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SCIENTIFIC ARTICLE

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Assessing the 2028–2034 CAP Reform: A Budget- and Payment-Driven Scenario Analysis Using the GLOBIOM Partial Equilibrium Model

ABSTRACT

The European Commission's July 2025 Multiannual Financial Framework proposal introduces structural changes to the Common Agricultural Policy (CAP) for the 2028–2034 programming period, raising questions about its alignment with the environmental ambitions of the Green Deal. This paper uses the spatially explicit partial equilibrium model GLOBIOM to assess how the proposed policy shifts alter production incentives and land allocation across EU Member States. We operationalise the reform by linking regional budget envelopes with unit payment rates for the key interventions, including the degressive area-based income support corridor, the consolidated Agri-Environmental and Climate Action (AECA) framework, and expanded coupled income support. Testing Member State implementation strategies ranging from fiscal minimisation to high environmental ambition, we quantify impacts on agricultural production, prices, trade, and greenhouse gas emissions, explicitly capturing the quantity-rationing effects of binding budget constraints. Results show that the aggregate 15% budget cut translates into heterogeneous impacts across instruments and Member States, that payment rate equalisation is the reform's primary redistributive mechanism, and that without practice conditionality the environmental gains of even ambitious green implementation remain limited.

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Introduction

The Common Agricultural Policy (CAP) of the European Union has long been the dominant framework governing agricultural production incentives, land use, market outcomes, and environmental management across all EU Member States (Heyl *et al.,* 2021). Through a combination of area-based income support, coupled production payments, and agri-environmental measures co-financed with Member States, the CAP directly shapes the financial returns to crop and livestock production at farm level, and through its aggregate effect on EU supply, influences commodity markets, trade balances, and environmental outcomes at the European and global scale (European Commission, 2024a; Pe'er *et al.,* 2020). The ongoing reform of the CAP for the 2028–2034 programming period therefore is of first-order analytical importance for agricultural economists and policy analysts, both because of the scale of the financial envelope involved, approaching €300 billion over seven years, and because of the structural novelty of several key design elements that depart significantly from the current 2023–2027 framework (European Commission, 2025a).

The European Commission's Multiannual Financial Framework (MFF) proposal published in 2025 (European Commission, 2025b) introduces a restructured agricultural support architecture embedded within the broader National and Regional Partnership Plan (NRPP), ring-fencing a minimum of €295.7 billion for income support, a nominal reduction of approximately 15% relative to the current 2023–2027 period, while simultaneously redistributing that support across instruments in ways that materially alter production incentives across the EU (Matthews, 2025; Dupeux *et al.,* 2025). The CAP budget reduction combined with a redesign of the payment is a significant policy signal (Sotte, 2026). Understanding how this combination of anticipated budget cuts and structural CAP changes propagate through the agricultural sector – across Member States, production activities, commodity markets, trade flows, and environmental outcomes – is therefore an essential input to the policy debate surrounding the MFF negotiations and the subsequent design of national plans.

Three structural shifts are of particular analytical relevance. First, the per-hectare Degressive Area-Based Income Support (DABIS) is bounded between a floor of €130 per hectare and a ceiling of €240 per hectare at the Member State average, compressing the payment distribution and redirecting released funds toward redistributive payments (Sotte, 2026). Second, eco-schemes and agri-environment-climate measures are merged into a unified Agri-Environmental and

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Climate Action (AECA) framework subject to a new minimum national co-financing requirement of 30–60%, raising the cost-sharing burden for Member States (Dupeux *et al.,* 2025). Third, coupled income support is explicitly expanded, with top-ups for protein crops, mixed farms, and at-risk livestock systems (Rosenow, 2026), reversing the long-run decoupling trend.

These three structural changes alter both the total budget envelopes available for individual CAP interventions and the per-hectare or per-livestock-unit payment rates that agricultural producers face across the EU. Quantifying the production, market, trade, and environmental consequences of these shifts within a partial equilibrium agricultural sector model is the central objective of this study. It is structured around the following research questions:

What are the production, land use and environmental effects of the shift from the current 2023–2027 CAP to the proposed 2028–2034 framework, when modelled as changes in total intervention budgets and per-hectare or per-livestock-unit payment rates across regions and production activities? Specifically, the analysis focuses on:

- payment rate per hectare for decoupled income support (DABIS) – within the regulatory €130–€240/ha corridor
- effective reduction in agri-environmental payment rates resulting from the introduction of mandatory national co-financing for the merged AECA framework
- expansion of coupled income support – increased budget envelopes for eligible sectors.

Additionally, how responsive are regional production and land use outcomes to alternative assumptions about the distribution of CAP budget across interventions, particularly across the spectrum from a Member State strategy that minimises co-financing exposure to one that maximises environmental ambition?

To answer these questions, the GLOBIOM (Global Biosphere Management Model) (IBF, 2023), a spatially explicit, recursive-dynamic, linear programming partial equilibrium model is used. GLOBIOM is one of the most widely used global land use models for agricultural and environmental policy analysis (Havlik *et al.,* 2014). GLOBIOM's supply side is constructed from the bottom up using spatially explicit units considering country, altitude, slope, and soil class characteristics (IIASA, 2026) – thereby capturing the biophysical heterogeneity that is critical for modelling the response of spatially differentiated production systems to area-based support payments. These spatial area changes are also linked to GHG emissions accounting as well as biodiversity linked to the Biodiversity Intactness Index (BII) (Cornford *et al.,* 2025). Market equilibrium maximises the sum of producer and consumer surplus across activities and regions, with international trade represented via spatial equilibrium based on bilateral trade flows.

The study is the first to address these questions using the GLOBIOM framework at the level of individual payment and budget interventions, providing a benchmark for the model-based assessment of the new CAP that can be extended as additional empirical evidence on national plan designs becomes available.

Implementation of CAP Payments in GLOBIOM

We extended the GLOBIOM model to represent CAP payments and budgets for the different policy interventions. The model accounts for differences in policy payments across regions and agricultural activities through a dedicated payment module mirroring the CAPRI premium module (Britz and Witzke, 2014) with the updated CAP Strategic Plans (Isbasoiu and Fellmann, 2024; Fellmann *et al.,* 2025). The module supports many-to-many mappings between policy instruments and activities: each scheme can apply to multiple activities at differentiated rates, while each activity may receive support from several schemes simultaneously. Premiums are paid on a per-activity basis – per hectare for crops or per animal head for livestock – at the regional level, with payment ceilings that proportionally reduce support once triggered.

The CAPRI budget ceiling mechanism ensures that when eligible activity quantities expand beyond what the available budget can support at the declared CAP Strategic Plans (CSPs) rate, the effective rate is proportionally scaled down to maintain fiscal consistency – capturing the quantity-rationing dimension of CAP support that becomes more binding as activity levels increase. As a result, some effective payment rates are lower than the declared CSP rates. In GLOBIOM we use these effective premium rates consistent with the established CAPRI integration for long-run macroeconomic projections.

Payment rates for crop activities are expressed in 1000 USD per hectare, calibrated from the CAPRI per-hectare premium rates and converted at 2000 price-level exchange rates. Livestock payment rates are expressed in 1000 USD per tropical livestock unit (TLU), after conversion from CAPRI per-head rates using species-specific TLU coefficients: 0.90 for dairy and beef raising cattle, 0.70 for beef fattening cattle, 0.25 for pigs, 0.10 for sheep and goats, and 0.01 for poultry (the latter reflecting that GLOBIOM stores poultry in physical head equivalents rather than TLU). For the period 2000 to 2020 we made use of the CAPRI calibrated values regarding the CAP midterm review policy and the 2014 greening reform. From 2030 onwards, payments are aggregated from the full CAP Strategic Plan disaggregation to eight representative aggregates (DPAGG) that can be explicitly modelled in GLOBIOM given the payments per ha or head.

- DPAGG_dabis *"DABIS, core decoupled area payment"*
- DPAGG_ecos *"Eco-scheme" (post 2030 AECA, merged with ENVC)*
- DPAGG_envc *"Agri-Env-Climate Programmes Second Pillar" (post 2030, AECA merged with ECOS)*
- DPAGG_cispr *"Coupled income support"*
- DPAGG_cisyf *"Complementary income support for young farmers"*
- DPAGG_criss *"Complementary Redistributive Income Support for Sustainability"*
- DPAGG_cotto *"Coupled income support for cotton"*
- DPAGG_ANC7 *"Payments to areas facing natural or other specific constraints"*

CAP direct payments enter the model's objective function as exogenous per-unit transfers differentiated by payment scheme across the full spatial and biophysical disaggregation. A budget constraint limits total CAP expenditure to the exogenous envelope for each intervention and region to ensure coherence with existing production bounds in GLOBIOM. A country and a policy intervention specific budget constraint limits total CAP expenditures by requiring that the sum of crop and livestock related payments, calculated as eligible upper-level activities multiplied by their respective per-unit payment rates, does not exceed the exogenously defined CAP budgets for each policy intervention/measure. It should be noted that the budgets in GLOBIOM were adjusted to take into consideration only the crop and livestock activities available in the model, given that in CAPRI the number of activities is larger than in GLOBIOM. During simulation the upper-level activity variables eligible for CAP payments are constrained to remain below the corresponding physical activity bounds already defined in the model. These constraints ensure that CAP payments are only granted to production levels that are feasible within the underlying land-use and livestock system representation and prevent policy-induced expansion beyond GLOBIOM baseline activity limits.

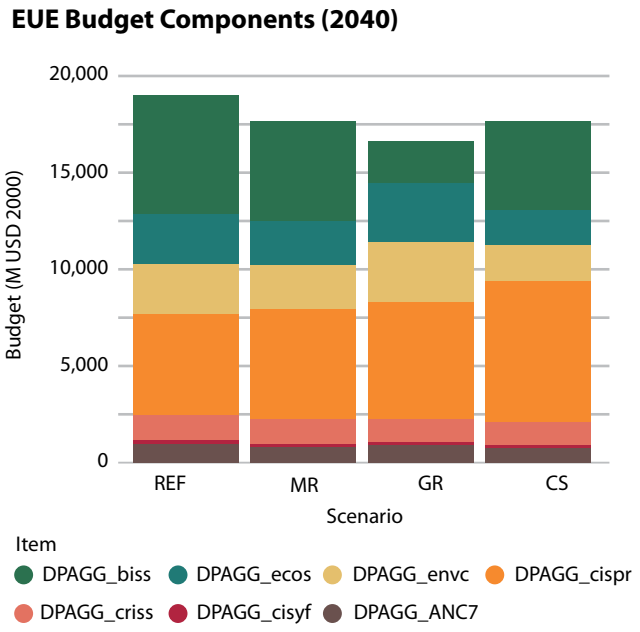

Figure 1: EU27 endogenous CAP budget components by scenario in 2040 (million USD 2000).

Source: Own composition

Scenario Design

We operationalise four scenarios as changes to payment rates and budget envelopes, with all other parameters held at business as usual (REF) values. The five endogenous interventions form a ring-fenced block subject to a −15% aggregate MFF cut, with internal redistribution reflecting alternative national plan strategies. Table 1 summarises the parameter changes.

Table 1: Scenario assumptions by intervention.

Intervention	REF	MR: Min. Compliance	GR: Ambitious Green	CS: Coupled Expansion
DPAGG_dabis (€/ha)	Observed MS payment	€130/ha (floor)	€180/ha (mid)	€240/ha (ceiling)
DPAGG_dabis budget	REF	−15%	−65%	−25%
DPAGG_ecos + DPAGG_envc (AECA) budget	REF	+10%; earmark 43%	+25%; earmark met	−25%; co-fin avoidance
DPAGG_cispr budget	REF	+10%	+15%	+40%
DPAGG_cispr (€/LU or ha)	Observed	+10% protein & livestock	+15% protein & livestock	+40% protein & livestock
DPAGG_criss budget	REF	+10%	+10%	+10%
DPAGG_ANC7 budget	REF	−10% co-fin tightening	BAU (MS compensate)	−15% steepest co-fin
DPAGG_cotto / DPAGG_cisyf	REF	Unchanged	Unchanged	Unchanged
Budget reduction (wrt REF)	—	-1.2 billion USD (6.3%)	2.1 billion USD (11.0%)	1.1 billion USD (5.9%)

Source: Own composition

REF – Reference

The counterfactual baseline reflecting the current 2023–2027 CAP as implemented across EU Member States. Payment rates per hectare and per livestock unit are calibrated to the CAPRI effective premiums Member State CAP Strategic Plans and DGAGRI 2024 medium-term Outlook (European Commission, 2024b). Budget envelopes per intervention and region reflect actual 2023–2027 allocations and are kept constant after 2030 and simulated at 10-year steps. This is the reason for looking at the results in 2040. This scenario serves as the reference against which all reform scenarios are evaluated.

Figure 1 indicates that the total budget for all policy interventions in EU27 in 2040 is around 19.5 billion USD 2000 level. The budget is substantially lower than the official CPS budget per year in EU27 (around 67.6 billion USD 2000 level[1]). Mainly because we only capture part of the policy interventions, excluding most of the Rural Development, as well as adjust only for the production activities that are available in the model. Still, the DABIS, AECA (ECOS+ENCL) and the CISPR are the dominating budgets which are driving the production and are adjusted in the respective scenarios.

MR – Minimum Compliance

It implements the proposed 2028–2034 CAP under conservative assumptions about Member State plan design, representing a fiscally minimalist response in which Member States minimise national co-financing exposure by concentrating budgets in zero-co-financing instruments. This

[1] The total CSP budget for the period 2023-2027 is around 304 billion euros (Isbasoiu and Fellmann, 2024), which is around 60.8 billion euros per year or 67.6 billion USD 2000 level.

scenario tests the production and land use implications of the lower bound of reform ambition.

DABIS rates reduced toward the €130/ha floor (−15% budget); freed resources redistributed to CISPR (+10%) and CRISS (+10%); AECA modestly expanded (+10%); ANC7 reduced (−10%) due to co-financing tightening. It should be noted that the DABIS premium rates are implemented in nominal terms. Meaning adjusted to USD price-exchange 2000 level for consistency with the implementation and development of the CAP. As can be seen from Figure 1, due to the budget shifts the total budget is lower by around 6.3% or 1.2 billion USD 2000. This is because the relative changes for each budget interventions resulted in -15% total budget but the absolute levels are different given the budget shares in the reference scenario. In addition, it should be noted that we are not considering the other budgets from the RD measures that should also contribute to the total budget reallocation.

GR – Ambitious Green

It implements the proposed 2028–2034 CAP under assumptions of high Member State ambition on environmental delivery, representing an upper bound of reform ambition in which the 43% environment and climate earmark is fully utilised and national co-financing is provided at rates sufficient to maintain or increase effective per-hectare payments for AECA interventions. Note that AECA payments enter as lump-sum area transfers in the model. This means there is no explicit linkage to specific farming practices or production management changes that can lead to environmental benefits or GHG emission reduction.

DABIS cut by 65%, with the largest share redirected to AECA (+25%) to meet the 43% environment and climate earmark, CISPR (+15%), and CRISS (+10%). DABIS rates set at the mid-corridor (€180/ha) also in nominal terms. ANC7 held at REF as Member States compensate nationally. The budgetary shifts in this scenario lead to a bit stronger total budget cut of around 11.0% or 2.1 billion USD 2000 level, due to the strong reduction in DABIS budget which as can be seen occupies a large share of the total budget in the reference scenario.

CS – Coupled Expansion

A scenario motivated by the political economy of co-financing under fiscal pressure, in which Member States respond to mandatory co-financing requirements for AECA by shifting plan budgets toward instruments requiring zero national co-financing – principally DABIS and coupled income support. This represents the most plausible downside risk scenario for environmental outcomes due to higher payments for livestock activities and the most production-intensive trajectory under the new CAP.

DABIS cut 25% but rates set toward the ceiling (€240/ha) and higher than GR due to lower reduction in budget; AECA contracted by 25% reflecting co-financing constraints; CISPR expanded by 40%. ANC7 reduced by 15%. The imposed budget shifts resulted in similar total budget reduction as in MR of around 5.9% or 1.1 billion USD 2000 level. This was still not close to the 15% total reduction target.

Figure 2 shows the change in DPAGG_dabis crop payment rates (1000 USD/ha) versus REF payment rates for each

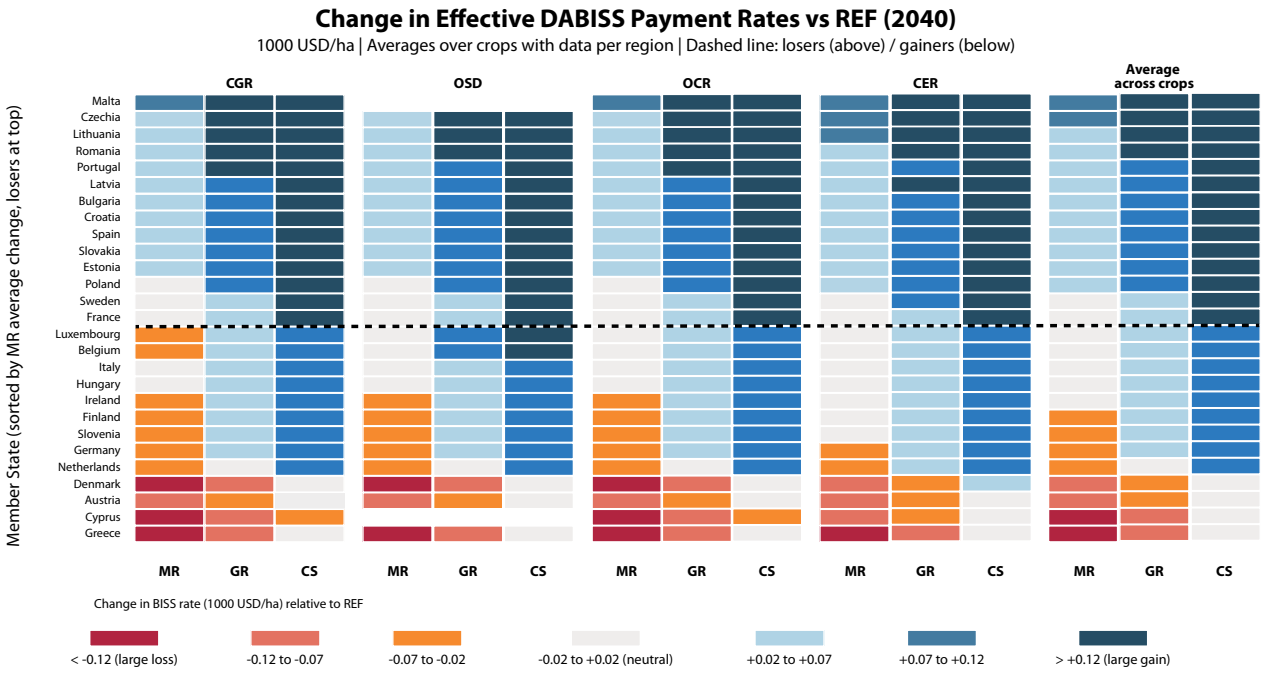

Figure 2: Change in DPAGG_DABIS crop payment rates vs REF declared rates (1000 USD/ha) by Member State, crop activity, and scenario (2030).

Red = losers (rate reduction); blue = winners (rate increase). Rightmost column: average across all crop activities.
Source: Own composition

Member State, crop activity, and scenario in 2030. Payments remain constant through 2040. The rightmost column shows the average change across all crops. The equalisation of DABIS rates within the €130–€240/ha corridor creates clear winners and losers. Under all scenarios, Greece, Cyprus, Austria, and Denmark – whose current plans specify rates above the corridor ceiling – experience rate reductions. By contrast, Malta, Lithuania, Latvia, Czech Republic, Romania, and Portugal gain as their low current rates are lifted toward the floor. Under GR the redistribution is amplified, as the deeper DABIS budget cut forces sharper convergence. Under CS, the ceiling rises toward €240/ha, shifting almost all Member States into positive territory. These payment rate changes at the regional level are the primary transmission mechanism linking the reform design to the production outcomes discussed in subsequent sections.

Changes in crop/livestock production and producer prices

Figure 3 presents the relative change in EU27 crop and livestock production by activity in 2040. Across all three scenarios, agricultural crop production declines relative to REF. The contraction is most pronounced for oilseeds (OSD, approximately 15–17% depending on scenario), which are among the most payment-sensitive crops given their traditionally high reliance on area-based income support. From Figure 2 it can be noticed that the OSD DABIS payments for some regions such as France and Hungary are close to the reference under MR, but increase under the GR and CS. Appendix 1 shows that these regions still reduce the OSD production across scenarios indicating that the budget cut has stronger impact than the changes in payments. The 10% increase in per-hectare payments for soybeans appears insufficient to induce expansion of an already limited production base across the EU. Cereals (CER) contract by 4–8% and coarse grains (CGR) by around 3%, while other crops (OCR) show only marginal changes driven mainly by higher payments per ha for legumes under the CISPR intervention. Livestock headcounts change far less across all scenarios, reflecting the relatively modest scale of coupled payment adjustments (DPAGG_cispr) compared to the scale of decoupled area payment changes (DPAGG_dabis). Still the increase in CISPR budget results into small increase in sheep and goats (other ruminants), with strongest impact under the CS scenario, given the strong increase in budget and payment.

The pattern differs meaningfully across scenarios. Under MR, regions losing DABIS rates through equalisation face a compounded pressure: lower total budgets combined with downward rate convergence in high-payment Member States. The absence of meaningful CISPR expansion in MR means that livestock producers receive minimal additional coupled support to offset the indirect effects of reduced crop area on feed availability and farm income.

Under GR, AECA payments – while substantially expanded (+25%) – enter the model as lump-sum area transfers without explicit linkage to specific farming practices

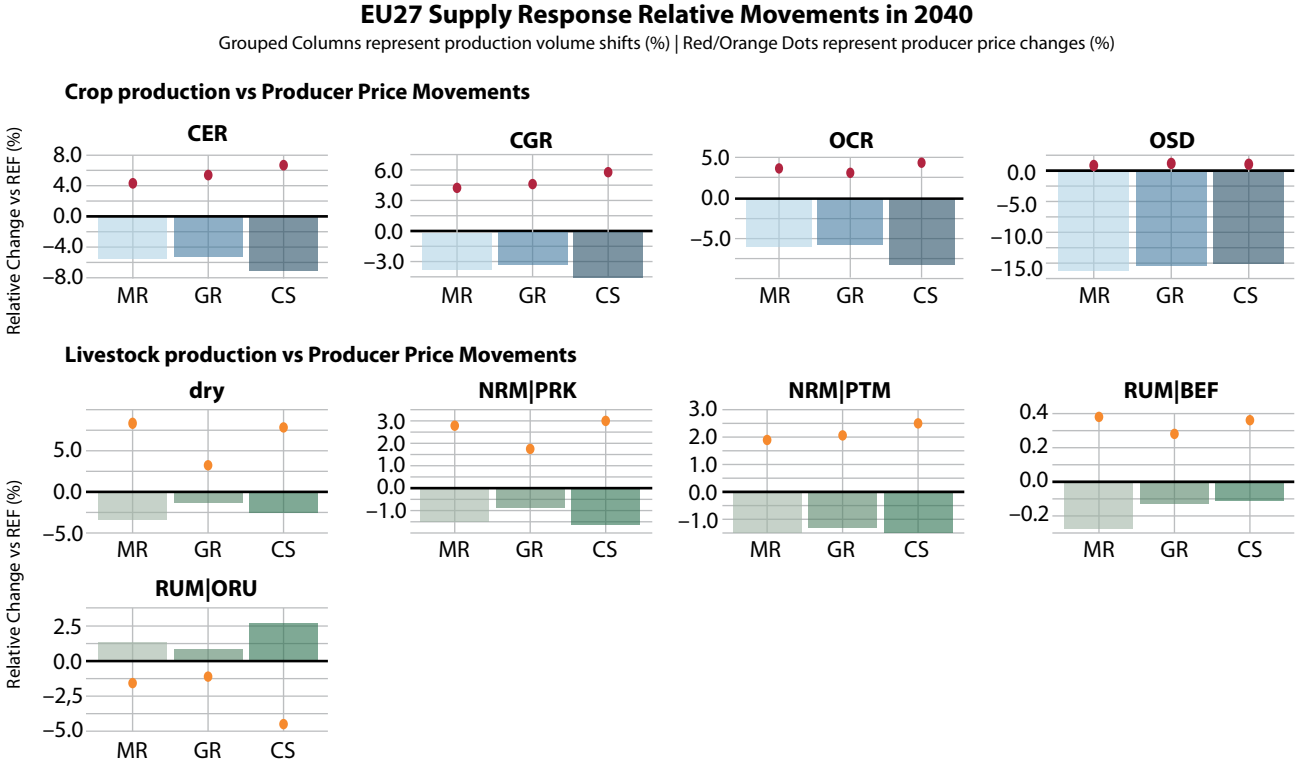

Figure 3: EU27 relative change in crop and livestock production and price changes vs REF by activity and scenario in 2040.

Source: Own composition

or production management changes. Crop producers can therefore capture AECA payments through general land eligibility without changing their production behaviour, partially offsetting the negative profitability effect of the deep DABIS cut and moderating the crop area reduction relative to what the DABIS cut alone would imply. This mechanism explains why GR produces smaller crop area losses than MR in aggregate despite its much deeper DABIS budget reduction. Appendix 2, shows that the average payment in GR increases to around 88 USD/ha, compared to MR (around 70 USD/ha). However, the utilised agricultural area reduces by around 1%, compared to 3.2% under MR. This indicates that under the MR scenario despite the lower budget cut (6.3%), the CAP budget is concentrated on less acreage, leading to land being abandoned. Because AECA is not linked to particular farming practices/technologies in the current model implementation, livestock producers do not directly benefit from the AECA expansion. Therefore, shifting livestock production in a spatial sense appears more constrained than crop production, resulting in limited change under GR for livestock herd numbers.

Under CS, higher DABIS rates toward the corridor ceiling and the substantial CISPR expansion (+40%) nominally support both crop and livestock sectors. However, the production response for livestock remains constrained except small impact on sheep and goat production (Figure 3, RUM/ORU): CISPR targets protein crops and at-risk livestock systems, but the higher DABIS rates simultaneously increase the opportunity cost of land, incentivising crop farmers to maintain area in arable activities rather than release land to extensive livestock grazing. For crops, the ceiling-level DABIS rates partially compensate for the lower total budget envelope, but total area nevertheless remains below REF (-2.1%, Appendix 2), with the largest contractions for oilseeds (Figure 3 and Appendix 1).

Consistent with the production changes at EU27 level, the respective producer prices follow the same pattern. Figure 3 shows that in 2040 crop producer prices rise in all three reform scenarios, with the magnitude varying from approximately 2% to 6% depending on commodity and scenario. The price increases are a direct market consequence of the supply contraction induced by lower area support: as domestic crop area and output fall, the residual demand – met partly from domestic production and partly through increased imports – pushes up equilibrium domestic prices. The largest price increases occur for cereals (CER) and coarse grains (CGR) (approximately 6%), reflecting that these activities have the highest absolute area contraction and the tightest domestic supply-demand balance. Other crops (OCR) show smaller price increases (below 1%), consistent with higher payment changes under CISPR leading to lower area reduction.

For livestock producer prices, the pattern also follows the production changes. Meaning, increase in producer prices (up to 3% for non-ruminants) due to lower production, except for lower prices for sheep and goats (ORU) producers due to supply increase coming from increase in CISPR payments and budgets.

Trade Balance Effects

Figure 4 presents EU27 absolute net trade volumes (exports minus imports, 1000 tonnes) in 2040 across all scenarios. For crops, the EU is already a net importer of cereals (CER), coarse grains (CGR) and oilseeds (OSD) in the reference, and this import dependency widens further under all reform scenarios as domestic supply contracts. For cereals, the net import position deteriorates noticeably – deepening from the REF level to substantially larger negative balances

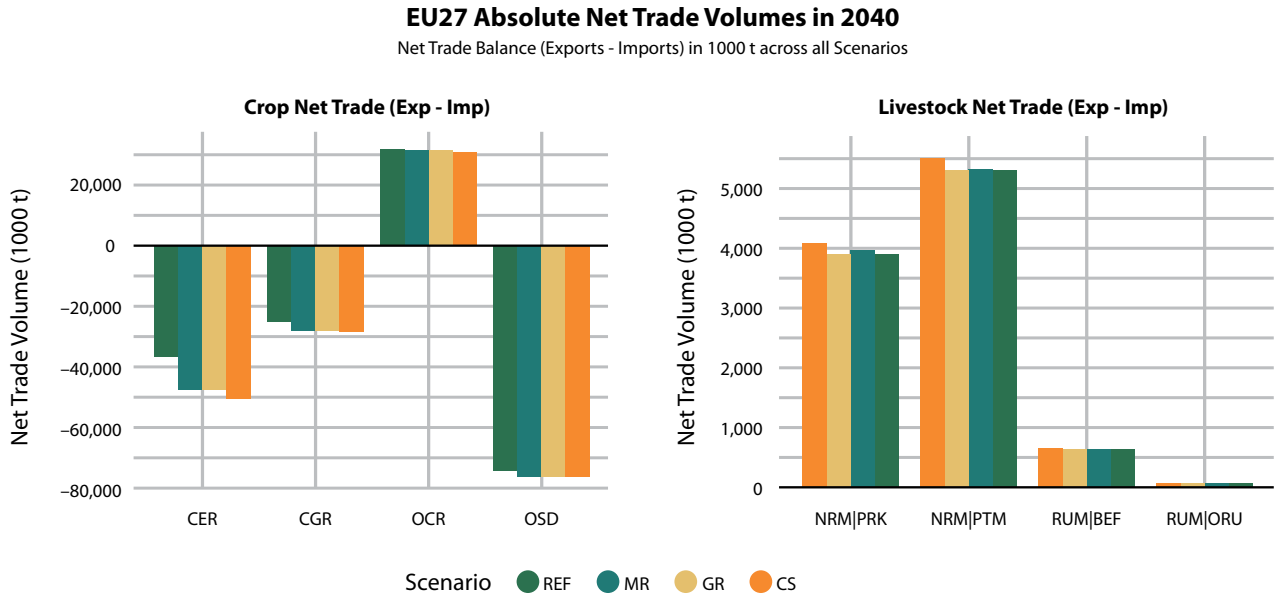

Figure 4: EU27 absolute net trade volumes (exports – imports, 1000 t) by crop and livestock item and scenario, 2040. Negative values indicate net import dependence.
Source: Own composition

under CS given the larger DABIS budget cut compared to MR. This indicates that EU demand for cereals, which remains broadly stable in the absence of income effects, is increasingly met through imports from third countries as domestic production declines.

Oilseeds (OSD) show also widening of the net import deficit across all scenarios, reflecting their particularly large area contractions of 15–17%. The EU is already structurally dependent on oilseed imports and the reform deepens this dependency across all pathways. For livestock products, pork and poultry (NRM/PRK, NRM/PTM) imports increase modestly as herd reductions reduce domestic non-ruminant output. Ruminant meat trade positions are largely stable across scenarios, reflecting the limited aggregate change in bovine and sheep herd sizes.

Overall, the trade results confirm that the primary external effect of the CAP reform is a widening of EU agricultural import dependency, particularly for crops, with the magnitude of the effect closely tracking the size of the domestic supply contraction in each scenario.

Greenhouse Gas Emissions

Figure 5 presents the total GHG emissions in 2040 in EU27 and non-EU regions, broken down my emissions source. Total agricultural emissions decline in all three scenarios relative to REF, confirming that the production contraction induced by lower CAP support has a broadly positive environmental externality for domestic emissions. The dominant driver of this reduction is the decline in N_2O emissions from fertilisers from the crop sector. As crop area declines, aggregate nitrogen fertiliser use falls, making N_2O the most responsive emission category to changes in area-based support.

The emission from livestock activities regarding enteric fermentation (ENT), manure management (MMG) and manure applied to soils (MAS) is stable given the reduction in dairy as well as beef and increase in sheep/goats herd size (Figure 3). The divergence between crop and livestock emission trajectories, but also the smaller emission savings under GR compared to MR and CS, underlines a fundamental structural limitation of the current payment architecture: without explicitly conditioning AECA payments on adoption of specific farming practices or livestock mitigation technologies, the reform cannot guarantee that the income support received by livestock producers translates into emission-reducing management changes.

A closely related concern is emission leakage. As EU domestic agricultural supply contracts under all three reform scenarios, the residual demand is increasingly satisfied through imports from non-EU countries. This production displacement is not emission-neutral because third-country agricultural systems typically operate at different emission intensities than EU production, and the expansion of export-oriented production by major suppliers may generate GHG emissions that partially or fully offset the EU-level reductions from supply contraction. However, the figure shows that the increase in total emissions from agriculture in non-EU regions is similar to the REF scenario for all emissions sources and thus the leakage effect is negligible.

Biodiversity

Figure 6 shows that the BII improves under all three reform scenarios, with EU27 net gains of +0.18% under both MR and GR and +0.20% under CS. The BII captures the combined effect of two key agricultural pressure variables: the extent of agricultural land use and the intensity of

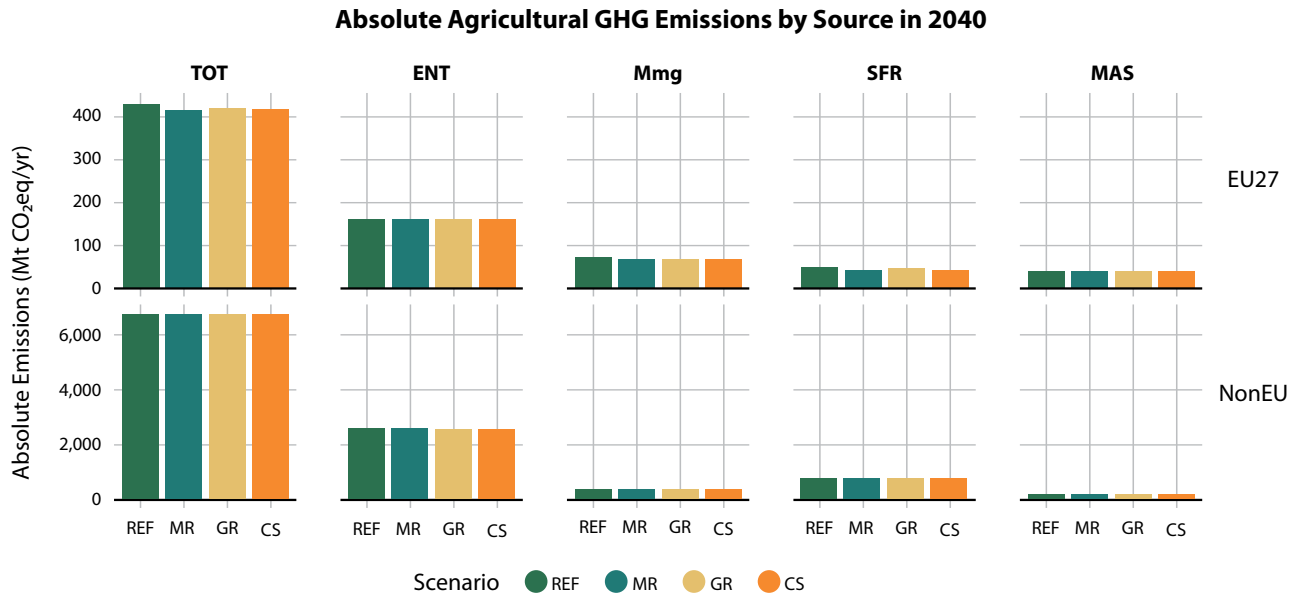

Figure 5: Total and source-specific GHG emissions in EU27 and non-EU regions by scenario in 2040. Sources include enteric fermentation, manure management, synthetic fertilisers, and manure applied to soils.
Source: Own composition

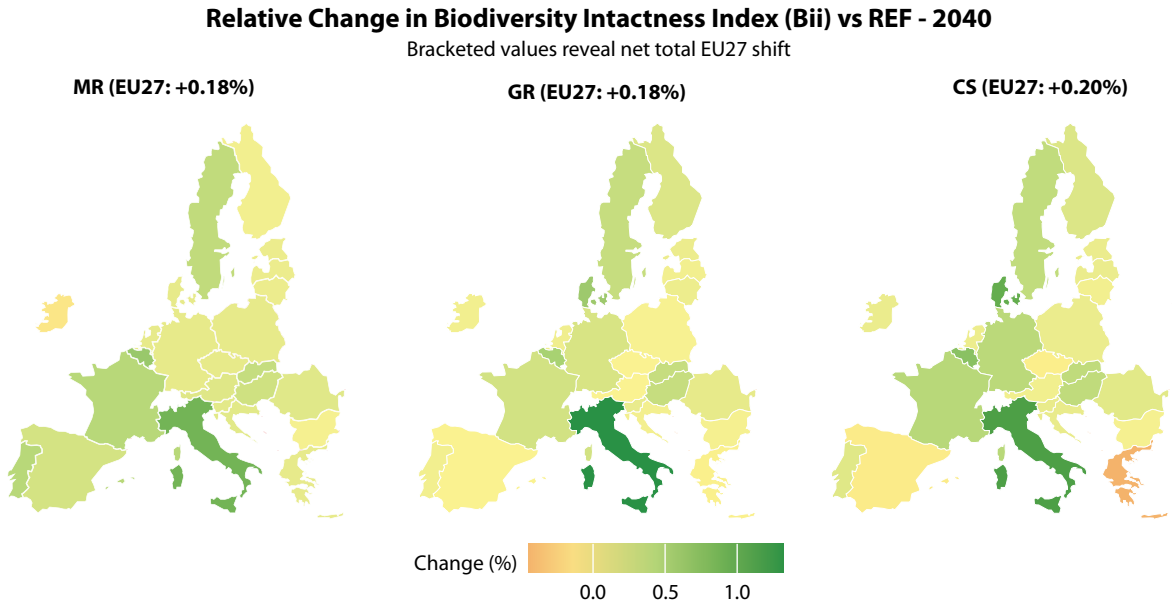

Figure 6: Change in BII per scenario relative to REF in EU27 in 2040
Source: Own composition

production as proxied by fertiliser application. Both of these drivers move in a favourable direction under the CAP reform scenarios. The contraction in crop area documented directly reduces habitat pressure on adjacent natural and semi-natural land, allowing partial recovery of species assemblages in affected regions. At the same time, the reduction in nitrogen fertiliser application that underlies the synthetic emission reductions also lowers agrochemical pressure on soil biodiversity and adjacent ecosystems. The spatial pattern of BII gains broadly reflects the geography of crop area contraction: Italy, parts of Spain and France, and the Baltic states show the largest improvements in GR and CS, consistent with their significant reductions in arable area under those scenarios (see Appendix 1). The marginally larger gain under CS (+0.20%) relative to MR and GR (+0.18%) reflects that scenario's deeper oilseed area contraction offsetting the partial livestock expansion, with the net land-use pressure reduction slightly larger than under the other two pathways.

Discussion

The results provide the first systematic quantitative assessment of the 2028–2034 CAP reform within a global partial equilibrium framework, revealing how budget and payment rate changes propagate through production structure, prices, trade and emissions across the EU. Several findings merit discussion beyond the direct interpretation of the scenario results.

First, the scenario results confirm that the aggregate 15% MFF budget cut does not translate uniformly or proportionally into equivalent production contractions across activities and Member States. Three mechanisms account for the divergence between the defined budget percentage changes and the simulated outcomes. First, spatial reallocation: as payment rates change differentially across Member States due to the DABIS corridor equalisation, farmers in gaining regions have incentives to expand production while farmers in losing regions contract, and the net EU effect is dampened by the bilateral nature of these shifts. Second, partial ceiling utilisation: where payment rates fall below the REF declared rate and crop area contracts below the eligibility threshold, the regional budget ceiling may no longer bind, meaning the full budget is not deployed even though it is notionally available. Third, inter-activity substitution: farmers at the margin between crop types will substitute toward more profitable activities when relative payment rates change, altering the composition of area and output without necessarily changing the total area eligible for support. Together, these three mechanisms mean that the modelled production response is smaller and more heterogeneous than a naive application of the defined percentage budget changes would suggest. This is an important finding for the policy debate: *ex ante* assessments of the CAP reform that rely on simple budget accounting and ignore endogenous spatial and activity-level adjustment will tend to overstate the production contraction and income loss implied by the MFF reduction. This echoes Darvas *et al.* (2026) who argue that reform conditions and decision-making must better reflect regional needs.

Second, a significant modelling limitation of this analysis is the incomplete coverage of the full CAP budget structure under the new MFF proposal. Seven additional intervention categories are present in the proposed framework but not modelled endogenously in the current implementation: sectoral interventions (DPAGG_sect), area-specific disadvantage payments (DPAGG_asd), investments (DPAGG_invest), farm installation support (DPAGG_instal), risk management instruments (DPAGG_risk), cooperation measures (DPAGG_coop), and knowledge exchange and dissemination (DPAGG_know). These instruments collectively account for a meaningful share of total national CAP plan expenditures, particularly in Member States that place high strate-

gic emphasis on investment, risk management and sectoral restructuring programmes. However, their production effects cannot be captured through per-hectare or per-livestock-unit payment parameters in a standard partial equilibrium framework, as they are not directly linked to activity-level quantities: investment subsidies alter factor costs rather than output prices, risk management instruments reduce income variability without directly affecting mean production levels, and cooperation and knowledge exchange measures operate through technology adoption pathways that are not explicitly represented in GLOBIOM. In addition, there is a critical structural change in the MFF proposal regarding which interventions are inside vs. outside the ring-fence. The NRPP Regulation specifies that not all interventions count toward the minimum €295.7 billion. The main interventions outside the ring-fenced amount are the COOP and KNOW interventions (Rosenow, 2026). These budgets will therefore compete with non-agricultural priorities within Member State NRPP plans, and their national allocations remain unknown.

The omission of these instruments likely leads to an underestimation of the total income support received by farmers, and potentially to some overestimation of the negative production responses, as farmers receiving support through non-modelled channels may sustain production levels that the model predicts would contract in the absence of such support.

A further calibration-related limitation concerns the source of the payment rates used in this analysis. The DABIS and coupled payment rates are derived from the CAPRI baseline calibration process, which applies a cut mechanism to ensure fiscal consistency across the full set of farm-level activities modelled in CAPRI. Due to this cut mechanism, the calibrated payment rates in GLOBIOM, particularly for DPAGG_dabis and DPAGG_cispr, are sometimes equal to or lower than the payment rates declared by Member States in their CAP Strategic Plans (CSPs). This means that the baseline (REF) payment rates in the model may not fully replicate the policy as implemented, and the reform scenarios are applied on top of a baseline that may already be somewhat below the actual declared rates. Future work will focus on improving the representation of CAP budgets in GLOBIOM by directly incorporating the declared rates from Member State CSPs as the starting point for calibration, rather than relying on the CAPRI cut mechanism, to ensure a more accurate baseline from which to evaluate policy shifts.

Third, the missing link between AECA payments and specific farming practices or mitigation technologies represents an important structural limitation, particularly for the emission projections under GR and CS. In the current GLOBIOM implementation, AECA payments (DPAGG_ecos, DPAGG_envc) enter as lump-sum area transfers without requiring any specific production management response from the recipient farmer. Crop and livestock producers therefore receive AECA income support without necessarily adopting low-emission practices such as reduced nitrogen application, cover cropping, improved manure management, or livestock feed modifications. This is particularly consequential for the GR scenario, where AECA constitutes the largest share of total endogenous support and where the policy intent is precisely to use this expanded budget to drive genuine practice change. The model is structurally unable to capture this conditionality, and the emission reductions associated with GR in Figure 5 likely understate what a fully conditioned AECA framework, one that links payment receipt to verifiable adoption of specific mitigation measures, would deliver in practice. In a fully specified implementation, the GR scenario would be expected to show the deepest emission reductions across all sectors, rather than the intermediate position observed here.

The broader context for this analysis is usefully framed by independent commentary on the Commission's MFF proposal. As noted by Matthews (2025) in a detailed assessment of the CAP budget proposals, the publication of the MFF legislative package in July 2025 was accompanied by considerable political controversy, with the European Parliament's Agriculture Committee (COMAGRI) reacting with hostility to what was perceived as a significant reduction in the CAP budget and a dilution of the CAP's identity through its integration into the broader NRPPs. Matthews emphasises that the full financial implications of the reform for individual farmers will not be known until all 28 National and Regional Partnership Plans are approved, which may not occur until 2027, because crucial choices about the internal allocation of national envelopes between instruments, the co-financing rates applied to AECA measures, and the specific implementation of the DABIS corridor remain at Member State discretion. This observation is directly relevant to our scenario design: the three scenarios (MR, GR, CS) should be interpreted as alternative national plan strategies spanning the plausible range of these discretionary choices, rather than as predicted outcomes.

A fourth dimension of uncertainty concerns the calibration of supply response parameters within GLOBIOM for the specific payment configurations introduced by the new CAP. The model is calibrated to observed historical behaviour across the 2000–2020 baseline period, a period characterised by broadly stable decoupled area payment rates within the historical ranges established by the 2003 Fischler reform and the 2013 CAP reform. The new CAP introduces payment rate configurations – particularly the binding floor and ceiling of the DABIS corridor, the scale of CISPR expansion under CS, and the magnitude of AECA under GR – that are structurally novel and for which no direct historical supply response evidence exists at the EU level. This implies that the supply elasticities embedded in GLOBIOM's production functions may not fully capture farmer behavioural responses to these novel policy configurations, particularly at the extremes of the payment distribution. According to Sotte (2026) the CAP has gradually lost much of its "common" character. Increasing national flexibility, diverse implementation choices, and fragmented policy instruments have produced a CAP that is unified in name but increasingly heterogeneous in practice. Similar challenges have been raised by Mendez *et al.* (2026), mainly about insufficient harmonisation across Member States, risk of uneven environmental ambition, farmer income pressure due to rising input costs, need for clearer indicators to measure climate and biodiversity outcomes,

potential adjustments to eco-scheme design as well as budgetary constraints ahead of the next Multiannual Financial Framework (MFF). Hence, farmers in Member States at the corridor floor may respond differently than historical elasticity estimates suggest if the floor binds on profitability, and similarly for farmers at the ceiling in high-payment Member States. The uncertainty around the point estimates presented in the Results should therefore be understood as wider than the deterministic scenario results imply.

Finally, this analysis represents a first attempt to model the new CAP payment architecture comprehensively in GLOBIOM at the level of individual payment interventions, and inherent structural uncertainty surrounds both the completeness of the payment representation and the magnitude of the endogenous production response. The results should be interpreted as scenario projections illustrating the direction and relative ordering of outcomes across scenarios, rather than as point forecasts of future production, price, trade or emission levels. As national plan designs are finalised and additional data on Member State strategic choices become available, the calibration of the payment module can be progressively refined to reflect actual declared payment rates and budget allocations, narrowing the scenario uncertainty and enabling more precise policy impact assessment.

Conclusions

This study provides the first systematic GLOBIOM-based scenario analysis of the 2028–2034 CAP reform, operationalised as changes to per-unit payment rates and budget envelopes for several policy interventions across all EU Member States. The results demonstrate that the aggregate 15% MFF budget reduction translates into heterogeneous and asymmetric impacts across instruments, Member States, production activities, and environmental outcomes, and that the specific design of national plans, particularly the allocation of freed DABIS funds and the co-financing response for AECA, matters as much as the aggregate budget cut for determining production and environmental outcomes.

Regarding the payment rate per hectare for decoupled income support within the DABIS corridor, the results show that the €130–€240/ha constraint generates a systematic redistribution of effective DABIS rates across Member States that is the primary transmission mechanism of the reform at the regional level. Member States currently above the ceiling – Greece, Cyprus, Austria, Denmark – face rate reductions across all eligible crop activities under all three scenarios, while Member States below the floor – Malta, Lithuania, Latvia, Czech Republic, Romania, Portugal – receive upward rate adjustments. This redistribution directly drives the spatial heterogeneity in crop area responses: regions losing effective rates reduce arable area, while gaining regions partially compensate through expanded production. At the EU level, the net effect is a crop area contraction of between 4% (OCR, CS) and 17% (OSD, MR) relative to REF, with oilseeds and cereals most affected given their high payment sensitivity. Importantly, the equalisation also carries a long-run structural risk: as effective rates converge toward the corridor midpoint, the comparative advantage of land becomes more strongly determined by inherent biophysical productivity than by historically differentiated entitlements, potentially accelerating production specialisation in high-productivity regions and land abandonment in marginal areas. The current payment structure – which retains regional differentiation – plays an important role in sustaining geographically diverse production across the EU, and this role is progressively eroded as equalisation intensifies. Maintaining an element of regional differentiation within the payment corridor or introducing complementary instruments targeting production in marginal and less-favoured areas may therefore be warranted from a long-run food security and regional cohesion perspective.

Regarding the effective reduction in agri-environmental payment rates from mandatory co-financing, the AECA co-financing requirement of 30–60% acts as a structural brake on agri-environmental ambition in fiscally constrained Member States. However, even the expanded GR AECA budget produces only a moderate dampening effect on crop area contraction, because payments are delivered as lump-sum area transfers without conditioning on specific farming practices. The difference between scenarios in terms of AECA scale is therefore almost entirely a function of assumed national co-financing willingness, and the production-moderating effect of AECA support is present across all scenarios but limited in magnitude. On the environmental side, the absence of practice conditionality means that AECA expansion under GR does not translate into emission reductions beyond those already achieved through crop area contraction, leaving a significant gap between the policy intent of the agri-environmental framework and its modelled environmental outcomes.

In the CS scenario, the CISPR expansion only partially offsets the simultaneous DABIS budget reduction for eligible activities despite higher payment rates, underscoring that the balance between decoupled and coupled support shapes the direction of structural change.

These findings carry direct implications for the design of national plans and for the conduct of the ongoing MFF negotiations. The results suggest that the GR scenario, despite its ambitious DABIS cut and AECA expansion, delivers only modest additional emission benefits relative to MR in the absence of practice conditionality for agri-environmental payments. Linking AECA payment receipt to verifiable adoption of specific mitigation technologies – as the policy intent stipulates but the current modelling cannot capture – would likely substantially improve the environmental performance of the GR pathway. The CS scenario offers the most production-supportive trajectory and sustains the highest farm profitability through ceiling-rate DABIS and expanded CISPR, but at the cost of the deepest trade deterioration and limited long-run environmental co-benefits. Future work should extend the analysis to incorporate non-modelled CAP instruments, to represent practice conditionality for AECA explicitly, and to quantify the emission leakage effects of production displacement through the global dimension of the GLOBIOM framework.

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References

Britz, W. and Witzke, P. (2014): CAPRI model documentation 2014. Institute for Food and Resource Economics, University of Bonn.

Cornford, R., van 't Veen, H., Jung, M. and Visconti, P. (2025): Coefficients of estimated biodiversity responses to land use and maps of conservation priorities (Deliverable D5.2). Lamasus Horizon Europe Project. Available at: https://www.lamasus.eu/wp-content/uploads/LAMASUS_D5.2_Coefficients-biodiversity_final.pdf (Accessed on 12 May 2026).

Darvas, Z., Lappe, M.S., Sangers, B. and Zettelmeyer, J. (2026): National plans, regional voices: cohesion policy in the next European Union budget. Policy Brief 06/2026. Available at: https://www.bruegel.org/policy-brief/national-plans-regional-voices-cohesion-policy-next-european-union-budget (Accessed on 5 April 2026).

Dupeux, B., Erjavec, E., Rac, I., Donnellan, T., Sterly, S., Wember, C., Jongeneel, R.A., van Asseldonk, M.A.P.M., Gonzalez Martinez, A.R., Charvalis, G., Zsolt, S., Okenkova, M., Garcia Lera, M., Pastor Carretero, R. and Bossche, L.V.D. (2025): CAP 2028-2034: Navigating change for an evidence-based policy: Tools4CAP Policy Brief. Available at: https://zenodo.org/records/18390422 (Accessed on 12 February 2026).

European Commission (2024a): The common agricultural policy at a glance. Available at: https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cap-glance_en (Accessed on 24 January 2026).

European Commission (2024b): EU Agricultural Outlook for markets, income and environment 2024–2035. DG Agriculture and Rural Development.

European Commission (2025a): Proposal for a Regulation of the European Parliament and of the Council establishing the conditions for the implementation of the Union support to the

Common Agricultural Policy for the period from 2028 to 2034, COM(2025) 560 final.

European Commission (2025b): A dynamic Union budget for the priorities of the future: Multiannual Financial Framework 2028–2034 (COM(2025) 570 final).

Fellmann, T., Tassinari, G., Lasarte Lopez, J., Rey Vicario, D., Beber, C. et al. (2025): Scenar 2040 - A scenario study on the Common Agricultural Policy, Publications Office of the European Union, Luxembourg, JRC142503. Available at: https://data.europa.eu/doi/10.2760/7381366 (Accessed on 22 March 2026).

Havlík, P., Valin, H., Herrero, M., Obersteiner, M., Schmid, E., Rufino, M.C., Thornton, P.K., Böttcher, H., Conant, R.T., Frank, S., Fritz, S., Fuss, S., Kraxner, F. and Notenbaert, A. (2014): Climate change mitigation through livestock system transitions. Proceedings of the National Academy of Sciences, **111** (10), 3709–3714. https://doi.org/10.1073/pnas.1308044111

Heyl, K., Döring, T., Garske, B., Stubenrauch, J. and Ekardt, F. (2021): The Common Agricultural Policy beyond 2020: A critical review in light of global environmental goals. Review of European, Comparative & International Environmental Law, **30** (1), 95–106. https://doi.org/10.1111/reel.12351

IBF (2023): Global Biosphere Management Model (GLOBIOM) Documentation 2023 - Version 1.0. Laxenburg, Austria. Integrated Biospheres Futures, International Institute for Applied Systems Analysis (IBF-IIASA). Available at: https://pure.iiasa.ac.at/18996 (Accessed on 25 May 2026).

IIASA (2026): GLOBIOM: Global Biosphere Management Model. International Institute for Applied Systems Analysis, Laxenburg. Available at: https://iiasa.ac.at/models-tools-data/globiom (Accessed on 25 June 2026).

Isbasoiu, A. and Fellmann, T. (2024): CAP Strategic Plans of the EU Member States – CSPs Master file and key data. Publications Office of the European Union, Luxembourg. Available at: https://op.europa.eu/en/publication-detail/-/publication/147ea24d-9cbd-11ef-85f0-01aa75ed71a1/language-en (Accessed on 18 May 2026).

Matthews, A. (2025): The Commission's CAP budget proposal in the next MFF. CAP Reform. Available at: https://capreform.eu/the-commissions-cap-budget-proposal-in-the-next-mff (Accessed on 20 May 2026).

Mendez, C., Bachtler, J., Van Der Valk, O. and McMaster, I. (2026): Flexibility and Simplification in Cohesion Policy under the 2028-2034 MFF Proposals. European Parliament, Policy Department for Regional Development, Agriculture and Fisheries, Brussels. Available at: https://op.europa.eu/en/publication-detail/-/publication/47ac1db5-443a-11f1-8095-01aa75ed71a1/language-en (Accessed on 10 March 2026).

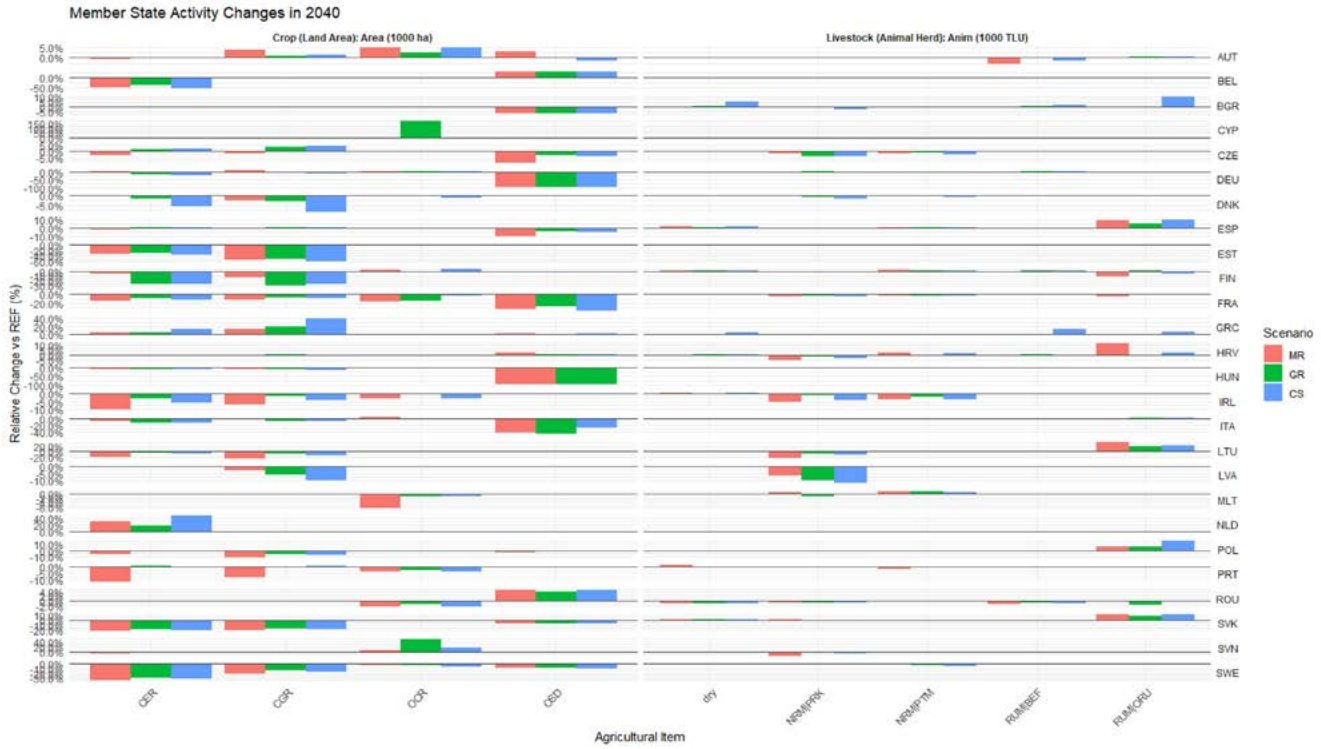
Pe'er, G., Bonn, A., Bruelheide, H., et al. (2020): Action needed for the EU Common Agricultural Policy to address sustainability challenges. People and Nature, **2** (2), 305–316. https://doi.org/10.1002/pan3.10080

Rosenow, K. (2026). The new CAP legal proposal and progress with financial instruments for agriculture. Presentation. Available at: https://www.fi-compass.eu/sites/default/files/publications/06_The%20new%20CAP%20legal%20proposal%20and%20progress%20with%20financial%20instruments%20for%20agriculture.pdf
(Accessed on 20 May 2026).

Sotte, F. (2026): What is still common in the Common Agricultural Policy? Bio-Based and Applied Economics. **15** (1), 95–100. https://doi.org/10.36253/bae-18692

Appendix

Appendix 1: Changes in crop area and livestock numbers per scenario relative to the reference in 2040.



Source: Own composition

Appendix 2: Total budget, total average payments per ha and UAAR across scenarios in EU27 in 2040.

Scenario	Total budget (mil USD 2000)		Average payment (1000 USD per ha)		UAAR (1000 ha)	
REF	19,528.26		0.0613		55,537.85	
MR	18,296.76	(–6.3%)	0.0697	(13.7%)	53,754.01	(–3.2%)
GR	17,377.38	(–11.0%)	0.0880	(43.6%)	54,901.56	(–1.1%)
CS	18,377.24	(–5.9%)	0.0988	(61.2%)	54,395.04	(–2.1%)

Note: the relative changes to the REF are in parentheses
Source: Own composition