Sector Insights

Spain's agriculture and livestock sector: impact and climate action

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This report was prepared for **alinnea** by Diego García-Vega, an environmental re-searcher in the agri-food sector. **alinnea** is a climate action Think & Action Tank based at IE University and supported by the European Climate Foundation (ECF).

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In 2023, Spain's agriculture and livestock sector accounted for 12.2% of national greenhouse gas (GHG) emissions. Although carbon dioxide (CO_2) emissions from the sector were limited (0.26% of the total), agriculture and livestock farming were the main sources of methane (62.4%) and nitrous oxide (69.3%). Given the high global warming potential and short atmospheric lifetime of CH_4, its mitigation is essential to slowing global warming in the short term, helping to avoid planetary tipping points and allowing time for climate adaptation measures to be implemented across the economy and territory.

After peaking between 2000 and 2004, total emissions from the sector have stabilised at levels similar to those recorded in 1990. The main emission sources are enteric fermentation (49.2%), manure management (32%) and agricultural soil fertilisation of (16.5%). Livestock farming generates more than 80% of total emissions. Its exact contribution is difficult to determine, as the national GHG inventory only reports direct emissions from each production system. However, when indirect emissions from animal feed are considered, livestock farming is also responsible for a significant share of the impacts associated with the production of cereals, fodder crops and meadow fertilization, both domestically and in third countries.

While extensive livestock systems have the potential to balance their emissions through carbon sequestration, intensive systems, such as white pig, poultry and dairy cattle production, remain net emissions sources.

Current regulatory framework

The most recent reform of the Common Agricultural Policy (CAP), in force for the 2023–2027 period, sets the most ambitious agri-environmental sustainability objectives to date. Forty percent of CAP funding for this period is earmarked for environmental and climate-related actions. The reform strengthens the environmental conditionality of direct payments to farmers through measures designed to promote more sustainable agricultural practices. It also introduces voluntary eco-schemes to foster low-carbon agriculture. Spain has opted for relatively modest measures, with the aim of extending them to 70–80% of cultivated land by 2027.

The specific climate mitigation targets for the sector are established in the National Integrated Energy and Climate Plan (PNIEC): an 18.6% reduction in agricultural emissions by 2030, to be achieved through measures such as conservation agriculture and improved livestock waste management. The plan relies on the CAP to activate these mitigation measures, and also on the transposition of European directives regulating the most polluting agricultural and livestock activities.

Spain's National Climate Change Adaptation Plan (PNACC), for its part, addresses how the sector should adapt to the impacts of climate change. It promotes practices that optimise water use and enhance the resilience of agroecosystems, in many cases creating synergies with mitigation measures. The measures set out in the PNACC are financed through CAP funds and other national and European instruments.

Barriers and possible courses of action

Advancing a more ambitious agri-environmental regulatory framework in Spain is hampered by several barriers that limit its acceptance and implementation. One of the main obstacles is resistance from the agricultural sector itself, which fears that environmental regulation will undermine farm profitability and distrusts European institutions, whose transition funds are seen as insufficient and whose free-trade policies conflict with their environmental ambitions. The lack of effective communication and technical advice deepens this opposition, a situation compounded by the advanced age of many farmers. Finally, certain agro-industrial actors exploit this rejection to promote private interests that seek to weaken environmental regulation of their extractive activities.

This narrative of opposition is reinforced by the political influence of the sector, which plays a key role in Spanish politics due to its strategic nature and importance in international trade. The Spanish regional context further amplifies this influence. Autonomous regions where the sector carries greater economic, territorial or social weight, and where the most profitable and high-impact activities are concentrated, are especially vulnerable to sectoral pressures and prone to blocking ambitious proposals for change or regulation.

Overcoming these barriers requires strategic policy integration that addresses the sector's concerns. Under the just transition approach, this could mean reforming the historical rights system to achieve a fairer distribution of CAP funds, combined with stricter ceilings on maximum aid per farm (capping). It could also involve enacting a Family Farming Law to protect smallholders and promote generational renewal. In terms of competitiveness and trade, it is essential to tackle unfair competition and advance the adoption of mirror clauses. The sector's bargaining power in the food chain should likewise be reinforced, notably through an effective review of the 2021 Food Chain Law. Administrative capacity for inspection and enforcement must also be strengthened, with additional resources to ensure compliance, including the creation of a state-level Food Information and Control Agency.

Finally, the central role of autonomous regions in agri-environmental policy implementation calls for a territorialised approach. This requires direct engagement with regional administrations and sectoral representatives in the most relevant territories, according to each policy objective, so that proposals to advance mitigation and adaptation in agriculture can be effectively implemented.

1 Assessment: climate impacts of Spain's agriculture and livestock sector

A. Total GHG emissions from the sector

In 2023, Spain's agriculture and livestock sector accounted for 12.2% of total gross national greenhouse gas (GHG) emissions, equivalent to 32,885.1 kt CO_2-eq out of 269,967.6 kt CO_2-eq (MITECO, 2025). It was the third largest emitting sector after road transport (32.5%) and industry (18.6%) (MITECO, 2025).

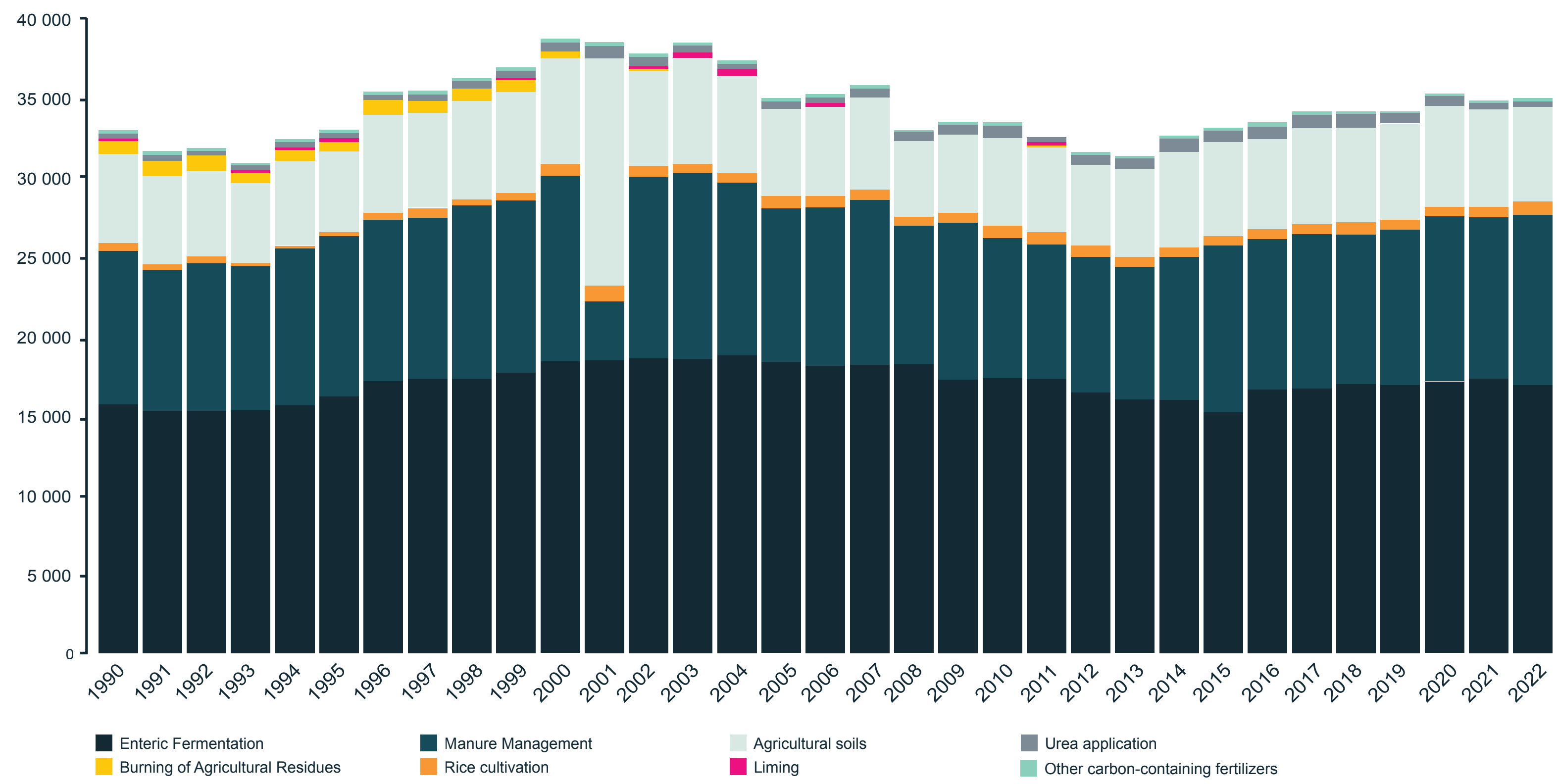
Although the sector contributes only a small share of national carbon dioxide emissions (0.26% of total CO_2), it is the main source of methane (62.4% of CH_4) and nitrous oxide (69.3% of N_2O) (MITECO, 2025; see Table 1).

Agriculture & Livestock	CO_2	CH_4	N_2O
Enteric Fermentation		**16,179.7**	
Manure management		**8,942.6**	**1,578.1**
Rice cultivation		316.7	
Nitrogen fertilisation of agricultural soils			**5,440.4**
Burning of agricultural residues		1.4	0.3
Liming	27.3		
Urea application	354.0		
Other carbon-containing fertilisers	44.5		
Total agriculture & livestock	425.9	25,440.3	7,018.9
Total net emissions from all sectors	163,982.9	40,773.5	10,127.6
% of total net emissions (National Inventory)	0.26	62.4	69.3

Table 1 – Distribution of total GHG emissions, by gas, in the agriculture and livestock sector. Activities with the highest contribution to sectoral emissions are highlighted in orange. Unit: kt CO_2-eq. Reference year: 2023. Source: MITECO (2025).

The sector's leading emission sources have remained unchanged since 1990: enteric fermentation (49.2% in 2023, +6.7% compared with 1990), manure management (32% in 2023, +8.4%), agricultural soils nitrogen fertilisation (16.5% in 2023, –9.3%). Together, these three activities accounted for almost 98% of total emissions from the sector in 2023 (MITECO, 2025a)

Total sectoral emissions peaked between 2000 and 2004 (see Figure 1) and have stabi-lised in recent years at levels close to those of 1990, with a slight, 1.5% decrease be-tween 1990 and 2023. Among all activities, the burning of agricultural residues has achieved the steepest emission reduction over this period, falling from 3.3% to almost 0% of total agricultural emissions, as a result of the effective application of CAP cross-compliance (MITECO, 2025a)



Source: Sistema Español de Inventario y Proyecciones de Emisiones de Contaminantes a la Atmósfera MITERD.

Figure 1 – Evolution of GHG emissions from the agricultural and livestock sector between 1990 and 2022, and distribution of activities. Source: MAPA (2024).

It is important to note that the different greenhouse gases behave very differently in the atmosphere, with direct implications for mitigation strategies. Methane (CH_4) and nitrous oxide (N_2O) have a much higher global warming potential (GWP) than carbon dioxide (CO_2): 28 for biogenic CH_4 and 265 for N_2O over a 100-year time horizon, with CO_2 as the reference gas (GWP = 1) (Myhre et al., 2013). Their atmospheric lifetimes, however, are shorter: CH_4 decomposes in about a decade, N_2O remains for more than a century, and CO_2 persists for millennia. As a result, while CH_4 can be offset naturally by atmospheric carbon absorption on human timescales, the cumulative effect of historically emitted CO_2 is far more difficult to reverse (Lynch et al., 2021).

Consequently, GHG mitigation in the agriculture and livestock sector, particularly methane, must complement and never replace the decarbonisation of fossil CO_2 sources. Without decarbonisation, it will not be possible to limit warming to below 1.5–2°C (Lynch et al., 2021). Meanwhile, given methane's high global warming potential and relatively short atmospheric lifetime, its mitigation provides a crucial opportunity to slow warming in the short to medium term to avoid irreversible tipping points and creating space to implement adaptation measures.

B. Contribution of the main production systems

GHG emissions from the agriculture and livestock sector are concentrated in specific production systems, which have varying economic, territorial and social importance (see Table 2).

Sectors	GHG emissions (% of sector total), 2022 (1)	Total nitrogen consumption (tonnes) and intensity (kg/ha), 2020 (3)	Area used (ha) and share of total (%), 2020 (2)	Average livestock population (thousand head) and change since 1990 (%), 2022 (1)	Main type of production ******	Number of farms and share of total (%), 2020 (2)	Standard output (SO) (€ million) and share of total (%), 2020 (2)	SO per farm (€), 2020 (2)
Dairy cattle	12.99	Grazing areas: 239,042t, 12.8 kg/ha**	523,013 (2.2%) ***	813 (-49%)	Intensive	15,601 (1.7%) ***	2,270 (5%)	180,935
Beef cattle & breeding	31.57		3,591,393 (15.0%)	5,792 (+63%)	Extensive	54,160 (5.9%)	2,849 (6.3%)	52,607
White pigs	21.55		592,637 (2.5%)	30,096 (+93%)	Intensive	14,458 (1.6%)	9,016 (19.9%)	623,621
Iberian pigs	1.54			3,221 (+350%)	Extensive			
Sheep	10.51		2,706,925 (11.3%) ****	14,453 (-40%)	Extensive	40,820 (4.5%) ****	2,455 (5.4%) ****	60,137****
Goats	0.74			2,463 (-33%)	Extensive			
Poultry (meat and eggs)	1.59		51,748 (0.2%)	155,058 (+16%)	Intensive	4,861 (0.5%)	3,152 (6.9%)	648,348

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Herbaceous crops (cereals, oilseeds, fodder, industrial crops)	Fertilization: 9.35	Cereals: 222,625t, 37.3 kg/ha Legumes: 7,598t, 18.1 kg/ha Industrial crops: 2,198t, 9.9 kg/ha Forage crops: 117,905t, 95.4 kg/ha Sunflower: -16,534t, -23.6 kg/ha	8,001,073 (33.5%)	N/A	Extensive	160,336 (17.5%)	5.407 (11,9%)	33.722
Olive groves		66,091t, 25.4 kg/ha	2,114,140 (8.8%)		Extensive	247,318 (27%)	3,330 (7.3%)	13,466
Vineyards		29,470t, 31.5 kg/ha	944,917 (4.0%)		Extensive	83,341 (9.1%)	2,015 (4.4%)	24,178
Fruit trees (citrus, fresh fruit)		Citrus fruit: 52,861t, 178.3 kg/ha Fruit trees: 26,592t, 70.9 kg/ha	1,060,209 (4.4%)		Extensive	137,359 (15%)	4,329 (9.5%)	31,517
Other woody crops		Almend trees: 19,531t, 28.4 kg/ha Other: 902t, 17.0 kg/ha	689,430 (2.9%)		Extensive	43,396 (4.7%)	951 (2.0%)	21,925
Vegetables		Vegetables: 61,239t, 159.5 kg/ha Tubers: 12,289t, 173.4 kg/ha	269,752 (1.1%)		Intensive / Extensive	42,396 (4.6%)	5,498 (12.1%)	Green-house: 130,659 Open Field: 78,350
Total	89.8*		23,913,682 ***** (46% of the nation-al area)			914,871 *****	45,385*****	

Table 2 – Characterisation of the main production systems in Spain's agriculture and livestock sector: climate impacts and economic, territorial and social importance. Livestock production is shown in orange and crop production in green, although part of the latter is used for animal feed. References: own calculations based on (1) MITECO (2024), (2) INE (2020), and (3) MAPA (2022).

Notes:

* The total does not add up to 100%, as not all sectors and emission sources are covered in this table.

** Not applicable to white pig, dairy cattle or poultry, as these are intensive closed systems.

*** Includes 3,055 cattle farms producing both milk and meat, which remain in this category because their production systems are similar.

**** Includes other minor herbivores such as equines.

***** The total does not match the figures shown because it includes mixed production systems combining different crops and livestock. These cannot easily be classified under the specialised sectors shown in the table and do not form a single useful category for this visualisation. They account for 70,825 farms, 3,368,444 ha and €3,979 million.

****** This classification is a simplification indicating whether the systems are carried out on the land (extensive) or in closed systems (intensive). This category is referred to in the following section (see I.C).

Livestock production was directly responsible for 75.3% of total agriculture and livestock sector emissions in 2023 (MITECO, 2025). However, the national inventory does not capture emissions indirectly associated with livestock, such as those from the production of animal feed on which it depends.

Spain is the EU's leading feed producer: 48% of its output is destined for pigs, followed by 35% for ruminants and 17% for poultry (CNCAA, 2022). According to Greenpeace (2018), Spain devotes 5.8 million hectares of farmland to livestock feed and imports cereals and soya from an additional 3.7 million hectares in third countries. In the case of white pigs, feed production, transport and processing account for 45% of the carbon footprint of the meat life cycle. This contribution stems mainly from crop fertilisation and, in some cases, deforestation (Martínez-Valero, 2019). Consequently, when feed production is taken into account, the share of livestock farming in the climate impact of the agriculture and livestock sector almost certainly exceeds 80%.

Inventory data also make it possible to identify the subsectors and activities with the highest direct GHG emissions in Spanish agriculture and livestock: beef cattle in first place (31.57%), followed by white pigs (21.55%), dairy cattle (12.99%), sheep (10.51%) and the fertilisation of agricultural soils (9.35%).

Beef cattle have a strong territorial and social impact, reflecting both their land use (15% of agricultural area) and their prevalence in farm numbers, where they rank first among livestock (see Table 2). White pigs, by contrast, exert a marked economic impact: they lead the sector in total economic output and rank second in average output per farm. Dairy cattle and sheep retain some economic and, in the case of sheep, territorial importance, although the numbers of both have been declining since the 1990s.
Fertilisation, meanwhile, cuts across multiple sectors but is primarily linked to livestock farming, as most nitrogen is applied to grazing areas (28%), fodder crops (14%) and cereals (26%). Its use is even more intensive in vegetables, citrus fruit, other fruit crops and tubers which are subsectors that together generate the highest economic output within Spain's agriculture and livestock sector.

C. Negative emissions from land use

In order to effectively mitigate climate change, land management and agricultural production must not only reduce their GHG emissions, but also contribute to atmospheric carbon absorption in terrestrial sinks (the Land Use, Land-Use Change, and Forestry sector, or LULUCF)

In 2023, Spain's LULUCF sector absorbed –51,032.8 kt CO_2-eq, equivalent to 18.9% of total gross national emissions or 155% of emissions from agriculture. According to the European Commission, in 2022 Spain ranked second in the EU for land-based carbon absorption, after Romania (EC, 2023a). The bulk of this absorption came from forest land (89%), while agriculture and livestock made a more modest contribution through cropland with woody crops (–3,671.7 kt, 7.2%) and natural grasslands and pastures (–875.4 kt, 1.71%) (MITECO, 2024). Currently, these calculations do not take into account conservation agriculture practices, including cover crops and reduced tillage.

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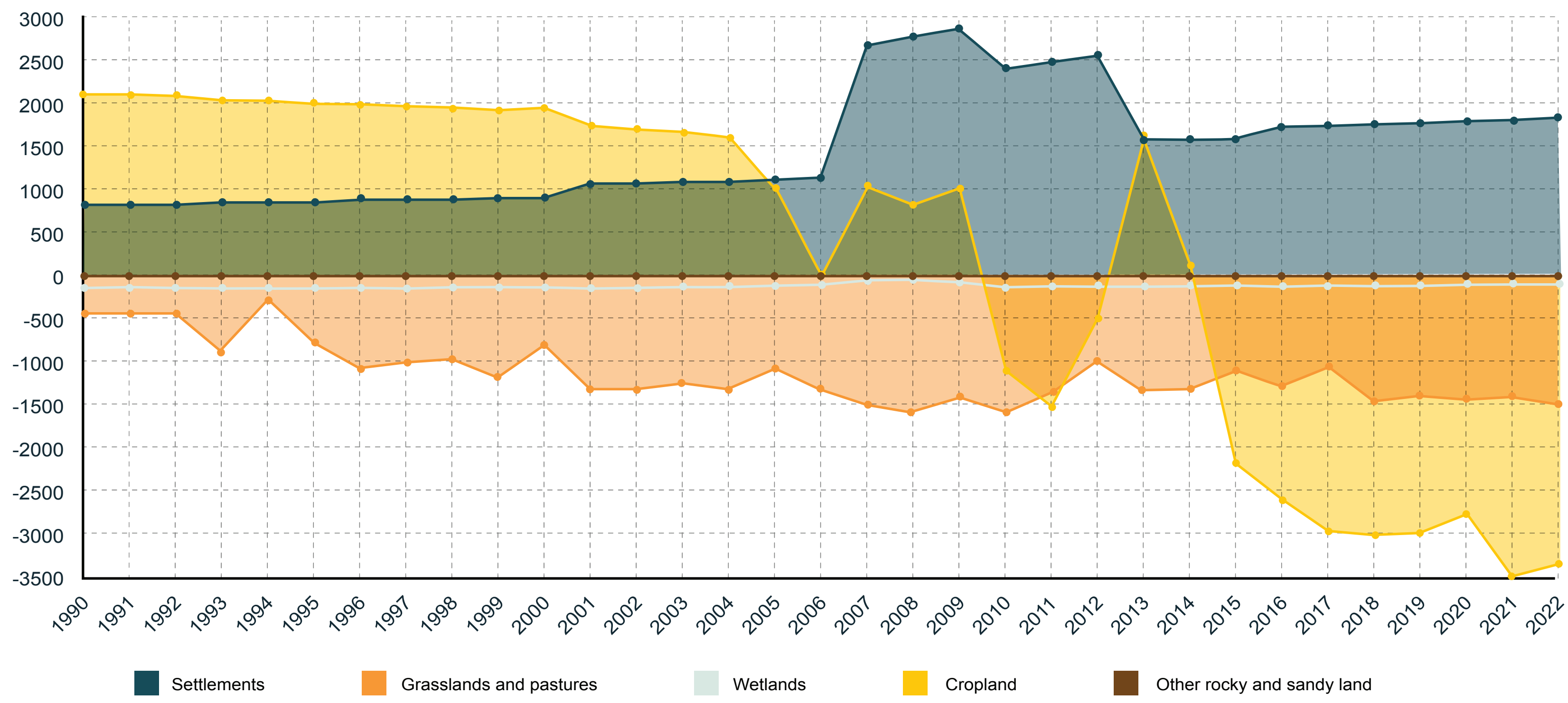

Figure 2 – Distribution of negative emissions from the LULUCF sector in Spain by land use type – excluding forests, forest plantations and harvested wood products, for clearer presentation.
Source: SEO BirdLife (2023).

Certain production systems offset part of their emissions through atmospheric carbon absorption: notably woody crops and pastoral or silvopastoral systems, depending on factors such as production intensity (e.g. livestock density, input use and soil conservation practices). By contrast, production systems that are not land-based are net sources of emissions with no capacity for compensation through absorption, such as intensive white pig, poultry or dairy cattle farming (see Table 2). This marks a fundamental distinction between systems carried out on the land (extensive) and those operating in closed environments (intensive). Whereas the former can reach or approach a balance between emissions and absorption, the latter are necessarily net emitters.

Existing regulatory framework: climate architecture governing the sector

A. A Common Agricultural Policy with renewed agri-environmental ambition

Formally adopted in 1962, the Common Agricultural Policy (CAP) was the European Community's first major common policy and marked the start of an integrated approach to addressing challenges at the Community level. Today, it remains one of the EU's fundamental pillars and plays a central role in the regulation, development and sustainability of the agriculture and livestock sector.

The CAP typically represents around one-third of total EU expenditure. For 2021–2027, it has a total budget of €386.6 billion, including exceptional Next Generation EU funds designed to relaunch the economy after the COVID-19 pandemic. The CAP is structured around two pillars:

- Pillar I covers direct payments to farmers and market measures. It accounts for 75% of CAP funding and is financed entirely from the EU budget through the European Agricultural Guarantee Fund (EAGF).
- Pillar II supports rural development. It accounts for 25% of funding, co-financed by the Member States and managed through the European Agricultural Fund for Rural Development (EAFRD).

For 2021–2027, Spain has been allocated €47.724 billion. CAP support directly benefits 630,000 farmers and livestock breeders, affects a total of 700,000 holdings (out of 915,000 farms in Spain according to the 2020 Agricultural Census), and represents 20% of agricultural income (Plataforma Tierra, 2023). Given the importance of the agriculture and livestock sector in Spain and the rural development challenges it faces, Spain is the EU's second largest net beneficiary of the CAP, after Poland: it receives more in CAP aid than it contributes to the EU budget. Even so, this benefit represented only 0.15% of Spain's gross national income in 2023 (compared with 1% for Greece, the third largest beneficiary) (Matthews, 2024).

The post-2020 CAP negotiations introduced the third major reform of the policy since its creation, strengthening its commitment to the sector's environmental transformation and aligning it with the objectives of the European Green Deal and the Farm to Fork and Biodiversity Strategies. The CAP 2023–2027 sets out ten objectives, including climate change mitigation and adaptation, efficient natural resource management, habitat conservation and biodiversity, facilitating access to sustainable food, fostering a sustainable bioeconomy, and promoting training and knowledge exchange.

To achieve these goals, the CAP Strategic Plans 2023–2027 strengthen environmental conditionality as a requirement for access to basic income support, through the Good Agricultural and Environmental Conditions (GAECs):

- GAEC 1: Maintenance of permanent grassland, with a maximum reduction of 5% compared to the 2018 reference year.
- GAEC 2: Protection of wetlands and peatlands.
- GAEC 3: Ban on stubble burning, except for plant protection.
- GAEC 4: Establishment of buffer strips along watercourses.
- GAEC 5: Tillage management to reduce the risk of soil degradation and erosion, taking slope gradient into account.
- GAEC 6: Minimum soil cover during the most sensitive periods.
- GAEC 7: Crop rotation on arable land, except for under water crops.
- GAEC 8: At least 4% of arable land dedicated to non-productive areas or features; maintenance of landscape elements; and a ban on cutting hedges and trees during the bird breeding and rearing season.
- GAEC 9: Ban on converting or ploughing permanent grassland designated as environmentally sensitive in Natura 2000.
- GAEC 10: Sustainable fertilisation.

In response to the European farmers' protests of 2024, launched in February in Spain, two professional agricultural organisations (UPA and La Unión) agreed a plan of 43 measures with MAPA. Among other provisions, this agreement made the application of GAEC 5 and 6 more flexible and simplified, and eliminated GAEC 8 (MAPA, 2024a).

To go beyond cross-compliance, voluntary eco-schemes have also been introduced: financial incentives for farmers to adopt sustainable practices, including those that reduce emissions. Spain has identified seven practices to promote low-carbon agriculture and agroecological approaches (MAPA, 2021):

- P1: Extensive grazing
- P2: Sustainable mowing of pastures and creation of biodiversity islands in pastures
- P3: Crop rotations with improving species, with sustainable input management in irrigation
- P4: Direct sowing, with sustainable input management in irrigation
- P5: Non-productive areas and landscape elements for biodiversity
- P6: Sown or spontaneous plant cover in woody crops
- P7: Inert plant cover in woody crops

Each EU Member State decides which practices to promote through its eco-schemes. In Spain, with the aim of ensuring broad uptake and measurable impact (MAPA expects that by 2027 between 70% and 80% of the eligible area will be covered by these voluntary measures), eco-schemes build on best practices already applied by some farmers (MAPA, 2021).

Additional EU-wide targets have also been set: by 2027, 10% of land cultivated with CAP support is to be under organic production (compared with 5.6% in 2020), and 35% of land is to increase soil carbon sequestration and reduce N_2O emissions (EC, 2023b).

This agri-environmental ambition is backed by earmarked funding: at least 25% of direct payments (EAGF) must go to eco-schemes, and 35% of EAFRD funds must be targeted at climate, environmental or animal welfare actions. Overall, the European Council expects 40% of the CAP budget to be directed towards environmentally sustainable agriculture (EC, 2023b). In Spain, the CAP 2023–2027 allocates 23% of direct payments to eco-schemes and 47% of EAFRD funds to environmental actions (MAPA, 2021).

B. EU climate architecture

The European Union has set the objective of becoming climate neutral by 2050. This requires decarbonising the economy, absorbing carbon to offset residual emissions, and adapting to the impacts of climate change.

The European Climate Law, adopted in June 2021, establishes a legally binding interim target of reducing total emissions 55% by 2030 compared with 1990 levels. The 2030 Climate and Energy Framework, adopted in 2014 and updated in 2020 with the new 55% target (from –40% previously), provides the roadmap for achieving this goal.

The sectors to be decarbonised fall into two broad categories. The first covers the most energy-intensive sectors, electricity generation and industry. These sectors account for 40% of EU emissions and are jointly regulated under the EU Emissions Trading System (EU ETS). Their 2030 target is –61% compared with 2005.

The second group includes the primary sector along with buildings, transport, waste management, fluorinated gases and small industries not covered by the EU ETS. These are considered "non-ETS" or "diffuse" sectors: less energy-intensive and more complex to regulate due to the dispersal of emission sources. Together, they account for 60% of EU emissions and are regulated through national targets designed to achieve a 40% reduction by 2030 compared with 2005.

i. Climate mitigation in the agriculture and livestock sector: the PNIEC

Each EU Member State sets out its energy transition, sectoral decarbonisation and carbon absorption pathways in a National Energy and Climate Plan (NECP), introduced by Regulation (EU) 2018/1999 and revised every ten years. Spain's National Energy and Climate Plan (PNIEC) sets out the targets for the agriculture and livestock sector (MITECO, 2024).

The plan approved for 2023–2030, recently updated from the PNIEC 2021–2023 in line with the EU's increased ambition of –55% by 2030, establishes national reduction targets. Spain's target for the non-ETS (diffuse) sectors is –42% compared with 2005 (versus the binding minimum of –37.7% granted to Spain under the revised Effort Sharing Regulation (EU) 2023/857). For agriculture and livestock, the 2030 target is –18.6%, equivalent to total emissions of 28,438 kt CO_2-eq in 2030 (MITECO, 2023). The plan also includes measures to improve the energy efficiency of industrial facilities and machinery affecting the sector, together with specific targets for carbon sequestration in agricultural and forest land.

To meet the sector's GHG reduction target (PNIEC, p. 223), the plan prioritises three main measures: promoting conservation agriculture practices, reducing nutrient losses from soil fertilisation, and applying the best available techniques in slurry management. Responsibility for implementing these measures lies with the Ministry of Agriculture, Fisheries and Food (MAPA).

The PNIEC relies largely on the CAP to activate these measures. The PEPAC eco-schemes, for instance, draw partly on the measures set out in the PNIEC, such as crop rotation, conservation agriculture, plant cover and extensive livestock farming.

Beyond the CAP, these measures are implemented nationally through a range of regulations transposing, among others, the EU directives on industrial emissions ((EU) 2024/1785), on national emissions of certain atmospheric pollutants ((EU) 2016/2284), and on the protection of waters against pollution from agricultural nitrates (91/676/EEC). These include:

Regulation	Objectives	Responsibility
Royal Decree 815/2013 on industrial emissions	Regulates the establishment of large pig and poultry farms, subject to environmental impact assessment.	MAPA
Royal Decree 818/2018 on national emissions reductions of certain atmospheric pollutants	National target of –62% NO_x emissions and –16% NH_3 emissions by 2030 (ref. 2005), including from agriculture and livestock.	MITECO
Royal Decree 1051/2022 on sustainable nutrition of agricultural soils	Reduce nutrient losses from the agricultural soils fertilisation	Shared MAPA-MITECO-MISAN
Royal Decree 47/2022 on the protection of waters against nitrate pollution from agricultural sources	Reduce and prevent nitrate pollution of surface and groundwater from agriculture.	Shared: MAPA-MITECO
Royal Decree 306/2020 on the management of pig farms	Establishes environmental standards for pig farms, including maximum livestock units per farm, best available techniques for manure management, minimum distances between facilities, and the preparation of environmental impact assessments and management plans.	Shared: MAPA-MITECO
Royal Decree 1053/2022 on cattle farm management	Establishes environmental standards for dairy and beef cattle farms.	Shared: MAPA-MITECO
Royal Decree 637/2021 on poultry farm management	Establishes environmental standards for meat and egg poultry farms.	Shared: MAPA-MITECO

Table 3 – Main regulations governing pollution from agriculture and livestock farming in Spain. Acronyms refer to the Ministry of Agriculture, Fisheries and Food (MAPA), the Ministry for the Ecological Transition and the Demographic Challenge (MITECO), and the Ministry of Health (MISAN).

Although several of these regulations do not directly address GHGs such as CO_2, CH_4 or N_2O, but instead focus on pollutants affecting human and ecological health (such as NO_x and NH_3), the emission sources overlap, and regulating the latter constitutes indirect climate action (EEA, 2020).

Notably, the Court of Justice of the European Union has recently sanctioned Spain for non-compliance with the Nitrates Directive (91/676/EEC), due to its failure to adequately protect waters against nitrate pollution from agriculture and livestock in eight autonomous regions (Revuelta P., 2024). Critical nitrogen deposition limits are exceeded across the country, particularly in the northeast, where the highest concentration of intensive livestock farming is found (EEA, 2024).

The PNIEC also considers other measures, such as promoting technologies and infrastructures that contribute to farm decarbonisation of (PNIEC, p. 302), through greater energy efficiency and using renewable energy. These measures are financed through the Recovery, Transformation and Resilience Plan (PRTR) (40% of the funds must be dedicated to ecological transition measures), as well as through CAP sectoral programmes such as operational funds from the fruit and vegetable sector (15% must be dedicated to environmental actions). These actions are the responsibility of MAPA and MITECO.

Finally, the PNIEC establishes binding targets for atmospheric CO_2 absorption in forest and agricultural sinks. Regulation (EU) 2023/839 sets an EU-wide target of –310 Mt CO_2-eq absorption by 2030, implying a 15% increase (–42 Mt CO_2-eq) compared with the current level of –268 Mt CO_2-eq.

With one of the largest net carbon credits in the EU, Spain is currently in compliance with the LULUCF Regulation for 2021–2025, which requires Member States to ensure at least a balance between emissions and removals in the land use sector (EC, 2023). From 2026 onwards, Spain's binding target is –43.6 Mt CO_2-eq, compared with –51 Mt CO_2-eq absorbed in 2023

The 2030 target for land-based carbon removals is lower than the amount currently absorbed (cf. Figure 3) because the absorption capacity of Spain's sinks is reaching saturation and is threatened by climate change: rising temperatures, reduced water availability, and risks of desertification and land degradation (Díaz-Martínez et al., 2024). The key challenge is to maintain existing soil organic carbon stocks, although the regulation allows for some flexibility in light of climate change impacts.

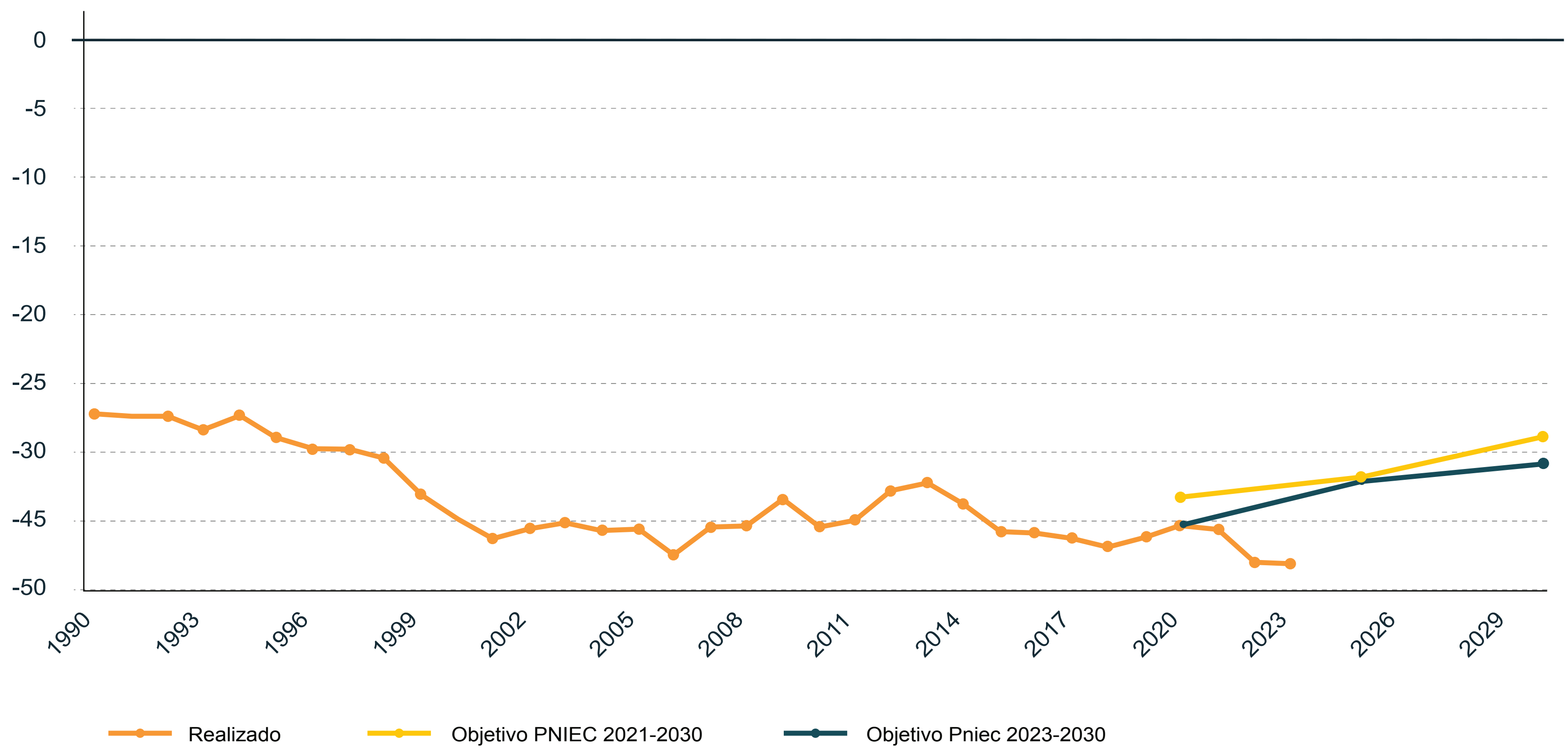

Figure 3 – Total negative emissions from the LULUCF sector in Spain over time and PNIEC targets for 2030.
Source: SEO Birdlife, 2023.

The PNIEC promotes measures to maintain existing carbon sinks and enhance new absorption. These include agroforestry actions (jointly the responsibility of MAPA and MITECO; PNIEC, p. 235), such as restoring degraded pastures and silvopastoral systems or using controlled grazing to prevent forest fires. They also include agricultural actions (MAPA's responsibility; PNIEC, p. 238), such as conservation agriculture (direct sowing), maintaining vegetation cover, and incorporating pruning residues into the soil of woody crops. These measures are implemented through the CAP, PRTR funds, forestry plans and ministerial programmes, among others.

ii. Adaptation of the sector to climate change: the PNACC

The National Climate Change Adaptation Plan (PNACC) is Spain's strategic framework for addressing the impacts of climate change on its territory, population and economy. Like the PNIEC, Regulation (EU) 2018/1999 requires Member States to develop national adaptation strategies. Spain, however, adopted its first plan in 2006, well before this regulation, making it a pioneer in the EU context.

The second PNACC covers the period 2021–2030 (MITECO, 2021). It is coordinated by MITECO, while responsibility for agriculture and livestock is shared between MAPA, MITECO and the Ministry of Consumer Affairs (MICON) (MITECO, 2021a). In this sector, measures focus on adapting farming systems to current and future climate conditions, with particular emphasis on water resource management. Measures that promote the sustainability of the food system are also encouraged, recognising that mitigation and adaptation often overlap. Short supply chains, together with the development of the bioeconomy and the circular economy, are likewise considered part of the adaptation strategy for the sector.

Implementing these measures also draws on the CAP, financed through both the EAGF and the EAFRD, along with other European instruments that support climate action and the transition to a decarbonised economy, such as the European Social Fund Plus, the European Regional Development Fund (ERDF), and research and innovation programmes like LIFE and Horizon Europe.

At the national level, PIMA Adapta (Plan to Boost the Environment for Adaptation to Climate Change), in place since 2015, channels revenue from the auctioning of EU ETS emission allowances into ecological restoration projects that enhance agroecosystems resilience.

Private investment is expected to be channelled into these measures, following the adoption of the Taxonomy Regulation (EU) 2020/852, which promotes sustainable finance. Although an omnibus package of amendments presented by the European Commission in the first half of 2025 is expected to limit the scope of companies affected, the regulation is designed to encourage banks, insurers and asset managers to integrate climate and environmental risks into their strategies.

Finally, water planning is a central element of climate adaptation in agriculture. It encompasses the management of irrigation, water supply, purification and quality, scarcity, and long-term resource sustainability. As a concrete expression of the 2001 National Hydrological Plan, the Hydrological Plans (PPHH) for inter-community river basin districts, under the jurisdiction of river basin confederations, and intra-community districts, under the jurisdiction of the Autonomous

Communities, set the lines of action for water resource management in Spain for 2022–2027. These plans are designed to address adaptation challenges such as extreme events, droughts and floods (MITECO, 2023). Complementing them are Special Drought Plans, aligned with the PPHH and adapted to the constraints of climate change (MITECO, 2018)

3 Some barriers to agri-environmental progress

Developing a more ambitious and effective environmental regulatory framework for Spain's agriculture and livestock sector faces a number of challenges that complicate both its acceptance and its implementation.

A. Lack of acceptance by the sector

As illustrated by the European farmers' protests of 2024, EU progress on agri-environmental policy is strongly resisted by the sector. Although awareness is growing regarding climate challenges and the sector's high vulnerability and exposure to it, some stakeholders still hold a number of economic, cultural and operational concerns.

Many farmers and livestock breeders fear that environmental rules and requirements will restrict production and undermine their farms' profitability. Small and medium-sized holdings in particular worry about being left behind in the transition to more sustainable models, since they lack the resources and flexibility needed to comply with new standards that larger, better-capitalised operators can more easily absorb. There is also a widespread mistrust of European institutions, whose policies over the past half-century have fostered the increasing consolidation of agriculture.

Another source of tension is an inconsistency in international trade policy. Falling under the competence of the European Commission, it sometimes allows direct competition between European products (and therefore Spanish products) and imports from third countries with lower environmental and labour standards than those of the EU. In the absence of mirror clauses, many farmers fear that EU environmental requirements may unfairly undermine the competitiveness of European products in general, and Spanish products in particular, on global markets.

Although current CAP funds are intended to support the transition towards greater sustainability, many farmers consider them insufficient to offset the economic and operational effort required to comply with the new regulations. The sector expects these resources to be additional to CAP funding, since the CAP is regarded more as an instrument to support farm profitability than as a transition fund. At the same time, the CAP represents a shrinking share of farmers' income each year and is linked to growing conditionalities. In the broader political context of the EU, where fiscal pressures are increasing, the outlook is more about maintaining current levels of funding than expanding them.

Another significant barrier to social acceptance is the lack of effective communication. The new regulations are widely perceived by the sector as top-down impositions, delivered without prior notice and with insufficient consideration of the specific features and diversity of the agriculture and livestock sector.

Farmers also lack targeted advice and training to support the shift towards more sustainable production practices and models. Many do not have the technical knowledge or tools needed to make effective changes on their farms. Delivering training adapted to the diversity of farm types and territories requires coordinated action between public administrations and specialised organisations

A further obstacle to the transition is the high average age of farmers, which exceeds 60 (COAG, 2023). As many are nearing the end of their careers, they are reluctant to introduce significant changes, especially since investments required to adopt new practices can be high with slow ROI. The lack of generational renewal aggravates the problem: younger people, who are more inclined to drive these changes, find the sector unattractive and insufficiently incentivised or supported to enter it

Finally, certain agro-industrial actors seeking weaker environmental regulation can also play a decisive role in slowing agri-environmental policy. In today's highly polarised context, where climate policy has become a target for reactionary forces, rural discontent risks being exploited to fuel opposition to environmental regulation, as seen during the tractor protests in February 2024, the blackout in April 2025 and the wildfires in August 2025. This dynamic ultimately benefits unsustainable models.

B. An influential sector that curbs administrations' ambitions

The agriculture and livestock sector holds a particularly prominent place in Spanish politics. In 2021 it contributed 2.73% of GDP (INE, 2024) and, in the first quarter of 2023, employed 748,200 people, representing 3.66% of those working in the primary sector (MAPA, 2023).

Spain also has a leading position in Europe and globally in the production and export of certain agricultural products: it is the EU's largest producer of white pork, fruit and vegetables, and olive oil, ranking 3rd, 7th and 1st worldwide, respectively. This global weight underpins Spain's economic and political influence in international relations, while the presence of Spanish products abroad reinforces its cultural identity and tourist appeal.

Agriculture and livestock farming also occupy nearly half of Spain's territory. Their management underpins food security, biodiversity and landscape conservation, wildfire prevention and maintaining a minimal population in rural areas in order to resist their complete depopulation — all priority concerns for public authorities. For this reason, the agricultural and livestock sector in Spain is far more than an economic activity: it is a cornerstone of territorial balance, cultural identity and the country's sustainable development, which explains its political relevance.

Farmers and livestock breeders are also highly organised in professional agricultural associations (OPAs), and their mobilisations have significant disruptive potential. The three officially recognised OPAs (COAG, UPA and Asaja) have direct channels of dialogue with MAPA and participate in shaping agricultural policy through sectoral conferences. This influence means that MAPA's proposals and negotiating position in the EU tend to reflect conservative ambitions, prioritising maintaining high levels of European funding with the fewest possible restrictions and requirements.

The sector's resilience and influence in Spain are further strengthened by the country's decentralised structure, which grants extensive powers to regional governments. These authorities are responsible, among other things, for implementing the second pillar of the CAP, transposing EU directives, and carrying out functions related to hygiene, health, the environment and food chain control.

In some Autonomous Communities, the sector holds particular economic and social weight and attracts substantial European funding. For example, in descending order:

- Contribution to GDP in 2021: over 8% in Castilla-La Mancha and Extremadura, over 6% in Andalusia, and over 5% in Aragon, Castilla y León and La Rioja (INE, 2024).
- CAP first pillar aid: Andalusia, Castilla y León, Castilla-La Mancha (FEGA, 2023).
- CAP second pillar aid: Andalusia, Castilla-La Mancha, Extremadura (FEGA, 2023).
- Number of farms: Andalusia, Castilla-La Mancha, Valencia (INE, 2020).
- Export value: Catalonia, Andalusia, Valencia (MECE, 2024).

In these Autonomous Communities, agricultural, environmental and rural development policies are subject to strong public scrutiny and pressure, whether through opinion, regional OPAs or electoral dynamics, given the high proportion of the population linked to agriculture and the greater electoral weight of rural areas.

Other Autonomous Communities where the sector has a decisive impact are those that concentrate the activities most affected by environmental regulation. As highlighted in the diagnostic section of this study, any meaningful effort to mitigate the sector's climate impacts must focus on livestock farming. White pigs, for example, are regulated due to nitrate, ammonia and other emissions. Their high concentration in certain regions — by herd size: Aragon (29%), Catalonia (23%) and Castilla y León (13%) (Rouault et al., 2013) — partly explains Spain's difficulties in complying with the Nitrates Directive. Implementing it exposes these regional governments to direct opposition from the sector in their territories and places constraints on the economic development of these high-value industries.

4 Key areas of work

In light of these barriers, two considerations will be critical to advancing agri-environmental sustainability in Spain in the coming years. First, resistance from the sector underscores the need for future regulations to address the main challenges and concerns if they are to gain acceptance and social legitimacy. Second, the role of Spain's autonomous regions makes it essential to target action in the key territories most affected by the regulations in question.

A. Focusing climate action on a just transition that protects small and medium-sized farmers

To advance effective and fair climate action the barriers to sectoral acceptance of ecological transition policies must be addressed one by one. In this regard, developing regulations not aimed directly at environmental sustainability may nonetheless generate indirect positive effects on environmental policy.

A key line of work is ensuring a just transition for small and medium-sized farmers. This may involve advocating for a fairer distribution of CAP funds, particularly in a context of increasingly limited resources, as well as supporting the Family Farming Law currently being drafted at national level.

One of the central reforms in this regard concerns the system of historical CAP payment entitlements. This system allocates values to each holding based on the level of production and type of farming carried out on the land during a historical reference period, generally between 2000 and 2002. The result is wide disparities in the funds received by farmers in different regions (€1,430/ha to €60/ha), which mainly benefit the largest and most productive farms and create barriers for new entrants, who must acquire entitlements from other farmers. The most recent CAP reform introduced a process of internal convergence to progressively narrow the gap between the highest and lowest allocations by 2027. However, the number of agronomic regions was reduced from 50 to 20, with average values applied in each, thereby maintaining inequalities between regions (García Azcárate, 2021). There is now debate on whether to abolish this historical system more decisively in the next CAP period, with the aim of achieving greater equality between regions and establishing free, non-nominal entitlements. Such a reform would prevent the accumulation of entitlements by a few holders, reduce speculation and payments disconnected from productive activity, and facilitate generational renewal.

Another important reform along these lines is capping, the maximum limit on CAP aid per farm. Spain has adopted the minimum ceiling allowed under the latest CAP reform: €100,000 per farm, plus an additional €100,000 linked to labour costs. As a result, the reform has had only limited impact, affecting just 56 farms (García Azcárate, 2024). Lowering this still generous ceiling and concentrating support on middle-income farms would provide greater backing for farmers and livestock breeders most concerned about being left behind in the transition, enabling them to adopt new practices with stronger institutional support.

At the time of publication of this report, MAPA was drafting a Family Farming Bill, with the intention of submitting it to parliament in 2025. This legislative initiative aims to establish a legal framework for family farming, in order to protect and support small and medium-sized farmers more directly and to facilitate generational renewal in the context of the transition to more sustainable agriculture.

Another key line of work is to strengthen the coherence of environmental regulations with trade policies that currently discourage the shift towards more sustainable models. A clear demand from the sector during the farmer protests was the need for mirror clauses to protect European producers from unfair competition from third-country products with lower environmental standards and production costs. Despite significant technical challenges and the constraints imposed by WTO rules, initial discussions are underway to include agricultural products in the Carbon Border Adjustment Mechanism (CBAM) (Fournier Gabela et al., 2024). There are also proposals to introduce mandatory due diligence for private operators to ensure consistency across supply chains, under Directive (EU) 2022/2464 on corporate sustainability reporting (CSRD). However, the omnibus simplification package presented by the European Commission in February 2025 proposes to exclude 80% of the companies initially covered by the CSRD. If adopted by the European Parliament and the Council, only companies with more than 1,000 employees, including those in the agri-food sector, would be required, to publish detailed reports on their environmental, social and governance impacts as of January 2026.

Finally, two national policies currently in development could help strengthen the sector's economic viability and accelerate its shift towards more sustainable practices. The first is the Food Chain Law, adopted in 2021, which requires revision as it has fallen short of its aim to protect farmers' bargaining power in relation to industry and distributors. Stronger enforcement would enhance the economic sustainability of farms and ensure that the costs and efforts of the transition are more fairly shared across the value chain. The second is the National Food Strategy, launched in early 2025 (MAPA, 2025), which provides an opportunity to build a more resilient and sustainable integrated food system, adapted to climate change and rooted in the territory, while strengthening the market position of local producers committed to sustainable models and promoting the consumption of healthy, high-quality food.

B. "Territorialising" action

Given Spain's decentralised system and the regional concentration of certain specialised sectors, it is crucial to incorporate the territorial dimension into agri-environmental policy development.

Decisions on Spain's negotiating position in the EU, the implementation of European policies at national level, the criteria for distributing funds among autonomous communities and programmes, and other joint strategies are taken in the Sectoral Conference on Agriculture and Rural Development. This coordination body brings together MAPA and the autonomous communities, with the ministers responsible for agri-food and rural affairs from the 17 autonomous regions under the chairmanship of the Minister of Agriculture. Although the Conference has no executive powers, the decisions and agreements reached are fundamental to the implementation of agri-environmental regulation in Spain

Depending on the policy area to be influenced, it is essential to work with the autonomous regions most directly affected, whether in support or in opposition. For example, in the latest CAP negotiations two regions that account for a large share of the agricultural land sector (Castilla-La Mancha and Aragón) led the opposition to reform the historical entitlements system. The weight of particular sectors in different regions also helps to identify the key interlocutors when addressing regulations that affect them. For instance:

- Pig production: Aragón (29%), Catalonia (23%) and Castilla y León (13%) (Rouault et al., 2023).
- Fruit and vegetable production: Andalusia (33%), Valencia (19%) and Murcia (12%) (Mercasa, 2022).
- Olive oil production: Andalusia (80%), Castilla-La Mancha (8%) and Extremadura (4%) (MAPA, 2023a).

It is therefore essential to work directly with the regional ministers of agriculture and environment in the most relevant autonomous regions, depending on the policy at stake, as well as with the professional agricultural organisations (OPAs) and regional farming associations that interact with these governments.

Conclusion

Mitigation in the agriculture and livestock sector is critical to limiting climate change in the short and medium term, avoiding planetary tipping points, and gaining time for the economy and the territory to adapt. The sector's high vulnerability to climate change, particularly acute in southern Europe, makes the adaptation of agriculture and livestock farming a strategic priority for safeguarding Spain's food security. Moreover, many mitigation and adaptation measures overlap, opening up opportunities for synergistic action.

Yet the approval and implementation of climate policies in Spain face significant economic and cultural barriers. The territorial and strategic importance of a sector that is a global leader in export, and in which reforms require large investments with slow return, creates resistance to change and constraints on reform.

Advancing towards more sustainable agriculture and livestock farming will require a mix of adaptation and mitigation policies that reflect the sector's economic and cultural realities, complemented by measures that ensure effective implementation and social acceptance. Support must be directed to the farmers most in need, delivered through additional and targeted funding, and aligned with other policies affecting the sector, so that the ecological transition is embraced and driven by the sector itself.

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