings from external costs, excluding congestion costs: 406.41 million euros (year 2023).

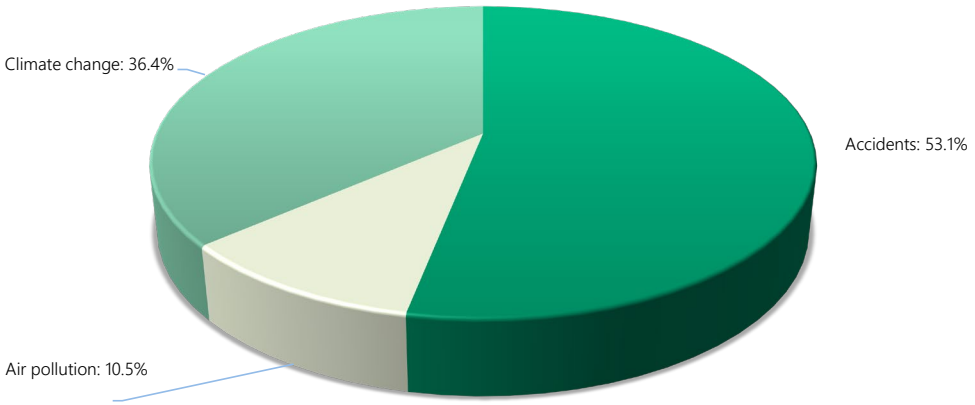
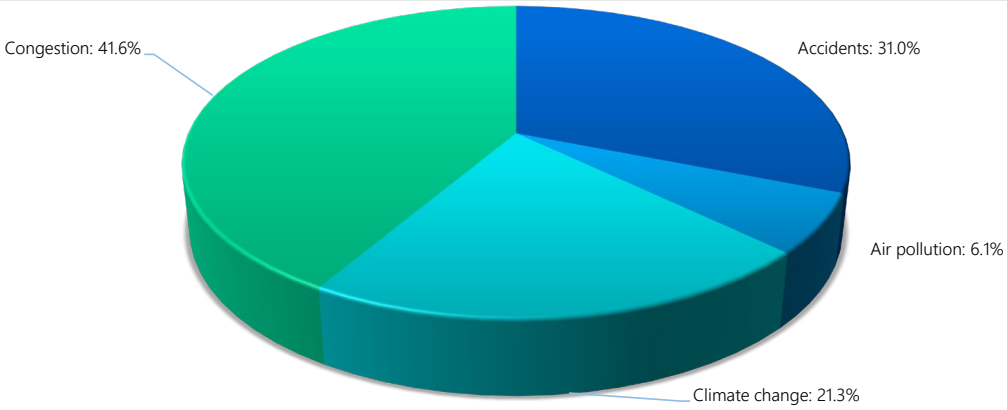


Chart 68. Distribution of external cost savings in the rail transport system managed by Adif-Alta Velocidad. Total savings from external costs, considering congestion costs in all modal substitution scenarios, amounted to 787.14 million euros (year 2023).



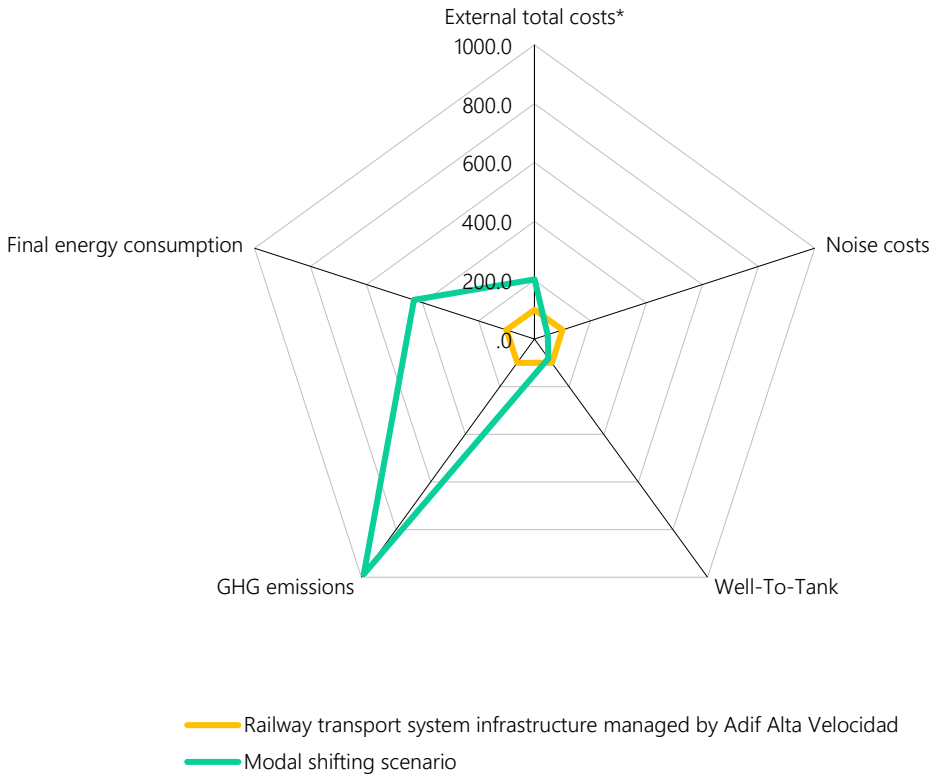
RELATIVE ECO-EFFICIENCY OF THE RAIL TRANSPORT SYSTEM ON ADIF-ALTA VELOCIDAD-MANAGED INFRASTRUCTURE

The contribution of the rail transport system in Adif-Alta Velocidad-managed infrastructure to environmental sustainability is based on three key elements: energy consumption, GHG emissions, and external costs.

The relative eco-efficiency of the rail transport system for the year 2023 has been assessed based on the following assumptions regarding modal substitution for the recorded traffic:

- Medium-distance, including High-Speed - Medium Distance: 20% substitution by bus and 80% by car.
- High-Speed - Long-distance: 40% substitution by air, 10% by bus and 50% by car.

Chart 69. Relative eco-efficiency of the rail transport system in Adif-Alta Velocidad-managed infrastructure compared to modal substitution scenarios



* Excluding congestion costs.
** Prepared by us using the methodology from the 'Handbook on External Costs of Transport', DE Delft, 2020.

The relative eco-efficiency of the rail transport system in 2023, based on the modal substitution scenarios considered, is clearly illustrated through the eco-compass. This graphical representation includes five key indicators: three primary ones—total external costs, final energy consumption, and GHG emissions—and two secondary ones: noise externalities and well-to-tank emissions.

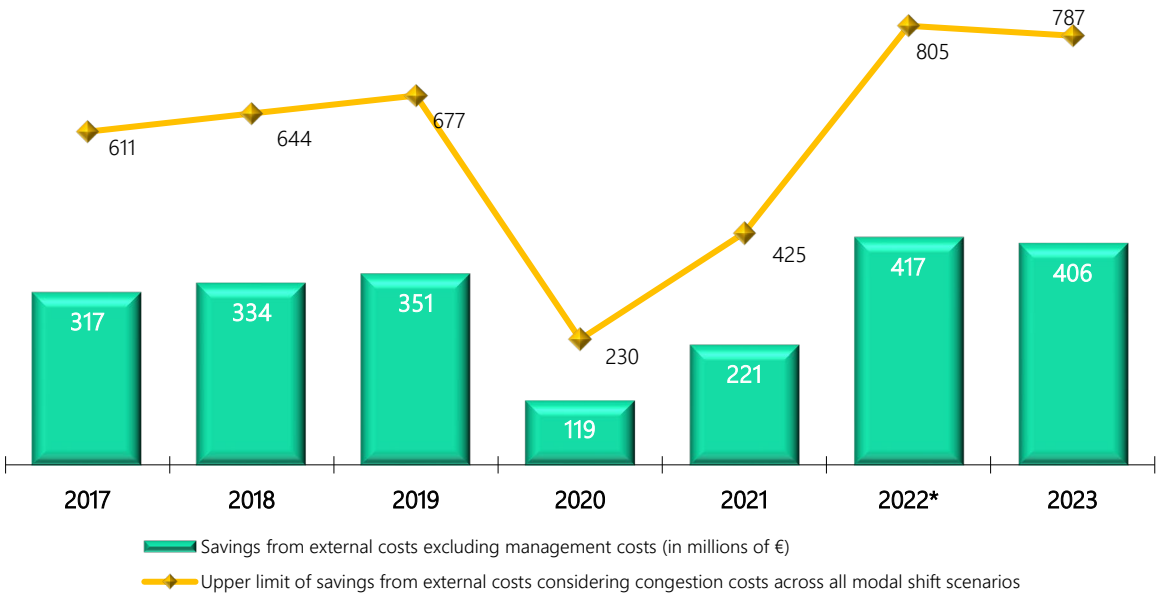
In the future, with the introduction of the new High-Speed Lines (HSL), relative eco-efficiency is expected to improve significantly.

Contribution to the Sustainability of the Rail Transport System on Infrastructure Managed by Adif-Alta Velocidad. 2023

The traffic recorded in 2023 on infrastructure managed by Adif-Alta Velocidad, in relation to modal shift scenarios, has resulted in:

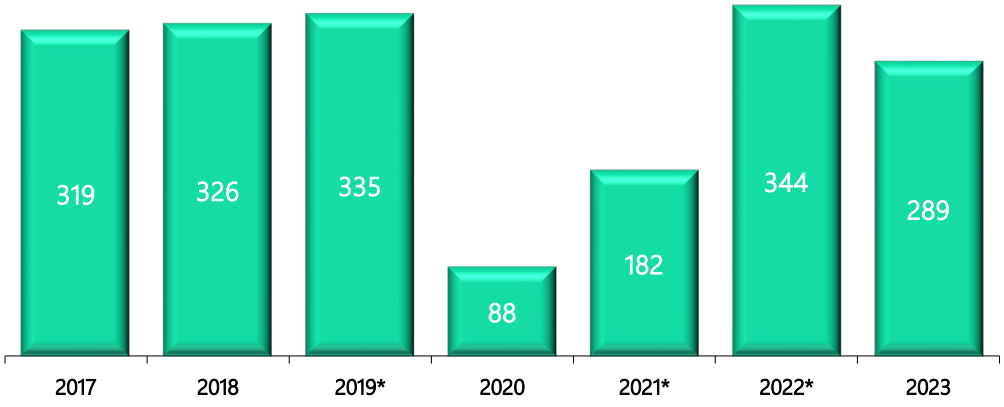
- Savings in external costs estimated at between 406 and 787 billion euros.
- A reduction in final energy consumption estimated at 289 thousand tonnes of oil equivalent (toe).
- A decrease in GHG emissions estimated at 1.29 million tonnes of CO2 equivalent.

Chart 70. Savings in external costs (million €/year) *



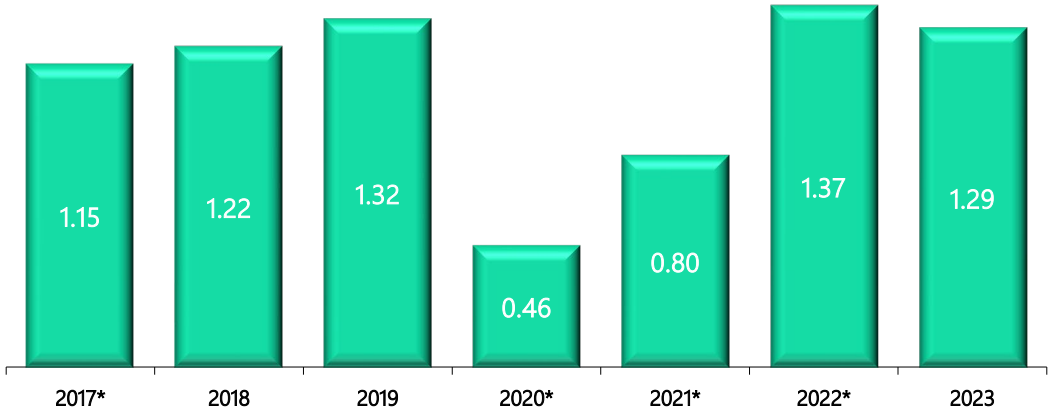
*Data revised in relation to the 2022 Environmental Report.

Chart 71. Decrease in final energy consumption (thousands of tonnes of oil equivalent, toe) *



* Data revised in relation to the 2022 Environmental Report.

Chart 72. Reduction in GHG emissions (millions of tonnes CO_{2eq}) *



* Data revised in relation to the 2022 Environmental Report.

11. ABOUT THIS REPORT

11. ABOUT THIS REPORT

3-3

Adif-Alta Velocidad Environmental Report has been prepared according to the Global Reporting Initiative (GRI) guidelines outlined in the 2021 GRI Standards, which apply to environmental performance. "It includes detailed information on most of the indicators and content recommended in the guide, as shown in the GRI Content Index.

The following GRI documents were considered in preparing the Report:

- GRI 1: Foundation 2021
- GRI 2: General Disclosures 2021
- GRI 3: Material Topics 2021
- GRI 300 Environmental Standards (2021)
- GRI (2006), GRI *Logistics and Transportation Sector Supplement Pilot Version 1.0 Incorporating an abridged version of the GRI 2002 Sustainability Reporting Guidelines*

By presenting this report, Adif-Alta Velocidad honours its commitment to report on the environmental aspects of its activities and the results achieved, in its tenth year of operation as an independent entity from Adif, following its establishment through the spin-off of the High-Speed infrastructure construction and management division.

OUTREACH

This Report covers the environmental performance of all activities, products, and services developed by Adif-Alta Velocidad in Spain.

Adif-Alta Velocidad was established on December 31, 2013, by Royal Decree-Law 15/2013[13], which provided for the division of Adif into two public business entities based on principles of rationalisation, efficiency, and budgetary stability.

The spin-off, with retroactive accounting effects from 1 January 2013, resulted in the creation of Adif-Alta Velocidad and the amendment of the objectives of the former Adif.

In this new context, Adif-Alta Velocidad takes on, among other responsibilities, the construction and management of certain high-speed rail infrastructures, as well as other transferred infrastructures and functions, including high-speed station operations and activities related to telecommunications and energy. Meanwhile, Adif handles the management of the conventional and metre-gauge networks, along with other associated activities and, generally, the businesses not transferred to Adif-Alta Velocidad, such as heritage assets, conventional network stations, and international communication.

Royal Decree-Law 15/2013 and related regulations [14] allow for the delegation of certain activities between Adif and Adif-Alta Velocidad through the signing of appropriate agreements. These agreements must include financial compensation for each entity for the services provided, covering areas such as traffic control systems and infrastructure capacity management, maintenance, public safety and

[13] Royal Decree Law 15/2013 of 13 December 2013 on the restructuring of the State-owned company 'Administrador de Infraestructuras Ferroviarias' (Adif) and other urgent economic measures (BOE No. 299 of 14 December 2013)

[14] Royal Decree 1044/2013 of 27 December, approving the Statute of the Public Business Entity Adif-Alta Velocidad (Official State Gazette (BOE) No. 311, 28 December 2013).

security, and corporate functions like environmental management.

Adif-Alta Velocidad produces this report annually, which was previously published jointly for both entities since 2005. From the 2014 Environmental Report onwards, it has been issued as two separate documents.

In this Report, continuing the approach mentioned earlier, we present the data from Adif-Alta Velocidad for the year 2023, marking the tenth year for which separate data are available for each entity. The time reference for many indicators includes annual information and data between 2014 and 2022, corresponding to the Adif-Alta Velocidad entity.

The impact of the identified material issues occurs both within and outside the organization, and the organization directly contributes to this impact. For indicators measuring the externalities of transport (Chapter 10: Adif's Contribution to the Environmental Sustainability of Transport), Adif-Alta Velocidad is also linked to the impact through its business relationships.

CONTENT SELECTION

The content of this report has been selected based on the new materiality analysis conducted in 2022.

In this analysis, a list of relevant issues was first identified and then evaluated through a thorough review of various external sources, including reporting frameworks such as GRI, Law 11/2018, and sectoral papers. Additionally, information sources from the public sector and the railway sector have been considered. Based on this, an initial exploration of the dual approach to materiality was conducted, considering concepts such as financial materiality and impact materiality, through surveys with various stakeholders.

A total of 29 relevant topics or issues were identified, organised into eleven categories across Environmental, Social, and Governance areas. The results of the analysis were presented in a materiality chart.

As a result of applying the materiality principle, the following issues of high relevance to the environmental dimension were identified:

- Sustainable mobility
- Developing sustainable cities and communities
- Energy consumption

Of medium relevance are:

- Emission mitigation
- Environmental protection
- Protection of biodiversity
- Greenhouse gas emissions and other pollutants

In this new materiality analysis, social aspects have decreased in relevance due to the end of the COVID-19 health crisis, with a more balanced focus across the three areas, with a shift in focus towards governance and environmental issues.

ASSURANCES OF ACCURACY AND VERACITY OF THE INFORMATION SUBMITTED

This Report contains information solely about the results directly attributable to **Adif-Alta Velocidad**, including the activities carried out and the products and services offered.

Where external sources are used, they are appropriately referenced to ensure traceability and verification.

The calculation of the various indicators and the presentation of their data generally follow the applicable technical protocols. In any case, the assumptions and estimates made, as well as the calculation methods used, are specified for each indicator where applicable.

To ensure the accuracy and reliability of the data and information presented, the Report has undergone a verification process by an independent verifier to confirm the traceability of the information before publication.

ACCESS TO INFORMATION AND QUERIES

This document is available to various stakeholders and the general public on the **Adif-Alta Velocidad** website (www.adifaltavelocidad.es).

For more information and access, copies of this Report are available from:

Adif-Alta Velocidad
Corporate Management
Corporate Environmental Sub-Department
c/ Titan, 4-6
28045 Madrid (Spain)
Telephone: +34 915 40 38 08

APPENDICES

GRI STANDARD

This report has been prepared in accordance with the Comprehensive option of the GRI Standards.

GRI Standard (1)		Adif-Alta Velocidad 2023 Environmental Report	Pages	Omissions (2)	External verification (3)
GRI 2	General Disclosures				
2-27	Compliance with environmental legislation and regulations	Environmental compliance	165		✓
GRI 3	Material Topics				
3.3	Management of Material Topics	Company's environmental strategy	11-15		✓
		Plan to Combat Climate Change (PLCCC)	19-22		✓
		Green Bond	28-29		✓
		Consumption of railway materials	51-52		✓
		Waste	55-57		✓
		Circular economy actions	57-61		✓
		Discharging	65-66		✓
		Contaminated soils	66-71		✓
		Noise pollution	72-76		✓
		Fire prevention	82-84		✓
		Notable actions taken during the construction of HSLs	84-95		✓
		Environmental integration of projects	99-100		✓
		Environmental monitoring of the works	100-134		✓
		Responsible purchasing	156-157		✓
		Environmental complaint management	158		✓
		Savings from external costs in the rail transport system on infrastructure managed by Adif-Alta Velocidad.	185-188		✓
		About this report	195-197		✓

GRI 301	**Materials**				
301-1	Materials used by weight or volume	Consumption of railway materials	51-52		✓
301-2	Recycled input materials used	Used rails, sleepers, and ballast are reused, where possible, at other locations within the rail network.		Used rails, sleepers, and ballast are reused where possible at other locations within the rail network, although this is not currently accounted for.	
301-3	Reclaimed products and their packaging materials			Given the characteristics of the organization, it is not appropriate.	
GRI 302	**Energy**				
302-1	Energy consumption within the organization	Energy consumption in Adif's own activities	37-38		✓
302-2	Energy consumption outside the organization	Primary energy consumption	40-41		✓
302-3	Energy intensity	Final and primary energy intensity	41-42		✓
302-4	Reduction of energy consumption	Monitoring the implementation of actions to combat climate change	23-26		✓
		Green Bond	28-29		✓
302-5	Reductions in energy requirements of products and services	Energy consumption in the rail transport system in infrastructures managed by Adif-Alta Velocidad	164-171		✓
		Traction energy consumption per transport unit	174-175		✓

GRI 303	**Water and effluents**				
303-1	Interactions with water as a shared resource	Water consumption	55		✓ ✓
303-2	Management of water discharge-related impacts	Discharging	65-66		✓
303-3	Water withdrawal			Water consumption mainly comes from public water supply networks. In addition, there is relatively less consumption from well water. Currently, there is no methodology available to determine the amount of reused water distributed through the public networks from which it is supplied.	
303-4	Water discharge	Discharging Adif-Alta Velocidad operates in Spain where the discharge of waste water is subject to specific legislation, which it strictly complies with	65-66		✓
303-5	Water consumption	Water consumption	55		✓
GRI 304	**Biodiversity**				
304-1	304-1 Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas.	Land use	79		✓
		Natural areas	80-81		✓
304-2	Significant impacts of activities, products and services on biodiversity	Natural areas	80-81		✓
		Environmental integration of projects	99-100		✓
		Environmental monitoring of the works	100-134		✓
		Notable actions taken during the construction of HSLs	84-95		✓

304-3	Habitats protected or restored	Natural areas	80-81		✓
		Notable actions taken during the construction of HSLs	84-95		✓
304-4	IUCN Red List species and national conservation list species with habitats in areas affected by operations			Information is not available, it will be included in future reports.	
GRI 305	**Emissions**				
305-1	Direct (Scope 1) GHG emissions	Carbon footprint	43-46		✓
		Air emissions from traction	175-178		✓
		GHG emissions per TU	178		✓
		GHG emissions compared to the transport sector	178-180		✓
305-2	Energy indirect (Scope 2) GHG emissions	Carbon footprint	43-46		✓
		GHG emissions per TU	178		✓
		GHG emissions compared to the transport sector	178-180		✓
		Air emissions from traction	175-178		✓
305-3	Other indirect (Scope 3) GHG emissions	Air emissions from traction	175-178		
		GHG emissions per TU	178		
		GHG emissions compared to the transport sector	178-180		
305-4	GHG emissions intensity	Carbon footprint	46-46		✓
305-5	Reduction of GHG emissions	Monitoring the implementation of actions to combat climate change	23-26		✓
		Green Bond	28-29		✓
305-6	Emissions of ozone-depleting substances (ODS)	Substances that deplete the ozone layer	53-54		✓
305-7	Nitrogen oxides (NOx), sulphur oxides (SOx), and other significant air emissions	Other air emissions	46-48		✓
		Air emissions from traction	175-178		✓
GRI 306	**Effluents and Waste**				
306-1	Waste generation and significant waste-related impacts	Waste	55-57		✓
306-2	Management of significant waste-related impacts	Waste	55-57		✓
		Circular economy actions	57-61		✓
GRI 308	**Supplier environmental assessment**				

308-1	New suppliers that were screened using environmental criteria.	Responsible purchasing	156-157	✓
308-2	Negative environmental impacts in the supply chain and actions taken	Responsible purchasing	156-157	✓
		Environmental integration of projects	99-100	✓
		Environmental monitoring of the works	100-134	✓
		Noise pollution	72-76	✓
		Fire prevention	82-84	✓
		Environmental risk management	157-158	✓

(1) List of material environmental aspects identified for Adif-Alta Velocidad, which are specific to the organization and relevant to its stakeholders.

(2) In exceptional cases where it is not possible to provide certain required information:

(a) Identify any omitted information.

(b) Explain the reasons for omission, including:

- Why a particular indicator from the GRI Standards does not apply.
- Information subject to confidentiality restrictions.
- Specific legal prohibitions.
- Measures planned to obtain missing data and the expected timeframe if data were unavailable at the time of reporting.

(3) All items mentioned in this list have been externally verified by independent personnel. The verification statement can be found in the appendices to the Report.

Sector-specific environmental performance indicators (GRI indicators for the transport and logistics sector).

Content	Description	Pages	Remarks	External verification (1)
Aspect: Fleet composition				
LT2: Significant environmental impacts of transportation of products, goods, and materials used in the organization's activities, as well as transporting personnel.	Not applicable			
Aspect: Policy				
LT3: Description of policies and programmes on the management of environmental impacts, including: 1. Initiatives on sustainable transportation (e.g. hybrid vehicles); 2. Modal shift; and 3. Route planning	Company's environmental strategy	**11-15**		✓
	Voluntary initiatives	19-31		✓
Aspect: Energy efficiency				
LT4: Description of initiatives to use renewable energy sources and to increase the energy efficiency.	Not applicable			
Aspect: Urban air pollution				
LT5: Description of initiatives to control urban air emissions in relation to road transport (e.g., use of alternative fuels, frequency of vehicle maintenance, driving styles, etc.).	Plan to Combat Climate Change (PLCCC)	19-22		✓
	Green Bond	28-29		✓
Aspect: Congestion				
LT6: Description of policies and programmes implemented to manage the impacts of traffic congestion (e.g., promoting off-peak distribution, percentage of delivery by modes of alternative transportation, etc.).	Framework collaboration agreement between Renfe Operadora and **Adif-Alta Velocidad** on environmental management and the promotion of sustainable mobility	33		✓
Aspect: Noise and vibration				
LT7: Description of policies and programmes for noise management/abatement	Noise pollution	72-76		✓
Aspect: Transport infrastructure development				
LT8: Description of the environmental impacts of the reporting organization transportation infrastructure assets and real estate that are subject to definition of financial control of the reporting organisation.	Environmental processes management	156-158		✓
	Environmental integration of projects	99-100		✓
	Environmental monitoring of the works	100-134		✓

	Notable actions taken during the construction of HSLs	84-95	✓

Indicators specified in: *Global Reporting Initiative* (GRI), (2021). *GRI Logistics and Transportation Sector Supplement. Pilot Version* 1.0 May 2006.
(1) All contents mentioned in this list have been externally verified by independent personnel. The verification statement can be found in the appendices to the Report.

INDEX OF TABLES

INDEX OF GRAPHS

INDEX OF FIGURES

LIST OF SOURCES USED

Adif and Adif-Alta Velocidad data	Statute of Adif-Alta Velocidad
	Royal Decree-Law 15/2013, of 13 December, on the restructuring of the public business entity 'Administrador de Infraestructuras Ferroviarias' (Adif) and other urgent economic measures (BOE No. 299, 14 December 2013).
	Network Declaration 2014 to 2023
	Strategic Plan 2030
	Adif Code of Ethics and Conduct
	Environment Policy (2019)
	Addendum to the Management Agreement between Administrador de Infraestructuras Ferroviarias (Adif) and Adif-Alta Velocidad
	General Procedure for Managing and Coordinating Environmental Activities. ADIF-PG-109-001-001
	Adif 2005 to 2012 Environmental Reports
	Adif and Adif-Alta Velocidad 2013 Environmental Report
	Adif-Alta Velocidad 2014 to 2022 Environmental Report
	Adif-Alta Velocidad 2018 Sustainability Report
	Adif-Alta Velocidad Management Report. Financial year 2019, 2021, 2022, and 2023
	Royal Decree 1044/2013, of 27 December, approving the Statute of the Public Business Entity ADIF-Alta Velocidad (BOE No. 311, 28 December 2013).
	Adif, Corporate Financial and Management Control Department, Corporate Treasury and Accounting Department, Administration and Services Division
	Adif, Corporate Passenger Stations Department
	Adif, Corporate Traffic and Capacity Management Department, Corporate Coordination and Management Sub-Department
	Adif, Corporate Conservation and Maintenance Department, Corporate Maintenance Department
	Adif, Corporate Conservation and Maintenance Department, Corporate Technical Department, Operations and Warehousing Headquarters
	Adif, Corporate Conservation and Maintenance Department, Corporate Technical Department, Corporate Resources Sub-Department
	Adif, Corporate Security, Processes and Systems, Quality and Environment Area Department
	Adif, Corporate Finance and Management Control Department, Corporate Economic Management and Financing Department, Corporate Accounting and Financial Information Sub-Department
	Adif, Track Area Management, Infrastructure and Track Sub-Department, Corporate Technical Department.
	Adif-Alta Velocidad, Corporate Department, Corporate Environmental Sub-Department
	Adif-Alta Velocidad, Corporate Planning, Strategy and Project Management Department, Corporate Business Strategy Department, Corporate Responsibility, Sustainability and Branding Sub-department, Environmental Sustainability and Fight against Climate Change Division
	Adif, Corporate Legal Advice Department, Corporate Litigations Sub-Department
	Adif, Corporate Finance and Management Control Department, Treasury and Accounting Department
RENFE Operatora data	Energy and traffic data
Transport sector data	Ministry of Transport and Sustainable Mobility. Yearbook. 2014 to 2020
	Law 38/2015 of 29 September on the railway sector (BOE No. 234, 30 September 2015)
	Royal Decree 61/2006, which sets out the specifications for petrol, diesel, fuel oil, and liquefied petroleum gases, and regulates the use of certain biofuels (BOE no. 41, 17 February 2006). Modified by: RD 1027/2006, RD 1088/2011, RD 1361/2011 and RD 290/2015
	EC Delft *Handbook on the external costs of transport* (2020)
	Spanish Transport and Logistics Observatory (OTLE), 2024
Energy data	*Red Eléctrica.* Spanish Electricity System Data. 2024
	Ministry for the Ecological Transition and the Demographic Challenge, State Secretariat for Energy. Energy Balance of Spain 2021 (2024)

Emissions data	EEA (2023). EMEP/EEA air pollutant emission inventory guidebook 2023.
	IPCC Guide on National Greenhouse Gas Inventories (2006 and 2021 update)
	Ministry for the Ecological Transition and the Demographic Challenge. Inventory of Greenhouse Gas Emissions in Spain. 2024 Edition (1990-2022). March 2024
	Ministry for the Ecological Transition and the Demographic Challenge (2023). National Inventory of Emissions of Pollutants into the Atmosphere 1990-2022
	Ministry for the Ecological Transition and the Demographic Challenge. Reports on the implementation of Law 1/2005 of 9 March 2005, which regulates the greenhouse gas emission allowance trading scheme.
Unit conversion	International Energy Agency / Natural Gas
Other sources	AENOR
	INE Insituto Nacional de Estadística (Spanish National Statistics Institute) Baseline data on water consumption, waste generation, and population
	IDAE *Instituto para la Diversidicación y Ahorro de Energía* (Spanish Institute for the Diversification and Saving of Energy)
	Comisión Nacional del Mercado de Valores (Spanish National Securities Market Commission)

GLOSSARY

Adif	Administrador de Infraestructuras Ferroviarias
AEMET	Spanish Meteorological Office
AENOR	Spanish Association for Standardisation and Certification
AFA	Auxiliary Facilities Area
AHEVs	Areas of High Environmental Value
AIO	Pre-Construction Report
AQO	Acoustic Quality Objectives
AVE	Alta Velocidad Española (high-speed rail service)
Benchmarking	It consists of taking comparators of products, services and work processes belonging to organisations, which demonstrate good practice in an area of interest, with the aim of transferring knowledge of good practices and their application
BOE	Boletín Oficial del Estado (Official State Gazette)
CDW	Construction and Demolition Waste
CER	Community of European Railway
CFC	Chlorofluorocarbons
CH4	Methane
CHA	Cultural Heritage Assets
CICERO	Center for International Climate Research
CN	Conventional Network
CO	Carbon monoxide
CO2	Carbon dioxide
CO2eq	Carbon dioxide equivalent This measures Carbon Footprint in tonnes
CSIC	Spanish National Research Council
CSR	Corporate Social Responsibility
DANA	Depresión Aislada de Niveles Altos (Cold drop)
DAO	Director Ambiental de Obras (Environmental Manager in construction sites)
EGP	Eligible Green Projects
EIA	Environmental Impact Assessment
EIM	European Rail Infrastructure Managers
EIS	Environmental Impact Statement
EMS	Environmental Management System
ESS	Environmental Site Supervisor
FNEE	Fondo Nacional de Eficiencia Energética (Spanish National Energy Efficiency Fund)
Forética	Spanish leading organisation in sustainability and corporate social responsibility
GBP	Green Bonds Principles
GDP	Gross Domestic Product
GHGs	Greenhouse Gases Those which contribute to global warming and, thus, to climate change
GoO	Renewable Guarantees of Origin
GRI	Global Reporting Initiative International agreement to design and establish a global framework for reporting on sustainability issues
GWh	Gigawatt hour (106 kWh)
ha	hectare (10,000 m2)
HC	Hydrographic Confederation
HCFCs	Hydrochlorofluorocarbons

HSL	High Speed Line
ICMA	International Capital Market Association
IDAE	Instituto para la Diversificación y Ahorro de la Energía (Institute for Energy Diversification and Saving)
ISO 14001	(UNE-EN-ISO 14001) International standard on environmental management systems
ITU	Intermodal Transport Unit
Kg	Kilograms (103 grams)
kJ	kilojoules (103 joules)
KPI	Key Performance Indicator
kt	kiloton
kWh	kilowatt-hour
l	Litres
Lnight	Equivalent continuous weighted equivalent sound pressure level, determined in the night period. It is measured in decibels, determined over a time interval. Definition given in Royal-Decree 1367/2007
LoW	European Waste List
m^2	square metres
m^3	cubic metres
MITERD	Ministry for Ecological Transition and the Demographic Challenge
MJ	Megajoules (106 joules)
N2000	Natura 2000
N2O	Nitrous oxide
NAP	Noise Action Plan
NMVOCs	Non-methane volatile organic compounds
NOx	Nitrogen oxide
NPA	Nature Protection Areas
PCBs	Polychlorinated biphenyls
PDLCCC	Climate Change Combat Master Plan
pk	kilometre point
PLCCC	Plan to Combat Climate Change
PM10	Fine particulate matter that are 10 microns or less
PM2.5	Fine particulate matter that are 2.5 microns or less
PPK	Passengers per kilometre. Unit of measurement of passenger traffic corresponding to the transport of one passenger over a distance of one kilometre
PRIME	Platform of Rail Infrastructure Managers in Europe
PWR	Public Water Resources
REE	Red Eléctrica
Renfe	Red Nacional de los Ferrocarriles Españoles (National Network of Spanish Railways)
RFIG	Red Ferroviaria de Interés General (General Interest Railway Network)
SDGs	Sustainable Development Goals
SNM	Strategic Noise Map
SOx	Sulphur oxides
SP 2030	Strategic Plan 2030
SPAs for birds	Special Protection Area for Birds
t	Tonnes
toe	Tonne of oil equivalent

TPK	Tonne per kilometre Unit of measurement of freight transport which represents the transport of one tonne of goods over a distance of one kilometre
TSP	Total suspended particles
TU	Transport Unit Functional unit taken as a relative value to express quantitative data. Corresponds to the sum of tkm and vkm
UIC	International Union of Railways
UME	Unidad de Mapa Estratégico (Strategic Map Units)
UOT	Uses other than traction
WSF	Waste Storage Facilities

Consulnima
Consultoría e Ingeniería Ambiental

Verification Statement

ADIF-ALTA VELOCIDAD 2023 Environmental Report

CONSULNIMA, Environmental Consulting and Engineering, has been engaged by ADIF-ALTA VELOCIDAD, with the knowledge of its Management, to conduct an independent verification of the traceability of the data included in the ADIF-ALTA VELOCIDAD 2023 Environmental Report. This Report has been prepared in accordance with the Sustainability Reporting Standards of the Global Reporting Initiative (GRI), as set out in the GRI Standards, applicable to environmental performance, and the sector-specific supplement 'Logistics and Transportation Sector Supplement Pilot Version 1.0' (2006), as detailed in Chapter 11 'About this Report' of the ADIF-ALTA VELOCIDAD 2023 Environmental Report.

The scope outlined by ADIF-ALTA VELOCIDAD for the preparation of the ADIF-ALTA VELOCIDAD 2023 Environmental Report is defined in Chapter 11, 'About this Report', under section 'Scope', of the aforementioned Report.

The preparation of the ADIF-ALTA VELOCIDAD 2023 Environmental Report, along with its content, is the responsibility of ADIF-ALTA VELOCIDAD's Management, which is also responsible for defining, adapting, and maintaining the management and internal control systems from which the information is derived.

CONSULNIMA has conducted an independent verification of the ADIF-ALTA VELOCIDAD 2023 Environmental Report by implementing audit protocols that enable relevant conclusions to be drawn regarding the traceability of the published data. To this end:

- Direct interviews were conducted with the organisation's personnel, and both internal and public documentation was reviewed as required.
- Documentary evidence supporting the data was cross-checked against the underlying documentation.
- The handling of the information, including calculations, transformations, and graphs, was verified.
- Sample-based analytical techniques were applied to those indicators that required this approach due to their importance and relevance.
- The structure and content of the sustainability indicators were reviewed for appropriateness in line with the latest available version of the GRI Standards, applicable to environmental performance, and the sector-specific supplement 'Logistics and Transportation Sector Supplement Pilot Version 1.0' (2006).

These procedures were applied to the sustainability indicators listed in the 'GRI Content Index', which is located in the 'Appendices' of the aforementioned Report.

The work was carried out by a team of sustainability specialists with extensive experience in reviewing such information.

Based on the verification process undertaken and the conclusions drawn, the Verification Statement is issued, summarising the results of the process.

Conclusion

During the verification process, no indications or evidence of significant deviations or omissions were found. Therefore, we confirm the accuracy of the information contained in the ADIF-ALTA VELOCIDAD 2023 Environmental Report.

Detailed information about this process is provided in the Verification Report, which is available to interested parties at the address provided in Chapter 11, 'About this Report', under section 'Access to Information', of the ADIF-ALTA VELOCIDAD Environmental Report 2023.

Madrid, 1st of August 2024

14301768T IGNACIO MARTIN (R: B84076009)

Firmado digitalmente por 14301768T IGNACIO MARTIN (R: B84076009)

Ignacio Martín González
CEO at CONSULNIMA, S.L.