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The Common Agricultural Policy post-2020: Views and recommendations from scientists to improve performance for biodiversity

Volume 1 – Synthesis Report

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Workshop coordinators wrote their respective country reports, with minimum editing and interventions by the authors.

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Abstract

Despite significant efforts, substantial investments and some local successes, the EU's Common Agricultural Policy (CAP) has not succeeded in halting the loss of farmland biodiversity. To address these weaknesses, the CAP post-2020 proposes a new "Green Architecture" comprising, *inter alia*, compulsory elements (enhanced conditionality through Good Agricultural and Environmental Conditions - GAEC), voluntary Agri-Environment-Climate Measures (AECMs), and a new instrument called "Eco-schemes". Will this new Green Architecture, combined with a result-based orientation of the CAP, help address the biodiversity crisis?

To provide science-based feedback on this proposal, more than 300 scientists from 22 Member States (MSs) have provided their expertise through 13 workshops that took place between October-December 2020, as well as a follow up online survey. The results are published as Thünen Working Paper 175[1] comprising three volumes: **Thünen Working Paper Vol. 1 (this document) contains a comprehensive synthesis of the results of the workshops alongside experts' assessments of the flagship Eco-schemes proposed by the European Commission.** Thünen Working Paper Vol. 2 contains the full reports of the Member State Workshops (Annex I) and the inputs submitted by the experts' regarding their opinions on the Flagship-Eco-schemes proposed by the EU Commission (Annex II)[2]. A policy brief is published as Thünen Working Paper Vol. 3[3].

Although the Working Paper focuses on the proposed CAP's performance for biodiversity as a core topic, benefits for climate change mitigation and other environmental aspects were highlighted by workshop participants; and economic considerations were highlighted where relevant.

Six key issues emerged as crucial for the Green Architecture to successfully address the biodiversity crisis:

- Protection and restoration of landscape features and semi-natural areas, including grasslands, should be at the core of the Green Architecture and decisive to its success.
- Habitat diversity and multifunctionality should be prioritised at both the farm and landscape levels.
- Spatial planning is needed in target-setting and implementation.
- Collaborative and result-based approaches can and should be promoted for higher effectiveness and efficiency.
- A result-based approach is highly recommended for both AECMs and Eco-schemes, with ample experience to support broader implementation.
- Communication, education and farmer engagement are key to improve acceptance of compulsory requirements (enhanced conditionality), maximise uptake of effective voluntary

[1] Thünen Working Papers cover selected subjects from the present research of the Thünen Institutes and are not peer-reviewed

[2] https://www.thuenen.de/media/publikationen/thuenen-workingpaper/ThuenenWorkingPaper_175_Vol2.pdf

[3] https://www.thuenen.de/media/publikationen/thuenen-workingpaper/ThuenenWorkingPaper_175_Vol3.pdf

measures (AECM and Eco-schemes), enhance learning, and generate a sense of ownership and stewardship.

Simplicity in administration and broad farmer participation are central to the success of Eco-schemes. Enhanced conditionality, Eco-schemes and AECMs should be coherent and complementary to each other. In addition, a no-backsliding principle should apply across all instruments to avoid losses of existing landscape structures or habitat quality, and with them, further biodiversity loss. Enhanced conditionality should set high minimum requirements: for instance, the threshold for landscape features and non-productive land (GAEC 9) should be set to at least 5 % of farmland and applied to all agricultural areas. Eco-schemes should serve to expand ambition (e.g. in the case of landscape features, expansion towards 10 %) and improve management. AECMs should receive priority in budgeting and efforts, targeting protected areas, High Nature Value Farmlands (HNVFs) , wetlands and peatlands, and long-term restoration efforts. Eco-schemes can supplement AECMs in volatile business environments and serve as entry points to AECMs.

Remuneration calculations should be clear, justifiable, and transparent. They should increase with the benefits delivered, and be aligned with AECMs to avoid competition. Farmers should be permitted to top up payments from different instruments into the same parcels if these fulfil multiple objectives, following, e.g., a points-based approach. Member States should strive to achieve a proper balance between “light-green”, spatially broad options versus “dark-green”, targeted measures with high impact. Eco-schemes need to be open to all types of land-users.

A menu-based Eco-scheme approach offers the advantage of catering to a wide variety of farms and farm types, while allowing the design of evidence-based measures. However, if a menu-based approach is selected, their biodiversity objectives need to become much more explicit and strengthened.

The targets set by the EU Green Deal and associated strategies, notably the Farm to Fork Strategy (F2FS) and the EU Biodiversity Strategy for 2030, should guide target-setting by the Member States. Biodiversity targets should be as specific, ambitious, clearly formulated, and quantitative as possible. Workshops highlighted seven criteria for ambition: 1) acknowledging the problems, 2) a clear intervention logic accompanied by a breadth of proposed actions, 3) adherence to key operating principles, 4) ambition reflected in budgets, 5) Investments into knowledge, 6) Selecting suitable indicators to ensure accountability, and 7) presenting sufficiently detailed strategic plans addressing local needs and adaptive capacities.

The transition years of 2021-2022, as well as COVID-19 recovery funds, should be used to prepare for the upcoming CAP implementation period. Key issues to address are: 1) Establishment of support mechanisms for guiding and implementing Eco-schemes; 2) Engagement in mapping efforts to establish baselines, especially for Ecologically Sensitive Permanent Grasslands and landscape features; 3) Expansion of infrastructures (including administrative structures to support Eco-schemes) and capacities for biodiversity monitoring; and 4) Habitat restoration.

Keywords: CAP, Common Agricultural Policy, AECM, Eco-schemes, European Union, Biodiversity
JEL: Q15, Q18, Q57, Q58

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List of Acronyms

AECM – Agri-Environment-Climate Measures

ANC – Areas facing Natural Constraints

AKIS – Agricultural Knowledge and Innovation Systems

BPS – Basic Payment Scheme

CAP – Common Agricultural Policy

DG AGRI – Directorate-General for Agriculture and Rural Development

DG ENVI – Directorate-General for Environment

DP – Direct Payments

EFA – Ecological Focus Areas

EIP-AGRI – European Innovation Partnerships for agriculture

ESPG – Ecological Sensitive Permanent Grasslands

EP – European Parliament

EU – European Union

FAS – Farm Advisory System

GA – Green Architecture

GAEC – Good Agricultural and Environmental Conditions (under Cross Compliance)

GBI – Green and Blue Infrastructure

GHG – Greenhouse Gas

HNVFs – High Nature Value Farmlands

IACS – Integrated Administration and Control System

MFF – Multiannual Financial Framework

MSs – Member States

NDV – Normalized Difference Vegetation Index

NSP – National Strategic Plan

RDP – Rural Development Programme (Pillar 2)

S.M.A.R.T. – Specific Measurable Achievable Reasonable Time-Bound

SMR – Statutory Management Requirements (under Cross Compliance)

SWOT – Strengths, Weaknesses, Opportunities und Threats (Analysis)

UAA – Utilized Agricultural Area

UNFCCC – United Nations Framework Convention on Climate Change

VCS – Voluntary Coupled Support

Background and Questions

Despite significant efforts and investments, the EU's Common Agricultural Policy (CAP) has not succeeded in halting the loss of farmland biodiversity. To address this weakness, the CAP post-2020 proposes a new "Green Architecture" comprising compulsory elements ("enhanced conditionality"), Agri-Environment-Climate Measures (AECM) and a new, voluntary-based instrument called "Eco-schemes". Will this new Green Architecture, combined with a result-based approach (which entails higher flexibility for Member States in terms of implementation), help address the biodiversity crisis?

While post-2020 CAP negotiations were still under negotiations at the time this report was finalized, various issues remained open about its final design and potential implementation. Accordingly, and following a series of meetings with members of the Commission (especially DG AGRI), scientists have been invited to help address some outstanding questions regarding the CAP's Green Architecture, with a particular focus on how the different instruments, especially Eco-schemes, can work best to achieve the biodiversity goals.

An overarching aim was to develop recommendations and guidelines for both the EU (Commission and any other interested parties) and the Member States (MSs), based on sound science. Because some recommendations may emerge that are relevant only for specific MSs, we issued a call for scientists to conduct workshops, across as many MSs as possible, in order to harvest such recommendations.

Our call for workshops focused on biodiversity and was structured around four questions:

1. How can the different Green-Architecture elements optimally complement each other?
2. What can be the role(s) of Eco-schemes in the Green Architecture, and accordingly, how could they best be designed and implemented?
3. How can the EU and MSs set S.M.A.R.T (Specific, Measurable, Achievable[4], Reasonable, and Time-bound) targets?
4. What landscape- and biodiversity indicators could be used to strengthen the indicator-system of the CAP, i.e. are most feasible to monitor, analyse and report across Member States?

Scientists were called to organize and conduct (online) workshops, to address these questions and develop three types of recommendations, for:

a) **design:** What can be (still) clarified so that the overall Green Architecture is most efficient and Eco-schemes are optimally designed;

b) **implementation:** What should be included in the strategic plans and anticipated/monitored by the EU, and

c) **interaction** between the EU and MSs: what should the Commission assess and how can it provide best guidance to MSs to ensure effective and efficient implementation?

[4] Various interpretations exist for the term S.M.A.R.T. For instance, "A" may also stand for "Ambitious".

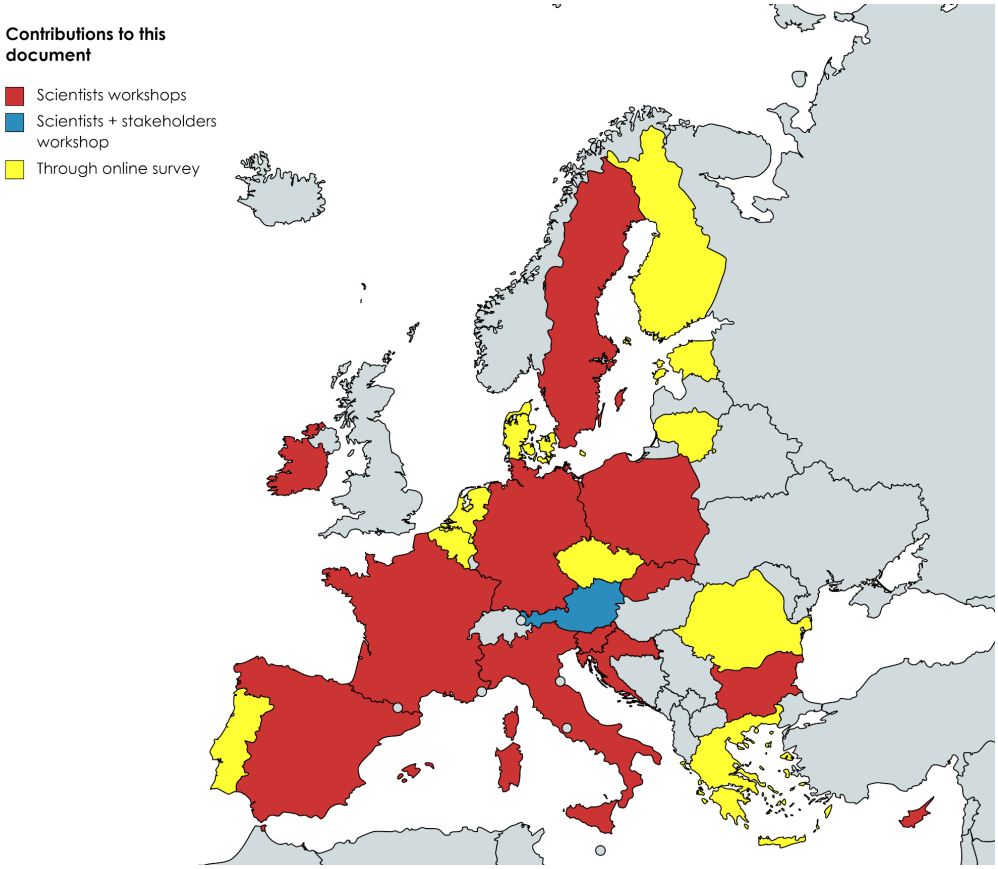
In response to our calls, workshops were organized and conducted in 13 Member States (MSs) between October and December 2020, with over 250 scientists participating (Table 1). These were followed by an online survey, conducted between mid-December 2020 and end-March 2021, from which we harvested comments from 89 scientists regarding Eco-scheme flagships proposed by the Commission and the Council (WK 10899/2020 INIT). In total, this report therefore builds on the inputs from over 300 scientists and experts covering 22 MSs (Figure 1).

Table 1: Overview of the workshops conducted

Member State	Date	Number of participants	Comments
Austria	12. Nov 2020	28	Stakeholders workshop
Bulgaria	10. Nov 2020	16	
Croatia	03. Dec 2020	8	
Cyprus	26. Nov 2020	5	
France	01. Dec 2020	20	
Germany	16. Oct 2020	16	
Ireland	26. Nov 2020	12	
Italy	02. Nov 2020	9	
Poland	11. Dec. 2020	13	
Slovakia	19. Oct 2020	23	
Slovenia	11., 19., 25. Nov 2020	86	Three workshops
Spain	12. Nov 2020	17	
Sweden	10. Nov 2020	12	

Source: Table based on own figures.

Figure 1: **Countries contributing through scientists' workshops (red), scientists plus stakeholder workshop (blue) and additional inputs through individuals contributing through the online survey (yellow)**



The map does not show countries where inputs were provided by both workshop participants and the survey.

Source: Map produced using MapChart (https://mapchart.net/europe.html) based on own figures.

We underline that this report focuses on the CAP's performance for biodiversity. Where relevant, synergies and tradeoffs with other CAP objectives are highlighted in the report. For instance, benefits for climate change mitigation and other environmental aspects were frequently highlighted by workshop participants; and economic considerations were brought up by a large number of participants. However, addressing these objectives was not the main aim of the workshops.

In the following chapters, this document synthesises inputs that can be considered relevant for many or all MSs. Notably, a large number of additional inputs and recommendations by the workshop participants were specific for individual countries. These recommendations can be found in Thünen Working Paper Vol. 2 **Annex I ("Full country reports")**, but were not fully harvested into the synthesis document. Selected quotes from the workshops are included in the following chapters. The quotations are always marked with the name of the country and can also be looked up in Annex I. The original comments from 89 scientists regarding Eco-scheme flagships can be found in Thünen Working Paper Vol. 2 Annex II. We therefore encourage experts, administrators and decision makers in the respective MSs to examine the full country reports where available, alongside the synthesis report.

Methodology

Method 1: Workshops

Format and participation:

Participants

The workshops were designed to ensure the contribution of science to the CAP's design and implementation, and to build on the vast amount of existing knowledge. Accordingly, the workshops were not perceived as "stakeholder engagement" workshops, but rather they sought to involve primarily **scientists** and the knowledge that has been generated through research and interactions with stakeholders in completed and running projects, including interdisciplinary projects. We placed particular emphasis on participation of scientists across a range of disciplines, with a balance between ecology, agronomy, economy and social sciences. Experts working in governmental organizations, environmental NGOs or farming organizations were not excluded if they expressed interest in joining.

Meeting format

Meetings took place **online**. Colleagues situated in the same institute or city were invited to sit together, while respecting COVID-related regulations. A virtual format eased coordination and moderating efforts, and also allowed members of the German organizing team to attend most meetings and provide guidance and comments where necessary.

While 6 to 15 participants was an optimal number of participants recommended, some workshops exceeded this number, reaching 30 participants or more. Workshop coordinators had the freedom to decide whether to divide participants into breakout groups or address the questions sequentially, as well as whether to conduct the workshops in one or more sessions.

Timeline and process

Workshops took place between October 2020 and mid-December 2020. The first workshop took place in Germany, in two sessions (9.10.2020 and 16.10.2020), and was used to test the approach and finalize the guidelines for all others.

To standardize all workshops, the coordination team developed a guidance document and a Power-Point presentation that was provided to all coordinators. We further prepared a template containing a list of questions and a "Template for replies". We recommended coordinators to send the template to all participants in advance, so that participants could write their replies individually, or at least, be ready to discuss their ideas. Coordinators then asked participants to fill and send back completed templates some 3-4 days after the workshops were completed, in order to harvest experts' inputs in a written form and maintain the diversity of opinions and recommendations.

The workshops were moderated by at least one person, and aided by technical assistance and minute-takers. To ease the process, we recommended workshops to a) be conducted in the language most convenient to the (majority of) participants, and b) be recorded in order to generate a clear protocol and ease minute-taking. Participants were informed (and provided their consent) to record. Moderators clarified that the recordings were for internal use only. Names, quotes or personal information remain with the coordinators and organizing team. In addition to the conversations, workshop coordinators harvested the inputs that were provided through the "Chat", or screenshots where relevant.

We asked all participants to provide **concrete recommendations and examples**. We asked workshop coordinators to register the inputs and collate them, without trying to achieve consensus or agreements, in order to retain a diversity of knowledge-inputs and opinions.

After the workshops, we asked all inputs from participants, both personal and from the meetings' minutes, to be taken into the reporting template so that the outcomes were well organized and easy to follow. Additional issues, considerations or recommendations could be written under each question or at the end of the document.

To ensure that the inputs were based on science, we asked participants to provide **references** to evidence where useful and available.

We asked the report to be provided in English. Nonetheless, we encouraged all workshop holders to generate a second document in their respective language (if differing from English).

The coordination team took the task of **synthesising all reports** and individual contributions into one document. To the synthesis report we harvested all inputs deemed relevant for a large number of countries or the EU as a whole.

None of the partners was paid for their participation in this process.

Method 2: Online survey

As a follow-up to the workshop, an online survey was developed to enable individual replies by scientists and other experts, beyond the inputs collected at the workshops. The aims of the online survey were:

(1) To collect written inputs and recommendations from scientists, across Member States, as rapidly as possible – allowing further participation as well as going beyond the Member States covered in the workshops. Accordingly, prior participation in the workshops was NOT required to answer the questions placed in the survey.

(2) To deepen the replies for some specific questions,

(3) To respond on initial proposals for Eco-schemes, offering participants the option to comment on the four flagship Eco-scheme options proposed by the Council, and

(4) To allow a quantitative, choice-experiment based analysis.

In addition to the workshops, scientists across scientific institutions and relevant disciplines, in EU Member States, were invited to contribute to an online survey. The individual scientists were selected through two processes:

- through an analysis of the scientific platform "ResearchGate" for publications on CAP reform, and
- using relevant email distribution lists such as those of agricultural and environmental science associations and other expert networks.

Participants were placed questions that could be used to confirm they have relevant expertise on the CAP, and were asked to reply only to questions that they felt were within their scope of expertise or knowledge.

The survey was open for inputs between mid-December 2020 and end-March 2021. From the survey inputs, we harvested for this Synthesis Report comments on the flagship Eco-schemes proposed by the Commission and the Council (WK 10899/2020 INIT). Further results of the survey will be published separately.

PART 1: DESIGN

1 Green Architecture

1.1 Background comments provided by workshop participants

The status quo is that the CAP is currently not delivering sufficiently meaningful results for biodiversity, with key biodiversity indicators continuing to decline. Reversing biodiversity declines, while sustaining yield and income of agricultural production, thus remains a challenge for European agriculture and the CAP.

Unlike for other areas, the CAP lacks concrete targets for biodiversity. These targets need to reflect both the EU's relevant policies, directives and strategies as well as the diversity and functional heterogeneity of agricultural landscapes in Europe and within Member States (MSs). Therefore, targets need to be set across different scales, from farm, through region and MSs, to the EU level. This is both a challenge for the CAP's final design and its implementation through MSs' CAP Strategic Plans.

> ***Slovakia**: "Set up minimum requirements per spatial scale based on biodiversity and landscape status."*

1.2 Key emerging principles that should guide the Green Architecture

1.2.1 Landscape features and semi-natural areas, including grasslands, should be at the core of the Green Architecture

There is broad consensus across all workshops over the pivotal role of semi-natural landscape features, and extensively used permanent grasslands as the key elements to protect and restore from a biodiversity perspective. It was highlighted that permanent grassland can simultaneously contribute to several objectives, including the protection of biodiversity potentially increasing carbon storage.

Scientists thus indicated that landscape features and semi-natural areas, including grasslands, should serve as a central scaffold of the entire Green Architecture. Specifically, enhanced conditionality, Eco-schemes and AECMs should complement each other as three tiered levels: Enhanced conditionality should set the minimum requirements (e.g. 5 % of non-productive features), Eco-schemes should support more ambitious goals (toward 10 % of non-productive features), and AECM, with more targeted and longer term contracts, should provide the means to further enhance habitat quality or area beyond 10 %. It was agreed that the minimum share of land devoted to these features under enhanced conditionality should be at least 5 %, applied to the EU's entire Utilised Agricultural Area (UAA) with no exceptions. In order to increase the flexibility for farmers, the establishment of a **point-**

based system could be beneficial. In addition, cooperation among farmers (the "Dutch" model; see also "spatial targeting" below) should be incentivised especially in priority regions.

Workshop participants highlighted that the current coverage of landscape features and semi-natural areas differs dramatically between farms and MSs, with some having much more than 10 % cover and others far below 10 or even 5 %. Thus**, a no-backsliding principle should be applied to protect and reward the effective management of the features that are still in place** (especially in High Nature Value regions (HNV) farmlands); and incentives through Eco-schemes should support restoration efforts in farms with low coverage or quality of landscape features.

Management strategies are critical to specify (extensive grazing; reduced or no chemical inputs – see "habitat quality" below); and eligibility issues should be revised as a large number of relevant habitats and landscape-features types are currently not eligible for support (see below "eligibility" issues).

> ***Ireland****: "The majority of Irish farms have more than 5 % semi-natural features with no fertiliser or pesticide application and many surveys in the wider countryside show farm habitat areas of 10-14 %".*
>
> ***Ireland:*** *"Eligible areas to meet this 10 % should extend to extensively grazed semi-natural grasslands because excluding these areas of value for biodiversity could potentially reduce their protection and increase their risk of degradation through either intensification or abandonment."*
>
> ***Cyprus****: "Management based approach at the farm [level are] … very important for Cyprus, where fields are of small size, with margins rich in wild vegetation."*
>
> ***Bulgaria:*** *"In the regions with predominantly extensive farming, the best strategy would be to keep the existing landscape elements; whereas in the regions with intensive farming, targeted efforts for creation and restoration of the landscape elements are needed. The target level for cover with green and blue infrastructure at a regional level range between 10 % and 20 %." "At least 10 % of farmland on the farm level should be occupied by landscape features and elements of green and blue infrastructures, which are highly effective in ecological terms for the specific region."*
>
> ***Bulgaria****: "Permanent grassland ... can simultaneously contribute to the protection of biodiversity and for the reduction of the farm's carbon footprint, in line with the requirements of the EU Biodiversity Strategy 2030."*
>
> ***Croatia****: "Percentage of landscape features should be defined per region. In some regions where intensive arable farming prevails, 10 % percent of landscape features should be required. In other areas with extensive agriculture and natural grassland, there are still a lot of landscape features and the percentage could be higher."*

> ***Austria**: "10 % landscape and biodiversity elements? Could be implemented in AT in a stepwise approach – voluntary AECM rail at least 7 %, incentive up to 20 %, this should result in an AT average of 10 %, but regionally different."*

> ***Germany:** [aim should be] "At least 10 % dark green measures in intensive agricultural landscapes and 20 % dark green measures in average of a whole country should be achieved (both >10 % / 20 % in arable land and >10 % / 20 % in grassland)"*

1.2.2 Diversity and multifunctionality should be prioritised at the farm and landscape levels

The heterogeneity of some farmland areas and agricultural landscapes, especially in areas recognized as HNV regions, needs to be maintained, or restored where lost. Enhancing or restoring landscape diversity requires actions both at the farm level (spatial diversification) and the landscape level.

> ***Sweden:** "Choose a combination of interventions that have the best potential to achieve multifunctionality."*

> ***Slovakia**: "Diversity supports diversity – management diversity supports biological diversity in the landscape, landscape structure diversity supports its species diversity. Each feature of GA has an importance as a single element, but mainly in interaction with other elements."*

Supporting diversity and multifunctionality, as well as overall landscape heterogeneity, require actions at both the farm and landscape levels.

At the landscape and regional levels, this can be achieved through:

- Improved spatial planning and targeting of measures (see below)
- Prioritising focal areas, especially HNV farming regions, with high diversity that needs to be preserved;

At the farm level, helping farmers retain and enhance diversity can be achieved through the use of a **point-based system**

> ***France**: "The more you adopt options within the menu, the higher the payments [should be] ("point system"); by this way, also incentives to adopt a higher number of measures … payment increasing [e.g.] with the share of agricultural area devoted to landscape features"*

> ***Ireland:** "Eco-schemes should be points based rewarding achievement of specific environmental targets across all applicant farms" ... "The area of landscape features and the quantity of semi-natural vegetation on farms can be used as the basis for a points-based Eco-scheme."*

> ***Slovenia**: "above-standard measures should have attractive payments to be economically interesting"*

> ***Spain:** "what may be valuable in one region may be not in another, even for the same agrosystem and within the same country (see e.g., Concepción & Díaz 2019, Concepción et al. 2020). Nonetheless, some general advices would be [to]: Prevent enlargement of field size; Support connectivity and small landscape elements CHARACTERISTIC of each region; Support grassland and fallow land".*

Prioritizing win-win options where feasible, i.e. measures that address more than one environmental objective, such as extensive management of permanent grasslands and HNV farming regions.

> ***Ireland:** "Eco-scheme options should explicitly consider the need to deliver co-benefits for carbon, biodiversity & water (quantity, quality). Options that deliver more co-benefits should be more highly rewarded."*

However, trade-offs between different environmental objectives (e.g. biodiversity, water protection or climate mitigation) exist. Therefore, it might be more efficient to achieve overall by a coordinated set of specialised measures. In addition, it is frequently easier with focussed measures to communicate their objective and evaluate their effectiveness

> ***Sweden:** "a focus on measures that in themselves are multifunctional may erode the total efficiency. For example, [it is] important to maintain some measures that are important for biodiversity per se, even if they do not have climate effects."*

Supporting bundles of joint options (i.e. several complementary measures in the same field, farm or region) that can enhance overall success.

> ***Ireland:** "Strongly consider incentives for the use of environmental bundles of mutually reinforcing measures to enhance effectiveness."*

> ***Sweden**: "Possibility to combine measures that could give synergy in reaching multiple targets – synergy incentives/synergy bonus – both among Eco-schemes and between Eco-schemes and AECM."*

Offering specific support for **maintaining and enhancing crop diversity over space** (beyond crop rotation, which promotes diversity over time).

> ***Slovakia**: "To set sufficiently high targets for increasing the landscape diversity, for example by increasing the crop-diversity, supporting growing vegetables and fruits, reducing the average size of plots through separating large blocks by green infrastructure to achieve a maximum size of 20-30 ha per block."*

Workshop participants highlighted that improving farmland biodiversity will require:

- Economic viability and stability for existing environmentally-friendly farming practices (particularly in small farms).
- Incentives for greater participation in environmentally-friendly farming.
- Reduced administrative burdens on such farms delivering high environmental output, especially in remote rural areas and in HNV regions.
- Reduced administrative burdens on MSs implementing targeted and regionalized measures to improve the CAP's environmental performance. This holds in particular for the smaller MSs.

1.2.3 Spatial planning is needed in target-setting and implementation

The effectiveness and cost-efficiency of spatial targeting has been repeatedly raised, highlighted and emphasised in most workshops as one key element for the success of the Green Architecture for biodiversity. Spatial targeting should apply both to AECM and Eco-schemes, as well as how they interact and complement each other. Environmental measures often refer to landscape elements, bufferstrips or non-productive land, also known as "green infrastructure"; while aquatic (semi-) natural habitats like rivers, lakes or ponds are known as "blue infrastructure". Effective planning – by defining priority areas and targeted measures – is essential for the protection and restoration of the EU's network of these elements, known also as Green and Blue Infrastructure (GBI), and (re)generating sufficient connectivity between habitats or resources to maintain biodiversity and production-relevant ecosystem services such as pollination, pest control, healthy soil and clean water.

> ***Italy**: "The spatialisation of Eco-schemes is likely the most important aspect of the Eco-scheme design. A focus on ecological corridors and more in general connections between ecological infrastructures is necessary."*
>
> ***Spain**: [Eco-schemes] "should be able to aim regionally targeted environmental objectives (e.g., 10-20 % extensive farmland) and be implemented at the landscape scale to improve habitat connectivity at broad scales."*
>
> ***Germany**: "spatial organization should be supported by the delimitation of areas where the support for specific measures is feasible. The coordination could be fostered by RDP-measure (e.g. consultancy / AKIS) and supported by top-ups"*
>
> ***Ireland**: "need to create a variety of interconnected, well-managed habitats that complement each other in the resources they offer."*
>
> ***Slovakia:** "GA should reflect ideas of **integrated landscape management** in a way of combination of different GA schemes and their implementation in the landscape, considering all scales (temporal, spatial, institutional) [...] Implement AECM in multiple spatial, temporal and functional contexts, for example support diversity in context of neighbouring parcels (biotopes for pollinators, water retention belts, etc.)"*

Slovenia: *"Coordinate implementation of measures in terms of their spatial allocation, especially specific measures with contradicting demands." "Improve targeting of ecologically important areas/elements."*

Cyprus: *"Consider improved spatial planning thus creating synergies from e.g. adjacency between targets or other elements of the landscape rather than simply number of hectares".*

Spain: *"Any policy design should take into account the landscape-scale context of individual farms, as well as their interaction with the surrounding landscape at different spatial scales ... The design of AECM and Eco-schemes should also recognize a spatially nested structure enabling to combine coordinated actions in private and public lands."*

Spain: *"In more complex landscapes, maintaining existing Green-Infrastructure elements could be incentivized through advanced conditionality preventing the loss of these elements ... [with] Eco-schemes providing incentives for their maintenance and management. In simpler landscapes, voluntary Eco-schemes and AES may be the most effective option for supporting targeted creation of new Green- Infrastructure."*

Sweden*: "Ensure possibilities to implement interventions with a landscape perspective in mind"*

Poland: *"Actions must be linked to spatial policy. Positive effects will be visible if, for example, gaps in ecological corridors are bridged. This policy must be properly implemented at the local level."*

1.2.4 Encouraging collective approaches to increase biodiversity benefits and payment efficiency

A large number of workshops highlighted that a collective or collaborative approach, i.e. the fostering of cooperation among farmers, can be highly beneficial for biodiversity when implementing effective measures -– with evidence of additional benefits from other perspectives such as social coherence. Collaborative implementation models are needed that increase the benefits at the landscape level and also provide financial incentives, e.g. through agglomeration bonuses.

Collaborative or coordinated implementation of measures within a local target-area has been shown to be valuable for increasing the effectiveness and efficiency of biodiversity support programs. Collaborative implementation models are needed that increase the benefits at the landscape level and also provide financial incentives, e.g. through agglomeration bonuses. The need for these approaches emerges from ecological considerations:

- Many species of European concern need contiguous areas that widely exceed the area that a single farm can provide. Achieving a measurable impact thus requires cooperation among several farms.
- A functional network of (semi-)natural habitats (GBI) requires coordination of adjacent land parcels to avoid isolated actions.

Collaborative approaches have also been shown to yield social benefits for the farming community, e.g.:

- Increased flexibility for the individual farms (swapping obligations according to capacities or needs), also in terms of management contracts and compliance with regulations.
- Enhancing the success and efficiency of result-based approaches, thus reducing the risks and improving the benefits from ecosystem services.
- More effective exchange of knowledge and relevant experience among farmers improves social cohesion, learning potentials and supports adaptive management, while assisting individuals in dealing with relevant authorities.

***Sweden**: "Collaborative implementation among neighbours to increase benefit."*

***Poland**: "Bonuses for farmers for group implementation of measures, especially in the case of linear elements of ecological infrastructure (e.g. potting bows, buffer zones along water courses)."*

***Croatia**: "More innovative approach is needed (e.g. collective implementation and results-based measures).*

***Slovenia:** "The cooperation measure is an important instrument for piloting new conservation measures, especially if they include more complex ways of organising, (e.g. several institutions)."*

***Bulgaria**: "collective application … would be much more effective and beneficial in terms of preserving the mosaic landscape on a larger scale and should therefore be encouraged. There are various examples of collective application of agri-environmental schemes. They require the development of a joint plan for preservation and development of the mosaic landscape, which determines the commitments of each individual farm, the recommended types of land use and landscape elements."*

***Germany:** "Cooperative and participatory approaches [are needed]; transparent communication in the design and implementation phase"*

***France:** "measures should support collective commitments (from a few farmers to large group within a territory) for environmental objectives where there is evidence that collective commitment is more efficient (case, for example, of biodiversity), for example through agglomeration bonuses"*

***Italy:** "include budget for collective uptake ... to maximise the environmental impact."*

1.2.5 A result-based approach is highly recommended

Action-oriented approaches (also known as prescription-based or management-based approaches), where farmers are paid to carry out specific management practices designed to improve environmental outcomes (such as the presence of four, six or eight plant species that serve as bio-indicators for ecological performance of a predefined place), have various merits when well designed and implemented. However, they can lead to landscape homogenization or sub-optimal results if one or few options are implemented too broadly. In addition, they do not provide direct information on their ecological effects, to farmers or to managing authorities.

Many workshop participants saw high potential for result-based approaches and payments, and recommended their increased implementation. An effective protection of farmland biodiversity requires a diversity of localized solutions, striking the balance between management needs and the different needs and life-cycles of different organisms. Result-based approaches have several advantages over action-oriented ones under some circumstances:

- they empower farmers and land-users to use their knowledge and experience, and increase their flexibility with respect to land management as they are not forced to comply with externally-imposed rules.
- they can provide rapid feedback to the farmer on the impact of the management practices and therefore incentivise a continuous management optimization.
- they preferentially reward the continued provision of existing habitats and ecosystem services and can reward habitat quality; in the case of biodiversity, this maximises biodiversity protection and restoration.

Workshop participants particularly highlighted the value of result-based approaches in grassland environments given their diversity and heterogeneity; and noted that experience with regards to their implementation is existing, at least at a pilot-level, in many MSs.

However, results-based approaches also require appropriate AKIS (Agricultural Knowledge and information system) support; identification of specific objectives and indicators; scoring schemes that link delivery levels to payments; and regular monitoring for feedback and assessment of progress. Furthermore, not all action-oriented measures can be replaced by result-based approaches, as certain species and communities:

- have long time lags before they respond to changes in the management,
- show large interannual stochastic fluctuations,
- respond to changes on spatial scales widely exceeding the managed entity, or
- demand a prohibitively high monitoring effort.

Therefore, depending on the objectives and context, a combination of action-oriented and results-based payments, accompanied by non-productive investments and a strong support in terms of information, training and monitoring, should be considered most appropriate.

Bulgaria: *"...result-based agri-environmental schemes ... is an innovative approach for protection and improvement of biodiversity in agricultural land through the active involvement of farmers … can be of particular benefit for improving the state of habitats and landscapes with a view to achieving favorable conservation status, as required in Natura 2000 sites".*

Ireland: *[A result-based approach is suitable where] "a desirable farming practice (e.g. extensive grazing) is threatened by intensification [and where support systems] already exist (e.g. via the EIP projects, Farm-Ecos project)"*

Ireland: *"it is possible to envisage results-based payments being offered within a list-based approach."*

Spain: *"follow a result-based scheme design. There is already a lot of knowledge about this. Three issues appear to be particularly critical to the success of schemes that pay for results. These are: i) clearly defined environmental objectives, ii) suitable indicators of these objectives, on which the result payments are based, and iii) socio-economic context (Herzon et al., 2018)."*

Spain: *"There is an increasing trend to "pay by results", ideally, evaluating biodiversity trends for a set of taxa, but how to achieve these results should be more flexible."*

1.2.6 Communication, education and farmer engagement can improve acceptance, cooperation and uptake of voluntary measures

A key barrier to effective design and implementation of the Green Architecture in MSs relate to farmers' reluctance to adhere to mandatory environmental restrictions (affecting, inter alia, adherence to enhanced conditionality requirements), or adopt environmentally-friendly farming practices.

Farmer involvement and engagement is accordingly highly important, to improve acceptance of compulsory requirements (Enhanced conditionality), maximise the uptake of effective voluntary measures (AECM and Eco-schemes). Greater farmer engagement and co-design during implementation can also facilitate horizontal exchanges, rapid learning and adaptive management, and generate a sense of ownership and stewardship that can help scaling up successes and best practices.

Member States should therefore invest in communication and engagement processes to ensure farmers are taking active part in planning and implementation of measures to the extent possible. This is particularly important for the implementation of result-based measures.

Spain: *"involving more stakeholders to create land-stewardship associations (https://landstewardshipproject.org/) allows to give power to the farmers to implement Eco-schemes at landscape level, the level where conservation takes place"*

Spain: *"Co-design options with farmers and local stakeholders. There is increasing evidence that uptake is higher when farmers are involved in the design process."*

Croatia*: "Information campaigns highlighting the role of farmers in protecting biodiversity and providing vital ecosystem services are needed."*

Poland*: "Often [there is] low level of social capital among farmers, [yet it is] necessary to achieve ambitious goals". [There is need for] "Support for communication and training, so as to convince farmers to participate and the advisability of implementation".*

2 How different Green Architecture elements can optimally complement each other (Question 1)

This chapter revolves around the overall design of the CAP's Green Architecture, its key components and how they should interact with each other. We place special focus on the question which instruments should or should not be considered as part of the Green Architecture and under which conditions.

2.1 Key principles and roles of enhanced conditionality, Eco-schemes and AECM and how they should interact to maximise the GA's success

2.1.1 Enhanced conditionality

Enhanced conditionality should operate across the entire UAA. Exceptions (based on land-use, crop type or farm area) will dilute, weaken and even damage it. Since it is obligatory, it may be the most efficient tool toward an aim, and hence the most important element to establish strong and clear standards of good management. This should be accompanied by strong monitoring and enforcement.

Enhanced conditionality requirements are the mandatory conditions for recipients of direct payments in pillar 1, and therefore set the minimum standards for land management. They provide the baseline for the voluntary schemes in Pillar 1 and Pillar 2. Member States may have some discretion to specify the details of the Good Agricultural and Environmental Conditions (GAECs), but are constrained by the legislative requirements in the CAP Regulation. It is therefore important that both the legislative requirements, and national specifications of these, are sufficiently ambitious and unambiguous to avoid degraded implementations by Member States. This applies in particular to the following GAECs:

GAEC 2 (defines appropriate protection of wetland and peatland): While covering merely 3% of the EU's agricultural land, drainage and damage of wetlands contributes 25% of the EU's agricultural greenhouse gas emissions. GAEC 2 should therefore cover all carbon-rich soils, including fens, peatlands and wet meadows, without exceptions or limitations (e.g. not restricted to Natura 2000 sites). In the long term, payments in support of agriculture on drained organic soils should be phased out or linked only to paludiculture.

GAEC 9 (defines protection of landscape features and land devoted to non-productive areas): Should secure landscape features and non-productive land, with a threshold of at least 5% of farm area applied to all farmland (i.e. not limited to just arable land). To avoid replicating the failures of the greening measures of the current CAP, no exemptions or exceptions should be made, and productive features should not be included. Catch crops and nitrogen-fixing crops do have a value for soil quality, but their frequently-intensive management yields limited or no biodiversity benefits. They should therefore belong in GAECs 7 and 8 only.

GAEC 10 (places a ban on converting or ploughing permanent grassland in Natura 2000 sites): The ban on converting permanent grassland in Natura 2000 should be expanded also beyond Natura 2000 sites, with particular emphasis on Ecologically Sensitive Permanent Grasslands (ESPG).

***Germany**: "Extended conditionality can set a new course for farming, e.g. in peatland management [but] ambitious minimum requirements [are] needed."*

***Ireland**: "Consider a threshold of 5 % of farm area for space for nature (landscape features and habitats) as part of GAEC 9, and applied to all farmland, and not just arable land."*

***France**: [Enhanced conditionality should see] "no climatic and environmental dumping, no distortions between Member States… [and applied to the] Whole agricultural area (no exemption/exception)"*

***Slovenia**: "GAEC 2**:** Definition of wetlands might be challenging at the national level. It should include fens, peatlands, wet meadows and some types of small water bodies (e.g. local depressions)". "GAEC 10**:** Ban on converting permanent grassland in Natura 2000 should be expanded since it is currently implemented only in some Natura 2000 sites. No exceptions should be allowed for organic and small farmers. It should also include an upper limit on fertilization and stocking rates."*

***Slovakia**: "Make Conditionality use as the most efficient tool (based on the previous experience) how basic and complex requirements for protection of natural resources are accepted (protection of water, soil, biodiversity, etc.), which contributes to climate change adaptation". Conditionality should "balance the trade-offs between biodiversity conservation and an economic growth of agriculture by defining cost-efficient, and at the same time biodiversity enhancing measures. For example reaching target of 25 % UAA in organic farming can be achieved, but if this concerns mainly grasslands then reaching this target would become inefficient, i.e. there is not a big difference in management of upland grasslands under organic farming and under conventional farming."*

***Spain**: [key issues are] "better enforcement of existing norms aimed to reduce the impact of agriculture intensification (ie. agrochemicals, animal welfare, etc.) … include all environmental legislation related to agriculture (WFD, pesticides, etc.) ... Reduce the number of exceptions; – Basic standards of environmental quality in farms at large-scale. Specially recommended for countries culturally prone to suffer the "tragedy of commons" (e.g. Spain) …Their success will depend on the seriousness of the states in demanding their compliance in return for receiving the aid. The risk is that, since they constitute a significant part of farm income, states are likely to be lax in their compliance"*

***Sweden**: "Clarify how EFAs (=arable land) are supposed to be included in GAEC 9 (concerns conservation of existing/"natural" landscape features), and what would be needed on top of that?"*

2.1.2 Eco-schemes (for further details see Section 3)

Eco-schemes should serve as a means to expand the overall coverage of biodiversity-, climatic- and environmentally-friendly farming. To do so, they should...

Be evidence-based, clearly linked to biodiversity objectives, and **coherent** with other components of the green architecture (see also section 2.2)

> ***Cyprus**: "Eco-schemes must be linked directly to the achievement of biodiversity and climate impact targets."*

> ***Poland: "**Eco-schemes must be consistent with each other and with other supported CAP measures"*

> ***Sweden**: "Ensure coherence between (short-term) interventions in pillar I (Eco-schemes) and (long-term) interventions in pillar II (AECM) to achieve multifunctionality"*

Go beyond enhanced conditionality, optimally going beyond the maintenance of (high quality) habitats to allow restoration of habitats in terms of extent (e.g. in regions and farms with less than 10 % landscape features) and quality.

> ***France**: "Remuneration of efforts beyond baseline requirements of conditionality"*

> ***Germany**: "Eco-schemes should go significantly beyond the minimum standards of conditionality and national standards"*

The inclusion of ineffective measures, which may end up dominating Eco-schemes, was repeatedly highlighted as the key risk to their success (see section 2.6, risks and weaknesses).

Eco-schemes should be applicable to all UAA, but Eco-scheme Measures should not try to cover all areas and farms – rather, higher-quality options should receive better priority and funding. Priority regions and areas should be identified as well, particularly HNV regions, Natura 2000 sites, and areas of relevance for the Water Framework Directive and Nitrates Directive, in a way that complements AECM.

> ***Germany**: [Eco-schemes are] "good where ecological relevance of action changes from year to year (e.g. breeding sites of ground breeding birds) [but] ... mechanisms in the design are needed to ensure spatially targeted and multiannual implementation".*

> ***Germany:** [Eco-schemes' role should be] "Filling the gap between good agricultural practice and AECM"*

> ***Cyprus**: "Eco-schemes will be effective when they target environmentally damaging, high input systems with the aim of shifting them towards more sustainable practices."*

> ***Croatia**: "Compensation for specific area-related legal restriction (e.g. Natura 2000 area, water framework directive areas) … Support to existing management that are environmentally beneficial but threatened from abandonment (e.g. HNV grassland)"*
>
> ***Austria** (farmers): "Small scale agriculture and extensive grazing should be promoted in the Eco-schemes. … alpine farming should be promoted ... e.g. to conserve extensive grazing (which has a positive impact on biodiversity)"*

Complement AECM and not compete with them. For examples, Eco-schemes can be used as an entry point for more sophisticated, longer-term AECMs.

> ***Poland**: "Relations between Eco-schemes and Agri-Environmental Programs (AECM) [needs to be] "balanced" so that farmers do not move away from AECM to Eco-schemes."*
>
> ***Sweden**: "Use interventions in pillar I (Eco-schemes) as short-term transition possibilities before joining the longer-term interventions in pillar II (AECM)."*
>
> ***Sweden:** "Important that new Eco-schemes do not erode the funding of AECMs in cases where contractual multi-year arrangements are important for success."*

Be financially attractive to make them both attractive and efficient.

Remuneration should increase with the benefits delivered. This means that if payments are coupled to agricultural land, the environmental impact should scale well with the agricultural land. Notably, this would exclude animal welfare and investment options: in animal welfare the relevant option is the animal, and the area, especially in granivore production, is only a very rough proxy for the number of animals kept. For investments, there is frequently no relation with the area, the environmental impact and the investment costs. In order to be efficient, Eco-schemes should be used mainly as an instrument to support environmental needs and not mainly as an income support instrument.

> ***Poland**: "Attractive payment rates – additional bonuses to be considered for repeating the action in the following years". [Other suggested (e.g. for restoration actions)] "higher rate in 1 year"*
>
> ***Spain:** "attractive to the farmer the maintenance of natural diversity and sustainable practices, both implying a plus of environmental quality added to the standards guaranteed by the advanced conditionality instrument."*
>
> ***Germany:** "Eco-schemes are attractive [especially] in non-flat areas, where commercial agriculture is not viable (e.g. valleys or mountains). The challenge is to increase the Eco-schemes in flat areas where commercial farming is very profitable ... that could be done ... by reducing the payments per hectare and to increase the payments in the Eco-schemes."*

> ***Sweden:*** *"Payments should be differentiated to reflect true cost of implementation, or better: the expected or achieved environmental outcome. Ambitious environmental schemes are often costly to implement."*

> ***Sweden****: "Differentiated compensation that is based on the expected effects … Enable multiple effects from interventions – exploit possible synergies between climate mitigation and biodiversity conservation"*

Be simple for administrators to handle and for farmers to participate in

> ***Poland****: "Eco-schemes must be administratively simple to implement and control (reducing the already spread bureaucracy)".*

> ***Poland:*** *"To achieve economies of scale – a wide offer of activities relatively simple to implement for a large number of farmers"*

> ***Bulgaria:*** *"ambitious but still doable by farmers, if too many changes are needed at once – the voluntary character of the scheme would destroy it"*

> ***Slovakia:*** *"...administratively accessible, achievable on the field, more tight to ecological aims, efficiently supervised and enforced; if payments for farmers are low then majority of farmers is not engaged and aims are not achieved"*

> ***Cyprus****: "Simple, simple and simple. Must be straightforward for a farmer to apply, easy to implement, and easy for the payment authority to evaluate compliance."*

Strive for continuity over time (multi-annual implementation)

Workshop participants strongly supported multiannual interventions and commitments where possible, especially for measures that have limited benefits if implemented only for one year (e.g. reduced chemical inputs, extensive grazing management).

> ***Sweden****: "multiannual interventions should be encouraged as they have a potential for having positive environmental effects."*

For further details and recommendations regarding Eco-schemes see **Section 3**.

2.1.3 Agri-Environment-Climate-Measures (AECM)

AECM are the most established CAP instrument to achieve environmental goals, with vast experience regarding the conditions under which they perform best; yet a range of challenges, including low overall budget and insufficient remuneration for effective but complex options, has led to low uptake in some Member States and regions. However, over the last decade the respective budget in many

MS was stagnant or even declined. In addition, the uptake by some Member States and farming communities was low. Given their potential high effectiveness with regards to biodiversity protection, AECM should generally receive the highest priority in budgeting and efforts of the financial support instruments of the Green architecture.. AECM can be used to support the implementation of specific conservation goals such as the Natura 2000-strategy of the EU or HNV areas, to cover more complex ecological requirements (i.e. focus on habitat quality), to scale up conservation and restoration efforts to the landscape level, and to improve landscape connectivity in support of Green and Blue Infrastructure.

***Ireland**: "Use AECM actions to implement results-based payments to improve the ecological quality of farmland habitats ... [and for] incentivising the improvement of degraded habitats, and maintaining those habitats with existing high ecological value."*

***Slovakia**: "AECM should aim for protected areas and specific problems, e.g. areas with wetlands on arable land or areas with higher share of non-forest wooded vegetation, areas where grazing restoration is needed, usually abandoned places of difficult access"*

***Poland:** "ACEM more focused on specific Natura 2000 hotspots".*

***Ireland:** [AECM should have] "two streams. Stream A would be targeted at general measures across the whole country, while stream B would provide a mechanism for roll out of targeted locally adapted farming for nature measures, focused on hybrid result based payments schemes".*

***Bulgaria:** "Support for permanent grasslands of High Nature Value through the agri-environmental measure under CAP Pillar II (continuation of existing commitments in accordance with the requirements of the Regulation).*

Preserving the schemes "Restoration and maintenance of High Nature Value grasslands".

***Spain:** [AECM should focus on] "Three general goals: biodiversity conservation, environmental quality at long-term, and adaptation to climate change. … Additional conservation targets (more specific): threatened biodiversity (species + habitats) ... can be adequate to implement functional improvements at large spatial scales (connectivity between ecosystems or remote regions, promotion of grazing and transhumance), more difficult to achieve by Eco-schemes."*

***Croatia:** "Specific and targeted AECM are crucial in addressing the specific environmental challenges."*

***Germany**: [AECM are] "Context dependent, but presumably most efficient measures to promote biodiversity; [an] Established system known to farmers and administration". [But they are] "Insufficient to reach the diverse targets … too little financial resources (limitation of budget share) and too little money spent for targeted actions ...".*

2.2 How Green Architecture instruments should interact

Coherence among AECM and Eco-schemes (the two key voluntary instruments), as well as overall coherence of the Green Architecture, requires a clear and consistent set of goals, a clear separation of roles, **a consistent intervention logic**, as well as comparable payment levels, to ensure AECMs and Eco-schemes complement each other in terms of the solutions they offer for the diversity of environmental challenges.

> ***Germany:*** *"Clarify and rank the goals, what is the primary target, what is auxiliary. Currently a lot of the goals are conflicting".*
>
> ***Ireland****: "Payments should be granted in line with climatic and environmental services, and increased with the provision of services".*
>
> ***Slovakia:*** *[to] "offer [a] wide range of measures and to adapt to regional/local differences; Eco-schemes and AECM must reflect different conditions and demands of particular regions".*
>
> ***Bulgaria****: "AECM and Eco-schemes should be designed to be as close to traditional agricultural practices (the most commonly used practices in a given region) as possible."*

A balance is required between compulsory and voluntary components, where enhanced conditionality is essential to set clear and strong basic standards. **Without strong mandatory standards, the added value of voluntary payments is eroded and "windfall gains" occur, i.e. payments for doing nothing**.

> ***Austria*** *(farmers): "it is important to have a balanced combination between mandatory and voluntary measures. Strong voluntary measures with an incentive component are particularly important here."*
>
> ***Austria*** *(farmers): "Eco-schemes and [AECM] should be thought together and complement each other"*
>
> ***Germany****: "Avoiding windfall gains […] definition of effective minimum protection through conditionality and national minimum standards, requirement that AECMs and Eco-schemes are only paid if they significantly exceed the minimum protection"*
>
> ***Sweden:*** *"Ensure that the chosen "menu of interventions" as a whole is multifunctional, even if individual farmers then can choose to implement all or only part of the menu."*

AECM and Eco-schemes could be differentiated in terms of their roles regarding local versus global public goods; or short-term (entry point) versus long-term implementation.

Inputs from the workshops varied, however, on the question how Eco-schemes, combined with AECMs, should complement each other (or balance within them) in terms of spatial extent, number

of farmers or a focus on intensive versus extensive regions. The **diversity of replies indicates a range of plausible options and context-dependency.** It is clear that a balance among the "tiers" of enhanced conditionality, Eco-schemes and AECM is needed; yet, potentially Eco-schemes could (or should) cover both broad-and-simple as well as deep-and-local options. It was highlighted that being too broad might result in weak or even completely ineffective Eco-schemes.

> ***France**: [AECM should address] "Local public goods such as soil, water and air quality, the maintenance of open and diversified landscapes, recreation ecosystem services (hunting, angling, etc.) .... [whereas Eco-schemes should cover] Global public goods, that is, climate mitigation, biodiversity preservation/restoration + animal welfare + Green Deal targets related to agricultural GHG emissions and the use of chemical inputs (pesticides, fertilizers and antimicrobials)".*
>
> ***Poland:** "the commencement of activities under Eco-schemes may become an incentive to expand and deepen the activities of the farmer and enter into long-term commitments in the AECM program"*
>
> ***Slovakia:** "good experience with some AECM measures like semi-natural grassland management ...should be kept, while Eco-schemes should include simple measures like changes in dates of mowing, mosaic mowing, reducing size of blocks, creating buffer zones around wetlands…".*
>
> ***Croatia**: [Eco-schemes] "should be designed as rather entry-level type of measures (light green), to leave a room for specific and targeted AECM that go beyond the level of ambition in Pillar I."*
>
> ***Cyprus**: "For Eco-schemes, focus on large scale impact with strong AKIS support, to reach our main environmental targets. For AECM, focus on Natura 2000 areas, mountains and catchment areas of dams (also mainly mountainous)."*
>
> ***Slovakia:** "Making Eco-schemes simple and thus to increase its applicability and attractiveness for [the] majority of farmers and this way spreading positive environmental impacts. AECM should aim to solve specific problems (target species, biotopes, protected areas, HNV areas), support result-based schemes and multifunctional measures at landscape level, allowing impact of one AECM measure to multiple problems."*
>
> ***Austria** (farmers): "broad-based measures are to be included in the Eco-scheme, so that many farmers can benefit from them".*

2.3 Other important instruments for the success of the Green Architecture

A range of instruments, especially in Pillar 2, can help achieve environmental goals. Selected examples are highlighted in this section.

***Germany**: "There are [many] useful instruments in pillar 2 [beyond] AECM, i.e. financing advice, financing cooperation (e.g. for joint water management in hydrological units at landscape-scale), supporting investment for initiating transformation to climate smart agriculture on peatland".*

***Sweden**: "The only reasonable criteria for counting a payment as a Green Architecture payment is if the measure is explicitly designed to do so. In Scown et al. 2020, "We define an environmental payment to include all CAP measures that state the intention to principally benefit nature, the environment, climate, or promote sustainable farming in the wording of the measure itself, and that involve more than the application of usual good farming practice or directly support production." According to this criteria, we identified 26 measures that could plausibly be constituted [as] environmental payments. We found that these payments constituted only about 15 % of CAP payments in 2015.[5]"*

2.3.1 Instruments for knowledge support

Knowledge-support instruments are key for supporting the Green Architecture, demonstrating the success of the EU's and MSs' investments in promoting innovation and knowledge-exchange especially through AKIS, Farm Advisory Services (FAS) and European Innovation Partnership (EIP-AGRI) as key instruments. Concomitantly, participants in all workshops highlighted a need to enhance investments in order to expand knowledge support where these are linked to environmental objectives. Ecological training clearly needs to be expanded, and better funding for such training is necessary to enhance awareness, acceptance, uptake and good implementation of effective measures.

***Cyprus**: "Capacity building events: Provide training and decipher the schemes to farmers well before implementation. … Involvement: Engage farmers in presenting their activities and impact to other farmers through workshops/ conferences"*

***Cyprus**: "We need to develop a detailed 10-year plan on how to reach the Green Deal targets in Cyprus and expand and improve AKIS to support this."*

***Cyprus**: "Establish interdisciplinary (e.g., soil, water, nutrients, crops, pest management, economics) science-extension-producer AKIS teams, facilitated by an Extension staff to support on-farm research and demos with regional farmer producer groups"*

***Slovenia**: "Knowledge transfer and cooperation are important supportive measures, so a suitable share of funds, which covers targeted projects and activities, could be considered as*

[5] List of environmental measures: Scown et al., 2020, Table S2: https://www.cell.com/cms/10.1016/j.oneear.2020.07.011/attachment/93d59604-c0af-4d7c-a98d-4f0e59212f7f/mmc1.pdf

well. Knowledge transfer ... system should be upgraded to include more individual approaches and learning in smaller groups of farmers, and a greater emphasis should be put on practical training and sharing of good practices on-site."

***Bulgaria**: "Introduction of training targeted at farmers managing agricultural land in Natura 2000 sites, as well as targeted consultations and advice on environmentally friendly farming practices for protection and restoration of species and habitats in particular protected areas… This addresses the needs for clarification of the essential requirements for management of agricultural land in Natura 2000 sites, including for justification of the reasons for the imposed prohibitions of use of agricultural land; what benefits are expected and desired for biodiversity, as well as what benefits the protection of biodiversity would bring for the farming activities and lands".*

***Ireland**: Important elements of the GA are "Farm advisory services/wider Agricultural Knowledge and Innovation Systems (AKIS), EIP operational groups and the cooperation measure". [IT is important to have] "Cross cutting supports such as AKIS and farm advisory services… co-operation and innovation support (European Innovation Partnership Operational Groups) need to be integrated into the CAP Green Architecture.".*

***Croatia**: "AKIS/consultancy- More and better advice is needed, but most advisors do not have sufficient knowledge on ES and AECM. Robust education and training programmes are needed to train advisors and farmers".*

2.3.2 Instruments to support Natura 2000

Instruments for targeted support of the Natura 2000 network were highlighted as important and should be enhanced.

***Poland:** [They are]"More ambitious, but much better paid than Eco-schemes. More adapted to regional conditions (LFA, NATURA 2000, etc.), e.g. The focus should be on the protection of valuable natural habitats (permanent grasslands), where extensive agricultural production is carried out"*

***Slovenia:** "Natura 2000 payments are an important instrument that should be targeted to the most sensitive habitat types where voluntary measures are insufficient."*

***Bulgaria**: "the Natura 2000 compensatory payment measure is considered the most ambitious and effective nature conservation measure as it supports over 10.000 farmers with over 25 mil Euro each year"*

2.3.3 Instruments for non-productive investments

Several workshop participants highlighted the need (or potential) for non-productive investments to generate positive impacts when investing in restoration measures, e.g. of landscape features, habitats or their quality. Such investments are important for instance in the restoration through rewetting of peatlands and wetlands.

> ***Poland:*** *"• Support for investments in water retention,*
>
> *• Investments in fixed assets supporting environmental and climate protection, including investments in Natura 2000 areas*
> *• Investments in afforestation"*

> ***Croatia****: "Non-productive investments-if used for restoration of habitats, purchase of electric fences and sheep dogs in areas of large carnivores, restoration of stonewalls, terraces, planting hedges."*

> ***Slovenia:*** *"Provide investment support for restoration of landscape features where sensible and necessary". "Non-productive investment – conservation projects to restore and newly set-up landscape features, which must then be tied to further above-standard schemes that the farmer can enter into, or take them into account for the needs of conditionality.*
>
> *Other investment: lower weighting factors for support to purchase of minimal tillage and other types of specialised machinery if it is included in Eco-schemes and new land is entered."*

> ***Germany****: "...peat- & wetland" [:...] "Considering the administrative background AECM and Eco-schemes only partly suit here. Better would be climate funds and non-productive investments (funds should have different focus; [otherwise,] legal problems of double funding)."*

2.3.4 Instruments to support cooperation for biodiversity

Cooperation for specific field work for biodiversity and for the cooperation between conservation specialists and local farmers should be supported.

> ***Slovenia****: "Support measures to implement complex biodiversity schemes and CAP technical support are important, too. Support measures are needed for very targeted biodiversity schemes, where they enable the functioning of different organisations engaged in cooperating or contracting with farmers, as well as substantive control (e.g. co-financing the work of field ornithologists who determine territories or nest-sites and then inform farmers about this)."*

2.4 Non-effective or ambiguous instruments for the Green Architecture

Some Instruments should not be considered part of the GA, or can impede success unless revised. Other policy instruments risk the success of the GA by conflicting biodiversity protection efforts and need to be carefully revised for their impacts. These include payments for Areas of Natural Constraints (ANC), (production-oriented) investments, support for forestry, and coupled payments.

2.4.1 Payments for Areas of Natural Constraints (ANC)

Payments for Areas of Natural Constraints (ANC) were identified as an instrument that should not be considered part of the Green Architecture under current conditions. Experts recommended that they should be revised if it is decided to count them as part of the Green Architecture. By explicitly linking ANCs with environmental objectives and potentially with the support of (farmers in) High Nature Value (HNV) farmlands, ANCs can generate concrete benefits.

> ***Ireland:*** *"redesigned ANC payments with a much clearer focus on environmental outcomes"*

> ***Spain:*** *"these types of instruments are not necessarily linked to environmental objectives, so their inclusion could artificially inflate European investment in green architecture. … To consider these instruments as contributors to green architecture, environmental criteria should be explicitly introduced in their design."*

2.4.2 Agri-Investment programs in Pillar 2

While some non-productive investments are used for conservation-oriented purposes (see above), other investment measures – especially for farm modernization – are not officially affiliated with environmental criteria or objectives, and are often used for agricultural intensification, also in sensitive regions such as HNV farmlands. Such investments can have the effect of being harmful subsidies that can counteract the environmental objectives of the GA, or even risk the CAP's overall performance for biodiversity. These need to be conditioned to stricter environmental criteria.

> ***France****: "Agricultural investment support should be conditioned to the respect of climatic and environmental objectives".*

> ***Spain****: "since these types of instruments are not necessarily linked to environmental objectives, … their inclusion could artificially inflate European investment in green architecture."*

2.4.3 Coupled payments

Coupled payments to livestock represent the lion's share of coupled aids. They suffer from important drawbacks linked in particular to their poor efficiency (assessed in terms of animal and herd

zootechnical performance, total factor productivity and agricultural income support However, when coupled payments are tied to biodiversity, climatic and other environmental requirements – namely, when supporting extensive forms of farming and grazing, they do have the potential to generate positive impacts. Thus, coupled payments should be strictly tied to sustainable farming management, or otherwise phased out altogether.

> ***Ireland**: "With the exception of payments for rare native breeds of livestock, payments coupled to production are a very crude instrument which have had considerable negative consequences on environmental quality … payments should [therefore] be linked to environmental outputs NOT to livestock numbers."*
>
> ***Sweden**: "Direct payments [in general] slow structural change ...VCS to livestock increase GHG and nutrient emissions. [We recommend] Transferring a large amount of direct payments budget to Eco-schemes and introducing results-based environmental payments."*
>
> ***Sweden:** "Cattle support ... is partly motivated by being important for biodiversity, but for this to be true, there should be requirements for cows/cattle to graze semi-natural grasslands. Also, this support raises a potential conflict with climate goals."*
>
> ***Poland:** [Coupled payments may generate benefits where used for:]*
>
> • *"Support related to the production of legumes*
>
> • *In areas of particularly valuable nature, support for extensive production of cattle, sheep or goats (depending on the nature of the habitat)"*
>
> ***Germany**: "Coupled support could be beneficial to support grazing in case underutilization is a problem or to support orphan crops with strong environmental benefits"*

2.5 Budget considerations and recommendations

If designed wisely, AECM and Eco-schemes combined can lead to a doubling of the overall budget allocated for biodiversity, climate and the environment. This can be achieved through a number of strategies.

2.5.1 Increased budget shares for environmental instruments

Increasing the budget across both pillars for AECM and Eco-schemes together. This topic was controversially discussed: participants from most attending MSs proposed that Eco-scheme and AECM budgets should be ring-fenced separately, to avoid competition among them; and that within Eco-schemes, sufficient budgets should be secured for biodiversity and climate objectives.

***Slovakia**: "insist on mandatory allocation of 30 % for Eco-schemes and to delimit at least 10 % of the agricultural area as non-productive areas (not including nitrogen fixing crops and catch crops)."*

***France**: "Ring-fenced budgets for both the Eco-schemes in Pillar 1 and AECM in Pillar 2 … Two ring-fenced budgets for Eco-schemes in order to cover both climate mitigation and biodiversity preservation objectives"*

***Germany**: "Eco-schemes [may] compete with 30 % share for agri-environmental measure in the 2nd pillar ==> a) ring-fencing over both pillars … Gradually increase the share of Eco-schemes on DP from year to year."*

***Sweden**: "High proportion of DP should be ring-fenced for Eco-schemes"*

2.5.2 Increased transfer for AECM in Pillar 2

Given the high effectiveness of AECM and their multiannual character, workshop participants highly recommended MSs to **increase budget transfers to AECM** was highly recommended. This is particularly relevant for implementing measures that require several or multiple years, since AECM contracts can be established beyond the limits of the CAP's Multiannual Financial Framework (MFF), whereas Eco-schemes will likely be bound by the MFF's limits.

***Ireland:** "an important element in designing the CAP Strategic Plan will be to reflect on the merits of transferring some of the Pillar 1 funding allocated to Eco-schemes to Pillar 2 where they may be used more effectively from an environmental and climate perspective."*

***Bulgaria:** "Smaller budget for Pillar 1 [Pe'er et al. 2019, 2020] and larger budget for Pillar 2."*

2.5.3 Secure unspent Eco-scheme budgets for environmental objectives

Unspent Eco-scheme budgets should go to environmental objectives, either in AECM or through re-allocation to Eco-scheme participants to incentivise participation. This is important as Eco-schemes might be particularly useful and beneficial to achieve environmental outputs in farming systems facing a highly volatile business environment. Under these conditions, planning of farmers' acceptance, and achieving an appropriate allocation of budget resources years in advance, is an extremely challenging task for national administrations.

***Ireland**: "To avoid perverse incentives, Member States should be assured that unused funds in any year can be retained, for example, by making use of flexibility arrangements to transfer them for use in agri-environment-climate schemes in Pillar 2 … and spent over a number of years*

to reward 'deep green' commitments for biodiversity and other objectives. … A points-based Eco-scheme could also be used [so that] the unspent money could be added onto the unit value of points gained by participants in that year as an eco-bonus payment".

***Germany**: "Unused funds for Eco-schemes could be transferred to the 2nd pillar for environmental related expenditures"*

2.5.4 Avoid misuse of green funds

It is important to ensure that non-environmental objectives (and budgets) do not lay claims to environmental instruments or bias budget calculations. This is the case with the proposal to include the boosting of competitiveness in Eco-scheme objectives; inclusion of precision farming and animal welfare under Eco-schemes without requiring coherence with biodiversity objectives; and the proposal to list ANC as part of the green budget without a revision of ANC objectives. Income- and competitiveness-benefits should be added values, but they cannot replace coherence with biodiversity objectives that must be met.

***Ireland**: "Schemes for boosting competitiveness included in European Parliament Amendment 238 (Article 28a) have the potential both to weaken the CAP Green Architecture and to divert budget away from environmental objectives of CAP." … "Given a limited budget for environmental schemes, the more this budget is used to finance income transfers rather than environmental action, the less environmental improvement will be achieved."*

***Germany**: "if Eco-schemes have an income component; only the not income relevant part should be attributed to this share"*

2.5.5 Assessment of cost-efficient spending within Green Architecture

Significant improvements are needed in *ex ante* evaluation of the effectiveness and cost-efficiency of alternative options. MSs should be required to clarify decision-making with this respect in their Strategic Plans, bearing in mind that more targeted, and hence more effective options are often also more costly - for both farmers and administering agencies. Notably, there is often a strong emphasis on reducing the administration costs (design, ICT systems, promotion, advisory support, training, monitoring and evaluation) associated with schemes; however, having lower administrative costs (as a percentage of the budget) for the delivery of any scheme leads to a false economy if the scheme objectives (e.g. to restore/protect biodiversity) are not attained.

***Sweden**: "The cost-efficiency of chosen interventions should be taken into account (i.e. did MS choose interventions that give highest environmental or climate effects per expenditure). This includes also "social efficiency", i.e. saving on administrative costs does not necessarily improve overall efficiency if less is achieved in the end in terms of environmental effects.*

***France**: "trade-off between the attractiveness of measures for farmers and the budgetary costs of these measures: necessity of impact assessments in order to maximise the efficiency of Eco-schemes (maximisation of climatic and environmental benefits for a given ring-fenced budget for Eco-schemes); the same logic should apply to AECMs"*

***Sweden**: "Important to take into account that activities with high environmental benefits may be very costly. If payments do not reflect differences in cost, those activities will not be performed. The relevant cost concept here is opportunity costs, which are difficult to observe."*

2.5.6 Addressing double-funding issues

Exclusion of double-funding can reduce red-tape, increase the implementation of ambitious measures, and allow differentiated designs. It should focus on the combination of measures that have some relevance for the overall budget, and can be achieved by clarifying the borders and complementarity among instruments. It was proposed, however, that extra-payments on the same parcel should be allowed if additional benefits are gained.

***Ireland**: "There is a need to ensure that there is no risk of double payment across the Green Architecture. This may be best achieved by ensuring there is a hierarchy and greater levels of ambition as you move up the tiers in the Green Architecture … There should be clear threshold targets between GAEC, Eco-scheme and AECM that would allow a single parcel to receive payments for all three, with a clear gradation of standards."*

***Italy**: "To not incur double funding, the targets of the 2nd Pillar of the CAP should be differentiated."*

2.5.7 Maximising flexibility in cost calculations

Flexibility in cost calculations should be maximised to allow the generation of benefits to participating farmers beyond recovery of income foregone. Especially, total budgets and remuneration levels of selected options (AECM, Eco-schemes) that generate high value, should be enhanced.

***Poland**: "The use of several Eco-schemes could be rewarded with additional funds (additional bonus). This element can be narrowed down to LFA [Least Favoured Areas], mountain areas, NATURE other areas of natural value"*

***Germany**: "Increase the flexibility in the cost calculation so that the incentives given by the payment better reflect the public benefit and not only the associated costs."*

***Ireland:** "It is difficult to see how the current proposal to transfer unspent budgets into income support would result in additional environmental benefit, compared to alternative approaches."*

2.6 Top-up payment versus income foregone

While AECM payments are based on the principles of compensating for income foregone, the rules for Eco-schemes will likely allow MSs to either adopt the established AECM-method of paying for "cost incurred or income-foregone" as benchmark (Article 28, 6b COM(2018) 392 final), or to grant Eco-scheme payments as additional "payments additional to the basic income support" (28, 6a), often also referred to as "top-up-payment". Workshop participants assessed both the pros and cons of both approaches. In reporting them here (**Table 2**), we propose that the Commission requires clarification from Member States on how they intend to address these issues when deciding for a given payment approach.

Regardless of whether a top-up or income-foregone approach is adopted, workshop participants highlighted the importance of ensuring that the benchmark for calculation is clear, justifiable, and transparent for assessment and re-evaluation.

Table 2: Arguments in favour of top-ups versus income-foregone payments

Pros of top-up payments	**Cons of top-up payments / factors favouring the income foregone approach**
Simple, attractive and likely sells well, leading to potentially high uptake. ***Cyprus:*** *"top up has a positive connotation (i.e. extra payment for a good deed rather than compensation for what's lost). Flexibility for farmers."* ***Sweden:*** *"More farmers likely to enter environmental schemes (e.g., intensively farmed regions where forgone profits can be very high)."* ***Poland:*** *"Simplicity, easily seen as an incentive to participate, probably favors the universality of deployments."* ***Spain:*** *"More acceptance. … If implemented well, it can be more attractive and better select committed farmers"*	The existing system works if well designed, and does not need to be aborted in favour of a new payment system. ***Ireland:*** *"There is sufficient flexibility in the income foregone/costs incurred formula to ensure payments constructed ...are sufficiently attractive to farmers. Irish agri-environment schemes are consistently over-subscribed."* ***Ireland:*** *"payment levels that are averaged across all farms lead to a self-selection bias in that it is those (less intensive) farms where opportunity costs of enrolment are lower that predominantly participate. But this self-selection bias will not be eliminated simply by raising the average level of payment by including a top-up"*
May operate well in places where income foregone is low and thus the approach is unattractive, e.g. for small-scale, part-time farmers or economically weaker farms to start with.	Bound to lobbying / political pressures: ***Ireland:*** *"Given that the top up represents a pure income transfer, there is a big danger that Eco-schemes using this formula will become income transfer schemes in disguise, much like the greening payment in the current CAP…*

Pros of top-up payments	**Cons of top-up payments / factors favouring the income foregone approach**
Cyprus: *"Many small-scale farmers, especially in mountainous areas are part-time farmers. The income foregone approach pays for the actual cost of the scheme, which many farmers do not find appealing. [They lack] extra time which will be charged as salaries in the income foregone approach. If the farmer does not have the extra time, he has no incentive in having themselves or employees to add something new in their daily tasks, and be reimbursed for the cost of their labour."* ***Poland:*** *"Top-up payments serve to redistribute the support. Thanks to this, they enable support for weaker but potentially developing farms."* ***Slovenia:*** *"In some areas payment calculations that are based only on income foregone result in low payment levels, so these measures are not competitive enough."*	*[whereas] Anchoring the payments made to farmers in costs incurred or income foregone provides some kind of objective benchmark for the level of payment. In the absence of such a benchmark, the top-up paid becomes a bargaining matter between the public authority and the farm organisations."* ***Slovenia****: "Sensitive to lobbying; danger of coupling high payments with low standards to increase uptake."*
Enhance the attractiveness of evidence-based options of high value. ***France:*** *"Possibility to (better) link the top-up payment to climatic and environmental services and thus to introduce payments for services"* ***Spain:*** *"More realistic and fair system to support farmers that really are promoting biodiversity and ecosystem services"* ***Germany:*** *"Cost efficiency can be ensured e.g. by point or rating systems"*	It is unclear how payments should be calculated and how to avoid a risk that these payments would become a focus of bargaining. The instruments for decision-making are currently underdeveloped and require clarification. ***Cyprus:*** *"Difficult to accurately estimate the amount for the top-up payment. Might be different in different areas/cases."* ***France:*** *"measurement of services may be complex (necessity of proxies) and costly (necessity to develop an efficient and complete information system)"* ***Recommendation (Germany):*** *"If the remuneration of Eco-schemes is not based on income foregone / cost incurred; the payment level should reflect ecological effectiveness per unit of support".*

Pros of top-up payments	**Cons of top-up payments / factors favouring the income foregone approach**
Allows concentrating on environmental values instead of complex calculations of income foregone. ***Ireland:*** *"Having the option of not solely concentrating on income foregone and costs incurred allowed for the assignment of a value to environmentally valuable areas. … least beneficial actions need to have payment rates that reflect their true lower value. … this will allow greater ambition to be achieved within the available budget."* ***Ireland:*** *"Could allow the welfare value of the environmental outcome to be explicitly rewarded, e.g. carbon sequestration could be rewarded at the market price for carbon regardless of the cost to the farmer to provide the sequestration."* ***Spain:*** *"More realistic budget assignment according to specific environmental traits of the farms, considering extra values related to singularity or strategic position."*	Inconsistency among instruments (AECM versus Eco-schemes) in terms of payment approaches and intervention logic generates risks of (continued) competition, or lack of comparability between the two. ***Croatia:*** *"If payments for Eco-schemes are based on opportunity costs and contain income element[s], then the same should be applied in AECM to avoid lower uptake in AECM induced by Eco-schemes. If payments for ES are designed with a large income component, farmers may decline to participate in AECM. Overall, high incentives in ES can lead to lower uptake in AECM."* ***Sweden:*** *"Payments for environmental services should follow the same principles in P1 and P2, namely, additional costs or income forgone. It will be very confusing otherwise. More generous compensations for presumably less demanding activities in P1 create, furthermore, wrong incentives."*
Advances a more positive perception of nature conservation as an investment rather than a cost ***Spain:*** *"It conveys a more positive image of conservation; It better transmits the idea that conservation is not a cost, but an investment …* *"income foregone" assumes there is a loss of productivity, perpetuating this view despite current evidence that conserving biodiversity can also enhance productivity"* ***Germany:*** *"Incentives for the provision of ecosystem services: Nature conservation and climate protection as business segments of agricultural enterprises"*	
Can support innovative practices	

Pros of top-up payments	Cons of top-up payments / factors favouring the income foregone approach
Germany: *"Innovation-friendly in new agricultural practices which are currently more expensive than conventional ones"*	

Source: Table based on quotes out of Thünen-Working Paper 175 Vol. 2 Annex I.

2.7 Risks and weaknesses to address

To ensure success, key barriers to overcome include 1) definitions and eligibility criteria, 2) the risk of setting low initial standards, 3) over-simplification of guidelines when preparing management plans or guidance, 4) lack of coherence between CAP instruments, and 5) a risk of "overdoing" if setting demands too high.

2.7.1 Definitions and eligibility issues

Many farmland landscape features and semi-natural habitats, some of which are listed under the Habitats' Directive, are partly or fully not eligible for CAP support. This results in reduced payments for the area owned or managed by farmers, increases the administrative burden and the risk of payment cuts, and acts as a financial disincentive for habitat protection. This ineligibility also generates conflicts between the CAP and Nature Directives, as well as inconsistencies between the management requirements inside versus outside Natura 2000 areas. This should be addressed by by expanding the definitions of an eligible hectare: **eligible areas for CAP support should include all semi-natural vegetation features on farms, both farmed and unfarmed**. Additionally, a differentiation between beneficiaries (farmers versus others) limits access to funding for some land-users engaged in farming, such as shepherds, farmers using commons, or NGOs engaged in farming. Participants therefore highlighted that **all types of land-users should be eligible to apply for Eco-schemes, to ensure a level-playing field for the various farmers and land-users engaged in farmland-management.** Placing barriers to participation in Eco-schemes may not only generate inequity among land-users but also potentially counteract their environmental objectives.

> ***Ireland****: "The majority of biodiversity on farmland occurs on farmland types that are not classed as 'landscape features' e.g. lowland species-rich grasslands, alpine species-rich grasslands, heathlands etc. These farmland types range from farmland habitats that are considered ineligible for CAP payments to high nature value farmland ... Considerable evidence indicates that the list of landscape features should be expanded from the current list. This would have a high biodiversity dividend, and would greatly assist farms to attain and exceed the 5 % and 10 % habitat area thresholds (Larkin et al., 2019; Rotchés-Ribalta et al. 2020). This includes semi-natural grasslands, heathland, peatland, native woodlands/scrub, wetlands, buffer strips, field*

margins (no chemical inputs), hedgerows/treelines, drainage ditches on mineral soils, and associated margin, and ponds."

Ireland: *"Eligible areas should include all semi-natural vegetation features on farms (farmed and unfarmed)"*

Cyprus*: "Up to now, farmers had a disincentive in maintaining non-productive features because the area was excluded from the area payments scheme, and Eco-schemes may offer a solution to the problem."*

Germany*: [Enhanced conditionality] "Addresses only farmers and not land owners ==> much more limited options compared to ordinance law".*

Germany*: "Definition of eligible area is relevant especially with respect to grasslands, structural rich areas, paludiculture; – Definition of minimum utilization: Requirement to mulch the entire area is an ecological nightmare; – Absolute Ban to use non-productive areas late in the year is counterproductive (Late partial harvest would be frequently beneficial); – 5-year rule for Grassland prevents voluntary establishment of longer-term fallows and buffer structures on arable land"*

2.7.2 Enhanced conditionality: Low minimum standards

The risk of setting too low standards, especially in the context of enhanced Conditionality, has been mentioned in several workshops – i.e. if some GAECs are applied only to arable land, minimum requirements for landscape-feature protection is set below existing levels, or quality requirements are missing. Beyond these, too abrupt changes in enhanced conditionality requirements can lead farmers to "opt out" of the CAP altogether. As an example for the case of peatlands:

Germany*: "Very strict, immediate requirements may lead to "opting out", i.e. farmers may waive CAP payments for organic soils, split the farm and continue drainage-based peatland use with a separate enterprise outside of the LPIS system."*

2.7.3 Agri-environment and climate measures (AECM) need clear guidelines

Attempts to reduce administrative burdens may hamper management plans if they result in over-simplified guidelines.

Sweden*: "Current discussions about removing the option to get management plans in favour of lower administrative costs, and replacing them with general requirements and increased general advice is in our opinion counterproductive. General requirements and advice is not sufficient to ensure optimal management of semi-natural grasslands due to the huge variation of grasslands and their individual conditions."*

2.7.4 Lack of coherence with other CAP instruments (harmful subsidies) and policy areas

If CAP instruments and practices are not coherent, they may cancel each other. The risk is particularly high for harmful subsidies (See also section 2.4)

> ***Ireland**: "Some other instruments counteracting the effects of the Green Architecture e.g. farm investments for modernisation; Forestry. There needs to be more coherence across the policy instruments."*

> ***Poland**: [A] "risk [is] how to define the patterns so that they do not coincide with the practices that are commonly used by farmers so far. Maybe it's worth paying for good practice introduced already by some farmers so that it becomes common in the future as a standard."*

> ***Bulgaria**: "city policies and food policies [: we need] municipal agricultural and forestry development plans … Strategic Plans of the member states [should be asked] to prepare Food and Urban strategies, directly linked to the expected results from the agriculture and promotion of short supply chains as well as promotion of schemes that create links between farms and urban communities (urban agriculture)".*

2.7.5 A risk of over-emphasis on biodiversity conservation

Some workshop participants mentioned a risk, or at least a perceived risk, of "overdoing" biodiversity conservation by protecting too much or by hampering production.

> ***Poland:** "Seeing the growing demand for food in the near future in the world (increasing population), one must be cautious about limiting (extensifying) agricultural production ("do not overdo") … The need to produce an appropriate amount of food (nationwide and in the EU) versus the requirement to limit the inputs of industrial means of production".*

> ***Slovakia**: "GA measures are often perceived as limits in food self-sufficiency, without considering [the] fact that food security is endangered by decrease of biodiversity and therefore synergies in finding the balance between both issues could be achieved in such cases".*

> ***Cyprus**: [Eco-schemes should not] Increase area covered with landscape features to 15 % of land...Given that landscape simplification is one of the most important drivers of biodiversity loss"*

2.8 Contribution of the Green Architecture to the climate objective

While climate-change mitigation and adaption was not the core topic of the workshop, reducing Greenhouse Gas (GHG) emissions is a pressing environmental issue, and the contribution of the

Green Architecture to it was brought up at most workshops (note that climate change affects also biodiversity and the delivery of ecosystem services). Concern was raised that the current planned measures are unlikely to yield sufficient reductions in GHG emissions.

> ***Sweden:*** *The Commission claims that 40% of the new CAP will be climate spending. This will require tripling funding for climate measures in the new CAP. Without substantial reallocation of payments to effective environmental measures, the post-2021 CAP will not achieve the European Commission targets of reducing greenhouse gas emissions 55% by 2030".*

Agriculture and land-use in the EU can play a vital role in reaching this objective - both directly through reducing emissions listed under agricultural production, and indirectly through reducing associated emissions relating to feedstock imports, production, processing and transportation-related emissions. The majority of agricultural GHG emissions results from animal production (meat and dairy), N-fertilizers and from agricultural production on drained peatlands and wetlands. By driving land-use changes, animal production and first generation bioenergy exert further pressures, currently leading to a net increase in GHG emissions.

In addition, conventional agricultural soil management practices, such as deep tillage, have been and are depleting arable soils of soil carbon throughout the EU, not only contributing to GHG emissions, but also leading to a decline in soil biodiversity. This, in turn, can lead to other problems such as soil erosion, compaction, reduced resistance to pests and reduced nutrient provision.

The CAP has a strong potential to help the sector to improve its GHG-balance and to turn arable soils into carbon sinks. The central instruments of the Green-Architecture - Enhanced conditionality, Eco-schemes and AECM - may have some potential in driving GHG-emission reductions, for instance by supporting extensive grazing systems and/or aiding farmers in extensifying land management (both for grasslands and reduced chemical inputs). Supporting a variety of soil management practices that benefit soil health and reduce the current loss of soil carbon also has a great potential to increase soil carbon stocks in the EU. Examples of suitable options are reduced or no-tillage, organic amendments (e.g. straw addition), catch or cover crops, crop rotations (preferably including perennials and/or legumes) and – less well-studied – perennial arable crops such as *Miscanthus*.

However, other instruments - especially non-productive investments and AKIS, might in many cases be more effective and efficient. They have high potential particularly in reducing the excessive use of nitrogen and consequently reducing N_2O emissions as well as methane emissions from manure storage and handling. As these actions reduce the indirect N-input into semi-natural ecosystems they can also mitigate a key pressure on biodiversity in these systems.

With respect to the preservation of the soil carbon pools, the GA can be more pivotal. Drained, agriculturally-used **peatlands** account for merely 3 % of the EU's agricultural land but contribute 25 % of the EU's GHG emissions related to agriculture. To tackle this source efficiently:

- **Eligibility criteria** and the **enhanced conditionality** should exclude freshly drained peatlands from receiving CAP support.

- **GAEC 2** should cover all organic soils according to GHG reporting under United Nations Framework Convention on Climate Change (UNFCCC) and exclude any new drainage or deepening of existing drainage level and the irreversible transformation of the soil profile such as deep ploughing.
- With the help of appropriate **support instruments** (especially AECM and non-productive investments), water tables should be raised close to the surface in as many peatlands as possible. Only by raising the water table, the decline in soil carbon stock can be stopped.
- **Paludicultures** should be recognized as an agricultural land-use, and eligible for CAP support; and the conversion of species-poor grasslands on organic soils into paludiculture should be exempted from the ban on converting permanent grasslands (GAEC 1)

> ***Germany**: "An ambitious GAEC 2 needed, in order to achieve a paradigm shift in the use of carbon-rich soils. Include ALL carbon-rich soils (i.e. organic soils according to GHG reporting under UNFCCC) for area affected by GAEC 2 (new layer in LPIS), NO limitation to e.g. Natura 2000 sites".*
>
> *[A proposed formulation of GAEC 2 can be]: "Immediate minimum protection for wetland and peatland, increasing to effective protection of wetland and peatland in 2030."*
>
> *[Implementation:] "1st step: non-deterioration rule: e.g. no new drainage, no deepening of existing drainage level, no irreversible transformation of the soil profile such as deep ploughing allowed; 2nd step: requirements for improvement e.g. conversion of arable land into wet grassland or paludiculture, creating infrastructure for water retention etc. up to prescribing minimum water levels".*
>
> *"Grassland on drained peatland sites emits large amounts of GHG. Paludiculture after rewetting yields considerable GHG saving … needs a conversion of grassland into permanent crops. Grassland conversion should therefore be permitted [where relevant and useful to meet e.g. climate objectives]."*
>
> *"Focus Peat- and Wetlands: … Considering the administrative background AECM and Eco-schemes only partly suit here. Better would be climate funds and non-productive investments … [e.g.] supporting investment for initiating transformation to climate smart agriculture on peatland (e.g. crops and harvesting machines adapted to water saturated soils)".*

Raising water tables on organic soils can not only mitigate one main source of GHG emissions but also, if done properly, restore rare ecosystems and provide habitats for many endangered species that depend on wetlands.

Grasslands are a second main carbon sink, and species-rich or structurally-diverse grasslands are pivotal to preserve the European biodiversity related to agriculture. Here all elements of the GA can help improve grassland management, to the benefit of both the climate- and biodiversity-objectives.

Workshop participants expressed strong concerns regarding the potential of first-generation bioenergy. To produce energy from plants requires, by order of magnitude, more land than to produce a given amount of energy compared to other types of renewable energy. In addition, first generation biofuels are generally only economically viable in highly productive agricultural systems,

and are associated with many negative effects on biodiversity. The same argument holds for the utilization of intentionally grown woody biomass. In addition, with the exemption of woody biomass are the mitigation costs markedly higher compared to other mitigation options. Therefore, the promotion of first-generation biofuels should be restricted to the use of residues and waste. Finally, scientific evidence indicates that, when accounting for land-use changes (e.g. driving deforestation), biomass production leads to a net increase rather than a decrease in GHG emissions. Generally, biomass production (e.g. for fuel, biomass energy and fibre) should be carefully assessed regarding its efficiency and effectiveness to tackle climate change issues.

> ***France**: "Permanent Grasslands [contribute to] Climate mitigation (carbon storage) + biodiversity (bonus for legumes) + water quality; payment [should be] increasing with the age of permanent grassland; Wetlands and peatlands [contribute to] Climate mitigation + biodiversity"*

Participants in several workshops also highlighted the role of the GA in helping farmers to adapt their land-use to achieve greater resilience to climate change. This includes better protection of the soil, water resources and quality, and the protection and restoration of landscape features.

> ***Cyprus**: "We need to improve the soil to make the land more resilient against climate change."*

> ***Ireland**: "increase proportion of eligible features on farm through a limited number of complementary actions with proven benefit/co-benefits for biodiversity, water or climate targets e.g. hedgerow planting, riparian buffer zone creation, field margins, native tree planting/farm woodland plots, pond creation etc."*

3 The role of Eco-schemes within the Green Architecture, and recommendations for design and implementation (Question 2)

3.1 General comments

Due to their annual nature[6], the relatively broad list of proposed (potential) options, and the risks of diluting them at implementation level (as was with Greening), some workshop participants doubted whether Eco-schemes can achieve the extent of improvement that is needed in the CAP's environmental performance. Experts highlighted that MSs should prioritise the improvement and expansion of AECMs in terms of budgets and administration, as an existing instrument that works, rather than set too high expectations from an instrument that is still evolving and bears a range of challenges.

> ***Bulgaria**: "I generally doubt that they will be an effective tool, given their voluntary nature."*

> ***Slovenia**: "One of the key drawbacks for including biodiversity measures in the Eco-schemes is their yearly implementation. This means that they are less suitable for measures that aim to improve or restore current ecological conditions, because suitable management should usually be applied for several years."*

> ***Spain:** "Eco-schemes could end up being misinterpreted as a mere extension of enhanced conditionality. Some regional governments ... already expressed their intention to do what they can to reach all farmers. … this interpretation constitutes a distortion of both instruments … EU must play a role in ensuring the ambition of the objectives, and checking for the possible existence of distorted channels that lead to widespread funding of farmers not committed to biodiversity conservation … If Eco-schemes ... reach ... only the fraction of farmers who actually implement environmentally efficient measures [, this should be] ... an indicator of the good functioning of this tool."*

Eligibility restricted to farmers: The fact that only farmers and groups of farmers may be eligible to apply to Eco-schemes, may entail another weakness of Eco-schemes which should favour the prioritization of AECM.

> ***Spain:** "The fact that AECMs can be addressed to actors other than landowners opens the possibility of implementing measures through shepherds or other entities, with longer-term actions (multiannual contract time)."*

[6] Since the workshops were conducted, it now seems that multi-annual Eco-scheme commitments may be possible, although the details are not yet clear. For instance, it is likely that farmers may be able to opt in and out yearly; and that contracts cannot extend beyond the MFF – effectively limiting contracts to a maximum of 5 years or less, depending on starting time.

3.2 Basic standards of Eco-schemes: soil, water and chemical inputs

Several workshops highlighted that sustainability, and particularly the use of water and certain agro-chemicals – particularly the control of pesticides and herbicides – should be set as basic criteria for Eco-schemes, i.e. considered as horizontal minimum requirements.

Chemical inputs and water-use affect soil and water quality as well as biodiversity. While the biodiversity strategy and the Farm to Fork strategy requires reduction of pesticide use and impacts; and N-fertilizers affect water quality and serve as a major contributor of agricultural GHG emissions, none of these are currently monitored, and farmers receiving CAP payments are not required to report on them. Participants pointed out that the question of how the CAP addresses chemical inputs needs to be resolved at the earliest possible point. In the meantime, some participants proposed that all Eco-schemes should be accompanied by minimum standards or even a "no pesticide" requirement.

> ***Ireland:*** *"Actions for conservation of grassland diversity should have zero or very low levels of applied nitrogen."*
>
> ***Italy:*** *"Pesticide reduction is paramount."*
>
> ***Poland:*** *"The primary goal of Eco-schemes should be to improve soil quality and (subsequently) biodiversity"*
>
> ***Slovakia:*** *"To protect water bodies and wetlands from fertilizers run-off in accordance with the Water Framework Directive, Nitrates Directive and Directive on Sustainable Use of Pesticides by e.g. buffer strips and other green infrastructure along watercourses or wetlands."*

3.3 List-based approach (menu of options): pros, cons and risks

The Eco-schemes were introduced as a measure that would be obligatory for MSs to offer, but voluntary for farmers. However, unlike the case of Greening, the EU Commission has not published a "white-list" or a menu of potential Eco-scheme options from which MSs should choose from. As the question whether to adopt a menu-based approach was open at the time when workshops were conducted, we asked scientists to explore both the advantages and disadvantages of such an approach.

3.3.1 Arguments in favour of a list-based approach

Simplicity makes it comprehensive for farmers, easy for MSs to implement, and hence attractive for both MSs and farmers. It further makes it comparable across the EU and hence eases monitoring and assessment by the EU.

***Cyprus**: "Easier to be administered at an MS level"*

***Bulgaria**: "Easier for both applicants and administrators."*

***Slovakia**: "farmers who are not experts in ecology can better understand and compare particular measures and select those which are best fitting to their plans"*

***Germany:** "Have a clear list/menu of options for farmers … Consistency within the EU, fewer "loopholes" for MS"*

***Sweden**: "Easier for EU to control"*

Potentially allows some level of **spatial targeting and effective awarding** of valuable options therein (but see below).

***Ireland**: [can be targeted to areas] "where certain options should be incentivised/ prioritised over others... [as well as rewarding] win-win outcomes where Eco-scheme options can use nature-based solutions [to reward] not just for … biodiversity value, but also for … contribution to carbon capture and sequestration, biological control, water quality and flood regulation"*

Allows linking to existing knowledge and evidence (also in countries with lower capacity), accompany by knowledge-support, and easily control MSs' performance.

***Cyprus**: "MS can align the schemes with strong AKIS support."*

***Bulgaria**: "Provides a clear and concise list of elements that are known to benefit biodiversity."*

***France**: "well-designed list of options should prevent insufficient climatic and environmental ambitions"*

***Bulgaria**: "Overall effects can be more easily measured and evaluated."*

***Spain**: "Uniformity for funding assignment and monitoring control"*

3.3.2 Arguments against a list-based approach

Over-simplicity limits adaptability (e.g. to local conditions) and heterogeneity in actions taken, and restrict the potential application of more complex, ambitious options where desired.

***Bulgaria**: "Does not allow targeting/adaptations for specific regions"*

***Bulgaria**: "they are not adapted to the social, economic and legislation specifics of member states."*

> ***Cyprus**: "Restrictive approach, especially for large farms where environmental targets can be achieved via site-specific practices not available in a menu approach."*
>
> ***Spain**: "Less plasticity/adaptability. Counterproductive effects of a lack of flexibility"*
>
> ***Germany:** "Not including food innovations that could be implemented in the following years."*
>
> ***Sweden**: "Inflexible to farmers' own interest and creativity. Reduce heterogeneity in actions, which in itself reduces biodiversity benefits."*

Design failures may be much more detrimental, to the extent where **Eco-schemes may have negative effects if ineffective measures dominate, or high-quality habitats are replaced by low quality ones.** (Notably, the benefits of retaining existing habitats normally exceed those of creating new ones). A list-based approach, however, may not be able to accommodate the need to secure continuity of habitats and practices.

> ***Bulgaria**: "If done incorrectly (i.e., options are too general, or are based on insufficient data, etc.), this approach would not fulfil its task."*
>
> ***Spain**: "Farmers could choose measures with low impact in his/her production system, or that have little or no beneficial impact on his region, making Eco-schemes a sort of enhanced conditionality extension".*

Control levels are limited and consequently the capacity to plan and regionalize (/target) actions effectively are limited as well. Specifically, a menu-based approach, especially for measures that are voluntarily taken up, has limited possibilities for regionalization since farmers may pick options that may not suit their regional settings in terms of environmental challenges and goals, landscape structure and connectivity, technological conditions, etc. Moreover, appropriateness of a measure depends on the priority objectives, the effect of the measure, and its implementation costs. The latter, however, vary significantly across Europe. A list-based approach may therefore miss the possibility for much needed cost-benefit adaptations.

> ***Germany: "**Regionalization of measures not possible, farmers can pick different options which might not be best options for regional biodiversity goals and landscape connectivity and composition"*
>
> ***Germany:** "To limit excessive income effects the measure must be associated with a max. payment levels => will be insufficient in the most intensive regions and much too high in low input regions"*
>
> ***Spain**: "Underestimation of farm attributes related to singularity and/or strategic location across the landscape, which play a basic role for landscape heterogeneity and functionality."*

A long list of options can be both a strength and a weakness: Some options may be effective for biodiversity; however, these can be diluted by more financially attractive but less environmentally effective options.

> ***Ireland**: [with] "a very wide range of available options … There is very likely to be an option, or set of options, that can be appropriate to a farm that delivers biodiversity benefits"*

but

> ***Ireland:** "The experience from decades of agri-environment schemes indicates that participants will tend to choose the most financially rewarding of available options ... which may not be the most environmentally effective ... (e.g. Cole et al. 2020)."*

> ***France**: "Dissolution of effects if the list is too large or includes (numerous) less ambitious measures that farmers can choose, which allows them not to select more ambitious measures (as [with] current greening measures)"*

A menu approach may also limit the application of a result-based orientation. Some noted, however, that a result-based approach is implementable also under a menu-based option.

3.4 Guidance and examples of optional practices for Eco-schemes to include or exclude

3.4.1 Guiding principles for the inclusion of measures in Eco-schemes

Farm-scale practices for inclusion as options in Eco-schemes should be evidence-based, effective measures that are supported by scientific literature for their effectiveness. Considering the abolition of greening, best practice measures that are not covered under enhanced conditionality should be continued into Eco-schemes. It would be important to include regionalized schemes and result-oriented options.

Eco-schemes are defined and communicated as a key instrument to improve the CAP's performance for biodiversity. Accordingly, highest priority (and a secured budget) should be given to options that have direct benefits for biodiversity, as well as options that concomitantly address additional environmental objectives.

> ***Germany**: "Any measures that lead to a reduction of inputs, increasing heterogeneity of land uses, preserving low-input uses, limit external effects of agriculture"*

> ***Italy**: "Maintenance of past agri-environmental interventions should be included to avoid inefficiencies."*

***Germany**: "It would be good to have regionalized schemes"*

3.4.2 Examples of options that should be included in Eco-schemes

- Protection and restoration of non-productive land and landscape features
- Protection of ecologically sensitive, extensively managed permanent grasslands; including through pastoralism and transhumance
- Habitat restoration e.g. when under 10 % coverage of landscape features
- Restoration of habitat quality, especially in HNV farmland
- Wetland protection and restoration
- Field margins and buffer strips, including flowering crops to support pollinators and birds (nesting, winter-feeding)
- Soil quality measures e.g. through reduced nutrients and chemical inputs (No/less hazardous chemical pesticide use).
- Animal welfare if linked to permanent grassland management and biodiversity
- Organic farming if linked to biodiversity (but see below)
- Extensive grain production with a wide seeding density
- Integrated Pest Management
- Crop rotation and spatial crop diversity
- Conservation tillage and no-tillage
- Non-material support e.g. AKIS, mapping, consultation
- Provision of biodiversity-friendly devices
- Support for biodiversity-friendly Land Consolidation Schemes
- (Adaptations to achieve) Coexistence with large carnivores

Further details and comments about the above list of options are provided in **Table 3**.

Table 3: Examples of options to be listed in Eco-schemes

Recommended option to be listed in Eco-schemes	**Explanatory notes and details**
Habitat protection	
Protection and restoration of non-productive land,	***Slovenia:** "Share of non-productive land and landscape features on farm holding's UAA, which exceeds the baseline defined in GAEC 9. If*

landscape features and fallow land	*e.g. 10 % of UAA should include non-productive features, as recommended in some papers, farm holdings that are willing to dedicate additional land exceeding that percentage could be compensated via Eco-schemes."* ***Bulgaria:*** *"Preservation and restoration of landscape features… and increasing the conservation status of habitats and species in the agricultural land within the scope of the European ecological network Natura 2000"* ***Slovakia:*** *"As for general targets to insist on mandatory allocation of 30 % for Eco-schemes and to delimit at least 10 % of the agricultural area as non-productive areas (not including nitrogen fixing crops and catch crops)."* ***Spain:*** *"Conservation of seminatural (i.e. non-exotic) woody hedgerows (≥2.0 m width; ≥2.0 m height, including fleshy-fruited species) in 50 % of farm edge" or "Conservation of 5 %* of farm area as patches of seminatural (i.e. non-exotic species) forest habitat (woody habitat ≥4.0 m height, including remnant trees), on a per Hectare basis"* *"Conservation of traditional dry-stone walls in farm edges (≥0.5 m width; ≥0.5 m height) in 50 % of farm edge."* ***Ireland:*** *"This includes semi-natural grasslands, heathland, peatland, native woodlands/scrub, wetlands, buffer strips, field margins (no chemical inputs), hedgerows/treelines, drainage ditches on mineral soils, and associated margin, and ponds."* ***Germany:*** *"Fallow arable on at least 10 % of the arable land of the farm, or at least [x] ha"* For fallow land, it is important to emphasize ecological functionality and an emphasis on multiannual implementation. It should comprise natural vegetation, maintained beyond just crop-rotation, and never ploughed. Specific management should be defined to achieve biodiversity targets according to regional conditions.
Protection of HNV habitats and conserving or restoring their quality, especially outside protected areas	***Ireland:*** *"Conservation of existing high nature value habitats, and to encompass those that occur outside of protected areas."*
Protection and maintenance of sensitive permanent grassland and	***France:*** *"Climate mitigation (carbon storage) + biodiversity (bonus for legumes) + water quality; payment increasing with the age of permanent grassland"*

(semi-)natural meadows, particularly through extensive grazing by cattle, sheep and goats; including pastoralism and transhumance	***Spain:*** *"They are at risk and it is easy to be applied once identified because it only needs to keep doing what is already doing. As a result-based scheme is worth take into account previous experiences"* ***Spain:*** "*Maintenance and sustainable management of extant traditional seminatural meadows endangered by intensification (overgrazing, eutrophication, intensive mechanization, transformation to annual monocultures such as ray-grass and corn, etc)."* ***Bulgaria:*** *"Traditional practices for seasonal grazing of animals (pastoralism)*" and "Conservation of endangered local breeds"* ***Spain:*** *"Transhumance is a traditional livestock practice consisting of the seasonal movement of livestock between high or higher latitude areas, destined for summer pastures, and low or lower latitude areas, where cattle spend the winter, following established regular routes."* ***Germany:*** *"Extensive permanent grassland management on at least [20 %] of the grassland or [x ha]* *(either under extensive grazing or extensive/partial mowing); - no pesticide use; – no cut or grazing ... in the main vegetation season … – no artificial fertilisation; Minimum XX % grazing refuges [e.g. 20 %] or/and structures are on the pastures and throughout the year"* ***Poland:*** *"To a greater extent take into account the maintenance and even restoration of agricultural production in extremely extensive (abandoned) areas. … Preserving the grazing of animals on the pasture in sensitive areas … Make payments conditional on the obligation to keep animals on the pasture for at least 2 months a year."*
Improvement in soil quality, particularly through reduced chemical inputs (no/less hazardous chemical pesticide use) and reduction of nutrient concentration in soil (e.g. NH4+, PO4-)	***Cyprus:*** *"The reduction of fertilisers benefits biodiversity. The list should identify the major components required to be reduced"* ***Sweden:*** *"Reduce use of pesticides, particularly of the more hazardous, and pesticide exposure to pollinators. Hazard classification can follow EPAs, where > 11 µg a.i./bee is classified as practically non-toxic to (honey) bees. Related to pesticide objectives of both the biodiversity strategy and Farm to Fork. Payment of forgone income based on expected yield reduction."* ***Germany:*** *"No application of pesticides in **all** Eco-schemes in the whole year … reduced fertilisation"* ***Poland:*** *"Actions aimed at improving the quality of the soil (crop rotation, water retention, use of catch crops). Additionally, the possible possibility of dividing Eco-schemes into those that improve soil*

	productivity (and those dedicated to particularly large and intensive farms) and contribute to the extensification of production (and dedicate them especially to small entities and managing valuable habitats)." ***Croatia:*** *"Whole farm nutrients management plan"*
Animal welfare linked to permanent grassland management (through extensification of grazing management) and biodiversity protection, considering local conditions	***Slovakia:*** *"To improve the condition of livestock production by improving animal welfare (increase outdoor access and free range and decrease stabling). By expanding extensive grazing many abandoned and overgrown localities can be restored, however the stage and rate of secondary succession should be considered in respect to local conditions, habitat type, shrub or tree species and predicted restoration costs."* ***Germany:*** *"Transition to extensive grazing; specific support for reducing grazing intensity below current levels"*
Conservation tillage, no-tillage / Organic no-till rain-fed cereal	***Cyprus:*** *"Organic no-till rainfed cereal and legume forages (rotations and mixtures) planted with seed-drill, fertilized with processed animal manure, with strong AKIS support. This scheme links with the GAECs. Thus, farmers already have to improve their practices, but if they participate in the Eco-scheme, they will get AKIS support to take it a step further, using state-of-the-art practices."* ***Sweden:*** *"No-till for a year, Try it out option with incentive."* ***Ireland:*** *"tillage farmers maintaining overwinter green stubble or cover crops, slurry injection rather than splash plate and wide buffer strips near watercourses for dairy farmers. Encouraging regenerative farming practices could also be incorporated, or knowledge transfer."*
Field margins, buffer strips and flower strips (annual and particularly multiannual)	***Germany:*** *"Landscape elements and buffer strips (together with fallow land – see above – on at least 10 %) on the arable land"* ***Sweden:*** *Annual flower strips: "Flower strips benefit pollinators (Scheper et al. 2013 Ecol Letters). It is a flexible option to increase flower resources to support pollinators. Easy to include in standard farm management and on an annual basis. Can be implemented on non-productive land as well as on crop fields. Incentivise the use of native species, which is often more expensive"* ***Spain:*** *"Conservation of seminatural (i.e. non-exotic) permanent herbaceous, multispecific floral strips (≥1.5 m width) in 5 %* of farm area … [or] Conservation of seminatural (i.e. non-exotic) permanent herbaceous cover (≥1.0 m width) in inter-row aisles"*

	Croatia: *"Fallows and flower strips on arable land might provide a positive environmental impact in the first year, but their impact increases the longer they remain on the spot."*
Organic Farming where linked to biodiversity	***Slovenia****: "Established certification schemes and comprehensive farming systems (as opposed to land under conversion, e.g. Organic farming and Conservation tillage)"*
Restoration	
Habitat restoration e.g. when under 10 % coverage of landscape features; Restoration of habitat quality, especially in HNV farmland	***Ireland:*** *"Eco-schemes can have potential in an Irish context, for example, in paying farmers to create additional landscape features as suggested in answer to the previous question. Once GAEC 9 applies to all farms, such features once created would be protected for the duration of the Strategic Plan."* ***Bulgaria:*** *"Preservation and restoration of the area size and quality of High Nature Value farmland."* ***Cyprus:*** *"Where minimum points are not achieved on a farm then a simple list of additional evidence-based actions per farm would be available e.g. native tree planting, hedgerow planting, riparian buffer strips. This would expand semi-natural vegetation and landscape features to a minimum percentage on all farms."* ***Germany:*** *"restoring landscape features, and/or conversion of a fallow land into permanent grassland "*
Protection and restoration of wetlands and riparian habitats **But: note that investment measures and climate funds may suit better**	***Ireland:*** *"Installation of ponds"* ***Spain:*** *"Riparian buffer strips of semi-natural vegetation (i.e. bands of 30m around fields) to provide an effective physical barrier against nitrogen (N), phosphorus (P) and sediment transfer."* ***Germany:*** *"Promotion of maintaining high-water levels on peatlands and of paludiculture (wet use of peatlands) as additional payment per ha."* But: *"Considering the administrative background AECM and Eco-schemes only partly suit here. Better would be climate funds and non-productive investments (funds should have different focus; otherwise legal problems of double funding)."* ***Sweden:*** *"Restoration of wetlands or pastures. The measure could be combined with AECMs afterwards."*
More specific (potentially local) management options	

Grass-legume ley or forage legume strips left for flowering for a year.	***Sweden:*** *"Particularly relevant in crop dominated regions that lack an abundance of alternative forage habitats"*
Extensive grain production with a wide seeding density	***Poland:*** *"It should be related to animal production: 1) pasture feeding of ruminants, 2) selected elements of increasing animal welfare, e.g. larger building area than indicated in the standard.".*
Crop rotation* and crop diversity (in space)	***Slovakia:*** *"large arable land parcels need to be cut by green infrastructure to provide regulating and cultural services. … it is important to cut large parcels by non-productive areas otherwise there would not be positive impact[s] on biodiversity, i.e. there would not be significant effect[s] on biodiversity if productive parcel is divided [in]to smaller parcels by growing different crop". "To increase the landscape diversity and ecological stability of the landscape by increasing the diversity of crops and elements of green architecture"* * we note that some workshops proposed crop rotation should be listed under enhanced conditionality rather than Eco-schemes.
Provision of biodiversity-friendly devices	***Spain:*** *"Set up and mid-term maintenance of small-scale devices providing habitat for pollinators and natural enemies of pests. [e.g.] "Minimum 5 bird/bat netboxes, 2 bee hotels, 1 raptor poles/nest boxes per Ha."*
Bird-oriented measures	***Slovenia: "****Measures targeting bird species, which nest on arable land (e.g. lapwings and skylarks)* *Implementation of such measures is usually connected to crop rotation and the location of nests in each breeding season, so one-year contracts might be a suitable solution."*
Other types (support measures)	
Non-material support: **AKIS, mapping,**	***Italy:*** *"Maximise the uptake in terms of hectares/farms through budget for "non-material" actions such as data collection, planning (grazing-, irrigation- plans)."*
Support for biodiversity-friendly Land Consolidation Schemes	***Spain:*** *"Land Consolidation Schemes should be supported when demonstrating biodiversity-friendly actions, mostly maintaining habitat patchiness forest habitat (≥500 m2/Ha of patches of seminatural woody habitat ≥4.0 m height) or hedgerows ((≥100 m/Ha ≥2.0 m width; ≥2.0 m height, including fleshy-fruited species), on a per Ha basis"*

Coexistence with large carnivores	***Spain:*** *"payment for living with [Large carnivores (LCs)] … to promote the adoption and maintenance of prevention measures. Because farmers who live with LCs have a competitive disadvantage"*

Source: Table based on own Workshop outcomes. For further quotes see Thünen Working Paper 175 Vol. 2 Annex I.

3.4.3 Guiding principles for the exclusion of practices in Eco-schemes

Key guiding principles to identify certain practices for exclusion from Eco-schemes should be: lack of evidence of positive impacts for biodiversity; evidence of negative or no impact on biodiversity; or the risk of diluting other more effective measures or competing with them. Additionally, one should avoid the inclusion of options that are nothing more than "good practice" that farmers should already adhere to – and are therefore more appropriate to list under enhanced conditionality.

> ***Ireland****: "Eco-schemes (and AECMs) should not have the effect of installing newly created habitats on existing habitats that have high nature value, resulting in a net loss of biodiversity; Older and existing habitats have higher nature value than newly created habitats. (Waesch and Becker, 2009)"*
>
> ***Spain****: "Permanent and cover crops, agroforestry and crop diversification had fewer benefits than grassland, fallow land and the connectivity and landscape features for biodiversity".*
>
> ***Germany:*** *"part of the [proposed] Eco-schemes could be "transferred" to the mandatory (i.e. conditionality) part ... Otherwise, we will have the risk, again, that farmers would not feel the necessity to apply the sustainable management practices"*

Table 4 Examples of practices that should be excluded from Eco-schemes

Examples of ineffective options for Eco-schemes	Explanatory notes
'Boost' schemes	***Ireland:*** *"'Boost' schemes should not be included within the budget for flagship Eco-schemes, [as they] are aiming to promote competitiveness, rather than environmental goals."*

Precision farming	***Germany:*** *"precision farming might "just" lead to a higher effectiveness; for biodiversity we need however more areas with lower input levels… [supports mostly] larger fields, less heterogeneity in the landscape …* ***Germany: "****In most cases precision farming has nothing to do with biodiversity and can even worsen the shift to monocultures. It has a high chance of diluting Eco-schemes. This measure can be supported under "investments", there is no need for Eco-schemes to do this."* ***France:*** *"Precision farming is important for reducing inefficiencies. Would be more efficiently supported by investment support rather than through Eco-schemes measures. Precision farming is a means that can be used to achieve climatic and environmental objectives allowing the farmer to receive Eco-scheme payments thanks to this improvement"* For further details see comments on the proposed Eco-scheme flagship (section 3.5.4) below.
Standard option fallows, Nitrogen-fixing crops, catch crops and green cover.	***Sweden:*** *"These options have had a great uptake as EFAs (Cole et al. 2020 J Appl Ecol), but could be modified to have a greater biodiversity benefit. N-fixing crops can provide forage for pollinators, particularly in crop dominated regions that lack an abundance of alternative forage habitats."* ***Slovenia:*** *"Disallow or penalise (weighting factors) any semi-productive areas such as nitrogen-fixing plants."* ***Germany****: "Mostly Nitrogen-fixing crops are grown as monoculture ... and they don't contribute substantially to biodiversity (except in best case small structured clover and Lucerne fields) nor do they contribute to water protection"* ***Germany:*** *"Evidence of [the]s contribution [of catch crops and green cover] to aboveground biodiversity is poor. It might even be contra-productive (e.g. by enhancing ploughing the stubbles) … "Primarily serving for intensive production ..., this measure is implemented by farmers anyway and hence, if supported through Eco-schemes, may result in payments with no added value (i.e. [not] going beyond ...GAEC)"* ***Poland:*** *"Subsidies for the cultivation of winter catch crops – they exhaust water from the soil"*

(Intense) Organic farming that is not linked to biodiversity; and/or without longer-term commitment.	***Spain:*** *"Sometimes, these labels can mask unsustainable management models, with, for example, more GHG emissions ... it is not uncommon to see some organic farms ploughing on high slopes or using large amounts of water for irrigation."* ***Germany: "****Under some conditions organic farming is as intensive as conventional farming (e.g. in case of grasslands, 4-5 cuts on 100 % of the grassland) therefore additional conditions are required for eligibility [e.g. minimum %] … under extensive management"* ***Germany:*** *"Organic farming is not automatically biodiversity friendly and, in some cases, not even sustainable. Intense production, in biodiversity sensitive areas, under irrigation and under plastic cover should not be supported under Eco-schemes."* ***Croatia:*** *"The application of ES for organic farming systems may present problems because ES are annual measures, whereas the conversion to organic farming is a long-term process."*
Intensive grazing of animals	***Poland:*** *"Intensive grazing of animals (high stocks especially in environmentally sensitive areas, e.g. LFA)"*
Support for extensive grazing of cattle, sheep and goats where more appropriate under AECM (but see above)	***Poland:*** *"This should be reserved for agri-environment scheme"*
Prescribed fire or mechanical clearing of scrubland in montane pasture areas	***Spain:*** *"(prescription [should be] only allowed for disturbance-needed habitat/species at small scale). These measures usually lead to losses of soil nutrients and biodiversity, and to the collapse of forest regeneration."*
Forestry and non-sustainable afforestation	***Spain****: "forest areas are increasing, … in part because of land abandonment, but also due to massive afforestation programs … which have led to a significant volume of masses with high risk of fire … and other ecological problems ... In addition, afforestation in agricultural lands is commonly performed using inadequate methods from a restoration ecology perspective (irrigation, tillage, etc.).* *It is probably time for the promotion of other habitat types not necessarily afforested"*

	Germany: *"Forestry operations, also under the title of "afforestation" should not be funded if they do not follow ecological principles of natural forest management and restoration."*
Reducing soil nutrient level and abandonment of herbicides	***Germany:*** ***"****Some measures have to be carried out before the farmer's agricultural application has informed the administration of their implementation (e.g. towing and rolling). This makes the measure uncontrollable for the administration and deadweight effects are very likely"*
Nutrient management options (if applied for a single year)	***Germany:*** *"First, to achieve a reasonable impact, in most cases the nutrient input must be reduced for a couple of years, as the soil can buffer annually changes to some degree in particular in relation to phosphorous and potassium. However, the farmer can opt in and out on a yearly basis. Second, given the current … data-infrastructure for nutrient data, on-the-spot checks are necessary, inducing high administrative costs. Third, ... chemical analysis are needed, increasing the control costs even further"*
Fallow land, landscape elements and flower strips below existing levels (e.g. minimum 5 %)	***Germany:*** *"Enhancing the extent of these elements from e.g. 3-5 % in the conditionality rules to 5-7 % is insufficient as it does not lead to actual restoration of such elements, and in some cases even allows habitat loss if thresholds are lower than current conditions. A requirement at MS levels should set target levels at 10-15 % or higher depending on conditions"*

Source: Table based on own Workshop outcomes. For more quotes Thünen Working Paper 175 Vol. 2 Annex I.

3.5 Experts' comments on the Eco-scheme flagships

Workshop participants, as well as 89 contributors to our online survey, provided detailed comments on the initial EU's proposal of Eco-scheme flagships launched as a Non-paper by the Commission in November 2020[7] . **Annex II** in Thünen Working Paper 175 – Volume 2 lists all individual comments received through our online survey. A selection of these is included below.

[7] EC WK 10899/2020 INIT, Proposal for a Regulation on CAP Strategic Plans –four flagship Eco-schemes as announced in the Farm to Fork Strategy.

3.5.1 A dedicated flagship Eco-scheme on Biodiversity

A dedicated flagship Eco-scheme on biodiversity is currently not included, but is essential to maintain and improve biodiversity. Such a flagship might be the most appropriate means for incorporating biodiversity into Eco-schemes, while also ensuring co-benefits for climate and water, and would help achieve the ambition of the EU Biodiversity Strategy for 2030. It could be used to pay for additional landscape features beyond minimal requirements of enhanced conditionality (SMR (Statutory Management Requirements) and GAEC). For such a biodiversity flagship, experts recommended:

- A focus on specific biodiversity targets and actions, potentially taking a result-based approach
- Landscape targeting
- Additional bonuses for collective implementation.

3.5.2 The Agro-ecology flagship

The flagship option "Agro-ecology" includes a large number of appropriate options that, from a scientific perspective, are relevant and effective for biodiversity and/or other environmental objectives, although not always both. Some practices generate joint benefits, also in terms of social, economic, cultural, traditional and educational aspects. However, not all the proposed options seem clearly achievable under the context of Eco-schemes' design (that is likely to be based on annual payments) and implementation capacities. For example, enhanced crop rotation requires monitoring of farm management at the individual field level. This requires both longer term commitments (to achieve value for money from investments and ensure continuity of the features over time) and the creation of an information system for farmers, to allow farmers and administrators follow and manage parcels over time – especially since short-lease contracts for arable land are not unusual. Nutrient management is another example where only a longer-term commitment can generate benefits. Such long-term commitments can be achieved either through multi-annual contracts or through AECMs. Experts proposed the following recommendations:

- The biodiversity objective of the **Agro-ecology flagship** needs to be made much more explicit, elaborated, and considerably strengthened. This is imperative if a dedicated biodiversity-oriented flagship is not established.
- There needs to be a strong recognition of the **need for multiannual commitments** for effective biodiversity practices and benefits.
- **For other environmental objectives** (air quality, water quality/quantity, nutrient management, carbon storage, etc.) that relate to biodiversity, directly and indirectly, there should be a clear assessment of measures to ensure that Eco-schemes are a) appropriate, b) effective as annual practices or only under multiannual contracts.
- Grassland and pasture management should be elaborated, to include clear criteria for habitat quality (potentially to be achieved through a result-based approach).

***Romania**: "Agro-ecology seems to be the most appropriate for ... social, economic, cultural, traditional, educational [reasons] etc"*

***Slovenia**: "Agro-ecology needs to be supported by wide and intensive AKIS to differentiate between putative and actual good practices."*

***Italy**: "The agro-ecology Flagship is still "fuzzy". Therefore, both the design and justification of "fuzzy measures" make agro-ecology (as a whole) very unfeasible within the Eco-schemes"*

***France**: "Agro-Ecology would require to be defined properly with a number of indicators as it is very vague: should at least require a substantial reduction in chemical input use that would be gradual over the 5 years of the future CAP programme"*

3.5.3 The agroforestry flagship

Agroforestry measures could have positive environmental and climate effects if carefully designed. However, these effects are not self-evident and their impacts are location-, context- and management-dependent. Although the establishment of an agroforestry system induces significant investment costs, their potential positive effects (economic and environmental) occur only after a significant time delay. Establishing new agroforestry systems using Eco-schemes, within the 5-year limit of the next CAP, may therefore pose some challenges. First, an annual payment may be needed that exceeds the investment cost – implying an extremely high payment per hectare. The non-productive investments measure in Pillar 2 is much better suited to achieve this goal. Second, it is unclear how Eco-schemes can ensure the maintenance of newly created features after 2027. Third, agroforestry that is inappropriately located could have negative environmental effects, especially for species linked to open habitats (steppes, meadows or scrublands) or for the conservation of organic soils. For example, in the case of steppes, agroforestry (as well as carbon farming) could generate negative impacts if they introduce too much woody vegetation into the ecosystem. To achieve benefits for the environment and biodiversity, the agroforestry flagship should be carefully designed and implemented to overcome challenges and achieve positive impacts. Experts proposed two main recommendations:

- For the establishment of new agroforestry systems, a tight link to biodiversity, as well as to Pillar 2 AECM, is needed. This should include effective site assessment for biodiversity impacts on existing habitats.
- Eco-schemes should focus on preserving existing (biodiversity-friendly) agroforestry systems and improving their quality.

***Netherlands**: "Agroforestry is more a niche, and needs more stimuli"*

***Spain:** "Agroforestry and carbon farming should be ineffective if they introduce too much woody vegetation into open arable and grasslands systems dominated by steppic species."*

Estonia: *"Effective only, when their applications are assured for decades. Otherwise, temporary face-lift."*

3.5.4 Precision farming flagship

Experts indicated that the Precision farming flagship may lead to negative environmental impacts and hamper Eco-schemes' success. This measure, as proposed, seems quite targeted toward improving the efficiency of farming practices to improve productivity. However, it makes no explicit reference to biodiversity nor requires biodiversity to be addressed. In fact, biodiversity-oriented options, or technologies that can help delivering ecosystem services, seem to be implicitly excluded. This can lead to negative environmental impacts of this Eco-scheme. Notably, the costs of the technology needed for precision farming do not scale up with the farmed area. This means that, if payment is linked to the farmed area, there will be significant overcompensation for larger farms, while they may often employ precision farming anyway due to its labour-saving effects and greater efficiency. In addition, precision farming may bring marginal or no environmental and economic benefits under some conditions, e.g. for small farms where site heterogeneity is low. Finally, given the voluntary nature of Eco-schemes as a whole, and the fact that this measure may be very attractive for farmers, broad uptake of precision farming may compete with other measures with much higher environmental potential and can hamper the overall success of Eco-schemes. Experts proposed that

- It seems more suitable to support biodiversity-friendly precision farming under investment support measures.

Finland*: "Precision farming is only a temporary measure – mostly driven by the desire to continue traditional, chemical-intensive cultivation, only with more precision. This does not make this cultivation system sustainable"*

Poland*: "Precision Farming is the most promising in my opinion, allowing to optimise current resources usage and brings environmental and economic benefits. The problem in implementation in Poland may be the small scale of production, while for the efficiency of this scheme larger scale is required. With generally low environmental awareness in Poland, programs bringing only environmental, not economic benefits may be not so popular."*

3.5.5 Carbon farming requires careful planning, multiannual contracts and careful regionalization to achieve environmental benefits

Many actions undertaken by farmers or land managers to lock up carbon, either in biomass or the soil (conservation agriculture, cover crops, afforestation, rewetting, conversion to grassland, etc.) require multiannual commitments. For instance, rewetting of organic soils generates benefits only when the water level is raised for a long(er) time. Rewetting also requires planning, consultation, and investment which are already in place for Pillar 2 but need to be established for Eco-schemes. Some carbon farming measures need to be supported by deeper research and monitoring, and should be

regarded as a pilot or an experiment. The diversity of climatic and geological conditions among and within MSs also entails that carbon storage and sequestration is uniform across soil types. Finally, the effects of conservation agriculture (at least in the humid zone of west-central Europe) on GHG mitigation can be very mixed, requiring a careful delineation of eligible areas. These factors, combined with a bias toward carbon sequestration instead of carbon storage (protection of existing old-growth forests and other habitats), suggests that carbon farming can be beneficial only when regionalized and linked to clear management requirements to avoid negative environmental impacts, e.g. if used to support intense forestry operations. For some of the listed measures, non-productive investments and longer-term management contracts, especially beyond the MFF (i.e., through AECM) may be more appropriate.

MSs who want to establish carbon farming should focus on maintaining (good practice) carbon farming and improving its management, or use Eco-schemes as a starting measure before entering a longer commitment under AECM. Using it as a "first-year measure" gives farmers the opportunity to familiarise themselves with the measure, and then be prepared to make a longer commitments given that one-year carbon farming is unlikely to achieve much positive impact. Alternatively, it would be more efficient to establish a (multi-annual) carbon farming system in Pillar 2. At any rate, a tight link to AKIS and for knowledge-support, and monitoring of outcomes, is particularly important for this flagship.

Some individuals also mentioned it would be interesting to explore the opportunity of including agriculture in the carbon market.

> ***Slovenia**: Carbon farming needs to be supported by more research and monitoring. Slovenia is very diverse geologically and sequestration is not likely to be uniform across soil types. If payments are to be made based on [the] amount of carbon sequestered, the knowledge base must be greatly expanded. Practice-based schemes, on the other hand, must be well-thought out and supported by currently available knowledge, which would probably suffice*
>
> ***Belgium**: "Develop a common carbon inventory system and give farmers access to the carbon market"*
>
> ***Germany**: "there are differences between mineral and organic soils (mostly peatlands). Organic soils are the most efficient carbon stores which a) need to be protected and b) enabled in the best case to sequester. Paludiculture would be an option here but it most probably will not pay off for farmers just from products as high initial investment is needed and it is a pioneer approach, so farmers need remuneration for "farmed carbon", this could be provided by Eco-schemes, e.g. high one-off payment for establishment, accompanied by long term remuneration from pillar II"*

3.5.6 Potential links between animal welfare and biodiversity

Animal welfare should optimally link to the biodiversity- and agro-ecology flagships, i.e. to good management practices for permanent grasslands and pastures. From a biodiversity perspective, the most beneficial measures in the animal welfare flagship are those linked to extensive grasslands, pasture-feeding animals, wood pastures and other good practices that generate concomitant benefits for biodiversity, climate, soil and animals therein. However, the animal welfare flagship does not officially link either to the biodiversity or the Agro-Ecology flagship. This raises the more general question to which extent Eco-schemes should include measures that address climate- or animal-welfare objectives but not linked to biodiversity (or may even have negative effects on biodiversity). This question is beyond the scope of this study. However, if such measures are included, then clarity is needed regarding how MSs can ring-fence sufficient Eco-scheme budgets to address the different objectives.

For monogastrics (e.g. pigs, poultry), improving animal welfare is mainly linked to the modernisation of livestock buildings, and will likely be more efficiently addressed through investment aids (in order to compensate for increased fixed costs) and market differentiation (to cover increased variable costs), possibly supplemented by AECM.

> ***Denmark**: "Mixed (plant & animal) farming is missing as a flagship option – in many marginal areas this should be encouraged"*

> ***France**: "Missing for transition to agri-ecology and animal welfare: reduction of pesticides according to toxicity, antimicrobials and certain harmful veterinary products, reduction of GHG, increasing animal welfare"*

PART 2: IMPLEMENTATION

4 Target setting and implementation (Question 3)

4.1 Target setting

The legislative CAP proposal of June 2018 requires MSs to provide support for voluntary schemes for climate and the environment. Accordingly, Eco-Schemes should have the overarching target of maintaining good agricultural practices and expanding and restoring them beyond the current baseline, to reach a measurable improvement of the extent and quality of landscapes that serve biodiversity as well as the soil, water and climate objectives of the CAP.

The EU has the role to clarify the exact aims and expectations from MSs. Member States, on their behalf, need to set Specific, Measurable, Achievable[8], Reasonable, and Time-bound (S.M.A.R.T) targets to help translate the CAP's objectives into concrete actions, and facilitate monitoring and evaluation.

4.1.1 Linking the CAP with the Green Deal targets

According to many workshop participants, the targets set by the Green Deal need to be reflected in the CAP. All workshops highlighted that the EU's Green Deal and associated strategies for climate, soil, biodiversity and sustainability, offer clear and concrete targets with which the CAP can – and should – align. Key commitments that should be reflected in target-setting include those related to the CBD (and with it, the Nature Directives), the UNFCCC, Ramsar convention (and with it, Water Framework Directive) and the UN's SDGs[9].

> ***Cyprus:*** *"The Green Deal, Farm to Fork Strategy, and Biodiversity Strategy set ambitious targets. A reduction in pesticide use by 50 %, a reduction in fertilizer use by 25 %, and an increase of organic farming to 25 % are quite ambitious targets."*
>
> *... "The targets set by the Strategies are "ambitious" but achievable. Indicators used for the Strategies can be used to measure if this "ambition" is reached."*
>
> ***Ireland:*** *"the ultimate objective must be that all habitats are in improving or favourable condition, that all protected species have stable or improving status and that farmland biodiversity (especially in the wider countryside, and not just in Natura 2000) as measured by a range of indicators is in a healthy state."*

[8] There are various interpretations of the term S.M.A.R.T. For instance, "A" may also stand for "Ambitious"

[9] As also reflected in the EP's amendment proposals to Articles 10 and 58, albeit missing some SDGs.

Ireland: *"the Commission will be issuing guidelines to Member States on desired targets in the Green Deal [that] will not be binding recommendations, but Member States should be [asked] to explain why they would not want to adopt these recommendations."*

Slovakia: *"Using clear, measurable and realistic indicators the CAP should meet [EU] strategies. The CAP operates with a huge part of the EU budget and it is probably the most powerful and complex tool for landscape management."*

Poland: *"The established goals should be ambitious, but at the same time technically and economically feasible, and not threatening food security."*

France: *"ensure their compatibility with EU climatic and environmental objectives and targets of the Green Deal"*

Slovenia: *"Contribution to the achievement of goals in the EU strategic documents, international commitments (e.g. CBD, Ramsar convention) and implementation of Bird and Habitat Directives"*

Spain: *"They should be in line with the objectives of the new EU Green Deal and Biodiversity Strategy"*

Austria: *"The 50 % pesticide reduction target could be interpreted as SMART, because it is a specific number and it is specified that amount and risk must be reduced. But on closer inspection there are several uncertainties, e.g. which substances should be considered, what's the baseline, active ingredients or commercial products to be measured, etc."*

Germany: *"integrating the CAP with other strategies (soil, biodiversity, green deal, Farm to Fork, Paris Agreement (NDCs), etc.) is urgently needed"*

Sweden: *"Targets set in CAP should reflect both targets and timelines given in relevant national and EU-strategies (i.e. Green Deal, Farm-2-Fork, biodiversity strategy)."*

4.1.2 The biodiversity targets should align with the objective to halt or reverse farmland biodiversity declines

Given the ongoing loss of biodiversity, the targets with respect to biodiversity need to be concrete, clearly formulated and quantitative (or at least quantifiable), while suiting the baseline conditions per MS. The targets need to go beyond those of the current (2014-2020) CAP objectives given the failure of the latter to halt biodiversity losses.

Spain: *[Targets should be] "Directly related to biodiversity, and not proxies (e.g. 20 % natural native habitats in working landscapes) … [they need to have] more functional impacts, which*

are clearly related to the production of ecosystem goods and services, rather than the promotion of labels or designations"

Cyprus: *"The EU Biodiversity Strategy to 2030 does not set up concrete goals for biodiversity conservation in agricultural land. Reduction in pesticide and fertilizer use by 50 and 20 % respectively, as outlined in the Farm to Fork Strategy, are beneficial for biodiversity conservation, yet not biodiversity targets [themselves]. The bringing of at least 10 % of agricultural area under high-diversity landscape features is expected to aid biodiversity conservation, but again it is not a biodiversity conservation target in itself."*

Slovenia: *"Contribution to reversing the biodiversity declines and improving the conservation statuses of Natura 2000 species and habitat types as measured within the current monitoring schemes …[ambition] should be defined in comparison to the current state of biodiversity and based on expert opinion of local biodiversity experts."*

Germany: *"Naming of the key species and key habitats should be required and the calculation of target populations as well as target areas (quantitative + qualitative) should be required ... areas of target species should calculate a 20 % [increase] of the populations within 5-7 years."*

Sweden: *"The ambition should be to not only halt biodiversity decline, but to reverse to an increase! Above what is expected from current trends? E.g. beyond the expected annual growth of 5-6 % of the organically managed land in Europe."*

Clear targets are necessary for the extent and management of landscape features and semi-natural areas, as the core elements for the performance of the Green Architecture as a whole.

Ireland: *"There should be clear objectives, indicators and targets for biodiversity aims that allow clear assessment of thresholds that distinguish GAEC from Eco-schemes from AECM."*

Ireland: *"The Biodiversity Strategy minimum threshold of 10 % for space for nature … This could be achieved ... through a combination of conditionality under GAEC 9 and incentivised measures to go beyond this mandatory minimum in Eco-schemes and AECMs.*

Ireland: *...the points target [should aim] to be equivalent to 10 % of the farm covered by eligible semi-natural vegetation i.e. 10 % of farm = 100 points and maximum Eco-scheme payment. Under this system farmers who do not meet 100 points can opt to increase the proportion of eligible features on the farm."*

Targets should be differentiated according to national and regional characteristics of agricultural systems and landscapes

Strategic Plans should be differentiated between MSs and within them, with respect to the targets of the different GA elements; how they support different objectives, habitats and farming practices; and

in all cases, they should focus on supporting effective measures (with evidence of impact) and avoid supporting unnecessary actions. This is essential partly because the baseline conditions are highly diverse. One key issue in the landscape context is to differentiate lowlands from highlands.

> ***Bulgaria:*** *"A clear distinction should be made between extensive and intensive land uses, with each group having its specific targets."*
>
> *"implementation should be based on assessment of the relationships between biodiversity and GBI elements, and measures should promote the most important elements for each country (i.e., promoted GBI elements should be MS-specific, and not common for all MS in the agricultural region)."*
>
> ***Bulgaria:*** *"The minimum requirements must be as high as possible… It is perfectly understandable in Western Europe to be more ambitious to achieve real results for biodiversity, however the key elements of biodiversity, including the land supported by CAP, are higher in South and Eastern Europe. The Member States in Eastern and Southern Europe ... are unlikely to have such high ambitions. The introduction of very low minimum requirements will lead to the development of weak Strategic plans, which in theory will be implemented, but in practice will not lead to significant changes for conservation of the elements of the environment."*
>
> ***Slovakia:*** *"Conditions of Eco-schemes and AECM should address regional demands, e.g. if majority of certain area indicates low ratio of soil organic carbon then a new AECM must support farming management with aim to increase the carbon in soil of the respective area"*
>
> ***Spain:*** *"Regional or site specific design and less bureaucratic burden (eg. Pavlis et al., 2015) and simplification (Hejnowicz et al., 2016; Navarro & López-Bao 2018)."*

Interim targets are needed, which should be accompanied by close monitoring to ensure adaptive policy management and adaptation of Eco-schemes.

> ***Ireland:*** *"As the CAP Strategic Plan will have an end date of 2027, interim targets should be set that would allow the achievement of the EU Biodiversity Strategy target by 2030."*
>
> ***France:*** *"increasing baseline over time for requirements to, for example, Ecological Focus Areas (EFA)"*
>
> ***France:*** *"Obligation for farmers to report emissions, fluxes and uses in order to base incentives (Eco-schemes and AECM) on these figures."*

4.2 How to assess the level of ambition in Strategic Plans

Beyond the requirement to set ambitious targets, inputs from the workshops build towards the following seven criteria as a means to assess ambition in MSs' Strategic Plans, and plausibility of

meeting the targets: 1) acknowledging the problems, 2) a clear intervention logic accompanied by a breadth of proposed actions, 3) adherence to key operating principles, 4) ambition reflected in budgets, 5) investments into knowledge, 6) selecting suitable indicators to ensure accountability, and 7) presenting sufficiently detailed strategic plans addressing local needs and adaptive capacities. Each of these criteria is discussed in more detail below.

> ***Croatia:*** *"The procedure related to the approval of the Strategic plan is practically the only mechanism in the EC's power for ensuring targeted and ambitious strategic planning. Therefore, it is important that the Commission be empowered to conduct a proper qualitative assessment of the Strategic plans. CAP strategic plans should contain a satisfactory and balanced level of consultation between stakeholders and involvement of other public authorities, and the Commission should be well equipped to assess the plan within a reasonable timeframe."*

4.2.1 Acknowledging the problems

Member States cannot resolve challenges without acknowledging them. This needs to be reflected in the SWOT analysis and accompanied by proposals for concrete solutions.

> ***Poland:*** *"Listing of the main environmental problems along with their scale (e.g. region, country) and presenting a list of the most important remedial actions"*

> ***Sweden:*** *"Map how and where the (environmental and climate) problems are created, and specifically target policies or interventions towards these areas/activities. This should be done both at EU-level, and at MS-level."*

4.2.2 Clear intervention logics accompanied by a breadth of proposed actions to address challenges

A clear link must be established between the relevant challenges and how the proposed actions address them. An ambitious plan requires demonstrating a clear link between objectives, breadth of measures taken to achieve them, and anticipated outcomes – based on scientific evidence.

> ***Bulgaria:*** *"The ambition has to be measured against (1) each environmental component and (2) the level of achievement of the "ambition" from the previous/current RDPs. If RDP 2014-2020 aimed at achieving X % of habitats with improved conservation status, the assessment has to ask was it achieved, to what extent, what were the reasons for not achieving it, what ACTUAL/REAL steps were taken to reduce/address the problems of the underachievement of the current RDP and only then to measure the ambition of the new SP. The new SP should exclude environmental components/priorities of the previous RDP only if they are no longer a problem, or when they prove that there is another, equal in funding and ambition instrument, that would address them."*

Bulgaria: *"the Strategic Plan should rely on quality research data as much as possible ..., demonstrating the current status of the target species and habitats (i.e., the reasons they were chosen) and estimating how the proposed measures would benefit them (e.g., promoting grasslands has been demonstrated to benefit threatened bird species).*

Bulgaria: *"Methodology: clearly presented methods by which the target could be reached, based on available scientific data. Results: what are the expected results and how they contribute to meeting the stipulated aims."*

Ireland: *"Eco-schemes options included in the CAP Strategic Plans should have associated scientific evidence that demonstrates their effectiveness, and the most appropriate farming contexts for its implementation. In the past, this 'cause-and-effect' model has been most deficient or absent for biodiversity, in comparison to other environmental objectives (Primdahl et al., 2010)."*

Croatia: *"…Member states need to be obligated to provide reputable and independent scientific and technical evidence to support their choices"*

Bulgaria: *"Breadth of the actions to address the problem, i.e. improve the conservation status of agriculture dependent habitats. How many habitats … are dependent on agriculture, what is their current status, what are the necessary actions to improve the status of each habitat type, how many of them ... are included in the Strategic plan?"*

France: *"EU should demand that each MS explains how the measures retained in its NSP will allow the achievement of climatic and environmental targets (ex-ante requirement)."*

Sweden: *"Demand quantification of the environmental and climate effect of interventions chosen by MS … Use back-casting to choose interventions! Which targets should be achieved, and when – and which interventions are needed in order to achieve these targets in time?"*

Germany: *"Require from the MS in the Strategic plan an ex-ante assessment (with quantification) which extent of measures is required to achieve the different goals codified in the European Environmental law relating to agriculture (e.g. Nitrates, Habitats, Birds, Water framework, …)"*

4.2.3 Adherence to key operating principles

Two critical principles are no dilution and no backsliding. The former relates to the risk of implementing measures that are unnecessary because they correspond to practices that are implemented anyway regardless of CAP support, or practices with little or no environmental benefit. The no backsliding principle requires MSs to provide robust information, which should include methods for measuring and monitoring, to demonstrate progress.

France: *"No backsliding … Whole agricultural area (no exemption/exception) ... Increasing baseline over the programming period"*

Slovakia: *"Eco-schemes measure to restore grassland on arable land cannot be implemented equally on the whole area of Slovakia, since most of the support would be consumed by regions with higher share of grassland."*

Spain: *"MSs should adopt regional targeting, which should not be confused with an autonomous community control of funds, but as a real adaptation of the measures to the environmental constraints of each ecoregion [considering] for each particular region, which are the dominant global change trends, mainly on land use and climate, as well as the main threats to landscapes and biodiversity, in order to prioritize [and] target sensitive areas [for application of] specific measures."*

Croatia: *"Percentage of landscape features should be defined per regions. In some regions where intensive arable farming prevails, 10 % percent of landscape features should be required. In other areas with extensive agriculture and natural grassland, there is still a lot of landscape features and the percentage could be higher."*

4.2.4 Ambition reflected in budget

The level of ambition within environmental measures should be related to the ring-fenced budget shares.

Bulgaria: "*Ambition of the budget – is the allocated budget sufficient to fund actions to improve the conservation status of how many habitats? Or what % of the habitats?"*

Ireland: *"decisions on regulation and funding e.g. thresholds between GAEC and Eco-scheme and AECM; allocation of unspent Eco-scheme budget to environmental aims ONLY, or its allocation to AECM in Pillar 2"*

Germany: *"At least 40 % budget payments, for both, Eco-scheme within 1st pillar and AECM within 2nd pillar"* But note, however that a *"methodology [is needed] to assess the ambition level; the budget share is not per se appropriate as Eco-scheme can have an income effect."*

Bulgaria: *"Paying Agency favours the measures that are "easy-spent" and does not open a regular call for proposals for the rest of the measures [...], or alternatively does not promote the area-based schemes that are not favoured. […] the EC has to be stricter when agreeing to the redistribution of budgets of environmental or innovation-focused measures, and to accept only well motivated and justified explanations."*

4.2.5 Enhanced investments into knowledge and administration

Acknowledging the success of AKIS and EIP-AGRI (European Innovation Partnerships) in promoting innovation and the expansion of best practices, concrete plans should be laid out by MSs on how to further expand and improve knowledge transfer, advisory services, technical support and monitoring as means to assure quality criterion of the CAP's implementation.

> ***Bulgaria:*** *"Planned advisory and technical support to farmers and land managers to guide them for the best possible actions and timeframe to carry out the activities on their farms in their regions, so that there is a real effect. … Planned monitoring and evaluation of the actions/measures/schemes on the conservation status of the target habitats."*

> ***Slovenia:*** *"sufficient support to knowledge transfer, monitoring schemes and evaluation, including for training new staff." "MS should provide proof of domestic expert consultation supporting CAP targets."*

> ***Slovenia:*** *"In some cases, a short-term limitation is also a shortage of trained volunteers or professionals, which could be overcome by additional training if the monitoring schemes are implemented systematically."*

> ***Spain:*** *"Advisors are needed to help in the implementation process (Lastra-Bravo et al., 2015; Pavlis et al. 2015; Hejnowicz et al., 2016); and with ecology and conservation backgrounds because until now they are skewed to agronomic issues (Navarro & López-Bao, 2018)"*

4.2.6 Selecting suitable indicators to ensure accountability

MSs should justify their selection of indicators and their monitoring procedures, demonstrating transparency and accountability (see also section 5).

> ***Slovakia:*** *"Ambition should be estimated through the output/result indicators, i.e. difference between baseline and target state. Roughly, if the present state is improved by 50 % it can be considered as a highly ambitious target."*

> ***France:*** *"NSP must include quantified indicators effectively correlated with expected climatic and environmental impacts; for example, indicators corresponding to pesticide uses/sales rather than areas concerned with actions aimed at reducing pesticide uses; idem for the uses of fertilizers and antibiotics, gross and net GHG emissions, high diversified landscape features"*

4.2.7 Strategic Plans sufficiently detailed to address local needs and to demonstrate adaptive management capacities

Detailed implementation plans are critical for effective implementation. In their Strategic Plans, MSs should place particular focus on a) avoiding a selection bias toward simpler but ineffective measures, b) adjusting measures to local conditions, and c) clarifying how adaptive management will be employed, to ensure rapid learning and response where improvements are needed.

> ***Ireland:*** *"Detailed description of implementation will be crucial to inform judgement of whether the proposed actions will be expected to be effective or not."*

> ***Bulgaria:*** *"5) Planned procedure for adapting the measure/scheme if it turns out that the proposed actions need to be adapted to reach the nature objectives better."*

4.3 Setting proper baselines for measuring ambition and progress toward targets

To halt the decline of agricultural related biodiversity in the EU, both the area of biodiversity-friendly farming practices (quantity) and the quality of these areas need to increase. Therefore, the GA needs to strike a balance between light-green, spatially-broad options that can reach low to medium impact, and dark-green, targeted measures with high impact. Both MSs (at the stage of developing their Strategic Plans) and the Commission (at evaluation and approval) should demonstrate how this balance is achieved, to avoid repeating the failures of Greening.

When setting targets for biodiversity and landscapes (landscape features, semi-natural areas and land management), it is imperative to set proper baselines. The choice of inadequate baselines can hamper biodiversity protection and restoration efforts even if objectives and targets seem to reflect ambition.

In that perspective, workshop participants provided a broad range of proposals on how baselines should be defined, referring usually to the last year before the start of the new CAP, or to the performance of the current CAP (MFF period 2014-2020). For biodiversity, it is recommended to refer to the last available report(s), in particular Article 17 of the Habitats Directive which requires MSs to report on the status and trend of habitats and species of conservation interest. In the same way, recent mapping efforts should be used to define baselines for landscape features and other relevant habitats.

The choice of baselines should be clearly justified by MSs, again applying a no-backsliding principle at both the MS and farm (or even field) level. For instance, targets cannot be determined without a reference to the current grassland coverage or diversification levels (or current speed of changes), as this may result in losing habitats or their quality. In both examples, baselines and targets should

reflect the fact that permanent grassland area and crop diversity have considerably declined in a large majority of MSs over the past decades.

Setting MS-level baselines also allows the EU to account for the history of ambition and efforts within MSs, some being more ambitious than others.

> ***Ireland:*** *"The area of landscape features and the quantity of semi-natural vegetation on farms can be used as the basis for a points-based Eco-scheme."*
>
> ***Croatia:*** *"Using ortho-photo from [the] year 2018. Define km of stonewalls and hedges."*
>
> ***Slovakia:*** *"To define baselines, it is appropriate to use monitoring data obtained according to Art. 17 of Habitats Directive."*
>
> ***Germany:*** *"Population sizes or population densities could form a baseline for measuring target achievement (e.g. target + 30 % within 5 years)."*
>
> ***Sweden:*** *"In line with existing policies, e.g., EU's climate target relative to 1990; biodiversity to stop decline by 2020 in line with Aichi. No need to reinvent the wheel."*
>
> ***Cyprus:*** *"Baselines need to reflect the end of the previous programmatic period to enable comparisons of target achievement between the new and the old period."*
>
> ***Ireland:*** *"Ideally, the baseline year would be the start of the Strategic Plan period." "For Article 17 reporting (Natura 2000), reference year can be the last report"*
>
> ***Poland****: "The baseline level should be the average for a given parameter over 5 years (2015-2020)."*
>
> ***Ireland:*** *"The area of landscape features and the quantity of semi-natural vegetation on farms can be used as the basis for a points-based Eco-scheme."*
>
> ***France:*** *"translate the EU targets for each MS (taking into account past efforts of each MS in order to reward good performers and to penalize bad performers."*
>
> *"[...] The baseline should take into account, on the one hand the Green Deal targets for agriculture (to ensure that the sum of national targets fits with the EU targets), on the other hand the efforts already made by the MS over the recent years (for example, the five past years) in order not to penalize those MS that already made (important) efforts"*

4.4 Implementation challenges, risks and advice for Member States

In this section we summarize additional implementation challenges raised by workshop participants. These include 1) challenges for small farms; 2) administrative burdens for farmers due to needing to

apply separately for different CAP instruments; 3) finding the right balance between incentives and sanctions for farmers; 4) insufficient coordination among agricultural and environmental administration; 5) land-ownership; and 6) seasonal mismatches between Eco-scheme administration and *in-situ* farm operations.

4.4.1 Challenges for small farms

Small farms have to face specific challenges for the implementation of environmental measures. Administration and controls can be problematic due to the small scale, so the proportion of administrative costs might be higher for small than for large farms. Reducing administrative burdens and barriers, as well as degressivity or capping, have been raised by some workshop participants as means to support small farms.

> ***Poland**: "The problem of small farms – how to incentivize due to scale – farmers may find such subsidies a disincentive, perhaps a degressivity in setting the rates may be considered"*

> However, an opposite opinion was expressed in the discussion: *"payments should be linear (not degressive). If someone implements good practices, why limit the support above an arbitrary decided area?"*

> ***Poland**: "There must be conditionality control for small farms, but it can be slightly reduced (without the need to keep extensive documentation)"*

> ***Slovakia**: "reduce administrative requirements for applicants, especially for small farmers".*

> ***Italy**: "Degressive and capping mechanisms would be required to avoid concentration of funds on few farms"*

4.4.2 Administrative burdens can be reduced by allowing whole-farm applications

Implementation and planning at the whole-farm level could generate a more coherent picture of farm operations and reduce administrative burdens on farmers. For instance, auditing schemes ("Farm sustainability audit") could improve data collection and control and allow farmers to submit one application for their farm as a means to simplify administrative burdens on farmers.

> ***Ireland:** "There is potential for existing audits to be strengthened and integrated with Eco-schemes; for example, to increase the quality of the data collected, reduce administrative burden on farmers and reduce duplication of inspections and data capture for administration. [...] With the integration of auditing schemes, there is potential for a simplified contract between the administration and the farmer encompassing the range of environmental*

commitments and services provided by the farmer. The ideal to work towards is that farmers would have a single agricultural-environmental-climate (AEC) contract that would include all commitments across the Green Architecture rather than having to enroll in multiple schemes."

Spain: *"Joint application for different instruments can overcome excessive bureaucratic and administrative [burdens]"*

4.4.3 Achieving a proper balance between incentives and sanctions

The design of incentives and sanctions remains challenging. Strict sanctions are necessary to secure effectiveness and targeting of measures. However, the higher the requirements and potential sanctions, the lower the willingness of farmers to participate. Neither a highly targeted and specific measure with zero participants nor a measure with low requirements and no targeting but high participation will achieve an environmental impact. Parts of the strict sanctions can be equalized by economic incentives, compensating the efforts and risks a farmer has to take. Member States would therefore need to find the right balance between sanctions and incentives.

Croatia: *"Strict controls and penalties for non-compliance [can] discourage farmers which have limited experience with "green" measures. More advice and warnings, especially at the beginning of implementation of new measures, are needed."*

Sweden: "We need both carrots and sticks: we have to look both at what is working well and how to expand it (the current focus of most policies), as well as what is most problematic and how to reduce it (which we have to stop avoiding, and instead find policies to do so fairly)."

4.4.4 Insufficient coordination between agricultural and environmental management/ministries

The shared objectives between the Green Architecture's instruments and those of the Birds and Habitats Directives (as well as other environmental directives) necessitates better collaboration, communication and cooperation between the agricultural and environmental administrators.

Spain: *"In some EU states, agricultural and environmental management are not adequately coordinated, and neither are central and regional governments, which may share or segregate competences in many different ways … conflicts will arise between administrations in these member states when designing CAP strategic plans. Frequently, administrations with environmental competences are particularly weak. The EU should be very vigilant in ensuring that the strategic plans maintain the appropriate weight of environmental objectives."*

4.4.5 Land-ownership as a barrier for the implementation

Land-ownership might be a barrier for the implementation of environmental measures if the farmer is not the land owner. In this sense, annual contracts under Eco-schemes offer a certain opportunity to promote some measures that can be beneficial, even if implemented for one year.

> ***Slovakia:*** *"Some ecological elements, created by land users, are not accepted by land owners; in such case creating green elements only on publicly owned parcels is feasible, also by implementing land adjustment projects, or land left fallow as a temporary solution."*

> ***Germany****: [Eco-schemes] "could be interesting for farmers that have short term, sometimes even annual land lease contracts. These farmers are not eligible to participate in AECM".*

4.4.6 Seasonal mismatches between administration and on-farm operation

Given their annual nature, Eco-schemes pose a logistical challenge relating to mismatches between farming operations and administrative timing. A menu-based approach may reduce this barrier by removing uncertainties regarding eligible measures. Closer communication with administrators and/or FAS may provide another solution.

> ***Ireland:*** *"From a logistical perspective, there may be difficulties in implementing and reconciling seasonal farming actions and seasonal administrative deadlines within a single year. In the context of an annual scheme with BPS applications in April/ May and payments in October there will only be 6 months to deliver additional actions. For example, planting hedges or native trees is not typical in the April – October period. Farmers need a choice of actions that build up environmental assets and can be delivered rapidly."*

> ***Slovenia:*** *"Eco-schemes might also be less suitable for measures that should be implemented early in the year, because most farmers will probably apply them in April or May, when they usually apply for CAP income support."*

4.5 EC support for Member States in target-setting and implementation

Experts recommended that the Commission should support and accompany MS in target setting, evaluation of Strategic Plans and setting their implementation on the right path; assist and guide MSs in the development of targets; and offer technical support and funding toward monitoring and evaluation throughout the implementation period.

> ***France:*** *"Enhanced conditionality and Eco-schemes rules should be defined at the EU level and then translated into National strategic plans (NSP) through quantified targets negotiated with*

the EC in order to ensure their compatibility with EU climatic and environmental objectives and targets"

Germany: *"Communicating clear standards for National Strategic Plans … Ask member states to involve science, NGOs, the public in time for designing National Strategic plans"*

Slovenia: *"Technical support to the implementation of the strategic plan must include sufficient funds for adequate monitoring and evaluation of measures. This is also crucial for ensuring adequate data bases for implementing result-oriented and spatially targeted biodiversity schemes."*

Sweden: *"Support in the foundation for distinct links between strategies, targets and actions! Support on how to assess targets and what to measure. Set clear and specific targets, and support MS in how to interpret non specific targets in an operational way! Unclear and non-specific targets at EU-level transfers a lot of responsibility to individual MS's to interpret targets and thus, makes it difficult for MS to implement in a good/efficient way."*

Croatia: *"Not all MS have the same level of ambition regarding nature protection. Therefore, the EU Commission should not leave all the decisions regarding Green Architecture to MSs. To achieve a common level playing field across the EU, conditionalities should contain a set of similar rules for all MSs."*

Sweden: *[EU support is needed on] "How to follow up on reaching the targets (how to assess, what to measure ...)."*

4.5.1 The Commission should closely monitor performance and progress toward stated objectives; incentives and sanctions for MSs need to be clarified

Workshops highlighted a central role of the continuous interaction between the Commission and the MSs. MSs should be incentivised when performing well – but should be clarified. Specifically, the focus of existing sanctions is on the accuracy of meeting budgetary goals, but not on compliance with environmental standards or the likelihood of reaching environmental impacts. While it is important to ensure that MSs are not sanctioned for setting (over-)ambitious targets, sanctions to MSs need consideration if actions are judged by the EC to be insufficient to meet their objectives.

Ireland: *"There is no sanction for Member States that are not on track to meet specific objectives related to environment and climate"*

Cyprus: *"Key factor during implementation: effective monitoring system – possibility to correct / adjust CSP (e.g. Eco-schemes are annual and some things could be corrected if not working properly; e.g. increase payment, improve monitoring)."*

> ***Slovakia:*** *"It is necessary to set obligatory criteria and limits, ensure consistent control, and following this, to make funding for the MSs conditional. … it is necessary to strengthen legal and personal capacities for supervision in the field."*

> ***France:*** *"If necessary, the EU would demand the MS to design and implement corrective actions, with dissuasive penalties in case of non-compliance."*

> ***France:*** *"penalties for non-compliance with conditionality requirements must be proportional to climatic and environmental damages (rather than linked to CAP payments only)."*

> ***Spain:*** *"The EU should also ensure that the targets set in the plans are well on track to actually achieving the Biodiversity strategy targets by 2030. It is expected that the self-imposed targets of some countries will not be fully met, and the EU should therefore be very demanding and ask for considerable progress in this transition, and not allow plans that postpone critical targets."*

Examples of **incentives for MSs showing ambition** could be to provide support to cover administrative burdens of ambitious implementation plans, to allow more flexible use of budgets or to ease reporting requirements.

> ***Ireland****: "There should be provision in the CAP budget to reimburse managing authorities for these additional administrative expenses, along the lines of the way provision is made to finance Technical Support for RDPs."*

> ***Germany****: "The higher the realized ambition level [of MSs], the higher [could be] the allowance to use income supporting / easy to administer instruments … The more ambitious the program structure is, the more flexibility [could be given with respect to] … reporting"*

4.5.2 Preparation for CAP implementation by MSs

Several workshop participants mentioned that preparation for the upcoming CAP will be essential, especially due to the novelty of Eco-schemes, the lack of sufficient mapping efforts to establish a baseline, and an urgent need to expand monitoring efforts. Particularly the implementation of ambitious Eoo-schemes will require investments in expanding administrative capacities.

The two-year transition period, as well as the COVID-19 recovery funds, can be an opportunity to do so, but should be used wisely and effectively. This requires a targeted use of available (short term) funds toward:

- Non-productive investments
- Habitat restoration
- Mapping

- Administrative updates to support Eco-schemes, including training of Farm Advisory Services (FAS)

The transition time during the years 2021-2022 allows such adjustments, but needs to be effectively used in preparation for the CAP's implementation starting 2023.

> ***Ireland:*** *[Setting Eco-schemes will]"...require investment in administrative systems and training; however, because Eco-schemes are an innovative instrument, this will be required anyway."*

4.5.3 Close mapping and monitoring gaps

To improve knowledge on biodiversity and policy effects, MSs should close existing mapping and monitoring gaps. There is an urgent need to extend biodiversity monitoring in some MSs, in terms of spatial extent and/or taxonomic group(s) monitored, and in some MSs both.

4.5.3.1 Mapping gaps

Key features to map include: on-farm landscape features (terraces, stonewalls, hedges, trees, ponds etc.), the number and the area of patches of (semi-natural) habitats and non-production parcels (including woody vegetation and land laid fallow where possible). Considering the importance of landscape connectivity and heterogeneity, it is important to map field/parcel sizes, assess crop diversity and structural complexity, and assess connectivity among (semi-natural) habitats in and around farmlands.

Mapping of both habitat extent and quality is achievable, but remains a challenge that should be resolved. It is also important to develop the capacity to monitor soil health, and processes that improve or degrade it.

> ***Spain:*** *"Connectivity and landscape features (semi-natural elements such as field boundaries, trees, ponds, etc.), grassland and fallow land, mean path size of agricultural fields, number of crops along the year (rotations)" [needs to be mapped]*

> ***Austria:*** *"Green infrastructure indicators are suitable, as they address the functioning network of natural landscapes; Landscape structure indicators are technically feasible and measurable (sentinel data), they are relevant for climate protection, erosion protection, stepping stone structures"*

> ***Germany:*** *"Diversity of crops within one farm: Increase wild biodiversity and food self-sufficiency, among other ecosystem services".*

> ***Sweden:*** *"Indexes that describe the structural complexity of the agricultural landscape, e.g. the element of more or less natural habitats (permanent habitat)".*

Ireland: *"Ireland does not currently have a national, high-resolution land use/habitats map. One is … due for delivery Q3/4 2021. This will give information on the quantity of landscape features, but not their quality (ecological condition for biodiversity). [Yet] Ireland did establish an eREPS mapping system[10] to support the REPS agri-environment scheme in the 2000s, but this was not maintained … The fact that it was not pursued has meant a real loss for biodiversity monitoring in Ireland, but it shows what can be done."*

Italy: *"Mapping the UAA under organic farming is one of the relevant issues, but temporal dynamics should be considered as well."*

France: *"Mapping of biodiversity reservoirs (from various field data and various documentation sources), including in Natura 2000 designated areas and other national and regional designated areas of ecological interest; Mapping of ecological corridors (from various field data and various documentation sources, including administrative and academic resources)"*

4.5.3.2 Biodiversity monitoring gaps

Only through close monitoring of biodiversity in agricultural landscapes can achievable biodiversity targets for CAP be set and their attainment or development specifically monitored (see also Section 5). Yet this requires filling a range of gaps in biodiversity monitoring, to achieve sufficient detail for evaluate the impacts of (all) CAP instruments. A key task in preparation for the next implementation period is therefore to expand monitoring schemes for well-monitored organisms (such as birds, plants, butterflies) to allow MSs to inform about biodiversity in the wider countryside (beyond protected areas). Monitoring design needs to be explicitly linked to targets; Workshop participants systematically highlighted that sufficient information and expertise are available to accomplish a proper design and implementation of such monitoring efforts in terms of organisms, methods and spatial distribution once targets are clarified.

Ireland: *"With the exception of the Countryside Birds Survey which, as its name implies, has a focus on birds, there is no systematic, regular, monitoring programme to assess the conservation status of habitats and species in the wider countryside (outside of protected areas), even though this is one of the seven priority areas in the national action plan"*

Slovakia: *"FarmLandBird: [...] including more observation points covering all focused areas would be beneficial. It would be useful to extend monitoring networks by areas with Eco-schemes and specifically evaluate the impact of Eco-schemes on the FBI."*

Croatia: *"Currently for many habitats and species status is unknown, and the status is based on expert opinion, rather than on data."*

[10] https://bit.ly/2SA4p1z

4.5.3.3 Information on water use and chemical input needs to improve

The water-target of reducing pesticide use and their impacts by 50 % cannot be met without sufficient monitoring, yet chemical input data is missing at the relevant scales. This forms a major barrier not only to the implementation of the biodiversity strategy, but also for reducing negative impacts on soil, water and public health.

> ***Slovakia:*** *"no [recent] correct data on use of pesticides exists since they offer information on the quantity of individual products used, while information on the amount of applied particular key ingredients is unknown and thus impact on the environment cannot be precisely evaluated.*"

> ***Cyprus:*** *"site or at least region-specific data (NUTS2) are needed on input use in agriculture – especially for pesticides and fertilizers. While MS level data are useful, in many cases the general patterns of pesticide and fertilizer use in especially sensitive areas are averaged out."*

> ***Italy:*** *"Input reduction [would be an important indicator]. However, data on input usage is in general not available. That would be relevant information for monitoring impacts and quality of any environmental scheme!"*

4.5.3.4 The EU's Land Parcel Identification System (LPIS) needs to be improved

To cover all habitats and land-cover within farmland, not only eligible land needs to be mapped. Otherwise, data flow is incomplete and depends on specific interests regarding CAP funding – which may differ between farmers, regions and MSs according to needs and regulations (see also section 5.2.3).

> ***Ireland****: "Current national land cover and habitat maps are being developed by the Environmental Protection Agency and due for release in 2021 which will make semi-natural vegetation/feature mapping feasible across all farms at little additional cost, dependent on the integration of the new land cover map into Land Parcel Identification System (LPIS)."*

PART 3: MONITORING AND REPORTING

5 Monitoring and reporting by Member States

By comparing actual performance with intended objectives and targets, monitoring (the process of data collection) provides the information with which to evaluate policy performance. When objectives are being attained, monitoring underpins the provision of positive feedback and reassurance that financial investments are effective and represent value-for-money. If objectives are not being attained, then timely monitoring and evaluation is crucial to identify this, and to rapidly implement changes to improve performance. Rapid learning and adaptive management require effective monitoring and evaluation, and is particularly important for new initiatives and instruments, such as (in the case of this CAP reform) Eco-schemes.

Workshop participants highlighted the insufficiency of monitoring information on environmental performance of the CAP in general, and with respect to biodiversity in particular. Monitoring efforts in many MSs need to urgently expand – to fill taxonomic, thematic and geographic gaps. Even in countries with well-established monitoring schemes, farmland monitoring (especially on arable land) lags behind. Notably, **there are well-established methodologies for data collection, analysis and sharing among scientific disciplines that could be used to implement improved monitoring with respect to the CAP's performance**. In addition, the layout of the CAP's output and result indicators do not allow converting the amount of financial resources that is spent into an indicator, for informing policymakers and the public on the ambition level of MSs or the likely environmental impact. With a proportion of CAP expenditure, **effective monitoring is a relatively small investment that could significantly improve the CAP's cost-efficiency.**

5.1 In situ biodiversity monitoring

While the methods for species' and habitats' monitoring are overall well established, monitoring efforts in many MSs need to urgently expand – to fill taxonomic, thematic and geographic gaps. Even in countries with well-established monitoring schemes, farmland monitoring (especially on arable land) lags behind (see also section 4.6.1).

> ***Bulgaria:*** *"Currently, the Natura 2000 compensatory payment measure is considered the most ambitious and effective nature conservation measure as it supports over 10.000 farmers with over 25 mln Euro each year; however, it has absolutely no monitoring so the nature conservation effect is practically unknown (Kazakova, 2020)."*
>
> ***Slovakia:*** *"it is appropriate to use monitoring data obtained according to Art. 17 of Habitats Directive".*
>
> ***Ireland:*** *"Current methods for surveying habitats and species for Article 17 reporting in Ireland are considered adequate, but should be extended to more farmed land in the wider countryside."*

***Sweden**: "there is a need to expand biodiversity monitoring, to sufficiently target agricultural land. The monitoring of birds and butterflies should be extended to properly cover the agricultural landscapes."*

5.2 Reporting by Member States

Broad **consensus emerged across workshops that yearly monitoring and reporting is essential** – especially if the CAP post-2020 is to employ a result-oriented delivery model allowing more flexibility to MS regarding how they meet the stated objectives. This implementation model requires a significant expansion and improvement of the system for monitoring, reporting and performance-evaluation, both at the EU and MSs' level.

Yearly monitoring, rapid evaluation and effective response is needed for the CAP as a whole rather than merely for the GA. However, it is particularly essential for Eco-schemes as a novel instrument that will undoubtedly require **adaptive policy management** and rapid adjustments to address implementation weaknesses and inefficiencies that are likely to occur especially in the first years.

Further, it is **advisable to ensure that monitoring efforts are proportional to the investments made in a given instrument**, or proportionally to the breadth of anticipated or desired impacts. Accordingly, monitoring efforts need to be significantly expanded with respect to Enhanced conditionality requirements and Direct Payments, to achieve sufficient monitoring of the impacts of the CAP as a whole.

***Slovakia:** [We need to] "develop systematic, precise and flexible monitoring of each Eco-scheme measure. If the particular scheme does not deliver the expected results within a given time frame, this should lead to an adjustment of the scheme."*

***Slovenia:** "One of the main problems is that only certain indicators (e.g. share of UAA in AEM) will be subject to mid-term and final evaluation, whereas others will only be evaluated at the end of the programming period."*

***Ireland:** "The greater the budgetary allocation to a policy instrument, the greater the priority that should be given to its evaluation (Finn and Ó hUallacháin, 2012)"*

***Slovakia:** "within Conditionality to secure ecological landscape elements on grasslands, improve overall supervision of Conditionality scheme and its enforcement, e.g. increase sanctions for breaking the law cases". … "Inclusion of wetlands into Enhanced Conditionality can be inefficient if measures are not monitored in detail and sanctions are regularly applied – this is based on experience when wetlands were usually ploughed"*

5.3 Transparency, accountability and data accessibility

Biodiversity monitoring is quite well advanced also in terms of available assessment methods and tools. A key challenge is, however, in relating the impacts on biodiversity directly to the various CAP instruments (also beyond the GA). Here, **inaccessibility of CAP implementation data forms the main barrier**. For instance, Integrated Administration and Control System (IACS) data owned by MSs are poorly standardized, and sharing policies differ between MSs and even regions (e.g. Federal States).

Workshops highlighted that key **barriers to overcome for data analyses are consequently inclusion of scientists, transparency and data-accessibility/sharing, lack of standards for reporting, as well as insufficient long-term funding to conduct such analyses** – not just as part of projects but as a long-term investment in infrastructure and human resources to provide support to policymakers.

5.3.1 Standardized data reporting and availability as preconditions for transparency

Ensuring that CAP spending is transparent requires MSs to deposit implementation data in a standardized way, and make it available for public (including scientific) scrutiny. Effective evaluation of Strategic plans, and monitoring of implementation, would strongly benefit from external evaluation (auditing) by an independent body.

> ***Germany:*** *"Ensure transparency on what is supported in the MS (database with description of the measures and the supported areas) as detailed as possible"*
>
> ***Spain:*** *"It is essential to create an independent commission or body to ensure compliance with the requirements for receiving aid from the CAP, which should be made up of scientific and civil servants who are not subject to the vagaries of the electoral processes. This body should audit the three tools: AECMS, Eco-schemes, and enhanced conditionality."*
>
> ***Sweden:*** *"A well-functioning follow-up and evaluation are important to ensure the cost-efficiency of all types of interventions. An increased budget for follow-up and evaluation is needed to make sure that cost-efficient interventions can be chosen based on available evidence."*
>
> ***Sweden:*** *"All MS must use a standard label to report their spending (for example, the Roman Numeral measure number such as "IV/A.15" to indicate "Agri-environment-climate," in addition to whatever local language and labels are used, so that payments can be matched to measures."*
>
> ***Cyprus:*** *"Currently, it is practically impossible to assess the extent of measure implementation and use data for EU-wide scientific studies on the effect of different measures on environmental targets. The challenge lies mainly on the unavailability or inaccessibility of data or the different measures applied in different EU regions, farmer participation, and linked outcomes.*

Information technology permits the sharing of such data relatively easily, and the Commission needs to ensure that such data are publicly available and updated on a yearly basis."

5.3.2 Inclusion of scientists and other experts in monitoring, analysis and performance evaluation

Scientists should be seen as partners in the process of performance evaluation, to ensure effective use of knowledge, (cost-)efficient use of funding, as well as improved capacities to employ adaptive management. For example, evaluating each of the CAP's instruments could be designed in a more systematic form to achieve cost-efficiency of investments. Similarly, to implement the Complementary Result Indicator for biodiversity, it will be essential to establish a data collection system and an assessment methodology. This could be done jointly with scientists.

Croatia: *"Results from monitoring and evaluation of the RDP 2014-2020 (in particular AECM) should be made available to [the] scientific community and lessons learnt from them used in designing of CAP GA. Biodiversity experts should be consulted and involved in designing of CAP SP. In general: improve the flow of information, make it more participatory."*

Sweden: *"A systematic evaluation/monitoring of the individual measures is needed. What are the real environmental effects, the effects on biodiversity?*

Such a systematic evaluation can include a BACI (Before-After-Impact-Control) study design, where selected entities (such as fields or farms) that do (Impact) and do not (Control) implement a measure are evaluated for biodiversity and/or environmental outcomes before and after implementation of the measure. This can be built in and part of the requirements for the Eco-schemes/ACEM.

Will increase cost-efficiency in the long run. It is extremely important to know that measures have an actual effect."

Slovakia: *[It is necessary]"to establish [a] data collection system for Complementary Result Indicators that could help to quantify the net effects of interventions per foreseen target (e.g. GHG emissions, ammonia, carbon sequestration, etc.). Using this data, it would also be possible to regularly update conditions of the Eco-schemes during the programming period and to provide a fact sheet to the farmers, decision-makers and public."*

However, funding is needed to allow scientific support for monitoring, analyses and performance evaluation. Particularly, to establish an effective monitoring and reporting system, agreements with research organizations and/or monitoring centres should be established to aid in data gathering, harmonization and analyses. Dependency on (short-term and unpredictable) project-based funding should be reduced by long-term funding for such efforts, to allow rapid and effective technical support in data analyses and performance evaluation.

Ireland: *"There has been no funding for monitoring baseline biodiversity indicators at the wider countryside scale. Science can improve the way indicators are used for performance evaluation systems, but this requires funding for researchers."*

Ireland: *"To date, ONLY research projects have generally been able to effectively investigate the effectiveness of CAP measures on biodiversity. It would be preferable to ensure that funding is allocated to research projects rather than to consultants to perform evaluations that are often anodyne and not very informative."*

Slovenia: *"...too few sampling plots to enable the calculation of an index at the national level. Currently, a research project is underway which aims to establish a national monitoring scheme for pollinators. Financing and staffing problems are important for this issue."*

Slovenia: *"All of the above could be used to establish suitable indicators within the CAP, but their implementation is limited by the available budget so sufficient funds for the CAP technical support should be ensured."*

5.3.3 Defining and completing common reporting standards across EU Member States

Major inconsistencies remain with respect to reporting needs by MSs regarding environmental performance. Considering that only Result indicators need to be reported yearly (and even this is still under negotiation), workshop participants supported the EP's proposal to insert a Result Indicator R29b *"Fostering high nature value farming: share of agricultural area under management commitments to generate high nature value"*.

Ireland: *"In Article 7 of the Regulation, it is indicated that achievement of the CAP objectives shall be assessed using impact indicators. In the Regulation itself, a 'target' is defined as a pre-agreed value to be achieved at the end of the period in relation to the result indicators included under a specific objective" (Art. 2(i)). There is no obligation in the Regulation for Member States to define targets for their impact indicators and that this requirement is only referenced in the preamble."*

6 Selection and best use of indicators (question 4)

Key criteria for good indicators are that they are feasible to collect and analyse in multiple MSs, they are supported by a running monitoring system and available data, they have existing analysis methods, and the outcomes can be clearly used to interlink CAP interventions with observable biodiversity impacts.

Participants in the workshops provided a breadth of recommendations on the selection of indicators for the status of biodiversity and ecosystem services, particularly focusing on

a) Impact Indicator I.19:

> *"Enhanced biodiversity protection: Percentage of species and habitats of Community interest related to agriculture with stable or increasing trends"*

b) Impact Indicator I.20:

> *"Enhanced provision of ecosystem services: share of UAA covered with landscape features"*

c) Complement*ary Result Indic*ator FA 4A:

> *"Restoring, preserving and enhancing biodiversity, including in NATURA 2000 areas, and in areas facing natural or other specific constraints, and high nature value farming, as well as the state of European landscapes". (https://bit.ly/3o52RZm)*

It was proposed by the workshop participants that the Complementary Result Indicator **FA 4A should divide into two types of sub-indicators**:

- One indicator (or set of indicators) based on monitoring of specified **taxonomic groups (animals and plants)**, to inform directly on the state of biodiversity. It should focus on the local level (parcel, field or farm) and reflect on-farm structure and management (Table 5).
- A second sub-indicator should focus on **landscape parameters (habitat extent and quality)**, as well-established proxies for the (anticipated) impacts on biodiversity, especially at the landscape scale (Table 6).

In the following sections, we elaborate on these two types of indicators, namely for biodiversity and landscapes, followed by inputs on their selection and implementation.

6.1 Biodiversity indicators

Biodiversity indicators should be measurable, to document policy impacts. From these indicators it should be possible to read whether and how the biodiversity of an area is affected. Future biodiversity indicators should go beyond measuring the number of hectares. The existing farmland bird index is not sufficient either.

Table 5: Taxonomic groups supported by respective monitoring schemes that can serve as reliable biodiversity indicators

Taxonomic group / indicator	Justification
Birds / Farmland Birds Indicator	***Cyprus:*** *"Good indicator of environment status, including habitat quality".* ***Bulgaria:*** *"Provides scientific evidence for the condition of widespread bird species, some of which inhabit agricultural lands."* ***Bulgaria:*** *"MS already have developed experience in reporting that indicator, so after its removal from the list of the result indicators, it can be con to be used as a complementary indicator"* ***Slovakia:*** *"It would be useful to extend monitoring networks by areas with Eco-schemes and specifically evaluate [the] impact of Eco-schemes on FBI. Today, the indicator is calculated only at the national level and for AECM areas."* ***Ireland:*** *"Countryside Bird Survey (CBS, established 1998) monitors farmland bird populations (as well as the populations of other bird species occurring in the wider countryside)"* ***Slovakia:*** *"Due to unavailability of continuous series of data at sufficient spatial level, it is not realistic to measure changes in the species population apart from birds which are covered by the Farmland Bird index. However periodical monitoring and assessment of some selected species should be launched in the long-term."* ***Spain:*** *standardized guidelines of the Pan-European Common Bird Monitoring Scheme of the European Bird Census Council and BirdLife International" (https://pecbms.info/).* ***Croatia:*** *"FBI at the level of [the] country is misleading. CRI should be developed for non-intensive and intensive farms."* ***Austria:*** *"Regionalization of the indicators would be important for a more precise assessment."*
Butterflies / Butterfly Grassland Indicator	Butterfly Monitoring Schemes are already operating in 22 MSs and new ones are being established (see project ABLE). ***Cyprus:*** *"Butterflies are a good indicator of the state of the agroecosystems"* ***Italy:*** *"Important services and iconic species; Wider availability of experts and taxonomists (also following citizen-science approaches like for the FBI). However, some concerns about data quality of citizen science have been raised."*

	Spain: *"follow specific recommendations of the European Butterfly Monitoring Scheme" (https://bit.ly/3tteRVq)*
Specific Plants – existence, abundance;	Methods are well established for flowering plants, and the existence and abundance of specific species (e.g. Habitats Directive) is feasible ***Cyprus:*** *"Presence/ absence would indicate if measure is efficient."*
Pollinators / Status of a key pollinator species in agricultural lands	***Cyprus:*** *"in addition to their biodiversity value, they offer the crucial ecosystem service of pollination and are the focus of the EU pollinators initiative" (https://bit.ly/3vVQaTi).* ***Ireland:*** *"EU Pollinator Monitoring Scheme"* *"Pollinators are specifically included in the EU Biodiversity Strategy to 2030 as one of the ways of restoring biodiversity in terrestrial systems. The EU Pollinator Strategy has published a Pollinator Monitoring Scheme EUPMS (Link) … developed by the JRC, which includes a methodology and policy indicators (including ones for the CAP)"* ***Italy:*** *"Important services and iconic species"* ***Spain****: "Pollinators surveys should follow specific recommendations of the … Pollinator Monitoring Scheme for Bees [https://bit.ly/3f1Uolo] EU initiative to monitor pollinators in all MSs. "European Pollinator Monitoring Scheme (EUPMS); If already implemented, can be cost – effective." (https://bit.ly/33wFI8G)*
Other Insects / insects in general	Species included in Habitats Directive **Italy:** *"The tool "Syrph the Net" allows an assessment of environmental quality by comparing expected vs. counted species. Syrphidae provide several ecosystem services, biological control at larval stage, pollinators as adult[s]."*
Populations of endangered and critically endangered species at national level	Potentially relates to Art. 17 **Bulgaria:** *Can be done for species where "the localities and population are very well known."*
Alien species monitoring / Threats by invasive species	***Italy:*** *"A true concern for agriculture and the cause of a relevant increase of pesticide use."* ***Slovakia:*** *"share of non-productive areas covered by invasive species"*
Species richness,	***Slovakia:*** *"indicator of species richness for grassland. Indicator of species*

diversity and abundance	*richness could be assessed for each habitat of Habitats Directive separately, using existing vegetation databases and results from ongoing regular biotope monitoring."* ***Bulgaria:*** *"Species diversity and abundance – a lot of indicators for all relevant habitat and animal groups"*
Providers of relevant agroecosystem services (relevant for farmers). Example: Soil arthropod diversity / soil biodiversity	For soil biodiversity, Soil BON network [https://bit.ly/33sGm79] develops protocols for global monitoring. ***Spain:*** *"there is a lot of evidence about the capacity of different groups of soil arthropods (e.g. ants …) to reflect the effects of different management models."* ***Sweden:*** *There is an EU wide monitoring program for soil biodiversity"*
Trends in large carnivores	***Spain:*** *"Status in large carnivore populations and changes in range. This would be linked to another indicator capturing the proportion of farms within these large carnivore ranges adopting proposed measures."*

Source: Table based on own Workshop outcomes. For more quotes Thünen Working Paper 175 Vol. 2 Annex I.

6.1.1 Specific comments on Impact indicator I.19

Austria: *"The important question would be where the data for the time series for I-19 come from and how these time series are examined. It's also important that an indicator should be easy to use in practice."*

Austria: *"I-19: This indicator is very straightforward. The basis is the national reports in accordance with Article 17 of the Habitats Directive: Only those habitat types and species that are closely related to agricultural use are evaluated."*

Germany: *"For the diversity of animal species, … [sometimes] indirect indicators would be the most efficient: Animal species are related to some habitats and plant species and, therefore, by estimating the diversity of plant species"*

6.2 Landscape indicators

Table 6: Proposed indicators for the state of landscapes and habitat, of relevance for Impact Indicator I.20 and Complementary Results Indicator FA 4A

Indicator	Justification
HNV farmland extent / spatial distribution of HNV farmland	***Cyprus:*** *"Has been used in the past and reflects most of the properties of these type of indicators. In addition resources have been allocated EU wide."* ***Ireland:*** *"HNV farmland is a very important refuge for biodiversity outside of Natura 2000 areas, and well recognised by previous CAP"... "spatial distribution of HNV could be used to formally test whether there is 'targeted allocation of resources to HNV'."* ***Spain:*** *"Especially valuable systems (HNV) in each member state …They are previously integrated within the CAP structure and recognized as a priority objective (CAP 2014-2020)… Most beneficial elements for biodiversity at EU level and already available at EU level (e.g., from Copernicus Land Monitoring Services)"* ***Croatia:*** *"Use [the] share of HNVF areas as [a] complementary] indicator."* ***Austria:*** *[important] "Land use types are considered in Austria within the Austrian HNV indicator. In this respect, the HNV indicator is actually an interesting indicator"* ***Ireland:*** *[An] "Additional supplementary impact indicators should be considered. One additional target could be the maintenance/extension of High Nature Value farmland ...The ability to predict the spatial distribution of HNV could be used to formally test whether there is 'targeted allocation of resources to HNV'. The amendment to include a result indicator as proposed in the EP position R29b "Fostering high nature value farming: share of agricultural area under management commitments to generate high nature value" deserves support."*
The proportion of semi-natural vegetation on farms	***Ireland:*** *"is an important indicator of the overall nature value of farms in Ireland (Boyle et al 2015). Across Europe the proportion of semi-natural vegetation is important for the supply of a range of regulation and support ecosystem services such as pollination, pest control and water quality for example"* ***Spain:*** *"Apart from the evident positive impact on the fauna and flora inhabiting remnants, there is overwhelming evidence of the benefits of landscape complexity on different species at higher spatial scales."*

	Spain: *"Connectivity and landscape features (semi-natural elements such as field boundaries, trees, ponds, etc.), grassland and fallow land, mean path size of agricultural fields, number of crops along the year; Most beneficial elements for biodiversity at EU level and already available at EU level (e.g., from Copernicus Land Monitoring Services)"*
Extent of specific, biodiversity-relevant habitats	***Austria:*** *"Some land use types go hand in hand with a high level of biodiversity, e.g. different kinds of extensive meadows in lowland and mountains, fallow land in arable fields."*
Habitat quality (e.g. of grasslands)	***Ireland:*** *"it would be desirable to have indicators of habitat quality for ubiquitous habitats such as hedgerows and field margins, ponds."* *For feasibility of habitat quantity and quality mapping see Ireland's "eREPS mapping system"* (Link);*"There has [also] been good progress made using apps for on-the-ground mapping"* *"Quality of landscape features/habitats [can also be] assessed via scorecards… [and] linked to payments for ecosystem services/results-based payments"*
% trees and shrubs in pastures.	***Bulgaria:*** *"There are two options for mapping – ortho-photo photos or field visits."* ***Spain:*** *"Relevance of linear habitat elements, small forests and remnant trees as ecological and connectivity elements at the landscape scale."*
Use and rest time in grazed lands (at the farm scale)	***Spain:*** *"Evidence indicates that rangelands subjected to seasonal grazing periods present a better ecological function and better regeneration"* ***Austria:*** *"We need to know exactly which grazing system is used for how many days so that the effect can be described precisely."*
Landscape heterogeneity, Crop diversity and field size(s)	***Germany:*** *"composition, configuration, temporal shifts e.g. crop rotation"* ***Spain****: [within-farm] "Diversity of crops … Increase wild biodiversity and food self-sufficiency, among other ecosystem services… [it is further important to] "Prevent enlargement of field size"*
Connectivity index	***Spain:*** *[It is] "essential to incorporate spatial connectivity indicators at scales larger than the farm scale, and it is more realistic to propose connectivity indicators based on landscape & spatial features rather than specific species information."*
Use of agrochemicals /	***Spain:*** *"pressure indicators like pesticide, fertiliser, antimicrobial consumption"* But see comments on feasibility, e.g.:

Input reduction	***France:*** *[current] "indicators corresponding to pesticide uses/sales rather than areas concerned with actions aimed at reducing pesticide uses; idem for the uses of fertilizers and antibiotic"*
Water consumption	***Spain:*** *The transformation of rainfed to irrigated lands has dramatic consequences on biodiversity … apart from the obvious impact on a natural resource scarce in many Mediterranean countries.*
Bare ground	***Spain:*** *"Especially recommended for landscapes with steep slopes … Especially in Mediterranean countries, which are more vulnerable to erosion."*
Distance to Nature (Hemeroby)	***Austria:*** *The indicator … "indicates the degree of naturalness – if a region is cultivated very intensively, measures must / could be taken to counteract this … The indicator measures ... has been tested in grassland and orchards. For example, landscape elements were planned based on this index."*

Source: Table based on own Workshop outcomes. For more quotes Thünen Working Paper 175 Vol. 2 Annex I

6.3 Technical recommendations

In the following section we collect recommendations that were provided by workshop participants with respect to monitoring and best use of indicators. This section covers 1) remote sensing, 2) required adaptations of LPIS, 3) the use of aggregate ("composite") indicators, and 4) options for the 'Complementary Result Indicator' for biodiversity (FA 4A).

6.3.1 Remote sensing as a means for mapping and monitoring performance

Remote sensing can reduce the required efforts for *in-situ* monitoring but cannot replace it fully. It is further advisable not to rely solely on remote-sensing / GIS-based assessments for reporting. Remote sensing methods are advanced enough for effective monitoring of landscape features and semi-natural areas e.g. using Copernicus data, but challenges remain regarding linear or small features, as well as grassland mapping and habitat quality. *In situ* validation and expanded monitoring over time are highly essential.

Practical examples were provided how this could be done on the ground.

> ***Ireland:*** *"The best approach to mapping is to combine remote monitoring (satellite), complemented with subsampling/ground-truthing, potentially with better use of Copernicus data. … Remote sensing could reduce the frequency of field assessment rather than replace it. Time-series remote sensing could be very useful for gauging change through the growing season, e.g. mowing dates. Scale is an issue in remote sensing – some landscape features may*

be too small to be captured remotely (e.g. field margins <2m width) and grasslands need to be disaggregated into intensive, extensive and semi-natural."

Bulgaria: *"Require MS to apply e-governance in a good governance way allowing better synergies between agricultural policy and environmental policy (integration of e-cadaster of arable land, pastures and HNV with Natura 2000 data and map)"*

Italy: *"The use of drones by administrative units, satellite measurement, photomaps"*

France: *"Semi-natural landscape elements listed in EFAs and largely absent in the present implementation of the CAP. Combine field observations and remote sensing to validate the remote sensing detection of semi-natural elements (hedges, ditches, ponds and dikes, etc.)"*

Slovenia: *"some landscape features (particularly woody and linear elements, like hedgerows), can be detected at a sufficient level of detail, so a common spatial layer of such features could be prepared at the national level. However, the suitable data is not available yearly, but only in certain time periods. Furthermore, some landscape features are not easily detectable with this approach (e.g. water objects under canopy and landscape features in areas with increasing shrub encroachment)."*

Italy: *"GIS database of landscape elements on which a range of indicators on landscape structure and composition could be assessed"*

Spain: *"Proportion of cover, edge length, connectedness, distance to nearest habitat patch, biological and structural diversity of linear elements in the farm (hedgerows, stone-walls, riparian strips, floral strips,.). … Measured using remote sensing bi- and tri-dimensional techniques (GIS, Lidar,…). Use of public platforms: https://land.copernicus.eu/pan-european/high-resolution-layers*

https://www.copernicus.eu/es/servicios/vigilancia-terrestre "

Germany: *"NDVI [Normalized Difference Vegetation Index]: Helps to estimate the abundance of vegetation and to distinguish between different types of vegetation"*

France: *"An improved information system relying on information collected in an automatic way (through satellites, sensors…) should also reduce collect and control costs."*

6.3.2 Adaptations are needed for LPIS and how it is used

The EU's Land Parcel Identification System (LPIS) is a key instrument for monitoring farm structure, but it should be improved to allow (and include) full mapping of farmland with regards to land ownership instead of fragmented mapping for funded-purposes only. Mapping should include both eligible and ineligible structures and habitats, partly because this may help overcoming current gaps

where the prevalence of such structures generates disadvantages for farmers. Overcoming such disadvantages, to ensure the CAP supports the EU's Green and Blue Infrastructure (GBI), can only be achieved through a coherent mapping and monitoring system.

> ***Slovenia:*** *"a combination of both remote sensing data and the expanding of the current system, including LPIS, was suggested. The latter would mean that the farmers are obliged to identify and apply certain non-productive features by themselves in order for them to be eligible for the CAP income support as part of the new system of Conditionality."*
>
> ***Slovakia:*** *"HNV: Currently, only the area of HNV1 (semi-natural grassland habitats) and HNV3 (habitats for the protection of bustard and ground squirrel) are delineated and included in the LPIS. There are no measures to support HNV2 "Farmland dominated by a mosaic of cultivated land and small-scale features" – to create the respective layer in LPIS and link with the related green architecture measure."*
>
> ***Slovakia:*** *"Landscape features as part of Land Parcel Identification System (LPIS):*
>
> - *To use combinations of LPIS, remote sensing, drones and field survey and possibly using existing databases (also based on farmers' requests).*
> - *It is appropriate to use 3D images LIDAR, which help to determine the area and other parameters of landscape features.*
> - *To include landscape features outside LPIS, like green elements on the edge of production parcels or periodic wetlands on arable land, which increase impact of green architecture (e.g. riparian vegetation, wetlands, windbreaks, etc.)*
> - *Create a vector layer of new green/blue features mentioned above and link it with the related green architecture schemes.*
> - *Create layers of specific and degraded areas of agricultural land (e.g. areas with high erosion risk, abandoned agricultural areas)"*
>
> *"- Habitat conservation status according to Art. 17 of Habitat directive. […] It would be appropriate to link the results of habitat monitoring with spatial data of the LPIS. Based on that, distribution of each habitat can be displayed in the LPIS layer and thus visible for farmers too. This assessment can help to assess the impact of the current management or the effectiveness of the existing measures"*
>
> ***Ireland:*** *"logistical problems in making data available, and aligning datasets remain. … The [Ministry for Agriculture] are currently rebuilding the LPIS system, and this should be designed to cross-talk with externally-built technology/applications."*

6.3.3 The use of aggregate ("composite") indicators

There are several relevant taxonomic groups or landscape characteristics that can (and should) be monitored, as well as several scales of relevance; and considering the variability among MSs in terms of running monitoring schemes (including capacities and experience to support data collection and

analysis), it is **recommended to use aggregated indicators**, i.e. a combination of several sub-indicators that complement each other to achieve a coherent picture, even if the exact set of such sub-indicators may somewhat differ among MSs.

> ***Ireland:*** *"A suite of taxon and habitat based monitoring schemes could be combined in different ways, but a national biodiversity data platform, that aligns with existing datasets, is required ... There is potential to use the outcome of results-based agri-environment schemes to feed into a nationally aggregated indicator."*

6.3.4 Options for Complementary Result Indicator

The way in which the 'Complementary Result Indicator' for biodiversity (FA 4A) is formulated will affect its final use. Proposals were therefore made on specific **formulations of how biodiversity could be linked with the CAP and its instruments:**

> ***Bulgaria:*** *"State of biodiversity (in particular birds) in areas with implementation of Biodiversity Eco-schemes and in those without such schemes." [or] "Conservation status of species and habitats in the agricultural lands" [under CAP support]*
>
> ***Germany:*** *"For a taxonomic indicator, possible formulation(s) can be:*
>
> *"Increase in the abundance and richness of indicator species (e.g. butterflies, flowering plants and/or other monitored species under the Habitats Directives' Article 17) in farmland areas under CAP, including NATURA 2000 sites and their vicinity, in permanent grasslands and in high nature value farmlands."*
>
> *OR:*
>
> *"An increase in butterflies/pollinators' abundance and the richness of grassland indicator species."*
>
> *For a landscape-level indicator, a possible formulation can be:*
>
> *"An increase in extent and improvement in quality of habitats in farmland areas under the CAP (especially under AECM, Eco-schemes and Areas of Nature Constraints) including High Nature Value farmland, permanent grasslands, as defined by prevalence of landscape features, extent of well-managed grasslands, use of pesticides and herbicides (composite indicator)"*
>
> *At landscape level: ... High Nature Value farmland (if information is available and mapped)"*

It is proposed by the workshop participants to give Member States several options to select from, but require MSs to select at least one taxonomic indicator and at least one landscape-level indicator.

Member states should select indicators that are feasible, i.e. where monitoring schemes (and data) exist. The selection of bio-indicators can, and should, go beyond the species and habitats listed in the Birds and Habitats Directives. This may be particularly beneficial when taking a result-based approach, to reduce dependence on overly specific measures of success.

> ***Spain:*** *"Identifying adequate umbrella species to cover the requirements of as many other species as possible. Adjust umbrella species to the different agricultural systems and landscapes. Correctly identified umbrella species can then be used as flagships, but not vice versa."*

> ***Slovakia:*** *"To halt decline of common bird species and to improve conditions for nesting of some regionally extinct bird species (Otis tarda, Limosa limosa, Coracias garrulus) where their return is likely. There is a risk that some of these species do not return during the programming period even if habitats are restored. Therefore the ambition should be measured also by the trends in abundances of other species associated with the same habitat."*

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