

Green Bond Program of the Kingdom of Spain

Impact of funds issued in 2023

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1. Background and objectives of this report

On July 26, 2021, the Kingdom of Spain introduced its Green Bond Framework, aligning its objectives with those established by the European Union. The framework is based on the Green Bond Principles of the International Capital Market Association (ICMA), published in June 2021, and is also aligned with the achievement of the United Nations Sustainable Development Goals. This framework was endorsed by a Second Party Opinion (SPO) from Vigeo Eiris, which awarded it the highest possible rating. The framework regulates the use of funds, the selection of budgetary allocations, the management of proceeds by the Treasury, and the information provided to investors.

Following the inaugural €5 billion auction in 2021 and further issuances totalling €3.207 billion in 2022, the Treasury issued €3.365 billion in 2023, achieving a higher coverage ratio than the previous year. On September 7, 2021, the Treasury completed its first issuance under the program through a syndication of a new bond maturing in July 2042, raising €5 billion and attracting demand exceeding €60 billion. In 2022, three further taps were conducted via auctions, totalling €3.207 billion, with an average coverage ratio of 1.49. In 2023, the bond was reopened twice more, adding €3.365 billion with an average coverage ratio of 1.54, underscoring the continued investor interest in Spain's green sovereign bonds. The total volume issued between 2021 and 2023 amounted to €11,572,424,000. **In 2021 and 2022, all funds raised were allocated to sustainable mobility programs,** particularly in the railway sector. Transfers were made to entities affiliated with the Ministry of Transport, Mobility, and Urban Agenda, promoting rail as a transportation mode. Funding was directed to Adif and Adif Alta Velocidad for rail infrastructure development and maintenance, and to Renfe for public service rail transport operations.

In 2023, the scope of expenditure widened to include water management and agricultural insurance programs, thereby addressing the sustainable use and protection of water and marine resources, as well as climate change adaptation goals. These were added to the previously established objectives of climate change mitigation and pollution prevention. On the one hand, water management programs, managed by the Ministry for the Ecological Transition and the Demographic Challenge, aiming for coordinated development and management of water and related resources to maximize societal and economic welfare without jeopardizing the sustainability of vital ecosystems. On the other hand, the agricultural insurance program, administered by ENESA (State Agricultural Insurance Entity), supports climate change adaptation by stabilizing the incomes of agricultural, cattle raising, aquaculture, and forestry farms, protecting them from uncontrollable risks such as climate ones.

Diagram 1: Allocated expenditure by objectives for the 2023 issue

	Objectives				TOTAL
	1	2	3	5	
PGE 2021	6.931.000,00	180.415.514,00	317.156.496,41	6.931.000,00	511.434.010,41
PGE 2022	623.053.304,89	106.006.073,00	250.768.228,14	623.053.304,89	1.602.880.910,92
PGE 2023	506.149.000,00	133.559.301,71	105.152.776,96	506.149.000,00	1.251.010.078,67
TOTAL	1.136.133.304,89	419.980.888,71	673.077.501,51	1.136.133.304,89	3.365.325.000,00
	<i>Sustainable mobility</i>	<i>Agricultural insurance</i>	<i>Water management</i>	<i>Sustainable mobility</i>	

Note: 1. Climate change mitigation
2. Adaptation to climate change
3. Sustainable use and protection of water and marine resources
5. Pollution prevention and control

This impact report aims to summarize the environmental benefits derived from the expenditures assigned to the categories of sustainable mobility, agricultural insurance and water management. The indicators used evaluate the spending programs for sustainable transport from both an economic standpoint, through sector-specific metrics and an environmental perspective, using other indicators aligned with the principles of the Harmonized Framework for Impact Reporting Handbook (June 2022 edition), published by ICMA.

For the purposes of this report, as will be explained further in the methodology section, a global impact approach based on public expenditure programs was adopted, rather than on a project-by-project basis. Given the nature of the public sector and the high number of actions included in these programs, it is more appropriate to quantify the impact by expenditure program rather than by project. This approach is commonly used in sovereign green bond allocation and impact exercises, and it is worth noting that the European Union Regulation on European Green Bonds allows sovereign issuers to report at the program level in most cases¹.

In preparing this report, the Working Group for the structuring of sovereign green bond of the Kingdom of Spain and for the promotion of sustainable finance was assisted by environmental experts from Renfe and Adif, ENESA (the State Agricultural Insurance Entity), and the Ministry for the Ecological Transition and the Demographic Challenge. These experts have substantial experience in environmental sustainability, energy efficiency, and climate change mitigation. The approaches and methodologies used are aligned with the work of the European Union's Sustainable Finance Platform and standard market practices, consistent with other impact reports issued by sovereign issuers. For the sake of clarity and accessibility, evaluation of complexity has been reduced wherever possible while granting rigorous results.

¹ Regulation (EU) 2023/2631 of the European Parliament and of the Council of 22 November 2023 on European Green Bonds and optional disclosures for bonds marketed as environmentally sustainable and for sustainability-linked bonds.

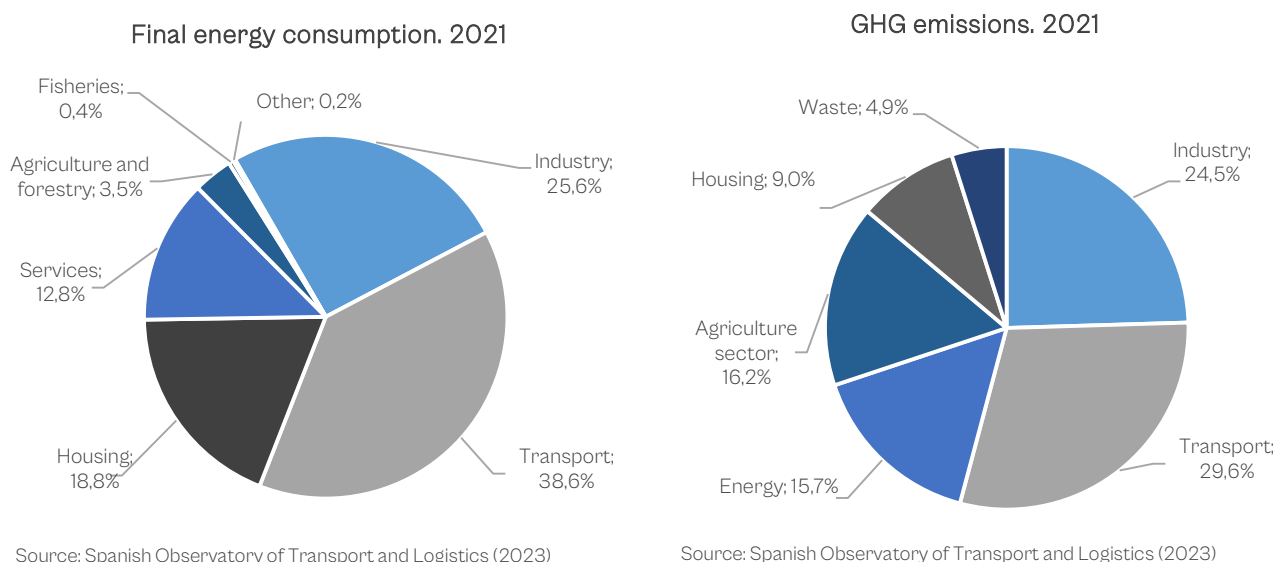
2. Environmental impact of the 2023 issues

2.1. Sustainable mobility

2.1.1. Environmental relevance of the transport sector

Transport and mobility policies are crucial levers in achieving the goal of decarbonizing the Spanish economy. The transport sector is the most energy-intensive and the largest source of greenhouse gas emissions as compared to other economic sectors. According to the 2023 Annual Report of the Spanish Observatory of Transport and Logistics (OTLE 2023), published in May 2024, transport accounted for 39% of final energy consumption and 29.6% of total greenhouse gas emissions (GHG) in 2021².

Diagram 2: Comparison of transport sector in Spain in relation to other sectors

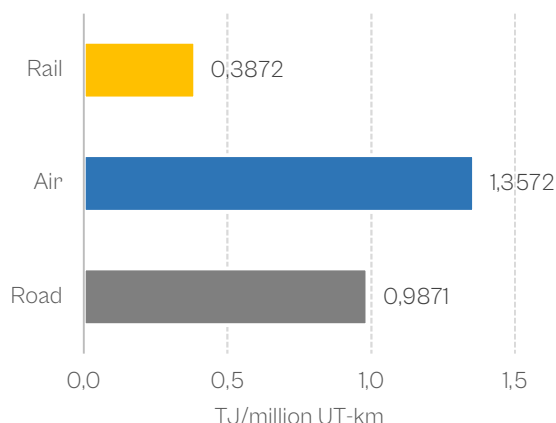


To foster energy savings in transport, it is necessary to promote more energy-efficient means of transportation with lower environmental impact per transport unit. Rail transport stands out significantly compared to other means of transportation, such as aviation and road, in terms of energy efficiency and environmental performance. According to OTLE 2023, railway emits approximately twelve times less GHG than road transport (non-urban) and seventeen times less than aviation.

² In EU-27 member states, transport accounts for 29,2% of final energy consumption and 22,4% of total greenhouse gas emissions.

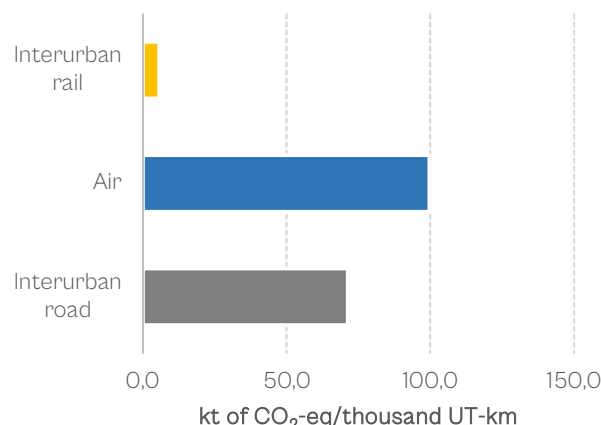
Diagram 3: Comparison of railway transport with other modes

Annual energy consumption per unit of transport.
2021



Source: Spanish Observatory of Transport and Logistics (2023)

GHG emissions per unit of transport, 2021



Source: Spanish Observatory of Transport and Logistics (2023)

Spain considers increasing the share of sustainable transport means a priority for achieving environmental sustainability, encouraging public transport and multimodal solutions. Rail transport, as a collective mode with lower energy use and emissions, plays a critical role in combating climate change.

Promoting railways, maintaining and improving infrastructure, and supporting the public rail operator must be central pillars of transport and sustainable mobility policy. Budgetary programs “Subsidies and Support for Land Transport” and “Rail Infrastructure,” managed by the Ministry of Transport and Sustainable Mobility, contribute directly to Spain's environmental objectives. The former supports public service obligations for passenger rail services, while the latter includes transfers to Adif and Adif Alta Velocidad to improve the conventional rail network, enhance freight rail, complete the high-speed rail network, and upgrade commuter services.

These programs, under Spain's Green Bond issuance framework, contribute to environmental goals related to climate change mitigation and pollution prevention and control.

2.1.2. Methodology and impact of spending allocated to sustainable mobility

A. Compensation to Renfe-Operadora for Public Service Obligations and Fare Subsidies for Travel Passes

Environmental benefits from this spending category are measured in terms of reduced atmospheric emissions. This includes both greenhouse gases (GHG) and local pollutants such as nitrogen oxides and fine particulate matter.

Renfe's methodology as Public Service Obligations operator has been used to calculate avoided emissions. Such methodology is based upon comparing the current scenario with a hypothetical one in which rail public service obligations do not exist and passengers shift

to private vehicles. Hence, the difference in emissions between these scenarios indicates the environmental savings.

To calculate avoided emissions, Renfe uses emission factors per unit for CO₂, NO_x, and PM₁₀ based on the 2011 External Costs of Transport in Europe study³. These factors (in grams per vehicle and kilometre) are combined with average occupancy rates (passengers per vehicle) to obtain total tons of CO₂, NO_x, and PM₁₀ avoided. Those factors are available for each country distinguishing by means of transportation, goods and travellers.

Traffic data from eligible public service rail operations in 2022 – the only year within the 2021–2023 period with assigned spending – **was used for these calculations.**

Diagram 4: Public Service Obligation traffic volumes for 2022 (million passenger-kilometres)

	2022
TOTAL RENFE PSO	7.500
Commuter railway	4.595
Conventional Mid distance	1.807
High speed Mid distance	1.007
Metric gauge	91

Three key indicators have been selected to assess savings in polluting emissions. CO₂ for greenhouse gases and, as for local pollution, nitrogen oxid (NO_x), which includes NO₂ (linked with petrol and diesel engines), as well as particles smaller than 10 microns (PM₁₀).

Diagram 5: Impact indicators

Indicator	Avoided emissions	Units
Sustainability	GHG	CO ₂ thousands of tons
Local pollution	Nitrogen oxides (NO _x)	NO _x tons
Local pollution	Small particles (<10 microns)	PM ₁₀ tons

Using Renfe's above-mentioned methodology, the following emissions savings were calculated for 2022, based on public service rail traffic financed through compensations and multi-journey fare subsidies:

Diagram 6: Avoided Emissions from RENFE Public Service Obligations (2022)

	2022
CO ₂ thousands of tons	1.388
NO _x tons	4.576
PM ₁₀ tons	157

³ External costs of transport in Europe (cedelft.eu)

B. Transfers to Adif and Adif Alta Velocidad for Rail Infrastructure Development and Sustainability

The methodology used by railway infrastructure managers calculates avoided GHG and pollutant emissions due to modal shifts from road to rail. This is evaluated through:

- Construction of new track kilometres
- Renovation of existing track
- Electrification of railway lines
- Operating expense compensation for infrastructure managers

These calculations include the modal shifts generated by building and renovating the rail network and by electrifying existing railway segments, as well as the modal shift that allows the financing of current expenditure by the infrastructure railway administrators.

The starting data include the kilometers of track built, renewed, and electrified, as well as their associated train movements in the period 2021–2023, together with the train-kilometers benefiting from the financing of current expenditure for the network managers. Greenhouse gas (GHG) and local pollutant emission factors (sourced from the EMEP/EEA Emission Inventory Guidebook 2019⁴) are applied to these, differentiated by mode of transport, for both freight and passenger services. Finally, the emission savings to the atmosphere are obtained by calculating the difference between the current scenario and the hypothetical modal shift scenario without the railway mode.

Regarding the results obtained, it is important to clarify three methodological notes:

1. First, for the calculation of the environmental benefit derived from Adif's actions, **train services operated under Public Service Obligations by Renfe Viajeros have been excluded**, since they have already been taken into account in the calculation of the emissions avoided by Renfe.
2. Second, to **avoid** the issue of **double counting in newly constructed sections**, electrification has been included in the calculation itself, applying the emission factor corresponding to electric traction rolling stock, whereas in sections that are not newly built but are only electrified, the environmental benefits have been calculated as the difference between the use of diesel locomotives and electric locomotives.
3. Third, in the case of track construction, renewal, and electrification, a service life of 30 years has been considered, in line with Regulation (EU) 480/2014. However, according to the Long-Term Decarbonisation Strategy, prepared by the Ministry for the Ecological Transition and the Demographic Challenge within the Strategic Framework for Energy and Climate, a progressive reduction of GHG emissions is established until reaching climate neutrality by 2050. Therefore, the reduction of

⁴ External costs of transport in Europe (cedelft.eu)

emissions attributable to infrastructure has been calculated following the trajectory defined by MITERD's inventory of GHG emission projections in the road and rail transport sector up to 2030, and then assuming a linear reduction from 2030 to zero by 2050.

For the calculation of the savings in tons of CO₂, NO_x, and PM₁₀, in line with the basic principles of the *Harmonized Framework for Impact Reporting Handbook* (June 2022 edition) published by ICMA, and more specifically those set out for the evaluation of sustainable transport expenditure programs, **the following baseline indicators have been taken into account:**

1. **Kilometres of track built or renewed:** the data do not include those renewal works of lesser scope than those considered as "comprehensive renewal".

Administrator	2021-2023 (km)	% over total network (2023)
ADIF	499,8	4,3%
ADIF AV	503,8	12,7%
Total km built or renewed	1003,6	6,4%

2. **Kilometres of track electrified:** the newly electrified kilometres of track amount to 72.1 km. This figure does not include the electrification of lines already accounted for under the track construction or renewal category.
3. **Train-kilometers that have used the network during the period and benefited from compensations to railway infrastructure managers for operating expenses:** as an indicator of activity, the train-kilometers that benefited from the operating expenditure subsidies granted by the Ministry of Transport and Sustainable Mobility to Adif and Adif-AV in the fiscal years 2021, 2022, and 2023 have been considered, as these subsidies promote the use of rail transport. The train-kilometers operated on the Adif and Adif-AV network during this period amounted to 542,837,179,465 train-kilometers.

From the overall activity of the infrastructure managers, the share corresponding to the allocations made in the 2021-2023 period to the 2023 green bond issuances must be considered. Differentiating between financing for investments and other activities, the Green Bonds represent the following percentages of the financing of Adif and Adif-AV:

Administrator	Type of financing	2021-2023 (thousand €)	% of total
ADIF	Contributions to ADIF for investments allocated to 2023 green bond issues	460.724	9,09%
ADIF	Contributions to ADIF for the rest of investments allocated to 2023 green bond issues	304.802	6,01%
ADIF AV	Contributions to ADIF-High Speed for investments allocated to 2023 green bond issues	311.574	4,84%
ADIF AV	Contributions to ADIF-High Speed for the rest of Investments allocated to 2023 green bond issues	70.000	1,09 %

Thus, in accordance with these percentages, the **baseline indicators** associated with the expenditure allocated by the Ministry of Transport and Sustainable Mobility to the 2023 Green Bond issuance are as follows:

- **69.8 km of track built or renewed.**
- **26.6 km of line electrified; 3.5 km excluding the newly constructed sections.**
- **23,647,068 train-kilometers** benefiting from the **operating expenditure subsidy** that promotes the use of rail transport.

To measure this environmental benefit, the same environmental indicators as those used for the railway operator (Renfe) are applied. Thus, the savings in GHG emissions in tons of CO₂, nitrogen oxides (NOx), and particulate matter smaller than 10 microns (PM10) are considered, along with the calculation of traffic data circulating on the lines and the emission coefficients of current vehicles.

The methodology has been revised to update the reference values to the most recent data currently available in the sector, as well as to adapt it to the projections of GHG emission trends in Spain for the coming years and to the objective of achieving climate neutrality by 2050.

Accordingly, the values of certain variables influencing the emission savings indicators have been updated to incorporate nationally available data, instead of the international references previously used. Specifically, the train speed values have been updated, both for long-distance passenger transport and freight transport; **the load factor values** related to net tons of freight transported, both for trains and for trucks, using official sources referenced to the Spanish case; **as well as the values for train utilization** (passenger-km/seat-km) and the evolution of the number of seats per train.

For the projection of avoided emissions, and in order to eliminate the effect of the pandemic in 2021 and 2022, average values of traffic densities, train utilization, and the evolution of the number of seats offered per train have been used. Finally, the expected evolution of GHG emissions for the years 2021 to 2030, for both road and rail transport, as published by the Ministry for the Ecological Transition and the Demographic Challenge in the Emissions Projections Inventory, has been taken into account. From 2030 onwards, a linear reduction has been assumed, reaching zero emissions by 2050, in line with the Long-Term Decarbonisation Strategy 2050.

The following diagrams summarize the emission savings resulting from the actions of Adif and Adif AV ⁵:

⁵ Applying these updates to the impact reports of the funds issued in 2021 and 2022, the following results are obtained:

- Impact of Adif and Adif AV allocations in the 2021 issuance: 1,261 thousand tons of CO₂, 3,389 tons of NOx, and 173 tons of PM10.
- Impact of Adif and Adif AV allocations in the 2022 issuance: 643 thousand tons of CO₂, 2,562 tons of NOx, and 130 tons of PM10.

Diagram 7: Emission Savings due to construction, renewal and railway lines electrification

	ADIF	ADIF AV	TOTAL
CO ₂ (thousands of tons)	68,77	51,36	120,13
NO _x (tons)	331	204	535
PM10 (tons)	16	9	25

Diagram 8: Emission savings due to compensation to railway administrators for current expenditure

	ADIF	ADIF AV	TOTAL
CO ₂ (thousands of tons)	167,48	51,79	219,26
NO _x (tons)	913	165	1,078
PM10 (tons)	39	8	47

2.2. Agricultural insurance

2.2.1. Environmental relevance of the agricultural sector

The agricultural sector represents an economic activity with a high degree of exposure to risk, as its productive activity takes place, in most subsectors, in the open air. Agricultural activity depends on environmental factors that are difficult to control, which justifies the need to use risk management tools in agricultural holdings. Agricultural production is subject to natural conditions and influenced both by production cycles and by climate variability in Spain.

The risks affecting the agricultural sector are diverse in nature, with adverse weather events—exacerbated by climate change—constituting one of the most significant risk factors. Adverse weather events such as natural disasters or similar occurrences can generate direct losses of crops and livestock, or indirect losses due to price fluctuations resulting from changes in the availability of production and raw materials. Thus, among the main risks that affect and threaten the economic viability of farms are frost, hail, flooding, and drought. Climate change increases the uncertainty associated with these types of risks.

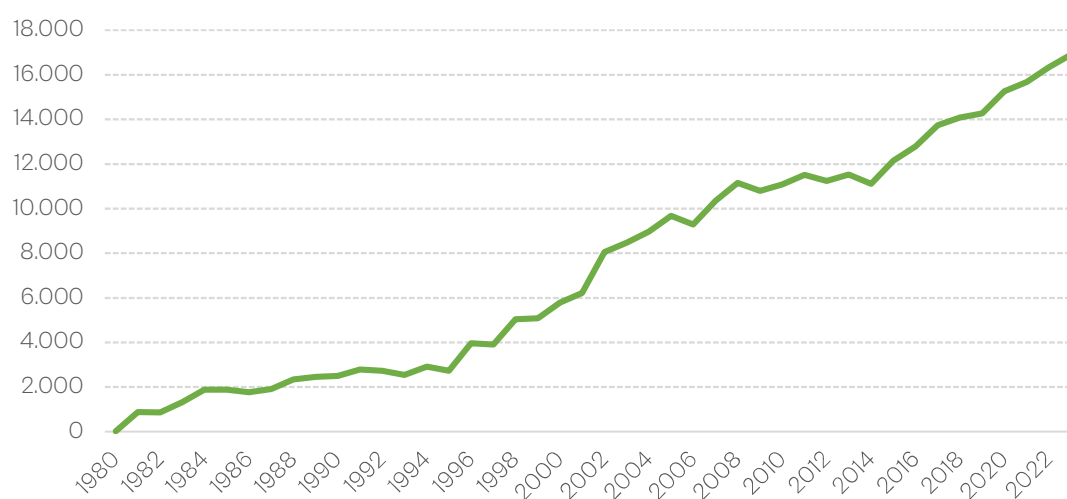
Agricultural producers combine strategies to minimize the impact of risks with agricultural insurance as a tool for managing risks that are beyond their control. Producers may adopt different risk management strategies to mitigate these impacts through the application of agronomic measures such as the use of drought-resistant varieties, the installation of anti-hail nets, or changes in cropping cycles. The transfer of risk to private insurance companies, through agricultural insurance, is a tool for managing all those risk factors that lie outside the control of farm managers, particularly those related to adverse weather events.

Agricultural insurance is considered a tool for climate change adaptation for farm holders, contributing to the economic viability of the agri-food chain and to sustaining the rural population. This system plays an essential role in maintaining farm income and ensuring the viability of the sector and, consequently, of the entire agri-food chain. In addition, the system includes incentives to properly align risk management.

In this context, agricultural insurance is one of the measures included in the National Climate Change Adaptation Plan (PNACC) adopted by the Government of Spain. This Plan provides the reference framework for public efforts to generate knowledge and build adaptation responses to climate change. The PNACC 2021–2030 considers the promotion of insurance as a key tool for adaptation across different socioeconomic sectors. In this regard, the Spanish Agricultural Insurance System (SSAC) represents a tool for climate change adaptation for agricultural holdings.

Indeed, the role of agricultural insurance as a climate change adaptation tool has increased substantially. The insured capital under the first Agricultural Insurance Plan, published in 1980, amounted to €22.17 million. After the expansion of insured products and risks over its four decades of history, the insured capital has risen to €16,918 million, highlighting the growing importance of this tool for risk management in agricultural holdings and for climate change adaptation for their holders.

Diagram 9: Evolution of insured capital since 1980 under the Agricultural Insurance Plan (million euros)



Source: Entidad Estatal de Seguros Agrarios, O.A.

2.2.2. Methodology and impact of spending allocated to agricultural insurance

To quantify the scale and impact of agricultural insurance programs, both physical and monetary indicators are used. The most relevant indicators in the sector include:

1. **Number of insured:** individuals or legal entities who have taken out agricultural insurance.

2. **Insured area:** measured in hectares, it indicates the extent of production covered by insurance.
3. **Insured production:** measured in tons, it quantifies total agricultural output under coverage.
4. **Insured capital:** presents the value of production, in euros, as the maximum economic amount established in the insurance declaration that the policyholder will receive in the event that the conditions are met for activating any of the coverages and guarantees included in the insurance policy. This amount is defined based on the expected harvest, taking into account the yields of each crop..
5. **Insurance premium:** the amount in euros paid by the insured party.
6. **ENESA subsidy:** this subsidy is divided into several components and is granted as a State contribution to the payment of the premium, which is deducted from the total premium amount payable by the policyholder at the time of contracting and subsequently reimbursed by ENESA to AGROSEGURO. The subsidy includes a base subsidy as well as possible additional subsidies for circumstances such as continuity of insurance coverage, characteristics of the policyholder (for example, the status of young farmer), or practices aimed at risk reduction, among other factors.

As indicated in the allocation report, when presenting the physical and monetary indicators, certain **exclusions have been applied to ensure that only agricultural insurance programs aligned with the climate change adaptation objective are included:**

- Since most insurance policies intended for **livestock holdings** cover, in addition to climate-related risks, other risks not linked to climate, the corresponding parameters and subsidies for these lines have not been considered.
- Insurance lines intended for **marine aquaculture** have not been considered, as they include non-climate-related risks in addition to climate risks.
- Insurance covering the **removal and destruction of animal carcasses** from agricultural holdings has likewise not been considered.
- Finally, the insurance line covering **tobacco, textiles, and wine grapes** has not been taken into account.

The subsidies included in this allocation correspond to the following insurance lines: fruit farms, citrus farms, horticultural farms in the Canary Islands, banana plantations, outdoor horticultural crops for both autumn-winter and spring-summer seasons, tomatoes in the Canary Islands, greenhouse and successive-cycle horticultural crops, extensive herbaceous crops, nut trees, persimmon and other fruit trees, olive groves, forage crops, cherry orchards, forestry, live plants and cut flowers, table grapes, tropical and subtropical fruits, strawberries and other berries, loquats and other fruit trees, as well as garlic cultivation.

Thus, for the allocation of the budget aimed at subsidizing agricultural insurance, 24 insurance lines out of the 45 included in the Annual Plans for the 2021, 2022, and 2023 fiscal years have been considered. The subsidy, together with the rest of the physical parameters, corresponds to policies contracted between January 1 and December 31 of each fiscal year. It does not correspond to the settlements made by ENESA to AGROSEGURO afterwards, since these involve a certain delay relative to the time of contracting.

Diagram 10: Insurance line included in 2023 allocation

fruit farms	multi-crop vegetables
citrus farms	olive farms / olive holdings
horticultural farms in the Canary Islands	forage crops
banana plantations	cherry
outdoor horticultural crops (autumn/winter cycle)	forestry holdings / forest holdings
outdoor horticultural crops (spring/summer cycle)	live plants
greenhouse horticultural crops	live plants in the Canary Islands
successive-cycle horticultural crops	tropical and subtropical fruit
tomatoes in the Canary Islands	strawberries and other berries
extensive herbaceous crops	loquat and other fruit trees
nut trees / nut crops	garlic farms / garlic holdings
persimmon and other fruit trees	table grapes

The following are the main **aggregated impact indicators** of agricultural insurance activity corresponding to the 2023 allocation.

Diagram 11: Aggregated impact indicators of 2023 allocation

	2021	2022	2023
Number of insured	145.436	68.992	55.450
Insured area (hectares)	5.702.503	2.803.364	2.284.490
Insured production (Tn)	37.071.896	17.221.750	13.940.097
Insured capital (€)	10.440.421.761	5.369.452.645	4.663.944.453
Insurance premium (€)	471.719.068	260.294.118	251.841.178
ENESA subsidy (€)	180.415.514	106.006.073	133.559.302

2.3. Water management

2.3.1. Environmental relevance of water resource management

At present, water resource management and water quality policy constitute an essential lever for achieving Sustainable Development Goal (SDG) 6: Clean Water and Sanitation. The rapid growth of the population, urbanization, and the increasing water needs of the agricultural, industrial, and energy sectors are driving a rise in water demand.

Among the measures needed to ensure universal access to safe and affordable drinking water by 2030 are **investments in infrastructure and sanitation facilities, the protection**

and restoration of water-related ecosystems, as well as hygiene education. In addition, improving the efficient use of water resources is one of the key factors in reducing water stress.

It is worth highlighting, within the EU framework, Directive 91/271 on the treatment of urban wastewater, currently under review, which presents a major investment challenge for the coming years. This challenge involves the different water administrations, and in the case of the Ministry for the Ecological Transition and the Demographic Challenge, it is reflected in the commitments to carry out works of general interest in the different Autonomous Communities. The forthcoming amendment of the Directive will require Member States to ensure that small municipalities are connected to general urban wastewater collection networks by 2035. Furthermore, given the potential of the urban wastewater treatment sector to contribute to significantly reducing greenhouse gas (GHG) emissions in the European Union, the new amendment to the Directive introduces a deadline to achieve energy neutrality in the sector.

Royal Decree 3/2023, “establishing the technical and health criteria for the quality of drinking water, its monitoring and supply,” adopts the criteria of Directive (EU) 2020/2184 on the quality of water intended for human consumption, incorporating new parameters and revised values for existing parameters regarding drinking water quality. It also introduces changes in the monitoring of water sources at origin, as well as in the production and distribution facilities for drinking water.

The Climate Change and Energy Transition Law devotes Article 19 exclusively to the “Consideration of climate change in water planning and management.”

Firstly, it sets out the two objectives for integrating climate and water policies: water security for people, biodiversity, and socioeconomic activities, and increased resilience.

Secondly, it establishes the importance of water planning and management, which must be aligned with the guidelines and measures developed in the Water Strategy for the Ecological Transition, without prejudice to the competences of the Autonomous Communities.

Finally, Article 19.5 of the Law establishes that Flood Risk Management Plans must take into account the need for hydrological-forestry correction measures and erosion prevention actions.

Thus, the most relevant actions of these programs are as follows:

- Water planning
- Management and administration of the public water domain
- Hydrological monitoring and information networks
- Restoration and conservation of the public water domain
- Flood risk management

- Regulation infrastructures
- Irrigation infrastructures
- Sanitation and wastewater treatment infrastructures
- Water supply infrastructures
- Desalination infrastructures
- Water reuse infrastructures
- Maintenance and conservation of hydraulic infrastructures
- Infrastructure safety
- Aquifer recovery

These action programs fall within the six main areas considered in the methodology for improving environmental impact: sustainable water management, sanitation and wastewater treatment, water supply, flood management, implementation of sustainable land and water resource management systems, and river restoration and recovery measures.

2.3.2. Methodology and impact of spending allocated to water management

To quantify the environmental benefit obtained from actions focused on water management, it is necessary to use physical outcome indicators and sustainability indicators.

- **Physical outcome indicators** express the annual water savings or the annual volume of wastewater treated or avoided as a result of specific projects, expressed in m³/year.
- **Sustainability indicators** assess the environmental benefit to society, expressed directly as the number of inhabitants who have benefited from actions aimed at reducing adverse effects such as floods, or the linear kilometers of riverbed improved or restored.

All indicators are calculated in accordance with the basic principles of the **Harmonized Framework for Impact Reporting Handbook** (June 2022 edition) published by ICMA, and specifically those defined for the evaluation of water management expenditure programs, reflecting the impact that Green Bonds have had on **water resource management**.

Diagram 12: Description and unit used in water management indicators

Indicator	Description	Unit
Annual water savings	Absolute annual water use before and after the project	m ³ /year
Annual volume of wastewater treated or avoided	Absolute annual amount of wastewater treated, re-used, or avoided before and after the project	m ³ /year
Improvement of measures to reduce the risk of adverse effects of floods and droughts	Number of people benefiting from measures to mitigate the consequences of floods and droughts	Inhabitants
River restoration and recovery measures	Kilometers of riverbed restored or recovered	km

The total results of the indicators for the 2021-2023 period are detailed for each of the expenditure programs, with an annual breakdown. It should be noted that many of the actions carried out are multi-annual in nature, and their contribution to the total indicator calculation will not be reflected until their completion.

As **key aspects of the applied methodology**, the following clarifications should be highlighted:

- Impacts are accounted for **based on actual execution data** of the actions within the years allocated to the bond. For example, water planning involves multi-annual periods with six-year cycles; in this case, the calculation considers annual data collected from multi-annual projects.
- For **actions executed with European funds**, only the share co-financed by Spain has been included, excluding the portion financed by the EU.
- **The annual and overall calculation of indicators** for each report is made in line with the annual allocation decision of the programs included in that issuance, in this case 2021-2023.

For the calculation of environmental and sustainability indicators, a **specific methodology is applied in which different scenarios are evaluated and compared with each other**. In general terms, a scenario without project implementation is compared against the real scenario where the project has been carried out. In this way, it is possible to determine the environmental and sustainability benefits derived from each action.

The actions undertaken by the **Ministry for the Ecological Transition and the Demographic Challenge—either directly through the Directorate-General for Water, or via the River Basin Authorities (*Confederaciones Hidrográficas*) and the State Water Companies (*Sociedades Estatales del Agua*)**—are quantified in the same way and with identical indicators, both physical and sustainability-related, due to the similarity of the objectives pursued by these three entities.

A. Annual volume of wastewater treated or avoided

To calculate the indicator annual **volume treated (m³/year)**, a **methodology** is applied that uses baseline data consisting of the average daily flow treated (m³/day), based on the design parameters of each of the actions implemented in 2021, 2022, and 2023. From these data, the annual treated volume (m³/year) is obtained. The impact indicator results are presented below, broken down by expenditure category and year.

Diagram 13: Wastewater treated or avoided indicators

Program denomination	Annual volume of wastewater treated or avoided (m³/year)			
	2021	2022	2023	TOTAL
Transfers to River Basin Authorities (000X)	27.375,00	757.375,00	255.803,50	1.040.553,50
Capital contributions to public Water Companies (452M)	-	-	-	-
Investment in water quality (456A)	-	1.576.800,00	279.093,60	1.855.893,60
TOTAL	27.375,00	2.334.175,00	534.897,10	2.896.447,10

B. Annual water savings

To calculate the annual water savings indicator (m³/year), baseline values are taken from the National Statistics Institute (INE), the Annual Report of the Directorate-General for Water of the Ministry for the Ecological Transition and the Demographic Challenge ("Water Use in Spain 2021/22")⁶, and the results of the XVII National Study on Drinking Water Supply and Sanitation in Spain 2022 by the Spanish Association for Water Supply and Sanitation (AEAS)⁷.

According to data published in 2022 by INE⁸, **the actual water losses per km of supply network in Spain amount to 2,543 m³/km-year**, and the length of the supply network per inhabitant is 5.7 m/inhabitant. In addition, also according to INE, Spain's population in 2022 amounted to 47,486,727 inhabitants. Based on these baseline data, the **total actual water losses** across the territory can be estimated at **688.324 hm³/year** (688,324,856.54 m³/year).

From the total actual water loss data, it is possible to estimate the annual water savings achieved through water management actions implemented by the Ministry for the Ecological Transition and the Demographic Challenge. On the one hand, according to AEAS, the renewal rate of distribution networks amounted to 0.4% in 2021, 0.2% in 2022, and 0.3% in 2023⁹. This renewal rate must, in turn, be weighted by the share of investment in the urban water cycle carried out by the Ministry for the Ecological Transition and the Demographic Challenge, taking into account the expenditure allocated to the 2023 issuance included in the allocation report, relative to the total annual investment in the urban water cycle¹⁰. Thus, starting from the total annual volume of real water losses, the annual water savings attributable to the actions carried out by the Ministry for the Ecological Transition and the Demographic Challenge—whether directly through the Directorate-General for

⁶ <https://www.miteco.gob.es/es/agua/temas/seguridad-de-presas-y-embalses/informe-de-los-usos-del-agua.html>

⁷ <https://www.aeas.es/component/content/article/52-estudios/estudios-suministro/301-xvii-estudio-nacional-aeas-aga?Itemid=101>

⁸ Resident population in Spain for 2022 according to INE.

⁹ Estimated on the basis of the volume of investment made in 2023 by the General State Administration.

¹⁰ The actual investment in the urban water cycle carried out in Spain is taken from the [Report on the Estimated Investment Gap in the Urban Water Cycle in Spain](#), 2024 PwC.

Water, or via the River Basin Authorities (*Confederaciones Hidrográficas*) and the State Water Companies (*Sociedades Estatales del Agua*)—can be obtained. The results of this indicator are as follows:

Diagram 14: Water savings indicators

Year	Distribution network renewal rate (%)	MITERD investment share (%)	Annual water savings (m³/year)
2021	0,4	7,55	207.964
2022	0,2	5,72	78.744
2023	0,3	3,199	66.069
TOTAL			352.777

C. Improvement of measures to reduce the risk of adverse effects of floods

The indicator used to quantify the benefit obtained from investments in flood management is expressed as the **number of people who benefit from measures to mitigate the consequences of floods (inhabitants)**, which reflects the improvement of measures to reduce the risk of adverse flood impacts.

The result is detailed in the following table, based on the number of inhabitants benefited by each of the actions carried out in this area, broken down by expenditure category and year.

Diagram 15: Indicators on flood risk reduction

Program denomination	Number of people benefiting from risk reduction measures			
	2021	2022	2023	TOTAL
Investment in water management and infrastructures (452A)	-	287	520	807
Transfers to River Basin Authorities (000X)	5.191	24.708	1.092	30.991
TOTAL	5.191	24.995	1.612	31.798

In the case of the State Water Companies, flood management is not among their main activities; therefore, no values for this indicator are included under that expenditure category.

D. River restoration and recovery measures

The impact of river restoration and recovery measures is estimated through an indicator expressed in linear **kilometers of river channel** in which the action is carried out. The result of the indicator is presented in the same way as the previous ones, for each expenditure category and attributed to the corresponding year.

The State Water Companies do not have river restoration among their main responsibilities; therefore, no values for this indicator are included under that expenditure category.

Diagram 16: River restoration and recovery indicators

Program denomination	Kilometers of riverbed restored or recovered			
	2021	2022	2023	TOTAL
Investment in water management and infrastructures (452A)	9,73	9,01	6,56	25,30
Transfers to River Basin Authorities (000X)	201,50	96,28	16,06	313,84
TOTAL	211,23	105,29	22,63	339,14

ANNEX 1. Impact indicators of agricultural insurance by specific insurance line

Diagram 17: Agricultural insurance contracting indicators by insurance line-2021

	Policyholders	Policies	Insured area (ha)	Insured production (TN)	Insured capital (€)	Insurance pre-mium (€)	ENESA Subsidy (€)
Fruit farms	9.548	11.980	94.573,10	2.118.883	1.108.540.404	123.202.814	51.272.933
Citrus farms	17.471	17.662	135.774,16	3.162.950	1.100.096.835	74.274.513	23.271.605
Horticultural farms Canary I.	407	804	3.250,81	138.486	49.343.812	732.975	342.404
Banana farms	3.048	3.048	4.959,13	678.286	345.925.718	8.681.113	5.041.885
Horticultural green house	2.729	3.011	8.735,88	777.858	886.490.368	7.727.380	2.705.601
Horticultural autumn winter	2.927	3.141	49.350,98	981.642	413.883.755	15.501.744	5.735.169
Tomato Canary Island	7	7	298,37	31.537	17.019.192	186.255	139.065
Extensive herbaceous	80.580	124.538	4.811.581,83	18.917.218	3.580.922.861	123.601.883	46.387.383
Dried fruits	4.116	4.450	105.896,26	129.260	252.631.398	14.044.169	6.562.459
Persimmon and other fruits	2.807	2.866	13.769,96	357.594	130.734.079	18.104.867	5.311.802
Olive farms	8.086	8.334	207.084,21	920.390	405.772.775	14.657.061	6.948.389
Forage crops	2.420	2.793	81.103,77	1.182.385	71.056.162	1.407.600	479.895
Cherry farms	1.072	1.115	7.879,55	44.911	72.008.602	9.214.078	3.123.819
Horticultural farms spring summer	3.751	4.785	64.083,25	4.879.695	631.295.181	26.852.411	10.527.300
Forestry	1.127	1.133	54.751,02	84.456	92.286.371	375.270	60.072
Live plants	403	478	2.992,90	892.047	237.044.396	1.702.586	655.915
Table grape	886	886	7.867,79	196.767	180.902.620	10.056.544	4.087.153
Tropical and subtropical	837	887	2.802,77	24.682	42.399.777	1.277.889	452.847
Multi-crop vegetables	84	84	842,83	8.520	10.842.195	232.527	54.938
Live plant Canary Island	118	127	171,42	1.746	35.359.772	215.940	79.511
Vegetables successive cycles	635	2.801	26.309,21	1.099.837	226.490.263	11.017.828	3.633.761
Strawberry and other red fruits	753	968	8.656,98	319.961	443.366.136	4.150.897	1.869.191
Loquat and other fruit	1.407	1.448	5.235,53	62.165	45.843.192	1.309.625	402.995
Garlic	217	217	4.530,91	60.618	60.165.898	3.191.100	1.269.423
TOTAL	145.436	197.563	5.702.503	37.071.896	10.440.421.761	471.719.068	180.415.514

Diagram 18: Agricultural insurance contracting indicators by insurance line-2022

	Policyholders	Policies	Insured area (ha)	Insured production (TN)	Insured capital (€)	Insurance premium (€)	ENESA Subsidy (€)
Explotaciones frutícolas	4.516	5.515	47.617,10	1.052.329	562.445.341,03	67.460.669,17	28.781.321,85
Explotaciones cítricas	7.975	8.094	65.696,08	1.470.125	534.285.307,61	35.470.479,66	11.234.335,89
Fruit farms	197	400	1.539,48	76.947	28.336.160,61	384.684,70	188.643,07
Citrus farms	1.464	1.464	2.426,24	338.354	172.560.321,72	4.345.866,33	2.590.112,68
Horticultural farms Canary I.	1.450	1.609	4.724,29	405.020	476.429.158,24	4.382.876,91	1.695.820,49
Banana farms	879	962	13.123,00	332.854	72.293.520,22	2.225.213,56	770.723,46
Horticultural green house	4	4	139,43	14.596	8.027.544,80	90.680,10	67.812,98
Horticultural autumn winter	38.464	57.152	2.367.305,26	8.652.957	1.896.018.197,32	79.570.643,69	33.312.080,42
Tomato Canary Island	2.425	2.584	63.630,30	73.713	147.146.124,24	10.514.886,20	5.029.991,87
Extensive herbaceous	1.329	1.349	6.745,74	127.085	46.237.494,47	7.921.629,73	2.340.290,43
Dried fruits	3.331	3.433	93.551,29	401.431	177.133.748,67	6.007.155,76	2.875.757,58
Persimmon and other fruits	1.168	1.320	38.921,29	619.794	35.274.277,25	731.567,65	295.522,99
Olive farms	513	519	3.815,13	19.676	32.535.324,86	4.232.400,95	1.589.672,79
Forage crops	1.708	2.148	27.181,36	2.077.656	278.223.703,78	12.020.823,12	4.818.747,38
Cherry farms	503	503	26.670,43	41.354	45.120.335,30	186.534,28	34.182,92
Horticultural farms spring summer	195	244	1.602,90	484.320	157.987.219,08	979.553,16	406.046,02
Forestry	437	437	4.488,27	120.535	126.691.671,09	6.776.302,91	3.322.948,89
Live plants	419	446	1.583,12	12.893	22.997.037,21	627.333,92	227.191,83
Table grape	22	22	139,00	1.448	2.197.405,80	75.687,93	20.410,47
Tropical and subtropical	52	57	67,75	806	16.024.494,35	145.276,26	59.772,30
Multi-crop vegetables	322	1.449	13.560,91	562.279	119.272.593,13	5.902.596,19	2.120.418,33
Live plant Canary Island	358	460	4.336,27	159.581	237.235.725,95	2.175.451,40	971.360,32
Vegetables successive cycles	677	700	2.739,69	30.879	24.161.128,27	688.378,52	229.283,58
Strawberry and other red fruits	589	607	11.759,87	145.117	150.818.809,96	7.377.425,92	3.023.624,72
TOTAL	68.992	91.472	2.803.364,13	17.221.750	5.369.452.644,91	260.294.117,95	106.006.073,22

Diagram 19: Agricultural insurance contracting indicators by insurance line-2023

	Policyholders	Policies	Insured area (ha)	Insured production (TN)	Insured capital (€)	Insurance premium (€)	ENESA Subsidy (€)
Fruit farms	3.754	5.076	40.856,77	911.775,49	519.059.798,26	68.015.120,01	34.373.686,90
Citrus farms	6.599	6.787	55.107,98	1.231.187,06	463.732.202,82	29.402.022,49	11.801.216,06
Horticultural farms Canary I.	154	314	1.171,00	57.260,73	18.835.176,33	233.920,26	135.381,86
Banana farms	1.254	1.254	2.109,77	281.130,80	143.376.706,65	3.578.278,79	2.688.349,19
Horticultural green house	1.333	1.524	3.985,46	355.438,11	412.743.706,68	4.629.473,34	2.166.925,68
Horticultural autumn winter	891	969	12.542,88	332.486,66	71.925.169,21	2.440.466,65	1.013.441,69
Tomato Canary Island	3	3	112,56	12.109,72	6.660.343,29	186.490,44	152.782,13
Extensive herbaceous	28.630	39.636	1.877.160,49	5.939.014,60	1.396.293.797,00	75.859.028,93	46.820.495,55
Dried fruits	2.007	2.282	52.031,29	65.714,83	152.024.354,65	5.486.330,86	3.636.906,40
Persimmon and other fruits	1.035	1.084	5.311,88	140.867,85	52.431.140,77	8.355.307,13	3.331.516,85
Olive farms	3.603	3.726	111.681,36	480.546,54	223.765.138,18	10.459.296,18	6.313.789,22
Forage crops	965	1.091	29.760,46	528.274,62	32.795.007,37	753.280,02	367.883,44
Cherry farms	439	470	3.365,83	19.932,89	32.796.933,36	4.457.216,77	1.972.001,77
Horticultural farms spring summer	1.721	2.280	27.764,21	2.131.048,18	335.009.984,50	15.704.337,39	7.710.136,03
Forestry	401	401	25.358,95	38.715,91	40.549.330,01	165.139,83	53.743,82
Live plants	187	231	1.540,92	426.963,32	139.987.414,57	862.109,98	410.224,11
Table grape	333	333	3.725,31	109.018,33	114.412.135,76	5.703.845,00	3.090.939,53
Tropical and subtropical	404	426	1.580,37	12.328,89	21.728.239,27	708.108,87	318.773,01
Multi-crop vegetables	18	18	108,00	1.129,97	1.803.925,69	60.468,36	21.960,46
Live plant Canary Island	43	48	75,70	747,43	16.169.540,32	118.721,28	68.254,07
Vegetables successive cycles	328	1.439	14.317,73	597.716,87	126.393.422,84	6.701.859,39	3.192.292,95
Strawberry and other red fruits	304	389	3.698,95	134.371,46	208.537.325,01	1.816.928,52	967.351,17
Loquat and other fruit	586	601	2.504,38	26.261,12	23.110.319,67	813.496,91	357.627,51
Garlic	457	470	8.617,31	106.055,72	109.803.340,56	5.329.931,08	2.593.622,62
TOTAL	55.450	70.854	2.284.489,56	13.940.097,09	4.663.944.452,78	251.841.178,48	133.559.302