Will the obligation of environmental results green the CAP? A comparison of the costs and effectiveness of six instruments for the transition to sustainable agriculture

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The study in brief

This study was carried out in the context of the reform of the Common Agricultural Policy (CAP) for the period 2021-2027: one of the key elements of this reform is the shift towards an obligation of results for some subsidies.

Supported by specific cases, we first show that the distinction between the obligation of means and the obligation of results is overly simplistic. The pure obligation of results in the environmental field never truly exists, and practical examples fall on a continuum of estimates of results with varying degrees of accuracy.

An estimation of the costs of six instruments found on this continuum (Green Payments (GPs), Agri-Environment-Climate Measures (AECMs), organic conversion support, High Environmental Value certification (HEV), and two carbon certification systems) enables us to draw several conclusions. First, the obligation of results is not necessarily more costly than the obligation of means: AECMs for example, which are generally considered as obligations of means, are more expensive to administer than carbon certification systems, which are typically considered as obligations of results. The genericity of the instrument plays a key role, making it possible to spread the design and monitoring costs across a large number of farmers.

Next, as regards the effectiveness of the instrument in terms of environmental impact, working towards an obligation of results does not appear to be decisive per se. Two factors are, however: the ambition of the instrument and the level of additionality required, for example by making subsidies conditional upon demonstrating an improvement over an initial state.

Finally, the specific advantage of shifting towards an obligation of results seems to be that it facilitates the environmental assessment of the CAP, which would make it possible to redirect support where necessary according to this impact data, which is currently unavailable.

The reform of the CAP opens up the possibility of introducing new types of payment in the context of the eco-schemes under the first pillar, and especially the carbon certification systems. Indeed, these systems give a good deal of attention to the issue of additionality. Since they are neither more costly to implement nor less effective than an AECM type instrument, they could begin to emerge within the CAP. Moreover, the example of support for organic agriculture shows that basing CAP subsidies on external labels is not without precedent.

« Avec le soutien financier de la Région Grand Est »

DIRECTION DE LA COMPÉTITIVITÉ ET DE LA CONNAISSANCE

Table of contents

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Glossary and acronyms

ACCU = Australian Carbon Credit Unit

AECM = Agri-Environment-Climate Measure

AEI = Agro-Ecological Infrastructure

ANC = Area of Natural Constraints

BP = Basic Payment

CAP = Common Agricultural Policy

CB = Certifying Body

DDT(M) = French Departmental Directorate for the Territories (and the Sea)

DGCCRF = French Directorate General for Competition Policy, Consumer Affairs and Fraud Control

EAFRD = European Agricultural Fund for Rural Development

EAGF = European Agricultural Guarantee Fund

ECA = European Court of Auditors

EFA = Ecological Focus Area

ERF = Emission Reduction Fund

EU = European Union

FTE = Full Time Equivalent

GHG = GreenHouse Gas

GP = Green Payment

HEV = High Environmental Value

IACS = Integrated Administration and Control System

INAO = French National Institute of Origin and Quality

LBC = French Low-Carbon Label

LU = Livestock Unit

MAA = French Ministry of Food and Agriculture

MFF = Multiannual Financial Framework

MTES = French Ministry for the Ecological and Inclusive Transition

NAA = Non-Agricultural Area

NSP = National Strategic Plan

OA = Organic Agriculture

OTEX = French typology of farm types

PA = Paying Agency

RCAI = Revenu Courant Avant Impots (French economic statistic for farms)

SFP = Single Farm Payment

UAA = Utilised Agricultural Area

VCS = Verified Carbon Standard

1. Introduction

On 1th June 2018, the European Commission published its proposal for the reform of the CAP for the period 2021-2027, drawn up in a context of numerous constraints. Foremost among these was a complicated schedule: the primary objective was to reach an agreement before the European elections of May 2019, which proved impossible. By early April 2020, the reform process had still not been finalised because the Multiannual Financial Framework (MFF), which sets the budget for EU policies and thus for the CAP, was still not settled at that point. Between the withdrawal of the United Kingdom, a net contributor to the EU budget, and budget increases in the fields of defence and migration control, pressure on the EU's finances has grown. Although its impact is difficult to assess for the time being, the coronavirus health crisis can only increase this pressure. Consequently, the CAP budget is likely to be reduced, or at best to stagnate. The Commission has already announced a minimum of two years of transition, during which the current CAP will be basically extended, before the reform can be truly implemented. A first draft of the transitional regulation was adopted by the EU Ministers of Agriculture on 6 April. The main outstanding issue is that of the duration of this transition period: at least two years, perhaps three, or even more if the negotiations continue to be postponed.

This reform proposal is important: the CAP is the largest item of EU expenditure and the greening processes launched since 1992 are struggling to produce tangible results. European GHG emissions from agriculture have decreased by around 10% since 1990, but this is far from the 50% target set by the EU for 2050, especially given that the trend has been upward again since 2012. Several analyses have highlighted the fact that the greening of the first pillar of the CAP has had a limited effect on the climate (European Court of Auditors, 2017) and that the Agri-Environment-Climate Measures under the second pillar are marred by significant deadweight effects (Chabé-Ferret and Subervie, 2013). Between 2003 and 2014, the reduction in French agricultural emissions attributable to the CAP was just 2% (Baudrier *et al.*, 2015). In a context of budget restrictions, it seems that subsidies need to be more effectively earmarked for actions with a real environmental impact.

This is why the Commission has announced its intention to submit EU agricultural subsidies to an obligation of results rather than to an obligation of means. In particular, Article 28(6) of the reform proposal concerning National Strategic Plans (EC COM(2018) 392 final) expressly states that payment for eco-schemes could be based (1) on the amount of additional costs incurred by the implementation of practices (6(b), the current functioning of some CAP subsidies), or (2) on "payments additional to the basic income support" (6(a), a new option provided by the reform). This legislatively introduces the possibility of a payment according to the "carbon performance" of a farm, for example.

This paradigm shift is continuing with the launch of the "From Farm to Fork" strategy (European Commission, 2020), a sectoral component of the European Green Deal. This strategy supports the importance of paying farmers for the carbon they store in their soils, and even suggests a new "green" economic model for farms, specifying that this should be based on the creation of robust and transparent assessment methods.

But what does the "obligation of results" actually mean? Does it imply putting greenhouse gas emissions sensors in barns and sampling the soils on all farms? At what cost could this shift be achieved? And in which situations could the obligation of results be more effective?

It should be noted that in addition to the issues of the budget and this change of approach, the other key point of the reform concerns the high level of subsidiarity given to states through the "National Strategic Plans" (NSPs). In simple terms, states would be responsible for defining their specific objectives for both pillars and choosing the instruments most suited to their context. The Commission would approve each plan, and would then monitor and assess it annually, according to the newly defined objectives as well as to impact, result and output indicators, for which the Commission has proposed an initial list (see details on objectives in Annex n°1 and examples of indicators in section II.3).

This study begins by questioning the "obligation of means - obligation of results" opposition and identifying the advantages and disadvantages of these two approaches. It goes on to assess the impact of the transition to an obligation of results on transaction costs (cost of designing the instrument, of deploying it, of monitoring projects, of inspections, etc.).

An optimal use of climate finance implies finding the best compromise between:

- Earmarking finance for projects with real impact;
- Minimising the private and public transaction costs.

Results-based payments are intuitively in line with "maximising environmental impact", but to what extent is this really the case? And what about their transaction costs? To answer these questions, six instruments for the transition to sustainable agriculture found on the "obligation of means - obligation of results" continuum are analysed: three CAP mechanisms (Green Payments (GPs), AECMs, and support for conversion to and maintenance of organic farming), High Environmental Value (HEV) certification, and two carbon certification methodologies (the CarbonAgri methodology in the framework of the Low Carbon Label (LCL), and an Australian methodology focusing on carbon sequestration in agricultural soils.

BOX 1: SOME KEY FIGURES ON THE CAP

Over the period 2014-2020, the European Union spent €362 bn on the CAP, or just under 38% of its total budget for this period. France is the main beneficiary of the CAP, with approximately €9 bn per year over this period. This amount accounted for 17.5% of the EU CAP budget in 2017 (European Commission, "EU expenditure and revenue 2014-2020", n.d.). The reform proposal provides for a budget cut of 15% in constant 2018 prices, or of 5% in current prices (European Court of Auditors, 2018; detail in Annex n°6).

The first "pillar" is aimed at supporting agricultural markets, prices and incomes through annual payments. In France in 2017, it was granted €7 bn, financed entirely by the EAGF. The second pillar focuses on the development of rural territories and environmental protection. In France, the regions are the managing authorities for this pillar. With 23% of the CAP budget at the European level for the period 2014-2020 (or, by way of example, €1.7 bn for France in 2017), its multi-year support is co-financed by EAFRD, the member states and their regions (AGRESTE, 2020, and European Parliament, 2018).

In 2016, the EU had just under 10.5 million farms, around 450,000 of which are in France. Among French farms, 90% receive CAP subsidies. On average, these subsidies represented 112% of farm income in 2016, then 78% in 2017 (AGRESTE, RICA 2017; details by OTEX farm type in Annex n°2).

Throughout the world, most countries have tools to support their agriculture, similar to the CAP in Europe. By way of example, US expenditure, even if the support mechanisms work differently, is similar to that of the EU as a proportion of GDP: in the order of 0.5 to 0.6% of GDP (OECD, 2019).

The CAP is regularly criticised for its tendency to overpay large farms: 1.8% of beneficiaries receive 32% of all payments (Pe'er G., *et al.*, 2019).

2. The obligation of results does not exist: a continuum in the estimation of results

2.1. Definitions: means and results… for a given objective

Before explaining in detail the functioning of the instruments chosen, the terms of the debate must be established. The concepts of the obligation of means and the obligation of results can be confusing, and we felt it was important to clarify these terms. This will also help to better contextualise the rest of the study.

A first observation is that although the obligation of means and the obligation of results are often contrasted by theoreticians as two radically different ways of operating, in practice this view must be qualified.

Theoretically, these two types of obligations work to characterise a contract, a relationship between an actor implementing an environmental action, for example, and a financier. The obligations to be met are set out in specifications and must be fulfilled in order to obtain financing (CAP subsidies, carbon finance, etc.), certification to add value to products (organic agriculture, private quality certification, etc.), or to ensure compliance with a regulation

In the context of a relationship characterised by a classical obligation of means, the obligated party must do her/his utmost to achieve the objective in question. For example, doctors are obligated to treat their patients, but not to heal them. Their payment does not depend on the patient recovering: this is an obligation of means.

In a sales contract, for example, the opposite is true: if the result is not achieved (the delivery of a given product at a given time, for example), then payment is not made. It is not enough that the seller has done her/his best. In order to be paid, she/he must deliver the merchandise according to the terms of the contract. This is an obligation of results.

It should also be noted that the distinction between means and results only makes sense in relation to a given objective. If we take the example of nitrogen fertilisation, an obligation of means to reduce the use of nitrogen fertiliser could be to introduce a minimum percentage of legumes in crop rotations. However, if the objective set is to reduce the use of nitrogen fertiliser, an obligation of results could be to apply no more than 50 kg of mineral nitrogen per hectare, whatever the practices implemented to achieve this. The direct measurement of results is then possible: it is the quantity of mineral nitrogen applied, and the books of account of farmers and suppliers are a reliable means of obtaining this figure.

If, on the other hand, the objective is to reduce N_2O emissions, the result is not easy to measure. As explained in the next section, an obligation of results in this case would be more akin to an obligation to quantify N_2O emissions based on proxies (*i.e.* an intermediate element), such as the quantity of nitrogen fertiliser applied.

In the same way, organic agriculture can be classed as an "obligation of results" if we consider the objective of no longer using chemical inputs, or as an "obligation of means" if we consider the environmental, biodiversity and animal wellbeing targets set by Agence BIO.

For these reasons, Bockstaller et al. (2015) prefer a ternary typology of indicators: causal indicators (obligation of means), predictive effect indicators, and measured effect indicators. Many different indicators can be qualified as "results" without necessarily corresponding to measured effects.

2.2. A continuum in the estimation of impact: the example of agricultural soils

For the examples of the doctor and the sales contract, the distinction between the obligation of means and the obligation of results is clear, but it becomes less so when the objective set is difficult to measure, such as water quality improvement, biodiversity restoration, or GHG emissions reduction. Moreover, if the measurement is not always accurate, linking the result measured to the practice implemented can be far from simple.

For example, for soil carbon storage, the obligation of means corresponds to the implementation of specific practices, recognised for their positive impact on carbon storage, whatever the real impact on a given plot at a given time. On the contrary, the obligation of results is based in principle on the physical measurement of the soil carbon stock, whatever the practices implemented to increase it. This dichotomy remains very theoretical, since in reality, most "results-based payment" tools do not rely on the direct measurement of results, but on estimations with varying degrees of accuracy, and often based on the practices implemented.

In general, three types of approaches are used to quantify additional carbon storage in agricultural soils:

1. **Applying a default factor for additional soil carbon storage for a given practice.** This entails extrapolating research findings. In this case, it is practice changes that are monitored on the farm and only this monitoring of practices is used to quantify the environmental impact. This is the most common case in existing results-based payment systems (no-till under the Chicago Climate Exchange; afforestation under the Clean Development Mechanism, the Gold Standard and the American Carbon Registry; hedge planting and conversion of forage crops to pastures in the CarbonAgri method under the Low-Carbon Label, etc.). Thus, in the CarbonAgri method,

carbon storage resulting from hedge planting is estimated based on the length of hedgerows, affected by the factor of sequestration of +125 kg C / 100 m /year. If data exists, one way to go further in terms of accuracy is to use default factors specific to a given soil and climate context (Antle *et al.*, 2013). Another example is using remote sensing to measure the rate or time of ground coverage by intermediate cover. This type of data should be available within one or two years at most through the new Copernicus Land Surface High Resolution Phenology and Cropland services. In all of these cases, the difference with so-called "obligation of means" instruments, such as green payments or AECMs, lies mainly in the estimation of an indicator known as the "midpoint" in life-cycle analysis, here the quantity of carbon stored. In theory, this difference may be enough to increase the effectiveness of the instrument thanks to better targeting or to a reduction in information asymmetry, but these gains should be compared with the costs of the additional quantification efforts required (Bellassen, V., *et al.*, 2017).

2. **Using biogeochemical models of the soil carbon balance**. In principle, these models can be used to improve integration of the soil and climate context in estimations of the local impact of practices implemented to increase storage. The Simeos-AMG model[1], developed in France by AgroTransfert based on research by INRA, is a good example: it uses data on local weather, soil characteristics and cropping practices (tillage depth, irrigation, use of intermediate crops). At the international level, models such as Roth C, Century and DNDC (DeNitrification-DeComposition) are used for national greenhouse gas emissions inventories. They are also used for local projects and initiatives: the Soil Carbon Quantification Methodology[2] by VCS uses the DNDC model, for example.

   In this case, it is no longer just the implementation of the practice that is monitored, but also a set of soil and climate data to feed the model. The apparent spatial accuracy of estimations can then hide two sources of uncertainty that are rarely quantified: the uncertainty inherent to the model used, and uncertainty about the input data of the model. For example, concerning biomass production in the field, a default value may be used according to the crop type and the region, data may be based on a declaration by the farmer, or it may be estimated by remote sensing. Limiting the use of default data as inputs means the level of uncertainty will be lower, but the cost will be higher. One alternative undoubtedly lies in new approaches involving modelling coupled with remote sensing, which are mutiplying (Pique, G., *et al.*, 2020). The advantage of these approaches is that they objectivise the intermediate effect of practices, such as the rate of coverage or the development of vegetation, for example. They make it possible to dispense with most input data on practices, they are widely applicable and they have a lower implementation cost than the aforementioned methods. Indeed, they are designed to be directly integrated into the monitoring and control tools already developed in the context of the new CAP.

3. **Directly measuring the evolution of soil carbon**. Two techniques can be used to physically measure the evolution of soil carbon: setting up flux towers or conducting repeated sampling every few years. These techniques are costly, but they can be used to propose default storage factors and to calibrate models. They are the only means of physically measuring results, in other words the evolution of soil carbon stocks. Despite its cost, soil sampling is used in one of the existing results-based payment systems, the Australian Emissions Reduction Fund (see section III.6). For this type of measurement, research using remote sensing is also underway, and could eventually provide information, at a low cost this time, on the organic carbon content of the upper part of the soil (Castaldi, F., *et al.*, 2019 and Vaudour, E., *et al.*, 2019).

2.3. The Commission's proposal distinguishes between output, result and impact

The European Commission proposes monitoring objectives according to three categories of indicators: i) output, ii) result, and iii) impact (see Box 3 below). The definitions given for these indicators remain unclear, but their broad lines are known. Among these three types of indicators (impact, result and output), the first focuses on analysing the state of the environment and its evolution, whereas the other two (output and result) are used in managing the CAP and particularly in monitoring expenditure. For the objective "farm income support", this implies for example (1) the evolution of farm incomes (to assess their stability), or (2) the comparison of farm incomes with incomes in other economic sectors. The result indicators, on the other hand, provide information on intermediate elements and are given in absolute values. For the same objective, the Commission proposes, among others, (1) the share of the UAA covered by income support and subject to cross-compliance, or (2) the share of farms benefiting from risk management tools proposed by the CAP. One of the objectives of the NSP is thus to link these two groups of indicators by justifying why a particular tool, described by the output and result indicators, enables progress on certain impact indicators describing the environment. The latter have no "contractual value", and serve as guidelines for policy. What the Commission will verify is the achievement of objectives set for the output and result indicators.

1 http://www.simeos-amg.org/
2 https://verra.org/methodology/vm0021-soil-carbon-quantification-methodology-v1-0/

Taking the example of reducing N_2O emissions, a number of indicators can be envisaged:

- **Output indicator** ▶ implementation of an AECM focusing on this issue in a given territory;
- **Result indicator** ▶ rate of contractualisation for the AECM;
- **Impact indicator** ▶ average level of nitrogen application.

BOX N°3 - EXTRACT FROM ARTICLE 7 RELATING TO MONITORING INDICATORS(EC COM(2018) 392 FINAL)

Article 7:

a) output indicators relating to the realised output of the interventions supported;

b) result indicators relating to the specific objectives concerned and used for the establishment of quantified milestones and targets […];

c) impact indicators related to the objectives set out in Articles 5 and 6(1) and used in the context of the CAP Strategic Plans and of the CAP.

LIST OF CLIMATE INDICATORS PROPOSED IN ANNEX 1 (O: OUTPUT; R: RESULT; I: IMPACT)

*(**O** : output ; **R** : result ; **I** : impact)*

SPECIFIC OBJECTIVES	INTERVENTION	OUTPUT INDICATORS	RESULT INDICATORS	IMPACT INDICATORS
Contribute to climate change mitigation and adaptation, as well as sustainable energy	**Payments for natural constraints and other region-specific constraints**	**O.11** Number of ha receiving ANC top up (3 categories) **O.12** Number of ha receiving support under Natura 2000 or the Water Framework Directive	**R.12 Adaptation to climate change**: Share of agricultural land under commitments to improve climate adaptation **R.13 Reducing emissions in the livestock sector**: Share of livestock units under support to reduce GHG emissions and/ or ammonia, including manure management **R.14 Carbon storage in soils and biomass**: Share of agricultural land under commitments to reducing emissions, maintaining and/ or enhancing carbon storage (permanent grassland, agricultural land in peatland, forest, etc.) **R.15 Green energy from agriculture and forestry**: Investments in renewable energy production capacity, including bio-based (MW) **R.16 Enhance energy efficiency**: Energy savings in agriculture **R.17 Afforested land**: Area supported for afforestation and creation of woodland, including agroforestry	**I.9 Improving farm resilience**: Index **I.10 Contribute to climate change mitigation**: Reducing GHG emissions from agriculture **I.11 Enhancing carbon sequestration**: Increase the soil organic carbon **I.12 Increase sustainable energy in agriculture**: Production of renewable energy from agriculture and forestry
	Payments for management commitments (environment climate, genetic resources, animal welfare)	**O.13** Number of ha (agricultural) covered by environment/climate commitments going beyond mandatory requirements **O.14** Number of ha (forestry) covered by environment/ climate commitments going beyond mandatory requirements **O.15** Number of ha with support for organic farming **O.16** Number of livestock units covered by support for animal welfare, health or increased biosecurity measures **O.17** Number of projects supporting genetic resources		

Concerning carbon storage in agricultural soils, the result indicator proposed by the Commission is "share of agricultural land under commitments to reducing emissions, maintaining and/or enhancing carbon storage (permanent grassland, agricultural land in peatland, forest, etc.)" and the impact indicator proposed is "increase the soil organic carbon", without any indication of how this indicator can be quantified.

Negotiations on the definition of these indicators are constantly evolving. The latest meetings were held in early May 2020 and brought together the parliamentary committees on environment and agriculture.

3. Comparison of transaction costs of six instruments with different requirement levels for the estimation of results

In order to understand what farmers and authorities can expect in terms of new mechanisms in this reformed CAP, six instruments for the transition to sustainable agriculture have been chosen to illustrate the range of possibilities between the obligation of means and the obligation of results. It is also important to assess the costs of these mechanisms in order to understand in which situations the use of the obligation of results would be appropriate and effective. The costs analysed concern the overall functioning of each instrument (for the authorities as well as for farmers):

- **Design cost:** the resources needed to imagine, create and update the instrument can be of very different orders of magnitude. This generally includes the development of specifications or of award criteria.
- **Administrative operating cost:** the management of each instrument requires an administrative staff to examine applications, to organise any payments and to manage institutional relations.
- **Cost of the monitoring and notification system:** the tools presented here all work in a similar way: in exchange for compliance with certain requirements, farmers are granted certification or subsidies. This system demands a certain amount of time from farmers, and therefore a cost, to gather and organise all of these binding dimensions of the instrument (maintenance of documents, e-filing, communication with the management body, preparation for inspections, etc.).
- **Cost of inspections:** different types of inspections verify the conformity of farmers' declarations.

These different transaction costs can be covered by either private or public financing, depending on the mechanism. For example, inspection costs are sometimes borne by the farmer, but they may also be covered by a public organisation in the case of CAP inspections, for example. The objective in the context of this study is to assess total transaction costs per tool, whether they are covered by private or public financing.

Given that data on the transaction costs of the different environmental tools are not widely documented, the goal of this study is above all to give an order of magnitude for each cost. Non-quantitative information is also provided in order to document certain transaction costs. This enables the relative comparison of tools.

3.1. High Environmental Value (HEV)

The HEV system, managed by the French Ministry of Food and Agriculture (MAA), was created further to the Grenelle Environment Forum, which took in particular Commitment 122: "Implementing as of 2008 a voluntary environmental certification process for farms, up to level "A", High Environmental Value, based on a simple frame of reference composed of result indicators". All of the information and citations in this chapter concerning the HEV system are available on the MAA website. This certification responds to "the need to recognise farms that are committed to particularly environmentally-friendly approaches". Farmers can opt for individual or group certification, with the latter option significantly reducing inspection costs. Four areas are concerned by this certification: plant health strategy, fertiliser management, biodiversity protection, and water resources management. Three levels of certification are given by this system, with only the third level awarding "High Environmental Value":

Level 1: preparation of a review demonstrating CAP cross-compliance (basic standards to be met in order to benefit from the CAP, see detail in Annex n°3) and completion of an assessment measuring the differential between the current level and the second or third level. The review and the assessment are conducted by the farmers themselves, with the help of an adviser if required. The auditor simply certifies the credibility of what the farmer has done, and this does not constitute a regulatory validation. Auditors can, at their discretion, make site visits for inspections.

Level 2: compliance with a frame of reference containing 16 requirements on the aforementioned areas. Three field visits are made (initial, monitoring and recertification visits), during which the auditor verifies the conformity of declarations made by the farmer according to 25 points of inspection. These include checking that farmers have correctly situated their agro-ecological infrastructures (AEIs) on their farm map, that they keep a logbook of crop protection operations, and that they have not applied or stored any plant protection products in buffer strips. It is possible to move directly to level 2 if the farm is already committed to another pre-existing approach that has been recognised by order of the Minister of Agriculture (full list available on the MAA website). There are currently around 60 of these, such as Terra Vitis for wineries and AGRIVITAE for crop production. This is the main channel through which this level of certification is achieved, and 17,500 farms are currently engaged in level 2. Inspections at this level take on average 3.5 hours.

Level 3: this level can only be achieved by reaching environmental performance thresholds that cover the whole farm. The farmer can choose either global indicators or thematic indicators. A rating scale is used to assess the "environmental performance" of the farm and if the final mark is high enough, the farm will receive HEV certification. Thus, in the biodiversity section, the results indicators include the share of the UAA with AEIs, the possible presence of beehives, or the proportion of the main crop in the total UAA. The inspection conducted at this level lasts 4 to 5 hours depending on the farm characteristics (size, number of crops, etc.).

From level 2, there are two inspections every three years (the validity period of certification). An initial audit is conducted when the farmer engages in the HEV process. If certification is awarded, a monitoring inspection must be carried out within 26 months, then a recertification audit is conducted during the final three months of validity if the farmer wishes to maintain the certification.

The wine sector is overrepresented (see table below), since it is one of the only sectors that can easily promote this certification on end products. Indeed, the HEV logo, accompanied by a promotional reference, can be affixed to unprocessed products but can be put on processed products only if they contain at least 95% of raw materials from HEV farms. This condition is relatively easy to satisfy for wine, but is far more complex for other sectors.

It is difficult to estimate the economic and environmental impacts of this certification: to our knowledge, no assessment of environmental progress made by HEV certified farms has been published.

Type of data	Figure	Comment
Number of farms concerned	5,399 on 01/01/2020, + 256% in one year (of which 4 532 in viticulture).	State objective: • 15,000 in 2022 • and 50,000 in 2030.
Total annual amount paid in €	n/a	There is no systematic financing for HEV certified farms. Generally, benefits entail an "environmental bonus" (*i.e.* money) for products from certified farms and vary according to the sector.
Design cost	Low	Relative to other instruments. Simple preparation of specifications.
Administrative operating cost	Around 10 FTEs	Order of magnitude enabling comparison of instruments. These are FTEs in charge of HEV certification within the Ministry of Agriculture.
Cost of monitoring and notification	Information unavailable	
Cost of verification per farm	≈ €40/year for group certification. ≈ €300/year for individual certification.	This cost is the one borne by the farmer. For group certification, internal inspections are also required, which have a cost (not shown here).
Effectiveness and/or impact	Information unavailable	No study available to our knowledge.

3.2. Green payments

Green payments (GPs) are decoupled annual payments under the first pillar of the CAP. They were created during the previous reform of the CAP, which enacted the division of the payment per hectare (SFP) into three parts (basic payment, GP and redistributive payment). Their amount, which is proportional to that of the basic payment, was on average €80/ha in France in 2018.

Payment of this support is conditional upon meeting three identical criteria for all French farmers (modulation according to farm size and OTEX type, details in Annex n°4):

- Crop diversification (goal: reducing pesticide use, which is high in monoculture);
- Maintenance of grasslands (goal: halting the conversion of grasslands to arable crops);
- Presence of Ecological Focus Areas, or EFAs (goal: halting biodiversity loss, especially in agricultural areas).

To receive their CAP support, and thus green payments, farmers must file a claim on TelePAC: this is the official French internet service supporting CAP management, enabling administrators to manage claims and inspectors to collect data. Similarly, all contacts between the authorities and farmers are made through TelePAC, hence the importance of understanding this platform. On it, farmers register the location and size of their plots, the types of crops grown and the presence of "non-agricultural areas" (NAAs, which include EFAs). In addition, farmers must submit to the authorities (DDT(M)) documents such as: bank details, invoices for seeds or plant protection products, commercial contracts or other such supporting documents. The exact list of documents to be provided is given on the acknowledgement of receipt sent by TelePAC when the request is made. In short, the (single) claim to be filed by farmers should contain: the application for support, the description of areas and livestock numbers, the updated plot register and the supporting documents. This procedure is not specific to green payments, and all farmers applying for CAP support must complete it. Based on the number of eligible hectares declared, the GP is then paid automatically when the application is complete.

In 2016, GPs concerned 325,000 French farms, for around €2 bn of payments (French Ministry of Food and Agriculture, 2020). The design cost of the instrument is relatively low because it is comprised of only three simple criteria. However, there is a specific scheme for maize, which has its own criteria, and equivalences such as OA certification, which enable farmers to receive GPs directly. Since there is only one set of implementation rules for the mechanism at the national level, this cost is spread over a large number of farmers. The administrative cost, on the other hand, is much higher since it involves a great deal of government red tape. Even if the initial cost was high (farmers, advisors and officials had to familiarise themselves with the EFA classification, the calculation of permanent grassland ratios, etc.), the cost of information for farmers is now low, due to the simplicity and genericity of implementation and its limited evolution. However, the combination with other CAP mechanisms (AECMs, coupled support, ANC payments, etc.) makes the declaration more complicated. Complexity and fear of penalties make farmers cautious: the vast majority of farmers call on a service organisation or on the DDT(M) for assistance in completing or even signing and checking the conformity of their online declaration. By way of example, every year over the period in question, *i.e.* April to mid-May, assistance with declarations mobilises around 1,200 staff members in the network of French Chambers of Agriculture (of a total staff of approximately 8,000), accompanied by 200 contractors taken on for this period. This assistance alone represents a cost of around €14 m per year. Of the 450,000 French farmers, around 340,000 make a CAP declaration: the APCA (French Chambers of Agriculture) assist 72,000 of them, in other words 21% of declarants. This assistance lasts on average two hours, but is in reality highly variable: from 20 minutes for the simplest claims to 12 hours for the most complex. New commitments, changes to regulations, and TelePAC malfunctions are all factors that are likely to significantly complicate the CAP declaration process.

Every year, farmers start from their previous declaration to fill in the new one. Some of the information is retained from one year to the next, the plan of plots and of NAAs in particular, but not all. For example, the land cover codes need to be updated for every declaration, even if the cover in question is unlikely to change (typically vines, fruit trees and permanent grasslands): errors concerning these codes are the cause of numerous declaration errors leading to sometimes heavy penalties for farmers.

As with any application for CAP support, an administrative inspection is carried out: the DDT(M) services systematically check that the application is complete, that the documents are all provided, correct and coherent, then they crosscheck these with external databases such as the land register. European texts then impose an on-site inspection rate of at least 5% of applications. Of these 5%, some inspections are actually conducted by remote sensing, which is sufficient to determine surface areas. The SEN4CAP project[3], launched by the Commission, should help to standardise methods for monitoring, notification and control by remote sensing at the European level. It should also enable verification of the implementation of certain practices, such as planting of intermediate crops. In line with a classical auditing procedure, the selection of applications for inspection is done by random selection informed by a prior risk assessment. Using past records of inspections and penalties, profiles of high-risk farm categories are established: these categories are more

3 http://esa-sen4cap.org/

likely to be inspected. Likewise, a farm that has committed transgressions in the past will have a higher probability of being inspected.

The effectiveness of green payments has been widely criticised. Despite the financial importance of the mechanism and the fact that almost all farmers are concerned by it, it appears to have had an impact on less than 5% of European agricultural land (European Court of Auditors, 2017). Two key factors have contributed to this lack of effectiveness: its initial ambition and its design. The lack of ambition of the measure limits the impact that could have been expected of it: when the GP was launched, most farmers already met its criteria and did not therefore need to change their practices. Its functioning is also problematic, since adverse effects have been identified: in particular, to avoid a pasture being classed as "permanent grassland" (a restrictive classification for farmers), many farmers declared that they ploughed this land at the end of the fourth year.

Type of data	Figure	Comment
Number of farms concerned	325,900 (2016)	
Total annual amount paid in €	≈ €2 bn/year	Accounts for 30% of direct payments, or €80/ha (in France)
Design cost	Low	Simple criteria. Single set of specifications for the whole country.
Administrative operating cost	Several thousand FTEs (MAA + PA) for the whole CAP.	All CAP support is managed by the same people: it is not possible to quantitatively deconstruct this figure.
Monitoring and notification cost	In the order of €200 per farm for assistance with the declaration (almost systematic) in addition to time spent by the farmer.	
Verification cost	Information unavailable.	"On-site" inspection rate of 5%.
Effectiveness and/or impact	Low (European Court of Auditors, 2017).	

3.3. AECMs

This tool is one of the main mechanisms under the second pillar of the CAP, both in Europe and in France (4% of the CAP budget at the European level, slightly less in France, see Annex n°5). It is intended to offset the additional costs of implementing environmentally-friendly practices that go beyond the demands of cross compliance and the GP (an example of an AECM is provided in Annex n°9). The amount is calculated in a theoretical manner as a flat rate: in France it ranges from €50-900/ha. The EAFRD budget granted to AECMs in France for the last period was €200 m/year (French Ministry of Food and Agriculture, 2020), supplemented by co-financing by the state (including the water agencies) and local authorities (typically 25%). This is a voluntary five-year renewable commitment.

Since 2015, three categories of AECMs exist:

- Localised AECMs, where commitments are made only for some farm plots, those where the issues are situated;
- AECMs for the protection of genetic resources, where the goal is to protect the genetic resources of fauna and flora, with a specific mechanism for bees;
- System-AECMs, the most recent type, where the goal is to commit the whole farm to change rather than isolated plots, and payment differs according to the level of requirement chosen by the farmer.

As with green payments, online declarations are made through TelePAC. Farmers declare whether they wish to commit to one or more of the AECMs available in their territory and receive the corresponding payments. The general framework of measures is defined by the state, but each region then chooses within its Regional Rural Development Programme the eligible AECMs in its territory. It also defines certain criteria and indicates the areas of application. It issues calls for tenders for the coordination of each AECM: the project is thus necessarily coordinated by an operator (chamber of agriculture, agricultural cooperative, regional natural park, river association, etc.) in an identified territory that presents environmental issues. Only plots situated within these territories can engage in the AECM. The regional directory of open measures along with their eligibility criteria and the objectives to be met are available on the website of the regional authority (DRAAF). As with the GP, 100% of applications are inspected administratively, then 5% are subject to on-site inspections.

The design and administrative operating costs are particularly high for AECMs, and even more so relative to their budget. More than 10,000 measures were opened by the regions in the last CAP period for around 30,000 beneficiaries. Some of the measures proposed had only one beneficiary. Empirical studies have shown that the complexity of this mechanism is the factor that has the greatest influence on the transaction costs of paying agencies (Mettepenningen, E., *et al.*, 2011). Thus, the French Court of Auditors indicated in 2019 that the €300 m of AECM and Organic subsidies combined (it is not possible to distinguish between these two types of aid, since they have the same budget heading) required from the PA twice as many person days as the €7.5 bn of area based subsidies under the first pillar of the CAP. Some AECMs are of course more effective than others, and it seems that system-AECMs and AECMs for the protection of genetic resources perform better due to their genercicty, but the purpose of this publication is not to provide further analysis of the different AECMs.

The complexity of a CAP application is not intrinsically linked to the number of hectares on a farm. Thus, for a field crop farmer who is not engaged in any AECM, the declaration will be relatively easy to fill in. On the other hand, for a young vegetable gardener engaged in both organic farming and in several AECMs on part of her/his farm, but not the rest, the application will be particularly complex to file and then to examine. The lack of genericity, the instability of eligibility criteria, the multiplicity of funding windows, and the changes made to inspection points, sometimes within the same year: all of these elements contribute to making rural development in general an expensive pillar to manage. Excluding PAs, IT system management and national institutions, this pillar mobilises 75 FTEs across all French regions for its administration (Court of Auditors, 2019).

The transaction cost for farmers is supposed to be taken into account in the calculation of the AECM amount, but it has not been made public. It is nevertheless possible to confirm that this cost is high (Mettepenningen, E., *et al.*, 2009). Farmers need to understand for which AECMs their territory is eligible, to analyse a directory of several dozen available measures, to familiarise themselves with the specific functioning of the support they choose, to fill in their online declaration correctly and, finally, to implement the practices required with the possible points of inspection in mind. The assistance available to farmers is highly irregular. It depends on the structure that coordinates the AECM, on the inherent complexity of the measure, on the number of measures available in the territory, and on the competence of local officials. In this respect, poor knowledge of CAP implementation within the coordinating structure can be problematic, sometimes causing a high rate of engagement followed by an equally high rate of failure (applications rejected due to incorrect online declarations).

In general, the design of this mechanism has been widely criticised for its highly complex implementation due to the number of AECMs, their high variability over time and the many administrative layers involved in the preparation of specifications and financing. The TelePAC tool increases this complexity: designed according to old programming methods, it is very difficult to modify. Any change in this system disrupts the whole code and regularly causes bugs, thereby delaying payments to farmers (the CAP operating cycle is explained in Annex n°10). This complexity is also

an obstacle to change in the functioning of the CAP as a whole, since the Ministry of Agriculture, anticipating these problems, limits any changes as much as possible. This IT system is managed by a specialist service provider, which dedicates around 100 FTEs to it. This entails fixing bugs, adding regulatory changes to the programme, improving the software and continuously testing it. For the management of this task over the period 01/09/2019 to 31/12/2025, the PA launched a call for tenders to the value of €105 m ("Résultat de l'appel d'offre lancé par l'Agence de Service et de Paiement", 2018).

Type of data	Figure	Comment
Number of farms concerned	27,000 (2015)	
Total annual amount paid in €	226 million (2017, **Organic + AECM**)	The amounts allocated to the AECMs and to support for organic agriculture cannot be separated (same budget heading).
Design cost	High	At least 10,000 measures created.
Administrative operating cost	See GP	
Monitoring and notification cost	See GP	
Verification cost per farm	See GP	
Effectiveness and/or impact	Cost-effectiveness is probably low.	Difficult to determine given the diversity of measures, but the AECMs seem to be marred by considerable deadweight effects (Chabé-Ferret and Subervie, 2013). Possible reversibility once the commitment has ended.

3.4. Support for conversion to and maintenance of organic agriculture

This support falls under the second pillar of the CAP. Unlike the HEV mechanism, it is possible for a farm to have some of its crops under organic agriculture and the rest under conventional agriculture, even if this hybrid situation is rare in practice. The functioning of this support is very similar to that of an AECM: voluntary subscription, support paid annually but with a multi-year commitment of five years, and an amount proportional to the number of hectares engaged to offset the additional costs. The three main differences with AECMs are that support for organic agriculture is not zoned (the measure is open across the whole of the French territory), the amount per hectare depends on the type of cover (which is one of the main sources of complexity when examining these applications), and there is a nationally unique set of specifications for each type of production. Support for conversion is higher than support for maintenance (in any event, the latter is less and less systematic) and makes up the core of the mechanism. By way of example, this support is respectively €900 and 600/ha for vegetable production (the OTEX farm type receiving the highest level of support).

The TelePAC part of the declaration is identical to the one for AECMs. However, farmers have to complete additional steps: declaring themselves to Agence BIO and choosing a certifying body (CB) accredited by INAO to carry out the inspections specific to this certification. These inspections have two parts: (1) a yearly farm visit, and (2) an unannounced inspection made at least once every two years. Inspections for support for organic agriculture are more stringent than for the other types of CAP support, but they do not replace them (farms remain subject to the usual inspections described above). In 2008, this type of inspection mobilised 114 FTEs in the CBs (Agence BIO, 2008). Taking account of growth in the number of certified farms, this quantity can be estimated at just under 400 FTEs in 2018. On average, a producer must set aside an annual budget of €400 to 800 excluding taxes for these inspections. The determinants of this cost are the farm size and OTEX type, the complexity of plots on the farm and the presence of complementary activities, such as a processing facility. In practice, the regional authorities sometimes cover part of this cost (€100 to 200 on average), but this is neither systematic nor significant for farmers. What is significant, on the other hand, is that assistance and training available to farmers wishing to transform their farms is now becoming more structured. Cooperatives and chambers of agriculture, which are key contacts for farmers, are increasingly capable of meeting such needs, whereas this was not always the case in the past. It was mainly independent training providers who met these requests, but without the capacity to address the increase in demand in recent years. Finally, downstream of the sector, it is the DGCCRF that carries out inspections. It is interesting to note here that support is based on a regulatory framework for certification external to the CAP, unlike the AECMs, and that verification of compliance with specifications is outsourced to the CBs. This functioning can be problematic if the articulation between the different inspections is not well managed. In the case of support for organic agriculture, the superposition of two different schedules (CB inspections over the calendar year and CAP campaign from May to May), as well as of two different crop notation systems (CAP codes differ from cover notations by the CBs during inspections), is a recurring source of problems. Moreover, data transmission between the CBs and the TelePAC examination services is not systematic, and it is farmers or their advisors who must extract the data then forward it to the CBs.

Type of data	Figure	Comment
Number of farms concerned	21,600 (2015)	The number of OA certified farms, but not all of these farms receive CAP support for organic agriculture.
Total annual amount paid in €	226 million (2017, **Organic + AECM**)	The amounts allocated to the AECMs and to support for organic agriculture cannot be separated (same budget heading).
Design cost	Low	Specifications differ according to the type of production. They are nevertheless very “dynamic” in that they are updated almost monthly.
Administrative operating cost	See GP	
Monitoring and notification cost	See GP	
Verification cost	In addition to the usual CAP inspections: mobilised 337 FTEs in the CBs in 2018*.	Figure obtained taking account of growth in the number of farms between 2008 and 2018.
Effectiveness and/or impact	High effectiveness (in particular, very few deadweight effects, see Chabé-Ferret and Subervie, 2013).	No direct assessment of environmental performance, but studies exist (Meier et al 2015, Bellassen et al in press).

* 114 FTEs for 14 080 farms in 2008, 41 623 farms in 2018, or 337 FTEs with proportional evolution. 400 FTEs maximum according to sector experts.

3.5. The CarbonAgri method under the Low-Carbon Label (France)

This method, coordinated by the Institut de l'Elevage (French Livestock Institute) in the context of the Low-Carbon Label and published in 2019, concerns farms "located in France with at least one cattle section (dairy or meat) or one field crop operation". The information provided in this chapter is taken from the official methodology available on the MTES website. Unlike HEV certification, GPs and AECMs, but similar to support for conversion to organic agriculture, this method rewards additional efforts made by farmers in relation to their initial situation. The method thus meets the additionality criterion of the Low-Carbon Label, in other words remunerating only the reductions that would probably not have happened in the absence of certification.

The scope of CarbonAgri is broad, since it takes account of: direct emissions reductions within the farm perimeter (including sequestration[4]), indirect reductions upstream, but also co-benefits such as biodiversity and food performance. The method thus uses numerous sources of data on the farm: livestock identification systems, milk recording documents, CAP data, farm general ledgers, etc.

This methodology uses the CAP'2ER tool to assess GHG emissions from farms and to provide other indicators on the economic sustainability of farms or on biodiversity, for example.

At the start of the project, the individual CAP'2ER level 2 assessment conducted by collecting 150 parameters is used to establish a "carbon plan" summarising the potential tools for action of a site. The farmer must then choose the tools she/he wishes to mobilise, and these are subsequently translated into specific technical objectives. In the "Livestock management" category, for example, it is possible to "optimise the age at first calving and the longevity of cows". The average reduction potential associated with this tool is estimated at between 3 and 4% of farm emissions. Since these tools act in a complementary manner, they are generally combined in order to obtain higher emissions reductions.

A technician assists farmers in implementing their individual plans and ensures monitoring throughout the project. A mid-term assessment, CAP'2ER level 1, is recommended, but not mandatory. However, to validate their emissions reductions, farmers must conduct a new CAP'2ER level 2 assessment at the end of the project (five years, renewable). A monitoring report must be submitted, especially with the tools implemented and the corresponding supporting documents. A verification report is drafted by an external auditor accredited by the French Ministry of the Environment. This verification concerns the initial and final assessments, and inspectors can make site visits for the purpose of their survey. Verification takes place every five years and is not systematic: a random sample of farms is inspected according to the "0.5 √n" rule.

The design cost of a carbon method is several months of an FTE for a methodology, but this also depends on the scope of the method in question: the higher the number of tools and practices covered, the higher the cost. For international certification frameworks, 2 to 3 months of an FTE are needed on average to develop a method. It should also be noted that no single method covers all sectors and all emissions reduction and carbon sequestration tools. By way of example, there are six methods on the agricultural sector for Gold Standard certification and seven for VCS certification.

Type of data	Figure	Comment
Number of farms concerned	391 farms responded to the first call for projects in early 2020. A second call for projects will be launched in autumn 2020.	
Total annual amount paid in €	The price per ton of carbon is between €30 and 40 and may subsequently increase.	It is currently companies that finance farmers by purchasing carbon credits.
Design cost	Low	Several months of an FTE to design the method (excluding development of the pre-existing CAP2'ER tool)
Administrative operating cost	As of 1th September 2020: 1.5 FTEs in central government and the equivalent of 2.7 FTEs in the regions dedicated to monitoring the Low-Carbon Label.	These FTEs cover monitoring of the Label as a whole, and not just the CarbonAgri method and associated projects. The number of FTEs is expected to increase with the development of the Label, but not proportionally to the number of projects (economies of scale). Internationally, the maximum observed is around 50 FTEs for this kind of certification.

4 A 20% abatement is nevertheless applied to this field due to the risk of non-permanence, and sequestration is estimated based on a storage factor in tCO2/ha/year according to the practice used.

Type of data	Figure	Comment
Monitoring and notification cost	€1,200 on entry (including level 2 CAP'2ER assessment, creation of a carbon plan and technical-economic visit), and €400/year for individual assistance (per farm, source: IDELE).	
Verification cost	Information unavailable (too early). By way of example: cost of €20,000/project for Kyoto domestic projects (Bellassen et al. 2015).	The LCL enables verification of projects by sampling and has opened up the list of accredited CBs, which should help to reduce these costs.
Effectiveness and/or impact	Carbon impact and co-benefits assessed.	For carbon offset projects, the climate impact is assessed and deadweight effects are limited by the need to demonstrate additionality. However, they do exist (e.g. Shishlov & Bellassen 2012).

3.6. The Measurement of Soil Carbon Sequestration in Agricultural Systems method under the Emissions Reduction Fund (Australia)

The Emissions Reduction Fund (ERF) is the Australian public body in charge of managing domestic carbon offset projects. The agricultural sector methodologies are divided into five groups, as follows: irrigated cotton, cattle farming, dairy farming, pig farming, and soil carbon. The methodology studied here, published in early 2018, belongs to the last group. Two methods also focusing on soil carbon were previously established: but their very low take-up rate, due not only to the high cost of direct measures, but also to the low number of eligible production systems, led the state to create a third method. This one is designed to be more flexible, to take into account a wider range of production types and to have a more effective principle of sampling.

The eligible production systems are pastures and field crops. Only soil carbon is counted in this method. Eligible practices include using irrigation to increase biomass production, restoring prairies by seeding, returning crop residues to the soil, and converting to soil conservation agriculture. As with the Low-Carbon Label, the additionality of emissions reductions must be demonstrated.

The number of credits[5] allocated is determined based on additional storage, which is itself calculated using direct measurements of soil carbon content. At the beginning of the project, farmers must have their soil sampled by an external auditor, and must then draw up a management plan. These management plans are assessed by auditors, who guide farmers on the relevance of their choices. Farmers submit a report at the end of the period, including in particular the calculation of additional storage (by means of a second sampling). In this report, the project manager demonstrates the "authenticity" of storage and the external auditor certifies that the estimation is correct. The information provided primarily concerns sampling dates and locations of samples, all practices implemented and corresponding surface areas. Soil sampling, comprised of at least nine measurements (at a depth of at least 30 cm), is conducted by a certified third party.

The design cost is typical for a carbon methodology: around three months of an FTE. Since inspections are carried out by an external auditor, the administrative management of the ERF in the strict sense mobilises only a small number of staff, just a few FTEs (data from the official ERF site). As with most certification frameworks of this type, the transaction cost for farmers is high, since they must familiarise themselves with: the carbon issues facing agriculture, the functioning of the local certification framework and, finally, the practices to be implemented. The costs linked to the project are high because of the need to take direct measurements (Janissen, B., 2016).

So far, this methodology has been used for six projects, one project per farm, since its launch in 2018. It is therefore difficult to accurately estimate the impact of this methodology. It should nevertheless be noted that Australian farms are much bigger than French farms (OECD, 2018). The emissions reductions expected from a French farm and from an Australian farm are therefore of different orders of magnitude.

Type of data	Figure	Comment
Number of farms concerned	Six projects recorded in the official register for the method in question.	Eight other ERF methodologies concern agriculture.
Total annual amount paid in €	Too early	The methodology was only launched in 2018.
Design cost	Low	Single set of specifications.
Administrative operating cost	Around 10 FTEs (for the whole ERF).	
Monitoring and notification cost	• €6,000 to register the project; • €2,000 per project per year for soil sampling; • €3,000 per project per report for notification.	These costs are not specific to the methodology presented, but concern all methodologies in the land sector.
Verification cost	€6,500 per project for initial audit, €5,250 per subsequent audit.	
Effectiveness and/or impact	Too early.	Since the data has been created, ex post assessment will be easy for carbon.

5 These are ACCUs (Australian carbon credit units), 1 ACCU = 1 tCO2e.

4. Cross-analysis and recommendations

4.1. The obligation of results is not necessarily more expensive to examine and inspect

Regarding the desire to steer CAP subsidies towards the obligation of results, the issue of the cost and advantages of such a change was raised. Theoretically, it is considered that (1) the obligation of results is the most costly of the two options, and (2) the high costs of the obligation of means concern its design and administrative management, whereas for the obligation of results, it is the monitoring, notification and inspection costs that are the highest. The analysis of the above-mentioned "practical cases" qualifies this interpretation (see **Table 1**).

TABLE 1: CROSS-COMPARISON OF TRANSACTION COSTS OF THE SIX INSTRUMENTS ANALYSED

	Obligation of means ---------- Obligation of results						
	GP	AECM	HEV	ORG	LCL	ERF	Comment
Number of farms concerned	+++	++	+	++	+	?	By order of magnitude: +++ ▶ 100,000 ++ ▶ 10,000 + ▶ 1,000
Total annual amount paid in €	+++	++	n/a	++	+(+)	?	By order of magnitude: +++ ▶ 1,000,000,000 ++ ▶ 100,000,000 + ▶ 100,000
Design cost	+	++++	+	+	++	++	Number of sets of specifications, by order of magnitude: ++++ ▶ 10,000 ++ ▶ 10 + ▶ 1
Administrative operating cost	++++*	++++	+	++++	+	+	FTEs dedicated to management, by order of magnitude: ++++ ▶ 10,000 ++ ▶ 100 + ▶ 10
Monitoring and notification cost	+	+	++	++	++	+++	+++ ▶ direct measurement ++ ▶ large amounts of data and numerous sources to manage + ▶ simple data
Verification cost	+	++	+++	+++	+++	++++	++++ ▶ mandatory site visit (and sometimes measurement to be taken) +++ ▶ mandatory site visit ++ ▶ possible site visit + ▶ most often remote inspection
Effectiveness/impact (Ease of assessment)	+ (+)	+ (-)	+ (++)	++ (++)	Too early (+++)	? (+++)	The impact is considered according to the objective set for the mechanism and the resources used. ++ ▶ Effective + ▶ Ineffective (+++) ▶ Easy to assess (-) ▶ Difficult to assess

* Since all CAP support (including GP, AECM, and support for organic agriculture) are managed by the same people and services, it is not possible to quantitatively deconstruct this figure.

Note: *for the sake of consistency, the columns covering the carbon certification frameworks (LCL and ERF) concern all of the agricultural methodologies for these standards. Indeed, GPs, AECMs, HEV certification and support for organic agriculture concern all farm types, whereas a methodology is based on only part of the sector (for example, only cattle farms are eligible for the LCL CarbonAgri methodology described above). Thus, each column covers the whole of the agricultural sector. Moreover, the data concerning the LCL should be treated with caution since 2020 is the first year in which agricultural projects have materialised, and is therefore not necessarily representative.*

Source: I4CE

Comparing the costs of the mechanisms first shows that some, especially those in the "obligation of means" category such as AECMs, prove to be at least as expensive to administer as others, such as the carbon certification frameworks, which are nevertheless geared towards an "obligations of results". The initial idea of the AECMs was to increase effectiveness by proposing mechanisms with specifications adapted to different soil and climate contexts and local issues. In practice, this method substantially increases the costs per farmer, creates very high administrative complexity, as well as a high inspection cost. It is also worth adding that "5,000 AECMs have been used for around 25,000 farmers, or a ratio of one measure for five farmers" (French Court of Auditors, 2019) and that despite this, the deadweight effects remain very present, particularly because the initial situation of farmers is not taken into account(Chabé-Ferret and Subervie, 2013). This functioning therefore generates a high cost, which makes the mechanism at least as expensive as a carbon certification framework, even if the distribution of costs is different. The cost of monitoring projects is higher for carbon certification frameworks given that there is generally more data to be collected in order to quantify the environmental impact, but this additional cost is largely offset by significantly reduced design and administrative operating costs in comparison with AECMs. The difference in design costs observed is primarily linked to the genericity of carbon methods. A single method can typically be applied nationally or even internationally.

The data presented in the table above concerns France. As regards the CAP, it is important to step back and look at how other member states have implemented this policy. These states have several options in terms of payment mechanisms, national management structures or technological choices (see table in Annex n°7). However, the conclusions drawn at the French level seem to also apply to the European level. Indeed, despite the efforts of the Commission, which at every reform of the CAP reiterates its intention to simplify the overall architecture of this European policy, the last period saw its complexity increase (European Commission, 2019). A report of the Commission on the period 2014-2020, entitled "Analysis of administrative burden arising from the CAP" shows that, compared to the previous period and excluding design costs, the administrative costs linked to the Integrated Administration and Control System (IACS) have increased by just over 30% (between 15 and 60% depending on the state). Similarly, the conclusions specific to the AECMs regarding the high transaction costs seem to be at least partially valid at the European level. Despite the smaller share of the budget it represents, and a smaller number of applications to manage, European rural development accounts for the highest share of costs associated with the IACS, and these costs are borne by national administrations (between 30 and 35% of the total, see figure in Annex n°8). The NIVA H2020 project[6], currently under development, aims to reduce these technical and administrative obstacles by standardising methods at the European level and through the massive (and even systematic) use of spatial technologies.

4.2. Obligation of means or obligation of results: this is not the only relevant question; the design of instruments is just as important to guarantee their effectiveness

Through the reasons for this increased effectiveness, it appears that it is not the obligation of results as such, or perhaps we should now say "the obligation to estimate environmental impact", that improves the effectiveness of instruments, but other facets of design such as the level of requirement or mandatory additionality (comparison before/after or with a baseline scenario). For example, the ineffectiveness of green payments seems to be due to the lack of ambition of the measure, which limits the impact that could have been expected of it. The advantage of instruments with mandatory, broad application, such as the green payment, is that they have relatively low transaction costs and therefore seem to be suited to implementing already well known "no regret" practices (which will unquestionably be beneficial in the long term), whose impacts remain positive whatever the agricultural system and the soil and climate context.

For practices with less well-known impacts or for which systematically applying stringent requirements is inappropriate, instruments imposing the demonstration of additionality or a before/after comparison (carbon certification frameworks, conversion to organic agriculture) seem to be more effective and less costly than instruments based on targeted obligations of means (AECMs). Thus, a first element of good design to be highlighted would be a comparison with a baseline or counterfactual scenario. Chabé-Ferret and Subervie (2013), who are generally pessimistic about the additionality of measures under the second pillar of the CAP, note very high additionality of support for conversion to organic agriculture, probably because by definition, it remunerates the difference between the initial state and the end state of a farm. Moreover, the very principle of carbon certification frameworks is to compare emissions further to the implementation of new practices with a baseline scenario or the initial situation.

This minimises deadweight effects, but the transaction costs are higher than for instruments with obligations of means

6 https://cordis.europa.eu/project/id/842009

for generic application, such as GPs. It therefore seems appropriate to use this type of instrument to promote good practices (Shishlov, I., *et al.*, 2012). Once these are known and widely applicable, it is possible to shift to a GP type instrument, for example, but with a high level of ambition.

4.3. Facilitating assessments and comparisons is the key benefit of the shift to an obligation of results

One of the advantages specific to obligation of results type instruments, as we have seen, is that they make use of quantitative estimations of environmental impact, or even direct measurements where possible. This data, which is currently unavailable, could be used to compare different practices (within the inherent limitations of the indicator chosen) in order to identify the best ones and to redirect funding according to the results obtained. Ultimately, in combination with an assessment of deadweight effects, this comparability would help to direct support towards the practices, projects or territories for which it has the greatest impact.

In short, obligation of results type instruments certainly have higher transaction costs than generic instruments with an obligation of means, such as green payments, but they are less expensive than targeted instruments with obligations of means such as AECMs. The principle of results-based payments is precisely to assess the environmental results obtained, which considerably reduces the risk of deadweight effects and thereby guarantees the effectiveness of financing. Moreover, quantitative data on the environmental impact of practices implemented will be useful to target financing as effectively as possible according to systems and to soil and climate contexts. This is why we believe it is appropriate to introduce obligation of results type instruments in the framework of the next CAP, along the lines of the proposal to pay farmers for the additional carbon stored in their soils made in the context of the “Farm to Fork” strategy (European Commission, 2020).

5. Prospects

Whatever the link considered, the most costly factor in the logistics chain remains human intervention. This is, for example, why on-site inspections make up such a large proportion of costs and why the Commission tries to minimise them, especially through the use of remote sensing. For the time being, this use is limited to the boundaries of plots and to the type of crops grown in them. Recent progress in the field with the launch of the Sentinel 1 and 2 satellites could dramatically change the way the CAP IACS operates (European Court of Auditors, 2020). These satellites provide high spatial resolution images, of 10 m per pixel, which are updated every five days, whereas the US Landsat previously provided images with a resolution of 30 m every 16 days. In addition to the abovementioned information, these new images can be used to identify agricultural practices (tilling, harvesting, mowing, planting of intermediate crops, etc.),to determine the state of crops and their production, or to establish environmental indicators (risk of erosion, humus content, biodiversity, etc.). The high level of precision combined with the frequency of image updates could enable a shift from a sequential system to continuous management, in an interactive manner. In short, a CAP declaration would no longer be made according to the usual cycle (declaration, examination, inspection, payment): farmers could be informed in real time of any non-compliances in order to remedy these without facing penalties. These new inspection methods have already been tested in five member states (Spain, Italy, Belgium, Denmark and Malta). Thanks to the use of remote sensing, it is becoming possible to inform farmers almost on a daily basis of their potential errors (illustration in Annex°10bis). These technical advances will further reduce examination costs for obligation of results type instruments.

Due to the strategic nature of the sector concerned and the amounts associated with the CAP, the reform of this European policy never fails to rekindle the ongoing debate in the agricultural sector. The economic survival of farms, environmental concerns or budget issues, the stumbling blocks during negotiations are manifold. The EU had an opportunity to radically reform the CAP. Although at first sight the shift towards an obligation of results seems to be a radical change, this study shows that this is not the case. Moreover, the increasing use of subsidiarity through the NSPs could have a far greater effect than the obligation of results. On this point, various analyses highlight numerous grey areas that could undermine the ambition of the NSPs: in particular, the ECA criticises the lack of articulation between the tools proposed and the objectives to be met. Another crucial point, beyond the definition of the type of instruments to be included in the CAP, is the level of associated support. Results-based payments, which are dependent on voluntary participation, can only be effective if the level of support is commensurate with the consent to receive of farmers. It should be noted that not all funding should necessarily come from the CAP. Organic agriculture is a good example, with CAP support on the one hand, and an increase in product prices on the other.

However, these are not the only problems facing the CAP at the European level. As regards optimising the management of funding, the irregularities identified by the series of articles in the New York Times in autumn 2019 raise questions, especially given that such abuses could be accentuated because of the increased nationalisation of the CAP brought about by the NSPs. Moreover, the multiple international trade pressures are putting European agriculture under strain.

With the ECA indicating that “to ensure future food security, addressing climate change is likely to be more relevant than supporting farm income”, a systemic, coherent EU-wide response would not be unwarranted, since this subject includes, but also far exceeds the scope of agriculture alone.

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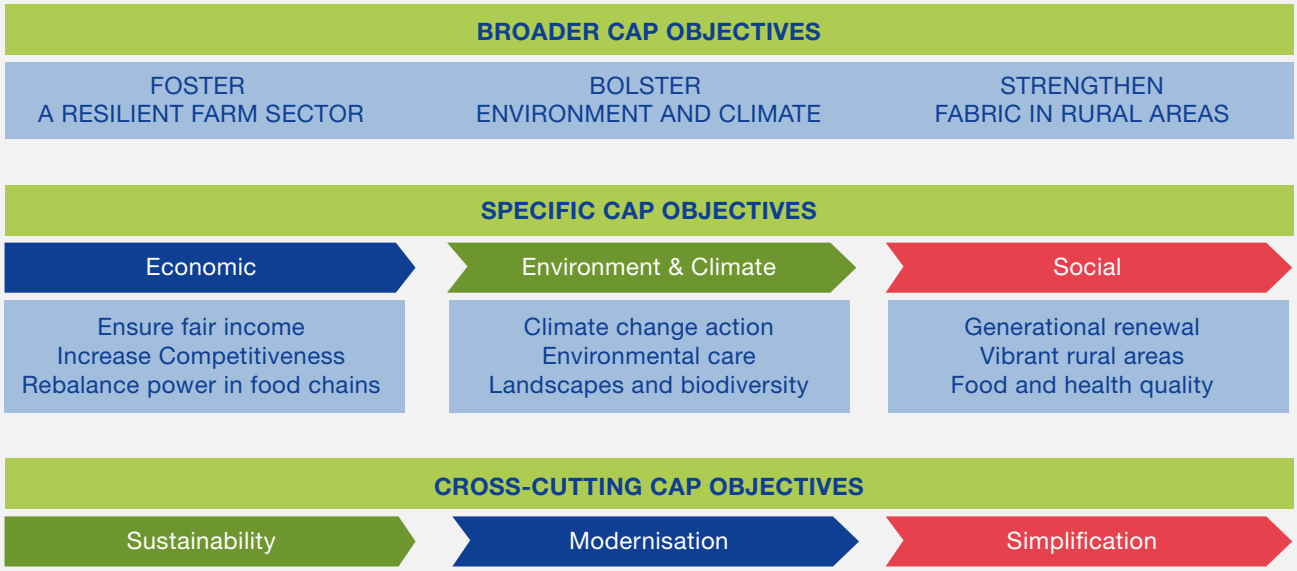
Annexes

ANNEX N°1: Updating CAP objectives

THE NEW ARCHITECTURE OF CAP OBJECTIVES



Source: European Commission.

ANNEX N°2: CAP support is a substantial component of farm income

NUMBER OF FARMS* WITH A NEGATIVE RCAI, BEFORE AND AFTER FARM SUBSIDIES, AND AVERAGE RCAI BY PRODUCTION TYPE IN 2017

	Proportions of farms with a negative EBIT						EBIT	EBIT excl. subsidies
	Excluding subsidies			Including subsidies				
	(as %)	Evolution 2017/2016 (as pp)	Evolution 2017/2015 (as pp)	(as %)	Evolution 2017/2016 (as pp)	Evolution 2017/2015 (as pp)		
Cereals and oil and protein crops	65	- 23.5	- 4.8	19	- 33.8	- 5.4	22,884	- 9,596
Other field crops	36	- 24.0	- 4.6	9	- 22.7	- 0.2	51,330	15,756
Market gardening and horticulture	17	0.0	0.6	15	0.8	3.6	50,882	44,850
Viticulture	22	7.1	9.5	18	5.8	7.7	52,741	48,255
Fruits and other permanent crops	37	13.2	12.3	22	8.8	12.1	44,849	26,517
Dairy cattle	41	- 23.3	- 15.6	7	- 10.0	- 5.0	42,887	8,862
Beef cattle	87	3.5	2.5	14	2.8	4.5	22,512	- 24,233
Sheep and goats	80	4.8	6.3	12	6.5	4.2	26,707	- 19,024
Pigs	19	- 8.3	- 29.1	7	- 5.4	- 16.7	70,111	52,063
Poultry	26	- 6.2	4.4	5	- 6.9	- 0.3	47,867	29,425
Polyculture, mixed livestock, others	63	- 15.4	- 1.8	17	- 12.5	- 0.9	32,729	- 6,544
Mainland France	50	- 10.6	- 2.7	14	- 10.2	0.0	38,325	8,461

* Evolution of 15-17 and 16-17 numbers calculated from full farm samples per year – current €.

Source: SSP, RICA

ANNEX N°3: All CAP support is subject to cross-compliance

Cross-compliance concerns all farmers benefiting from at least one of the following types of support or payment schemes: decoupled support, coupled support and some types of support for rural development under the second pillar (ANC payments, AECMs, support for organic agriculture, afforestation and agroforestry). Introduced for the first time in 2005, this mechanism subjects payment of the abovementioned types of support to compliance with basic rules in three different areas:

- Environment, climate change and good agricultural conditions of land; this area is divided into two sub-sections, "environment"(two rules) and "GAECs" (seven rules);
- Public, animal and plant health (six rules);
- Animal welfare (one rule).

A specific case is the measure concerning the "establishment of buffer strips along watercourses" in the GAEC sub-section. The goal here is to protect soil from erosion and surface waters from diffuse pollution. It is also a matter of improving soil structure. Farmers owning land within 5 m of a watercourse (maps defined by ministerial decree) are concerned.

ANNEX N°4: Detail of the application of GP criteria according to farm size and OTEX type

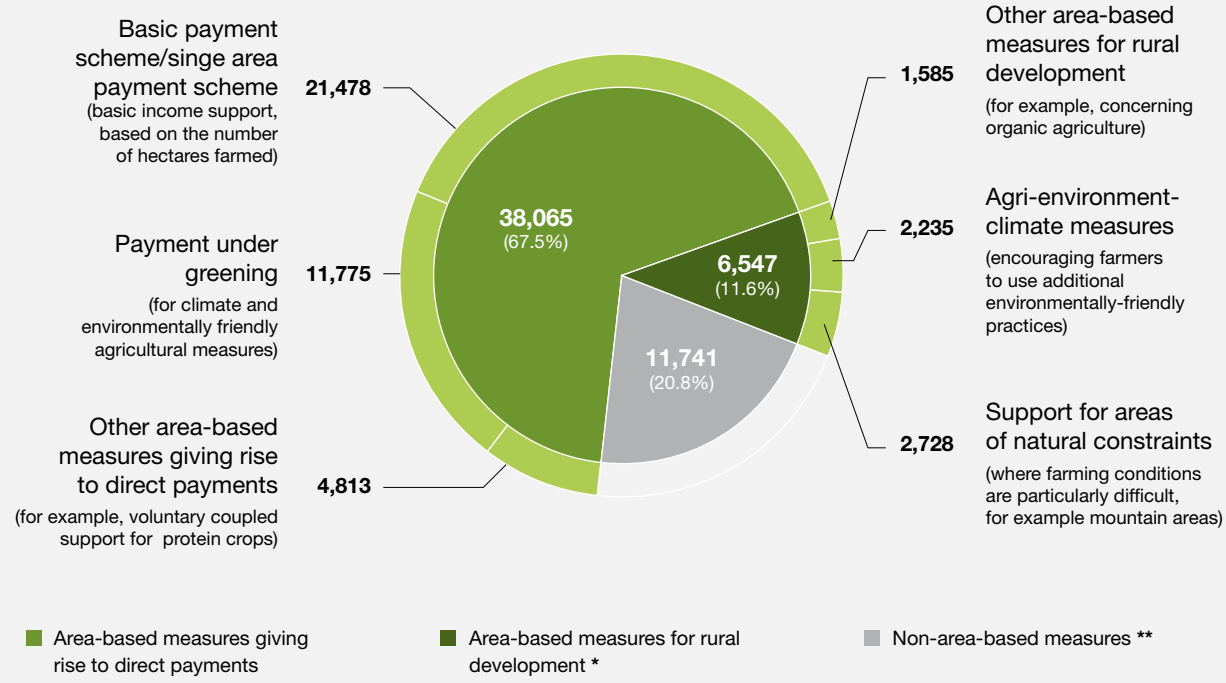
FARMS CONCERNED BY THE THREE "GREEN PAYMENT" MEASURES

<table>
<tr><th></th><th>Crop diversity</th><th>Ecological focus area</th><th>Grassland maintenance</th></tr>
<tr><td>Less than 10 ha of cropland</td><td colspan="2" rowspan="3">No obligation</td><td rowspan="6">The regional permanent grassland / UAA ratio declared must not decline by more than 5 % relative to the 2012 baseline</td></tr>
<tr><td>75 % of cropland area under temporary grassland or fallow AND remaining cropland less than 30 ha</td></tr>
<tr><td>75 % of UAA under permanent grassland AND cropland area less than 30 ha</td></tr>
<tr><td>From 10 to 15 ha of cropland</td><td rowspan="2">2 crops: max. 75% pour la principale</td><td rowspan="2">5 % of cropland</td></tr>
<tr><td>De 15 à 30 ha labourables</td></tr>
<tr><td>More than 30 ha of cropland</td><td>3 crops: max. 75% for the main one and 95% for the two main ones</td></tr>
</table>

Organic farms are not obliged to meet the three conditions for green payments.

Source: Normandy Chamber of Agriculture.

MAIN SUPPORT SCHEMES UNDER THE CAP AND CORRESPONDING EXPENDITURE (IN MILLION EUROS), IN 2018



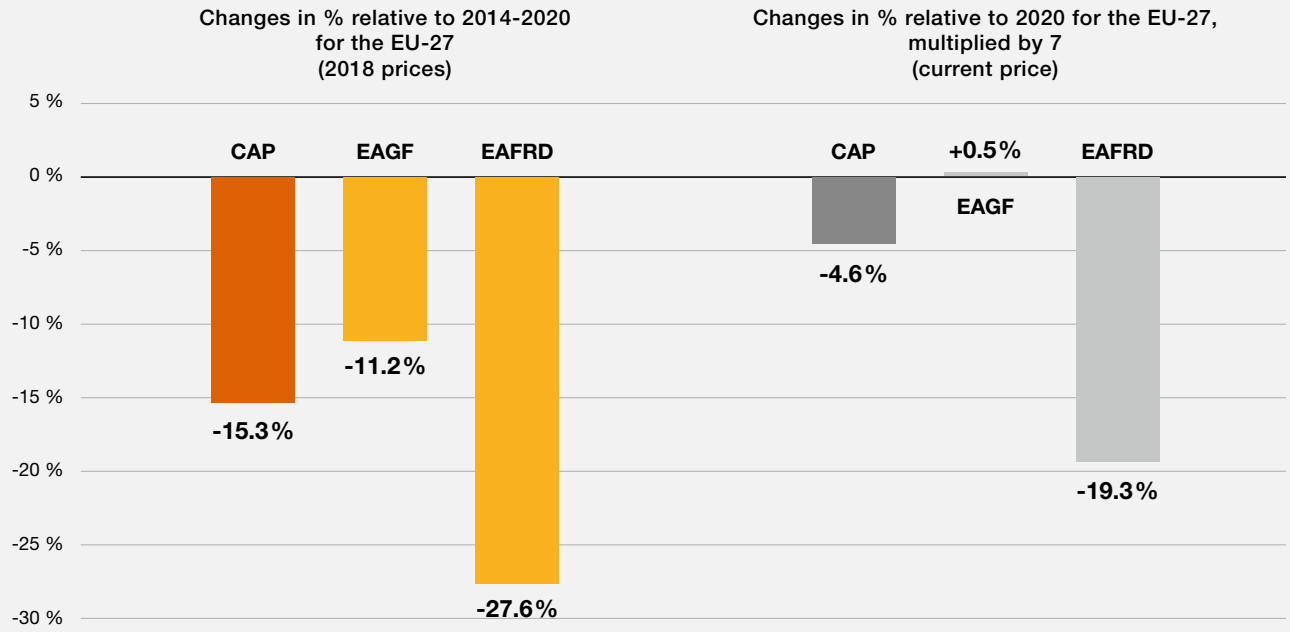
* Among the area-based measures we have examined, some may contain elements not linked to these, which do not however constitute the majority of the support scheme.

** Non-area-based measures include, inter alia, market measures, investments in rural development and voluntary coupled support for livestock.

Source: European Court of Auditors, based on information provided by the Information System for Agriculture Refund Expenditure AGREX and by the Commission.

ANNEX N°6: Detail of the evolution of the CAP budget

CHANGES IN THE CAP BUDGET



Source: European Court of Auditors, based on data provided by the Commission.

ANNEX N°7: Choices made by member states for CAP implementation (valid in 2018, frequent changes).

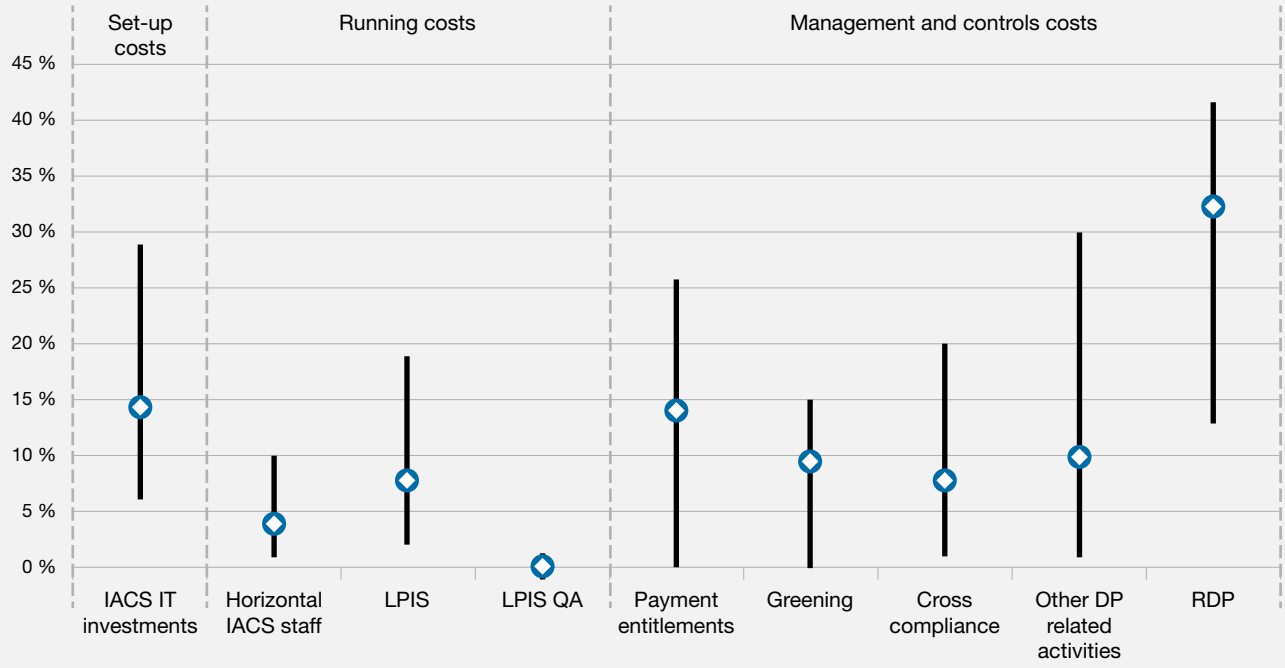
OVERVIEW OF CRITERIA USED AND JUSTIFICATION FOR THE SELECTION OF MSS

	1. Methods and schemes chosen for CAP implementation		2. National structures to implement IACS	3. Technology choices		4. Geography/ Agricultural Structure of the Member State		
Country	**Payment Scheme**	**Regionalisation of PBS**	**Pillar I : level of implementation**	**LPIS system**	**Use of satellite imagery**	**Economic size of agricultural sector**	**Average farm size (ha)**	**Major output (constant producer prices)**
Bulgaria	SAPS	No	National	Physical/ topographical block	No Sentinel	4.4%	18	Cereals
Estonia	SAPS	No	National	Farmer's block	Sentinel 1 and 2	2.9%	49	Milk and Cereals
France	BPS	Yes	Regional	Farmer's block	Unknown	1.6%	58	Cereals
Germany	BPS	Yes	National and regional	Depends on region	Sentinel 2 only	0.6%	58	Milk
Greece	BPS	Yes	Regional	Physical/ topographical block	Unknown	4.0%	6	Fruits
Italy	BPS	No	National	Cadastral parcel	Sentinel 2 only	2.1%	12	Vegetables and horticultural products
Lithuania	SAPS	No	National	To be updated	To be updated	3.8%	14	Cereals & dairy farming
Malta	BPS	No	National	To be updated	To be updated	1.5%	1	Arable crops
Netherlands	BPS	No	National	Physical/ topographical block	Unknown	1.8%	27	Vegetables and horticultural products
Poland	SAPS	No	National	Cadastral parcel	Unknown	2.4%	10	Cereals and Milk
Spain	BPS	Yes	National	Cadastral parcel	Sentinel 2 only	2.6%	24	Vegetables and horticultural products
Sweden	BPS (existing PE)	No	National	Farmer's block	No Sentinel	1.3%	45	Milk
Sources :	*Ecorys (2016)*	*Ecorys (2016)*	*Ecorys (2016)*	*ECA (2011)*	*JRC (2017)*	*EUROSTAT*	*EUROSTAT*	*EUROSTAT*

Source: European Court of Auditors, 2018.

ANNEX N°8: Breakdown of CAP management costs for national administrations

BREAKDOWN OF MAIN IACS RELATED COSTS BORNE BY NATIONAL ADMINISTRATIONS



Source: European Court of Auditors, 2020.

ANNEX N°9: Example of an AECM

It is interesting to present a specific case as an example: the field crop system-AECM. The idea of this AECM is mainly to reduce the use of plant protection products. In order to be eligible, at least 70% of the UAA must be under arable crops and the maximum LU equivalent must be less than or equal to 10 (this threshold can differ according to the region). Farmers can commit to two different levels of requirement:

- **Level 1**
  - For herbicide products: the farm treatment frequency indicator (TFI) must be at least 30% lower than the territorial TFI (in year five);
  - For non-herbicide products: the farm TFI must be at least 35% lower than the territorial TFI (in year five).
- **Level 2**
  - For herbicide products: the farm TFI must be at least 40% lower than the territorial TFI (in year five);
  - For non-herbicide products: the farm TFI must be at least 50% lower than the territorial TFI (in year five).

Payment depends on certain regional criteria, such as the TFI, and on the level of requirement chosen. In general, it stands at:

- Level 1 ▶ from €90/ha to €121/ha;
- Level 2 ▶ from €152/ha to €234/ha.

By engaging in this AECM, farmers are obliged to respect the following constraints:

- Mandatory rotation; a single crop cannot remain on the same plot.
- Comparison of the farm TFI with the territorial TFI, according to the level of requirement chosen and taking account of annual increments.
- Crop diversity:
  - The main crop cannot make up more than 60% (year two) and 50% from year three;
  - There must be at least four different crops in year two and five different crops from year three onwards;
  - There must be a minimum share of 5% legumes from year two onwards (with the possibility in some regions of going up to 10% from year three).

ANNEX N°10: Annual operating cycle of the CAP

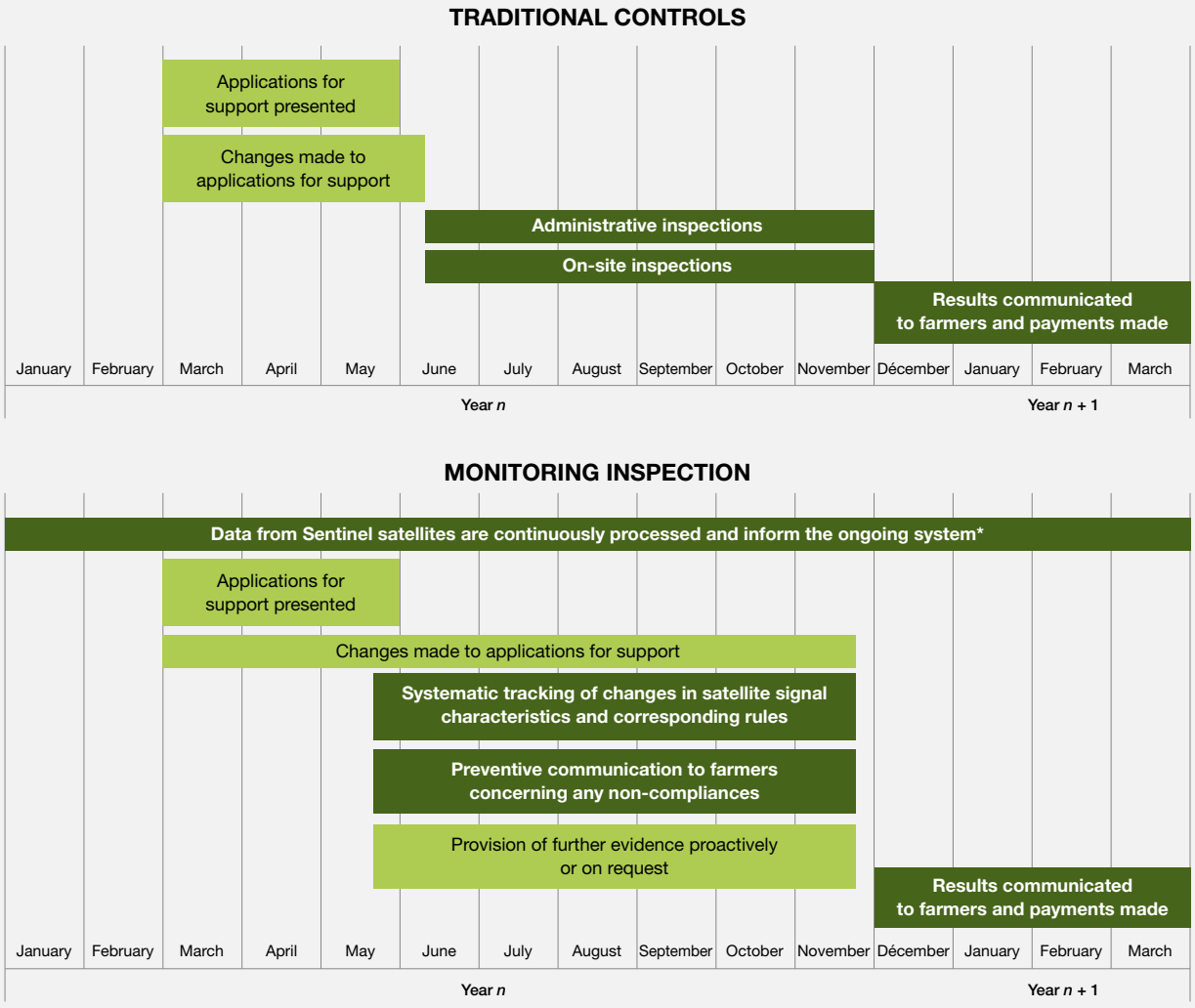
Applications for CAP support must be made every year. Four main peak activity periods mark a cycle: preparation of applications, online declarations, inspections and, finally, payments. The cycle runs from May to May:

- From 01/04 to 15/05 ▶ online declaration;
- From 15/05 to 30/05 ▶ modification of applications possible, sometimes with penalties;
- From 01/06 to 11/06 ▶ modification of applications possible, systematically with penalties;
- From 13/06 to 13/09 ▶ inspections;
- October ▶ first payments;
- December ▶ finalisation of the majority of payments.

The “free” time between the end of payments and the new online declaration session is used to prepare the next applications and to solve any problems of the last period.

ANNEX N°10BIS: Evolution of this operating cycle thanks to remote sensing

SUGGESTED TIMETABLE FOR REGULATORY TOOLS



* Data can be processed before presentation of applications for support and used to help farmers to fill in these applications.

Source: European Court of Auditors.

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