# ESCA

# GUIDELINES

V7 - 06/2026

*Please download the latest version from our website 2bsvs.org*

# SUMMARY

# HISTORY OF CHANGES

| DATE | PAGE | CHAPTER | CHANGES MADE | VERSION |
|---|---|---|---|---|
| 23/07/2024 | 14 | Specificities concerning biogas and biomethane production | Clarification on the use of the "manure" bonus | 2 |
| 23/07/2024 | 15,16 | Agricultural practices | Addition of a clarification to the definition of "intermediate cover". | 2 |
| 23/07/2024 | 19 | IPCC categories and decision rules | Updating the decision tree | 2 |
| 23/07/2024 | 23 | Soil analysis | Added explanation of soil analysis calculations | 2 |
| 23/07/2024 | 24 | GHG Calculator | Clarification of the reference method to be indicated in the calculator | 2 |
| 23/07/2024 | 26 | ef" factor | Clarification of the scope of application of the "ef" factor | 2 |
| 23/07/2024 | 34 | Appendix 3: Reference tables for establishing the CSR | Correcting data errors | 2 |
| 10/10/2024 | 27 | Tenant farmers | Addition of a sentence concerning the refusal to renew a lease agreement | 3 |
| 10/10/2024 | 27 | Ef" factor | Additional information added on the calculation of "Ef" and the notion of double counting | 3 |
| 10/10/2024 | 28 | Special cases | Addition of a "cessation of activities" paragraph | 3 |
| 26/02/26 | 19 | Agricultural practices | Correction of the table (replacing 6/6 with 7/7, as there are indeed 7 practices) | 6 |
| 26/02/26 | 21 | Soil analyses | Addition of complementary information on the methodology for applying soil analyses | 6 |

# HISTORY OF CHANGES

| DATE | PAGE | CHAPTER | CHANGES MADE | VERSION |
|---|---|---|---|---|
| 22/06/2026 | | Case no. 1: farmers who have made one or more esca claims before june 30th, 2022 | Clarification of the specific dates for CSA soil analyses and addition of an explanatory example.<br><br>Addition of a footnote regarding soil analysis methodology.<br><br>Clarification on the use of modeled and corrected values.<br><br>Modification of the timeline (explanatory diagram). | 7 |
| 22/06/2026 | | Case no. 2: farmers who have already implemented good agricultural practices but without having claimed an esca bonus | Clarification on historical CSR soil analyses, including details on key dates.<br><br>Clarification on CSA soil analysis periods.<br><br>Clarification on soil analyses: carbon content results and alternative option for determining soil density.<br><br>Addition of a footnote regarding soil analysis methodology.<br><br>Clarification on the use of modeled and corrected values.<br><br>Modification and addition of timelines (explanatory diagram). | 7 |
| 22/06/2026 | | Case no. 3: farmers entering the process | Clarification on the use of modeled and corrected values.<br><br>Clarification on the periods for CSA soil analyses.<br><br>Addition of a footnote regarding soil analysis methodology.<br><br>Modification of the timeline (explanatory diagram). | 7 |
| 22/06/2026 | | Soil analysis | Addition of supplementary information regarding the areas to be considered for CSR and CSA soil analyses (cases 1, 2, and 3). | 7 |
| 22/06/2026 | | Method for Collecting Representative Samples | Clarification on bulk density data | 7 |
| 22/06/2026 | | Determination of dry bulk density | Added an explanatory sentence on pedotransfer functions. | 7 |
| 22/06/2026 | | Appendix 1 | Edits in line with the preceding points regarding the chapters on cases 1, 2, and 3. | 7 |

# INTRODUCTION

The Renewable Energy Directive (RED II) aims to promote the sustainable and increasing use of renewable energy sources. Adopted in 2018, it establishes an ambitious regulatory framework for the transition to a low-carbon economy.

The implementation of this directive is done through national schemes or voluntary schemes, such as 2BS. These schemes aim to facilitate the implementation of the objectives of the directive by providing an additional framework for the certification of renewable energies and to guarantee their environmental sustainability.

The RED II certification of fuels[1] is based on two essential pillars: the sustainability criteria of the raw material and the criteria for saving greenhouse gas (GHG) emissions. These criteria guarantee environmental sustainability and the reduction of GHG emissions associated with the production and use of fuels.

Regarding GHG emissions, RED II provides a standardized calculation formula to assess GHG emissions savings resulting from the use of renewable energy sources compared to emissions generated by fossil fuels. This formula incorporates a crucial factor called "ESCA" (*Emission Saving from Soil Carbon Accumulation*). This factor is used to quantify greenhouse gas (GHG) emissions savings resulting from the accumulation of carbon in the soil, primarily in the production of fuels from agricultural feedstocks.

$$E = e_{ec} + e_l + e_p + e_{td} + e_u - e_{sca} - e_{ccs} - e_{ccr}$$

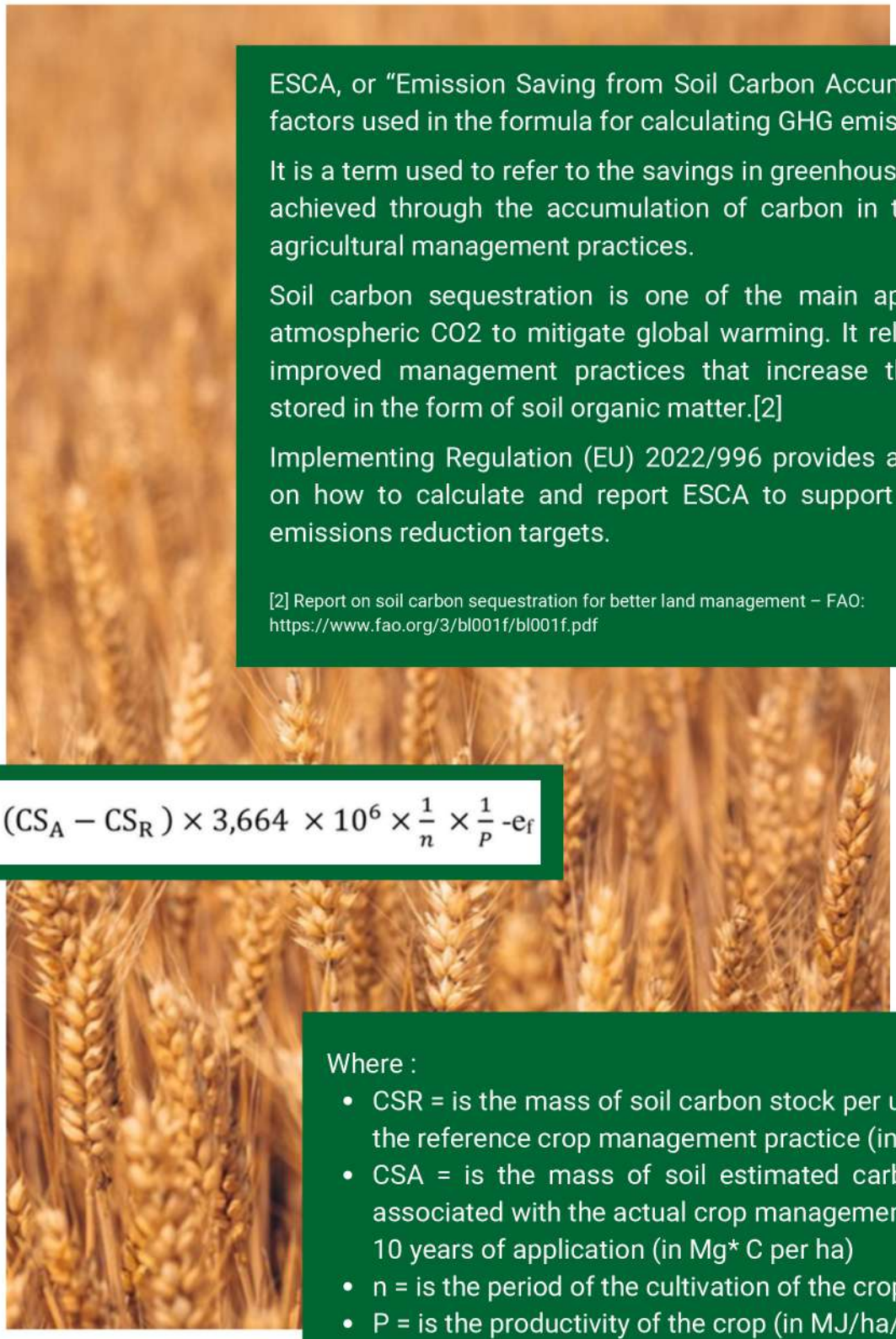
Where :

- E = total emissions from fuel use, (gCO2 eq /MJ)
- eec = emissions from the extraction or cultivation of raw materials, (gCO2 eq /MJ)
- el = annualized emissions from carbon stock changes caused by land-use change, (gCO2 eq /MJ)
- ep = emissions from processing, (gCO2 eq /MJ)
- etd = emissions from transport and distribution, (gCO2 eq /MJ)
- eu = emissions from fuel in use, (gCO2 eq /MJ)
- esca = emission savings from soil carbon accumulation via improved agricultural management, (gCO2 eq /MJ)
- eccs = emission savings from CO2 capture and geological storage, (gCO2eq/MJ)
- eccr = emission savings from CO2 capture and substitution, (gCO2 eq /MJ)

**This document focuses on explaining the new methodology for calculating the "ESCA" factor, introduced in Implementing Regulation (EU) 2022/996, published on June 27th, 2022.**

*[1] Includes biofuels, bioliquids, biomass fuels, renewable liquid and gaseous transport fuels of non-biological origin, and recycled carbon fuels.*

# WHAT IS THE ESCA?



ESCA, or "Emission Saving from Soil Carbon Accumulation", is one of the factors used in the formula for calculating GHG emissions.

It is a term used to refer to the savings in greenhouse gas (GHG) emissions achieved through the accumulation of carbon in the soil through better agricultural management practices.

Soil carbon sequestration is one of the main approaches to reducing atmospheric CO2 to mitigate global warming. It relies on the adoption of improved management practices that increase the amount of carbon stored in the form of soil organic matter.[2]

Implementing Regulation (EU) 2022/996 provides a detailed methodology on how to calculate and report ESCA to support the European Union's emissions reduction targets.

[2] Report on soil carbon sequestration for better land management – FAO: https://www.fao.org/3/bl001f/bl001f.pdf

$$e_{sca} = (CS_A - CS_R) \times 3{,}664 \times 10^6 \times \frac{1}{n} \times \frac{1}{P} \text{-} e_f$$

Where :

- CSR = is the mass of soil carbon stock per unit area associated with the reference crop management practice (in Mg* of C per ha)
- CSA = is the mass of soil estimated carbon stock per unit area associated with the actual crop management practices after at least 10 years of application (in Mg* C per ha)
- n = is the period of the cultivation of the crop considered (in years)
- P = is the productivity of the crop (in MJ/ha/year)
- ef = emissions from the increased fertilisers or herbicide use

* 1 Mg = 1 t

# WHO CAN CLAIM THE ESCA ?

Economic operators eligible for the ESCA bonus must meet the following conditions:

- You must be certified in accordance with the 2BS specification and respect all the sustainability criteria established by the 2BS standards.
- Work with agricultural biomass suppliers who implement sustainable agricultural practices.
- Use a methodology for calculating greenhouse gas emissions in real values.

**Economic operators cannot claim an ESCA bonus on their raw materials, if the GHG methodology used to qualify them is in default value or NUTS2 value.**

The ESCA value calculated by the first gathering point in “kgCO2eq/ton dry matter” is then communicated throughout the chain (See Appendix 2). The first and last transformation units downstream of the gathering point must correct the ESCA, affecting the allocation and conversion factors (feedstock factor) of their respective processes. The biofuel producer will thus be able to convert the corrected ESCA into “gCO2eq/MJ” of biofuel and add it to the calculated total GHG emissions.

# PRINCIPLE OF IMPLEMENTING AN ESCA CLAIM

While the ESCA claim falls on the certified economic operator, it is the farmer who is responsible for implementing improved practices to promote the accumulation of carbon in their soil.

The surface area taken into account is that of the farm. The farmer must therefore provide a compilation of evidence of the implementation of good agricultural practices covering all sustainable plots (according to RED II) on his farm. It is recommended to have the same number of good agricultural practices each year across the entire farm. If necessary, he can subdivide his farm to form homogeneous groups (soil-climate, tillage and inputs). If different agricultural management practices are applied, GHG emissions savings claims must be calculated and applied for, individually for each method.

In the case of two energy crops on the same plot and the same year, the ESCA value is distributed proportionally to the LHV (MJ/kg) of the raw material. The ESCA bonus can only be allocated to the area (in hectares) where an energy crop is cultivated during the current year.

*STD-01 Indicator 2.4.3 (Major indicator): In the case of two sequential energy crops on the same plot and during the same year, the ESCA value is allocated proportionally to the added value (MJ/kg on a dry basis) of the raw material.*
*Verifier: Farm management system (tracing system, spreading notebook, distribution of ESCA value) Verifier: PCI of each raw material*

In case there is a change of first gathering point, the first initial gathering point is responsible for transferring the history of documents relating to the farmer's ESCA to the next one or directly to the farmer. The new first gathering point is then responsible for collecting the history of documents related to the farmer's ESCA.

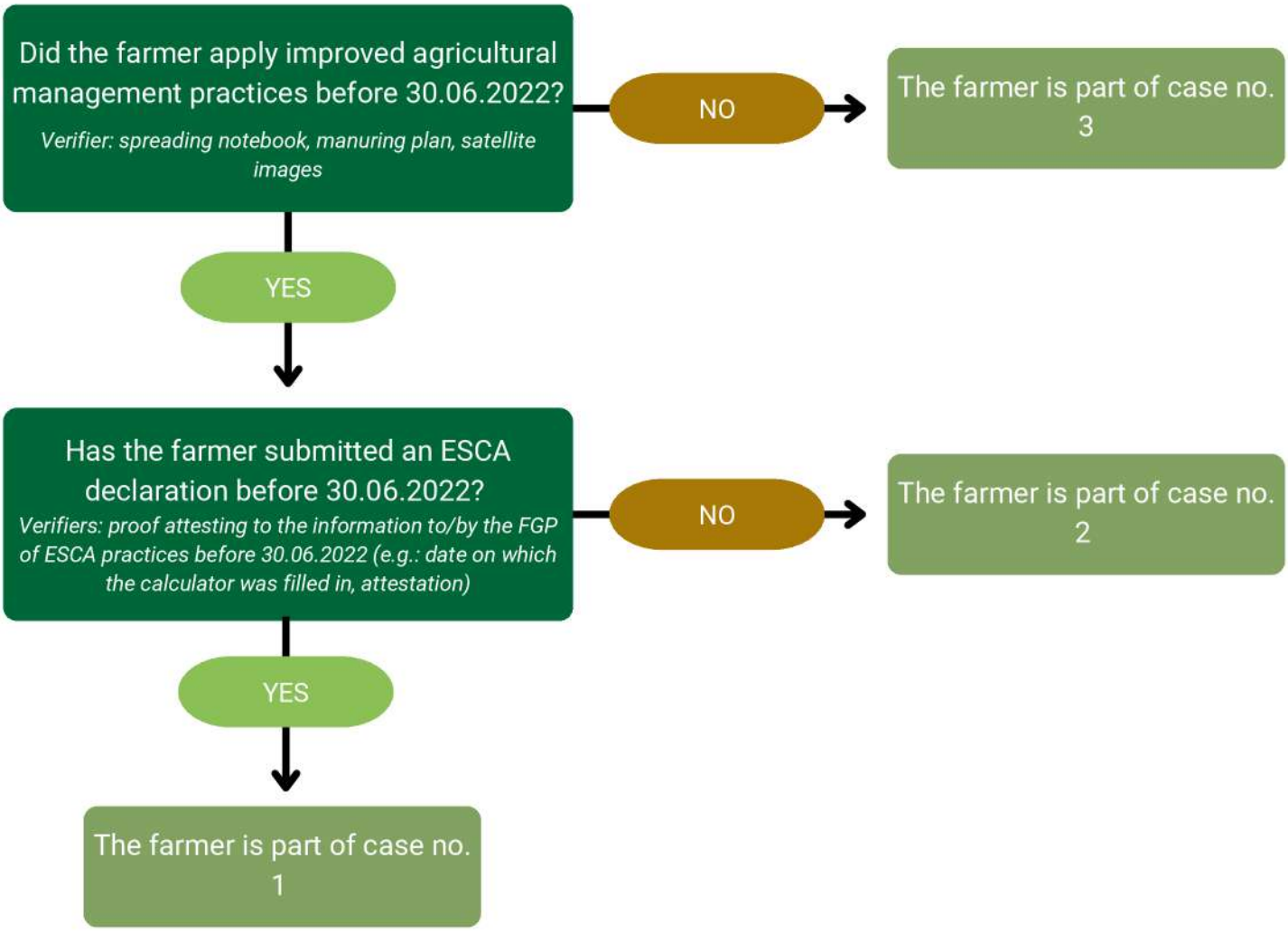
**The management of the ESCA system is based on three different scenarios. These scenarios vary depending on:**

- the start date of improved agricultural management practices
- the submission of an ESCA claim before the date of entry into force of Implementing Regulation (EU) 2022/996, i.e. 30.06.2022.

The decision tree presented below as well as the detailed tables of the different scenarios presented in Appendix 1 provide an overview of the methodology to follow.

*STD-01 Indicator 2.4.1 (Major indicator): To establish which case the farmer belongs to, the first gathering entity must have sufficient evidence.*
*Verifier: Cross-verification with section 2.7.7.3 of document 2BS-PRO-03.*
*Verifier: Assignment of a category*
*Verifier: ESCA self-declaration for each farmer*

**Decision tree for the economic operator to determine where the farmer is in relation to ESCA claims**



# CASE NO. 1: FARMERS WHO HAVE MADE ONE OR MORE ESCA CLAIMS BEFORE JUNE 30TH, 2022

The first case concerns farmers who improved their agricultural practices and claimed an ESCA bonus before the entry into force of Implementing Regulation 2022/996, i.e. before June 30th, 2022.

## a. Engagement

Improved agricultural management practices must be applied continuously to have an impact on carbon soil storage. This is why commitment to the process is mandatory. The farmer commits to a 5-year period, which must be renewed at least once, for a minimum total period of 10 years. The farmer commits to a period of 5 years, renewable at least once.

The farmer must commit to applying at least one of the best agricultural management practices annually, on the plots involved in the ten-year ESCA approach. (See Appendix 4)

The economic operator must provide the auditor with proof each year that its suppliers of agricultural biomass have implemented improved management practices during the previous years and that they are therefore respecting their commitment. In the event of non-compliance with this criterion, penalties will be applied.

The ten-year commitment in the ESCA approach must be signed before the first claim in the new approach. It concerns the continuity of application of good practices and not the delivery of materials.

## b. Determination of CSR

The CSR, part of the formula for calculating the ESCA factor, corresponds to the reference (initial) stock of carbon in the soil. It is measured per unit area in Mg (metric tons) of carbon per hectare. The CSR value must predate the change in agricultural management practices in order to establish a baseline that will be compared with the value measured during the first commitment cycle. Once defined over time, this value remains unchanged for a given farm.

The CSR can be determined in several ways:

Option 1: Individual soil analysis carried out before the start of good agricultural practices*.

Option 2: Measurement from a neighboring field or other fields with similar climatic and soil conditions as well as a similar field management history, if analyzes exist for the year in which good agricultural practices were implemented *.

Option 3: Use of a reference chosen in an interval indicated in the database (see Appendix 3)

The first option takes priority, if the measure does not exist, the second or third option must be used. If the third option is used, the result of the first soil test will become the new CSR.

**Analyses carried out in the past must enable to determine the carbon stock per hectare. Soil carbon stock is calculated by multiplying soil bulk density (g/cm³ or kg/m³) by soil carbon content (percentage). If the bulk density of the soil is unknown, this measurement can be carried out at the time of commitment. For the soil analysis methodology to be applied, refer to the "Soil Analyses" chapter of this guidelines.*

## c. ESCA Claim Submission

In this first case, the ESCA claim can be submitted without a transition period because the farmer was already registered in the process before the entry into force of Implementing Regulation 2022/996.

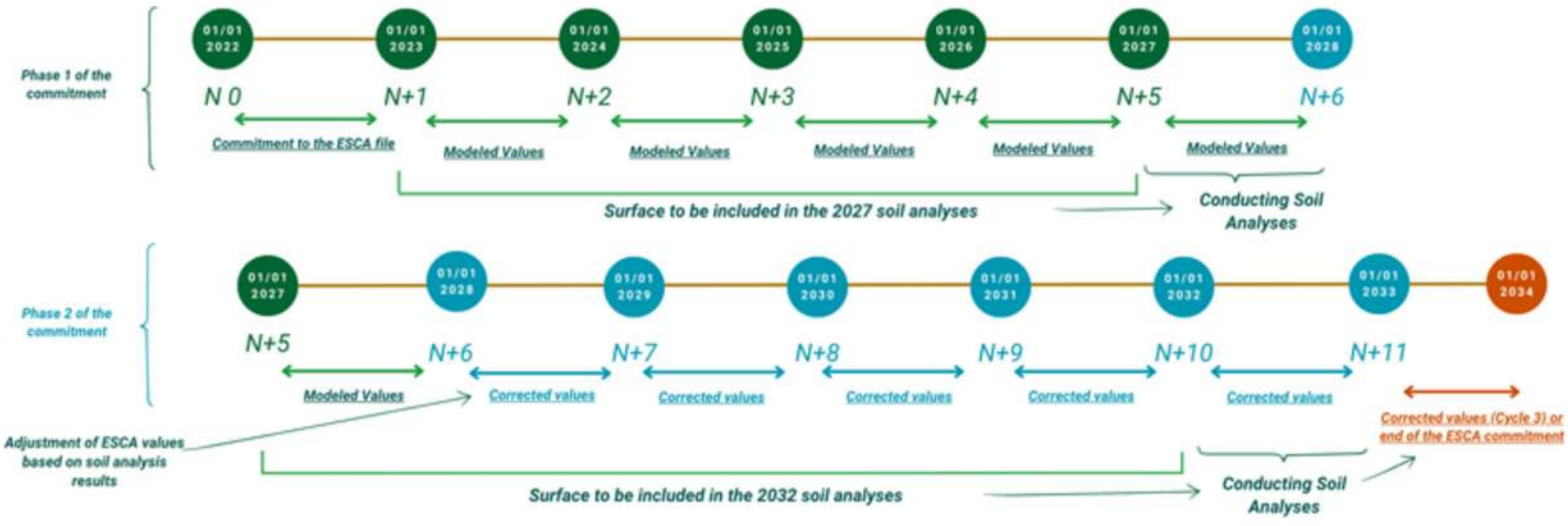
## d. Determination of the CSA

The CSA, part of the formula for calculating the ESCA factor, corresponds to the carbon stock associated with crop management practices. It is measured per unit area in Mg of carbon per hectare.

From the date of the CSR, the operator calculates a CSA based on a prediction model (modeled CSA) for 5 years. The modeled CSA value will be used pending the analysis of the actual CSA, including during the year in which that analysis is conducted (agricultural crops harvested until December 31st of the fifth year following the CSR date). For example, if a farmer conducts soil analyses in October 2026, the farmer will use the modeled CSA value for grains harvested during 2026 and must apply the actual CSA value for grains harvested from January 1st 2027.

No later than December 31st of the fifth year following the CSR date, the economic operator must conduct an initial soil analysis (actual CSA) according to 2BS standards in accordance with European regulatory requirements.

The prediction model recommended by 2BS is the IPCC Tier 2 model. 2BS has developed a calculator based on this model, which can be used to calculate the modeled CSA.



## e. Applicable cap

In this new approach, a cap has been established on the ESCA factor with the aim of limiting excessive claims.

This cap is expressed in grams of CO2 equivalent per megajoule (gCO2eq/MJ) of biofuel and applies to the last interface producing the biofuel. However, the cap applicable to this last interface depends on the scenario in which the upstream farmer finds himself, who provided the raw material from which this biofuel originates. It is therefore essential that the cap data is transmitted throughout the supply chain.

In this first scenario, economic operators can apply a cap of 45 g CO2eq/MJ of biofuel or bioliquid during a transition period until the first measurement of the increase in carbon stock is carried out at the fifth year. Thereafter, the increase in carbon stock measured in the fifth year (actual CSA) will become a cap for annual declarations to be submitted in the following five years, even if it is lower.

*STD-02 Indicator 2.2.4 (Major indicator): When real values are used, economic operators describe in detail and in writing all relevant information in order to justify all choices. It is necessary to divide the total amount of emissions into all relevant elements of the GHG emissions calculation formula. This also applies to formula elements that are not included in the default values, such as el, ESCA, eccr, and eccs. Relevant information includes a detailed description of the industrial process, data collected on site or in the literature, and the description of the calculation tool used if it is a "specific" tool. In case of unusual data, an explanation must be provided. This documentation must be available before the audit.*
*Verifier: Document completed by the supplier including the ESCA cap to apply.*

# CASE NO. 2: FARMERS WHO HAVE ALREADY IMPLEMENTED GOOD AGRICULTURAL PRACTICES BUT WITHOUT HAVING CLAIMED AN ESCA BONUS

This second case concerns farmers who have started to improve their agricultural practices but who have not claimed an ESCA bonus before the entry into force of implementing regulation 2022/996, i.e. before June 30th, 2022.

## a. Engagement

Improved agricultural management practices must be applied continuously to have an impact on soil carbon stock. This is why commitment to the process is mandatory. The farmer commits to a 5-year period, which must be renewed at least once, for a minimum total period of 10 years.

The farmer must commit to applying at least one of the best agricultural management practices annually, on the plots involved in the ten-year ESCA approach. (See Appendix 4)

The economic operator must provide the auditor with proof each year that its suppliers of agricultural biomass have implemented improved management practices during the previous year and that they are therefore respecting their commitment. In the event of non-compliance with this criterion, penalties will be applied.

The ten-year commitment in the ESCA approach must be signed before the first claim in the new approach. It concerns the continuity of application of good practices and not the delivery of materials.

## b. Determination of CSR

The CSR, part of the formula for calculating the ESCA factor, corresponds to the reference soil carbon stock. It is measured per unit area in Mg (metric tons) of carbon per hectare. The CSR value must be determined based on soil analyses conducted between three and one year prior to the year of commitment, in agricultural management practices in order to establish a baseline. Once defined over time, this value remains unchanged for a given farm.

Option 1: Individual soil analysis carried out between three and one year prior to the year of commitment according to the sampling protocol compliant with Implementing Regulation 2022/996, if the analysis was performed after January 1st, 2024*.

There are no criteria regarding the sampling grid density for analyses conducted prior to 2024 for Options 1 and 2.

Option 2: Measurement from a neighboring field or other fields with similar climatic and soil conditions as well as a similar field management history, if analyses are available for the period between one and three years prior to the year of commitment[5]. If the soil analysis was conducted after January 1st, 2024, the sampling protocol must comply with Implementing Regulation 2022/996.

**Analyses carried out in the past must enable to determine the carbon stock per hectare. Soil carbon stock is calculated by multiplying soil bulk density (g/cm³ or kg/m³) by soil carbon content (percentage). If the bulk density of the soil is unknown, this measurement can be carried out at the time of commitment.*

If there is no data available for a neighboring field, a first measurement must be made immediately, at the time of commitment (calendar year of signature). The next measurement (actual CSA) of the increase in carbon stock will have to be made no later than five years later after the initial measurement (CSR) as required by the regulations.

The first option should be preferred. If the data is not available, the second option should be used.
If data from historical soil analyses is used, it must be able to verify the carbon content for the calculation of the carbon stock. If a different unit was used, it must be converted to carbon content.
If only a historical analysis of the soil's organic matter content is available, the bulk density must be determined at the time the ESCA commitment is signed.

It is possible to use a historical soil density value, derived from a physical analysis, provided that the date of the analysis is after the date on which good agricultural practices were implemented.*

Other robust and recognized methods, as alternatives to the tapping method, are accepted. For more details about the requirements in order to use other methods, please refer to the "Soil Analyses" section.

*For the soil analysis methodology to be applied, refer to the "Soil Analyses" chapter of the guidelines on page 26.

## Summary of available options for Case n°2:

- Soil analysis dated before January 1st, 2024
- Soil analysis dated in the calendar year 2024 or later: historical analysis in accordance with the analysis rules set forth in Implementing Regulation 2022/996
- If the data is not available (carbon content or density): an analysis must be conducted during the calendar year in which the commitment is signed, in accordance with Implementing Regulation 2022/996.

*Analyses carried out in the past must enable to determine the carbon stock per hectare. Soil carbon stock is calculated by multiplying soil bulk density ($g/cm^3$ or $kg/m^3$) by soil carbon content (percentage). If the bulk density of the soil is unknown, this measurement can be carried out at the time of commitment.*

## c. ESCA Claim Submission

A minimum of 3 years of continuous application of an improved management practice is required, before the farmer or economic operator can submit a claim.

It is possible to submit retroactive claims annually, but no more than three years before the first ESCA claim. These ESCA can be valued by being distributed over a period of 10 years following the date of commitment.

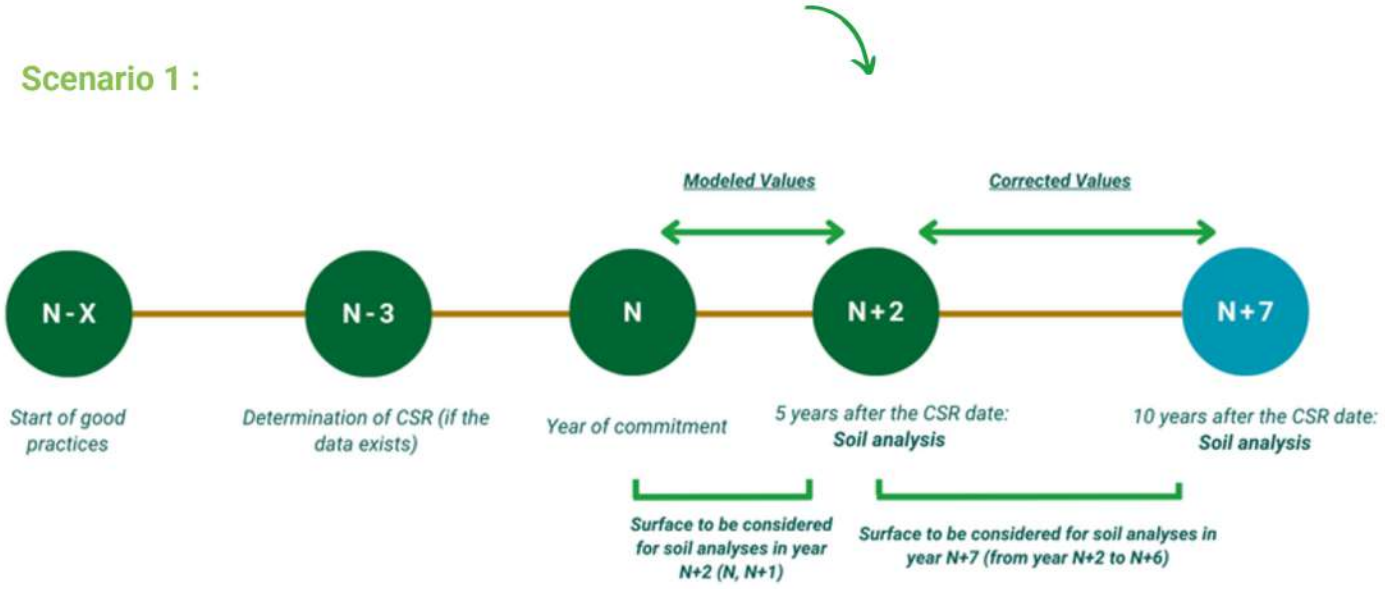
## d. Determination of the CSA

CSA corresponds to the carbon stock associated with crop management practices. It is measured per unit area in Mg of carbon per hectare. From the date of the CSR, the operator calculates a CSA based on a prediction model (modeled CSA) for 5 years. The modeled CSA value will be used pending the analysis of the actual CSA, including during the year in which that analysis is conducted (agricultural crops harvested until December 31st of the fifth year following the CSR date).

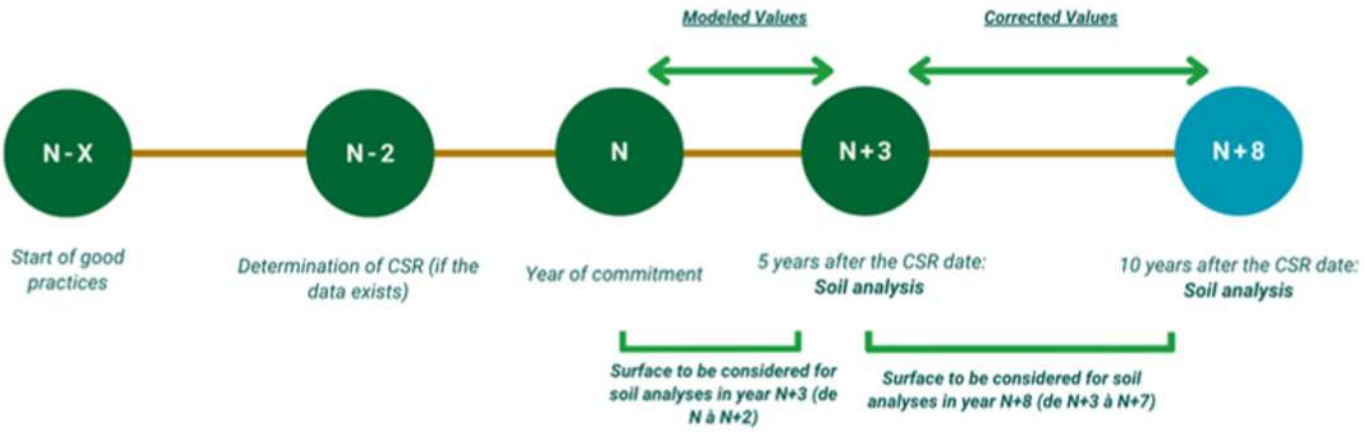
No later than December 31st of the fifth year following the CSR date, the operator must carry out a first soil analysis (actual CSA) according to 2BS standards in accordance with European regulatory requirements.

The prediction model recommended by 2BS is the IPCC Tier 2 model. 2BS has developed a calculator based on this model, which can be used to calculate the modeled CSA.

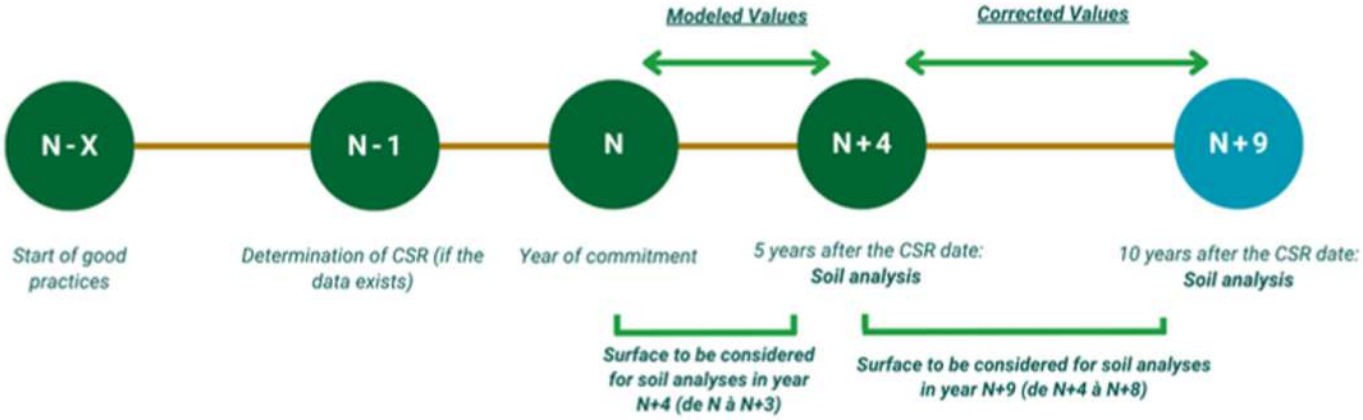
**Scenario 1 :**



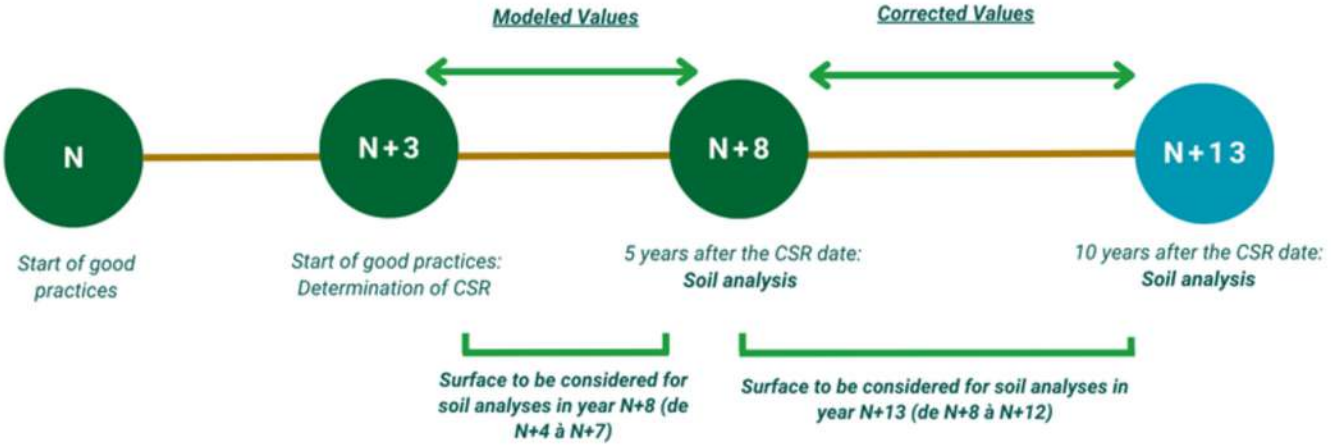
## Scenario 2 :




## Scenario 3 :




## Scenario 4 :



## e. Applicable cap

In this new approach, a cap has been established on the ESCA factor with the aim of limiting excessive claims.

This cap is expressed in grams of CO2 equivalent per megajoule (gCO2eq/MJ) of biofuel and applies to the last interface producing the biofuel. However, the cap applicable to this last interface depends on the scenario in which the upstream farmer finds himself, who provided the raw material from which this biofuel originates. It is therefore essential that the cap data is transmitted throughout the supply chain.

In this second scenario, economic operators must apply a cap of 25g CO2eq/MJ of biofuel or bioliquid.

The cap can be raised to 45 gCO2eq/MJ for the entire period of application of ESCA practices, if biochar is used annually as the only organic amendment or in combination with other authorized ESCA practices. If a calculation of the quantity of biochar is carried out by the first gathering point, 2BS recommends referring to the IPCC 2019 (Volume 4, Chapter 2, Annex 4).

*STD-01 Indicator 2.4.5a: When the farmer uses biochar as an organic amendment, alone or in combination with other eligible esca practices, the first gathering point must induce a capping of the ESCA at 45gCO2eq/MJ biofuel or bioliquid.*
*Verifier: dated proof of purchase (invoices detailing product specifications) Verifier: spreading notebook including biochar.*

# CASE NO. 3: FARMERS ENTERING THE PROCESS

This third case concerns farmers new to the ESCA approach and beginning to improve their agricultural practices.

## a. Engagement

Improved agricultural management practices must be applied continuously to have an impact on carbon soil storage. This is why commitment to the process is mandatory. The farmer commits to a period of 5 years, renewable at least once.

The farmer must commit to applying at least one of the best agricultural management practices annually, on the plots involved in the ten-year ESCA approach. (See Appendix 4).

The economic operator must provide the auditor with proof each year that its suppliers of agricultural biomass have implemented improved management practices during the previous year and that they are therefore respecting their commitment. In the event of non-compliance with this criterion, penalties will be applied.

The date of commitment to the process corresponds to the start date of application of good practices.

The farmer's ten-year commitment to the ESCA program concerns the continued application of good agricultural practices on their farm during this period, and not to claiming the ESCA for agricultural products.

## b. Determination of CSR

The CSR, part of the formula for calculating the ESCA factor, corresponds to the reference stock of carbon in the soil. It is measured per unit area in Mg (metric tons) of carbon per hectare. The CSR value must predate the change in agricultural management practices in order to establish a baseline. Once defined over time, this value remains unchanged for a given farm.

The value of the CSR will be based on a soil analysis which must be carried out in the year of the commitment.*

*For the soil analysis methodology to be applied, refer to the "Soil Analyses" chapter of the guidelines on page 26.

## c. ESCA Claim Submission

The farmer or economic operator must have applied improved management practices continuously for at least three years from the date of commitment before being able to submit an ESCA claim.

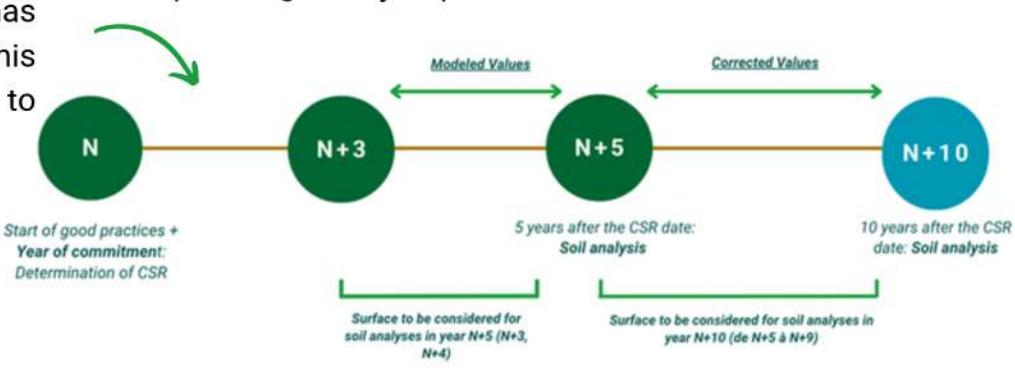
## d. Determination of the CSA

The CSA, part of the formula for calculating the ESCA factor, corresponds to the carbon stock associated with crop management practices. It is measured per unit area in Mg of carbon per hectare.

Between the 3rd and 5th year after the CSR date, the operator calculates a CSA based on a prediction model (modeled CSA). The modeled CSA value will be used pending the analysis of the actual CSA, including during the year in which this analysis is conducted (agricultural materials harvested until December 31st of the fifth year following the CSR date).

No later than December 31st of the fifth year following the CSR date, the operator must conduct the soil analysis (actual CSA) in accordance with 2BS standards and European regulatory requirements.

The prediction model recommended by 2BS is the IPCC Tier 2 model. 2BS has developed a calculator based on this model. This calculator can be used to calculate the modeled CSA.




## e. Applicable cap

In this new approach, a cap has been established on the ESCA factor with the aim of limiting excessive claims.

This cap is expressed in grams of CO2 equivalent per megajoule (gCO2eq/MJ) of biofuel and applies to the last interface producing the biofuel. However, the cap applicable to this last interface depends on the scenario in which the upstream farmer finds himself, who provided the raw material from which this biofuel originates. It is therefore essential that the cap data is transmitted throughout the supply chain.

In this third scenario, economic operators must apply a cap of 25g CO2eq/MJ of biofuel or bioliquid.

The cap can be raised to 45 gco2eq/MJ for the entire period of application of ESCA practices, if biochar is used annually as the only organic amendment or in combination with other eligible ESCA practices. If a calculation of the quantity of biochar is carried out by the first gathering point, 2BS recommends referring to the IPCC 2019 (Volume 4, Chapter 2, Annex 4).

*STD-01 Indicator 2.4.5a: When the farmer uses biochar as an organic amendment, alone or in combination with other eligible ESCA practices, the first gathering point must induce a capping of the ESCA at 45gCO2eq/MJ biofuel or bioliquid.*
*Verifier: dated proof of purchase (invoices detailing product specifications)*
*Verifier: spreading notebook including biochar.*

# SPECIFICITIES CONCERNING THE PRODUCTION OF BIOGAS AND BIOMETHANE

In the case of biogas and biomethane producers, a bonus of 45 g CO2eq/MJ of manure can be allocated for improving agricultural and manure management in the case where animal manure is used as a substrate to produce biogas and biomethane.

A biogas plant can either benefit from the ESCA bonus through the use of manure or from the ESCA due to the application of good agricultural practices. The two options are not cumulative.

*STD-02 Indicator 2.2.5: For the ESCA factor, a bonus of 45 g CO2eq/MJ of manure is allocated for improving agricultural and manure management in the case where animal manure is used as substrate for the production of biogas and biomethane.*
*- Verifier: Manure production and storage capacity*
*- Verifier: Monthly quantity introduced into the digester"*

# AGRICULTURAL PRACTICES

The objective of this initiative is to demonstrate that the farmer adopts improved agricultural management practices aimed at increasing carbon storage in the soil.

As part of this approach, the farmer commits to implement at least one good practice each year, even if he does not claim ESCA each year on his farm.

*STD-01 Indicator 2.4.4 (Critical indicator): Each time the farmer implements agricultural practices favoring the storage of carbon in the soil under the ESCA, the first gathering point must have recorded information precise in terms of inputs and tillage.*
*Verifier: spreading notebook, agricultural management system, organic routes*
*Verifier: purchase invoices for organic inputs, nitrogen-fixing plant seeds, catch crops or plant covers, etc.*
*Verifier: self-declaration concerning ground work.*

If different management practices are applied, a GHG emissions savings claim must be calculated and requested individually for each method.

An exhaustive list of good practices is given in the 2BS standards. Please see pages 15 and 16.

| PRACTICE | DEFINITION | EVIDENCES |
|---|---|---|
| **DEEP TILLAGE** | Deep tillage of the soil (reference practice, not part of improved management practices) | |
| **NO-TILL** | Soil mixing and fragmentation. Practice taking into account TCS (Simplified Cultural Techniques), strip-till, decompaction and subsoiling.<br>It is authorized to practice exceptional tillage under certain conditions listed below: climatic accidents, plants weeded in the rotation, phytosanitary problems.* | • Technical itinerary (agricultural Notebook or Farm Management System)<br>• Use of a Geographic Information System (GIS)<br>• Use of sensors or drone imagery |
| **DIRECT SEEDING** | Soil fragmentation only on the sowing line.<br>It is authorized to practice exceptional tillage under certain conditions listed below: climatic accidents, plants weeded in the rotation, phytosanitary problems.* | |
| **ORGANIC FERTILIZATION** | Operators must provide a significant contribution of organic matter (all waste and organic by-products from agricultural and human activities intended to be spread in the field. They can be of origin)<br>Non-exhaustive list of organic matter:<br>• Animal: livestock effluent, compost, dried blood, crushed horn<br>• Plant: green waste, intra-plot agroforestry, ashes<br>• Human: sewage sludge<br>• Industrial: waste from sugar factories, starch production, vegetables, etc.<br>• Digestats<br>• Biochar<br>• Fermentation of manure<br>• Compost | • Technical itinerary (agricultural Notebook or Farm Management System)<br>• Invoice, delivery note, stock tracking<br>• Spreading book |

**When exceptional tillage is carried out (subject to adequate evidence), the farmer may retain his classification in the "no-till" or "direct seeding" category (see page 19)*

| | | |
|---|---|---|
| **INTERMEDIATE CULTURE** | Seeding cover/catch/intermediate crops. Crop management practices should ensure minimum soil cover so as not to have bare soil during the most sensitive periods).<br><br>Cover crop must achieve a cumulative yield (over 5 years maximum) of production, greater than 1.5 tonnes of biomass, with complete restitution of the biomass | • Technical itinerary (agricultural Notebook or Farm Management System)<br><br>• Use of a Geographic Information System (GIS)<br><br>• Use of sensors or drone imagery |
| **MULCHING USING CROP RESIDUES** | Agricultural technique consisting of covering the soil with organic material (mulch), in order to preserve and improve the structure and fertility of the soil, and limit evaporation and erosion. Mulching can be carried out directly with residue from the previous crop | |
| **3 CROP ROTATION** | At least one three-year rotation, including legumes or green manure in the cropping system, taking into account the agronomic crop succession requirements specific to each cultivated plant and climatic conditions. A multi-species cover crop between cash crops counts as one crop. | |
| **RESTITUTION OF CROP RESIDUES** | Action of leaving all crop residues on the agricultural plot which can be returned or left as mulch on the surface | |

# IPCC CATEGORIES
# AND DECISION RULES

To enable CSA modeling and use the IPCC Tier 2 prediction model, it is necessary to define for each farmer the IPCC categories corresponding to their practices. The categories are divided into two parts:

A part on tillage with 3 possible categories

| | |
|---|---|
| **Full tillage** | Significant disruption with complete inversion and/or frequent tillage work (during the year). Low residue coverage (<30% for example) at the time of planting. |
| **Reduced tillage** | Primary and/or secondary tillage with less soil disturbance (generally shallow and without complete inversion), normally leaving >30% residue coverage at planting. |
| **No tillage** | Direct seeding without primary tillage, with minimal soil disturbance in the seeding area. Herbicides are generally used to control weeds. |

A part on inputs with 4 possible categories:

| | |
|---|---|
| **Low inputs** | The residue rate is low when there is removal of residues (by collecting or burning), frequent bare fallowing, crops producing little residue (vegetables, tobacco, cotton, for example), absence of use of fertilizers minerals, absence of nitrogen-fixing crops. |
| **Moderate inputs** | Annual cultivation with planting of cereals, all residues being left in the fields. If residues are removed, additional organic matter (e.g. manure) is added. This also requires mineral fertilizers and nitrogen-fixing crops in rotation. |
| **Important inputs with manure** | Much greater carbon inputs compared to cropping systems with moderate carbon inputs, due to the additional practice of regularly adding manure. |
| **Important inputs without manure** | Much higher inputs of crop residues compared to cropping systems with moderate carbon inputs due to additional practices, such as crops producing a lot of residue, use of green manures, cover crops, improved vegetated fallows, irrigation, frequent use of perennial grasses in annual rotations, but without application of manure (see previous paragraph). |

When entering the farmer's process, the first gathering point evaluates the farmer's practices over years N-x (x being a maximum of 5 years) to determine, using the decision tree below, the IPCC category in which the farmer is located. He must decide on a category for the tillage part and another category for the input part.

| Tillage practices | Techniques implemented | Exceptions |
|---|---|---|
| **NO TILL** | Soil fragmentation only on the seed line | *It is authorized to practice exceptional tillage in certain conditions, for example: climatic accidents, weeded plants in the rotation representing less than 30% of the farm, phytosanitary problems.* |
| **REDUCED TILLAGE** | Soil mixing and fragmentation. Practice taking into account TCS (Simplified Cultural Techniques), strip-till, decor | |
| **FULL TILLAGE** | Any other technique regularly using tillage | *Exceptional tillage allows us to remain committed to "direct seeding" and "superficial work" practices but implies taking into account the carbon release associated with this change in practice (see calculator)* |

| INPUT PRACTICES | CATEGORIES | DECISION RULE |
|---|---|---|
| No till<br>Reduced tillage<br>Intermediate cutlery<br>Organic fertilization<br>Mulching using crop residues<br>3 crops Rotation<br>Return of crop residues | **Low Inputs** → | 0/7 practices |
| | **Moderate Inputs** → | 1/7 practices |
| | **Significant inputs without addition of manure** → | 2/7 to 7/7 practices without manure or livestock effluent |
| | **Important inputs with significant addition of manure** → | 2/7 to 7/7 practices with manure or livestock effluent |

## Decision guide:

**For the large inputs with manure category:**

- No mandatory threshold for organic carbon intake.
- Concerning crop residues, IPCC rules must be followed (if there is export of residues this must be compensated by an addition of organic matter). (See STD-01 Principle 4)

**For the large input without manure category :**

- Establishment of at least one cover, which must achieve a cumulative yield (over 5 years maximum) of production, greater than 1.5 tonnes of biomass, with complete restitution of the biomass.
- Concerning crop residues, IPCC rules must be followed (if there is export of residues this must be compensated by an addition of organic matter).

Each year, the farmer must provide evidence to justify that he is still implementing the minimum necessary practices over years N-x (x being a maximum of 5 years), to remain in the IPCC categories assigned to him. If the minimum number of practices to reach its IPCC category is no longer reached, a new category, simulating less carbon storage, can be applied to the farmer. Similarly, if additional practices are put in place, the first gathering point may decide to change the farmer's IPCC category to a higher carbon storage model.

# SOIL ANALYSIS

Depending on the situation in which the farmer finds himself, soil analysis must be carried out at regular intervals but according to a specific schedule (see the diagrams presented above) in order to measure the actual soil carbon stock and verify the difference between the CSA modeled on the basis of the IPCC Tier 2 prediction model and the actual CSA measured.

For farmers under cases 2 and 3, the surface area to be considered for CSR soil analyses may correspond either to all of the farm's sustainable plots or, when this information is available, to the surface area of the plots that will be included in the ESCA initiative. This choice must be maintained for the entire duration of the commitment. In all cases, the surface area taken into account cannot be less than that of the plots scheduled to be used in the ESCA initiative.

The soil analysis to obtain the actual CSA must be carried out only on plots where an ESCA claim has been registered at least once between the year of commitment and January 1st of the fifth year following the CSR date. Plots for which an ESCA claim was submitted in the fifth year will be included in the soil analysis for the actual CSA of the following cycle.

For farmers under case n°1, the first soil analyses used to determine the actual CSA will take into account crop areas from the year 2023 and onwards.

The calculation is performed by multiplying the mass of fine earth by the carbon content (%), resulting in the unit tC/ha.

***Carbon stock (t/ha) = Carbon content (g/kg) × 0.001 × Fine earth mass (t/ha)***
***Fine earth mass (t/ha) = Pf (cm) × BD × (100 – CG (%))***

Where:

- Pf: sample depth, e.g., 30 cm.
- BD: bulk density or dry bulk density.
- CG: percentage of coarse fragments or stoniness (soil fraction > 2 mm).*

** Stoniness may be determined together with the sampler and the farmer, based on visual reference charts.*

Sampling to analyze the carbon content in the soil must be carried out using the method listed below. Regarding the sampling carried out to measure bulk density, 2BS recommends performing at least one analysis per soil type (according to the IPCC categories) that is representative of the farm. It is also recommended that sampling be carried out under identical conditions for each new analysis. Bulk density is measured using the tapping method, in accordance with standard NF11272.
Sampling is carried out either by a sampler or by the farmer. In both cases, sampling must follow the sampling protocol.

## *1. Representative sampling method*

*a)* sampling shall be made for each plot or field*;

*b)* at least one localized sample, consisting of 15 well distributed sub-samples per every 5 hectares or per field, whichever is smaller (taking into account the heterogeneity of the plot's carbon content), shall be taken;

*c)* smaller fields* (≤ 5ha) with same climatic conditions, soil type, reference farming practice, and esca practice can be grouped;

**Field means an area of land, used for growing crops or keeping animals, usually surrounded by a fence: [Cambridge Dictionnary]*

Indeed, it is possible to group samples taken from different fields (fields of 5 ha maximum) with a maximum cumulative area of 20 ha. These fields must have the same soil and climatic characteristics, a similar management history in terms of tillage and carbon input to the soil, and they will be subject to the same improved management practice. In this case, samples can be pooled for analysis, including those from fields belonging to different farmers.

d) sampling shall be done either before soil cultivation and fertilization or a minimum of 2 months after harvest;

It is permitted to measure soil bulk density and carbon content at different times to facilitate implementation given crop rotation constraints:

Sampling may be carried out either:
- in spring, before soil cultivation and fertilization, or
- in autumn, a minimum of 2 months after harvest.

The key element to ensure the reliability of a carbon stock measurement is to avoid any influence from a recent input of fresh carbon into the soil. It is therefore recommended to carry out sampling in spring before cropping and fertilization, or at least two months after:
- an application of organic products (manure, compost, effluents, etc.);
- the incorporation of harvest residues;
- the destruction or incorporation of an intercrop cover.

This waiting period ensures that most of the fresh carbon has decomposed and no longer interferes with the measurement of total carbon. This criterion is more important than the harvest date itself.
Carbon analysis may be carried out even after the establishment of the next crop, provided that no fresh carbon input has occurred in the two preceding months. Sowing or the presence of the crop therefore does not pose an obstacle.

However, bulk density measurement requires greater precautions, as the soil must be moist but not waterlogged, and must be minimally disturbed (recent tillage can distort the measurement, especially when using the tapping method).

When alternative methods to the tapping method are used, these constraints are reduced, offering more flexibility for performing the sampling.

If previous soil analyses for carbon content are available and were taken at the same sampling depth (0–30 cm), but bulk density was not measured, it is possible to determine it via a direct measurement or an estimate using alternative methods at the time of the commitment.

If the tapping method is used, it must be repeated at year N+5 using the same type of cylinder. Similarly, if pedotransfer functions or density estimation are used, they must also be applied at N+5 to ensure consistency of results.

If previous soil analyses for carbon content are available but bulk density was not measured, this measurement may be carried out at the time of the commitment.

e) direct measurements of soil carbon stock changes shall be taken for the first 30 cm of soil;

f) the points of the initial sampling to measure the baseline of soil carbon stocks shall be used under identical field conditions (especially soil moisture);

Soil analyses and sampling must be carried out on all plots declared as sustainable in year N0 (if required for the CSR calculation), and then again in years N+5, N+10, etc (by December 31st of those years). These analyses must cover all plots that have hosted at least one energy crop during the previous five years. However, due to the three-year rotation, the exact GPS point used for a measurement may no longer be accessible five years later. It is permitted to move the new sampling point to another plot or block than the one inventoried in $N_0$ under the following conditions:

- This plot or block of the Economic Operator must have similar climatic and pedological conditions as well as a similar field management history.
- The Economic Operator must provide documented evidence through a written statement confirming the exchange of the plot or block, demonstrating close or identical similarity (area, soil type, GPS, cadastral and climatic comparison, aquifer zone, and others).

*g)* The sampling protocol shall be well documented.

Measurements of soil carbon stocks should preferably be carried out by accredited laboratories (ISO 17025 or equivalent). If such laboratories are not available, measurements can be carried out by a certified independent laboratory of proven impartiality. When using certified laboratories, preference must be given to laboratories undergoing accreditation (ISO 17025).

Soil analysis (soil carbon content, dry bulk density) must be carried out according to the method below or alternatively according to the default standards listed in 2BS-PRO-03 (§2.7.7.6).

*2. Measurement of the soil carbon content:*

*a)* soil samples shall be dried, sieved, and if necessary grounded;

*b)* if the combustion method is used, inorganic carbon shall be excluded.

Two reliable analytical methods for measuring soil carbon are available on the market:

- NF ISO 14235: Sulfochromic oxidation method, known as the Anne method
- NF ISO 10694: Measurement of organic carbon by dry combustion

*3. Determination of dry bulk density*

*a)* changes in bulk density over time shall be taken into account;

Pedotransfer functions and the use of bulk density estimates take temporal evolution into account, in particular through variations in carbon content or changes in soil tillage practices.

*b)* bulk density should be measured using the tapping method, that is to say by mechanically tapping a cylinder into the soil, which greatly reduces any errors associated with bulk density measurement;

*c)* if the tapping method is not possible, especially with sandy soils, a reliable method shall be used instead;

The tapping method is the technique recommended by the European Commission. It is applicable to stone-free or slightly stony soils. However, its practical application can present some limitations. When the tapping method is not possible, the use of another reliable method is permitted, for example:

1. Density estimation using reference charts based on measurable parameters (granulometry, limestone content, hydromorphy, depth, stoniness).

Accepted sources for these reference charts:

a. Official statistical data from government bodies were available and of good quality.
b. If no official statistical data from government bodies are available, statistical data published by independent bodies may be used.
c. If these values are not available, the data may be based on scientifically peer-reviewed work with the precondition that data lies within the commonly accepted data range.

2. Use of pedotransfer functions: statistically based tools designed to estimate soil properties or dynamics that are difficult to measure directly, based on existing, more easily measurable properties.

If limitations regarding the tapping method are observed, a study must be carried out in order to justify, during the audit, the use of reliable alternative methods to the tapping method.

*d)* samples should be oven-dried prior to weighing.

To be compared to the model, the result of the soil analysis must take into account the measurement uncertainty and the sampling uncertainty. These uncertainties are communicated in the analysis reports from accredited laboratories.

After soil analysis, we obtain :

→ 1 soil analyzes every 5 hectares (including measurement and sampling uncertainty),

or

→ 1 soil analysis for grouped fields with a cumulative area of up to 20 hectares (including measurement and sampling uncertainty)..

To compare the actual CSA with the modeled CSA, obtaining a final operational value is essential. This involves calculating:

1. Low average 2. High average 3. Median

*The current CSA will lie within the range.*

## EXAMPLE

Analysis 1: 30 t/C/ha (+/- 10%)

Analysis 2: 45 t/C/ha (+/- 10%)

Analysis 3: 35 t/C/ha (+/- 10%)

**Median: 35 tons per hectare**

**The current CSA will lie within the range :**

**33 tons C per hectare - 40.33 tons C per hectare**

| | Low value | High value |
|---|---|---|
| Analysis 1 | 27 | 33 |
| Analysis 2 | 40,5 | 49,5 |
| Analysis 3 | 31,5 | 38,5 |
| **Average** | **33** | **40,33** |

# 2BS CALCULATOR

## (ACCORDING TO THE IPCC TIER 2 MODEL) [3]

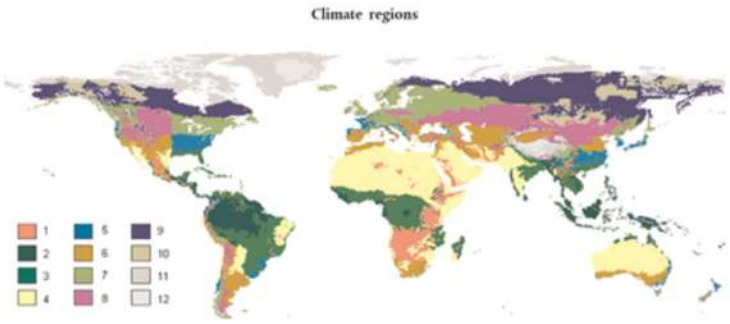
The prediction model recommended by 2BS is the IPCC Tier 2 model. 2BS has developed a calculator based on this model. This calculator can be used to calculate the modeled CSA.

### a. Application

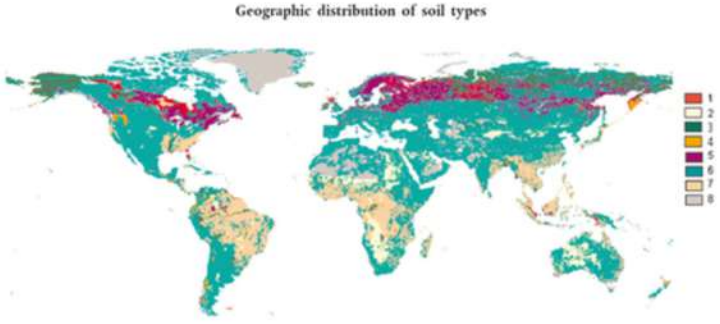
The use of 2BS calculator by economic operators is not mandatory. However, it is necessary to use the methodology which is detailed in 2BS-PRO-03 (§2.7.7.7)

This calculator has been developed for use in France. In order to use the calculator in other countries, economic operators, representative bodies of operators or the relevant public authorities should provide 2BS with climate data and soil types by region for their respective countries. This adaptation will ensure accurate and effective use of the calculator, taking into account the environmental specificities of each country.

Below is a map of the world's soil types and climates[4]. To adapt the calculator to specific needs, the same type of data is required at the level of the chosen country.




*Legend*: 1 = Tropical, montane; 2 = Tropical, wet; 3 = Tropical, moist; 4 = Tropical, dry; 5 = Warm temperate, moist; 6 = Warm temperate, dry; 7 = Cool temperate, moist; 8 = Cool temperate, dry; 9 = Boreal, moist; 10 = Boreal, dry; 11 = Polar, moist; 12 = Polar, dry.




*Legend*: 1 = Organic; 2 = Sandy Soils; 3 = Wetland Soils; 4 = Volcanic Soils; 5 = Spodic Soils; 6 = High Activity Clay Soils; 7 = Low Activity Clay Soils; 8 = Other Areas.

In the 2BS calculator, the ESCA calculation is carried out in the “ESCA Calculator” tab.

*[3] See the calculator “GHG-Calculator EEC ESCA 2024-V4” - soon available on www.2bsvs.org*

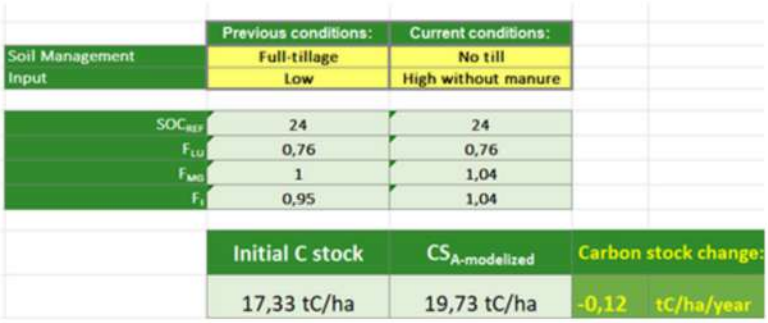
*[4] Commission Decision of 10 June 2010 - (2010/335/EU)*

# 2BS CALCULATOR

## (ACCORDING TO THE IPCC TIER 2 MODEL) [3]

To begin, the economic operator enters their postal code. The calculator will thus determine the climate and soil type based on the IPCC climate maps (Tier 2).
If in doubt about the precise location of the climate type (straddling several zones), the climate type with the lowest carbon stock per hectare must be considered.

*STD-01 Indicator 2.4.2: When the first gathering point wishes to determine the climate and soil categories of a farm, it must use the IPCC climate maps (Tier 2 type) associated to date with the calculation model of ESCA or equivalent if the resolution is higher. If there is any doubt about the precise location of the climate type (straddling several zones), the climate type with the lowest carbon stock per hectare must be taken into account.*
*Verifier: Use of IPCC level 2 climate maps*



| | Previous conditions: | Current conditions: |
|---|---|---|
| Soil Management | Full-tillage | No till |
| Input | Low | High without manure |
| $SOC_{REF}$ | 24 | 24 |
| $F_{LU}$ | 0,76 | 0,76 |
| $F_{MG}$ | 1 | 1,04 |
| $F_I$ | 0,95 | 1,04 |

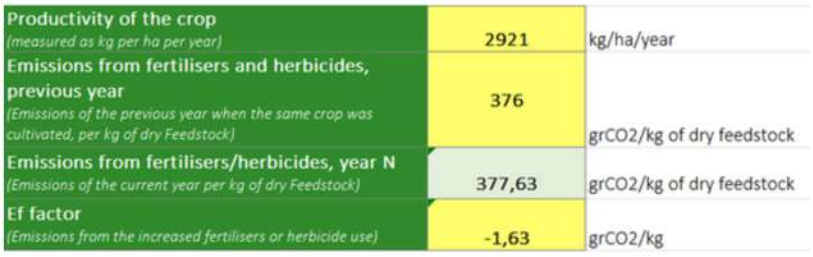
| Initial C stock | $CS_{A\text{-}modelized}$ | Carbon stock change: | |
|---|---|---|---|
| 17,33 tC/ha | 19,73 tC/ha | -0,12 | tC/ha/year |

The economic operator then chooses his reference method as well as his current method (see p.18).

He then obtains a quantity of carbon storage in tC/ha/year at the farm level.

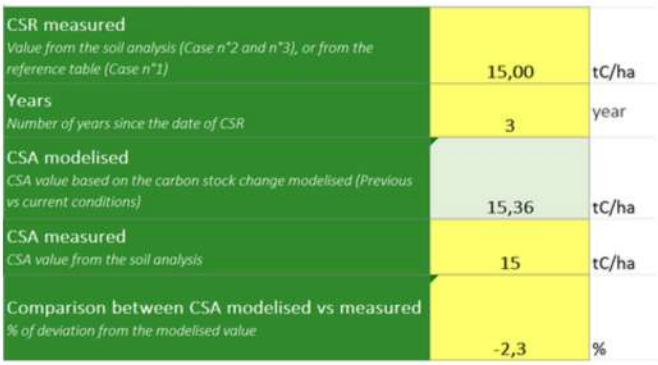
The reference method corresponds to the practices carried out before the implementation of improved agricultural management practices (e.g., 2008). The determination of the reference method is based on a declaration by the farmer.

It will also be necessary to provide crop yield as well as emissions associated to the use of fertilizers and herbicides from previous years (average of the last 3 years before entering the new ESCA approach) and the current year ("ef" factor) in order to obtain the final ESCA value for a given crop. (see p.26)



| | | |
|---|---|---|
| Productivity of the crop *(measured as kg per ha per year)* | 2921 | kg/ha/year |
| Emissions from fertilisers and herbicides, previous year *(Emissions of the previous year when the same crop was cultivated, per kg of dry Feedstock)* | 376 | grCO2/kg of dry feedstock |
| Emissions from fertilisers/herbicides, year N *(Emissions of the current year per kg of dry Feedstock)* | 377,63 | grCO2/kg of dry feedstock |
| Ef factor *(Emissions from the increased fertilisers or herbicide use)* | -1,63 | grCO2/kg |

| $e_{sca}$ value | 149 grCO2/kg of dry feedstock |
|---|---|



| | | |
|---|---|---|
| CSR measured *Value from the soil analysis (Case n°2 and n°3), or from the reference table (Case n°1)* | 15,00 | tC/ha |
| Years *Number of years since the date of CSR* | 3 | year |
| CSA modelised *CSA value based on the carbon stock change modelised (Previous vs current conditions)* | 15,36 | tC/ha |
| CSA measured *CSA value from the soil analysis* | 15 | tC/ha |
| Comparison between CSA modelised vs measured *% of deviation from the modelised value* | -2,3 | % |

Finally, from the CSR and the number of years indicated (y), the calculator can determine the modeled CSA (*CSR + y * carbon stock change*) and compare it to the actual CSA (to complete once the soil analysis has been carried out).

*[3] See the calculator "GHG-Calculator EEC ESCA 2024-V4" - soon available on www.2bsvs.org*

### b. Calibration

After the soil analysis (actual CSA), if the measured value is different from the modeled value (modeled CSA), the model used must be calibrated on the basis of the actual values measured and approved by 2BS. Actual soil carbon measurements must be reintegrated into the 2BS model, as implemented by the economic operator, in order to improve its predictive value and adjust the annual emissions savings resulting from the accumulation of soil carbon through agricultural management in subsequent years.

Calibration of the model is the responsibility of the economic operator (the first gathering point). It will be verified during audits as soon as the CSA is measured. 2BS will then provide the calibration rules. The model calibration will target the specific stock variation factors (FLU, FMG and FI) in order to obtain a more region-specific model. The difference between the CSR and the first CSA will help the economic operator to calibrate the model. Model calibration is not necessary if the model is verified by the first CSA measurement, i.e. if the modeled CSA is equivalent to the actual measured CSA.

# GROUP AUDIT

The internal audit of farmers by the first gathering point must be carried out on 100% of farmers annually.

The audit carried out by a third party (certification body) can be carried out in the form of a group audit. Indeed, an audit of several farms can be carried out when the farmers belong to the same case and the farms have:

- A similar climate and soil type
- A similar management history in terms of tillage;
- The same carbon contributions to the soil
- The same agricultural practices;

It is the responsibility of the economic operator to create homogeneous groups allowing the third-party auditor to audit the square root of the farmers. The sample size is the square root of the number of farmers and their selection is 75% done by risk analysis and 25% randomly.

If a farmer belonging to an audit group disengages from the ESCA process, the sanctions then only apply to the farmer concerned and not to all other elements of the group.

*STD-01 Indicator 2.4.6: When the first gathering point chooses to create homogeneous groups among farmers allowing the third-party auditor to audit the square root of farmers, the entity must have precise elements to justify its decision.*
*Verifier: Esca self-declaration for each farmer*
*Verifier: List of homogeneous groups (decision criteria)*

# PENALTIES

The methodology provides for a process of transferring penalties to suppliers of agricultural biomass (farmers). However, responsibility for ESCA claims on the market lies at the level of the economic operator (first gathering point, if applicable). Any penalties will be recorded at the level of the economic operator. The economic operator can pass on the penalties to the farmer.

**1.If a farmer withdraws from the ESCA system (non-compliance with commitment)**

- Farm ESCA values for the current year are added as emissions to the overall GHG emissions of the relevant energy crop, instead of being deducted as GHG emissions savings.
- The farmer is prohibited from including an ESCA value in the calculation of greenhouse gas emissions for the following five years.
- The list of farmers who have not respected the ESCA commitment as well as the sanctions applied are published on the 2BS website, shared with other voluntary schemes and included in the annual activity reports to be sent to the Commission.

**2. If actual CSA < modeled CSA**

If the first measurement of the increase in carbon stock in the fifth year (actual CSA) indicates a total annual increase in carbon stock less than the annual claims (modeled CSA), the annual difference (between the modeled CSA and the actual CSA) must be fully deducted during the next ESCA claim.* After applying the penalty, the ESCA claims resume normally, as the penalty is applied for only one year.

** In the case where an esca claim is made each year, this corresponds to the year following the year of soil analysis*

*STD-01 Indicator 2.4.7 (Major Indicator): Whenever a farmer withdraws from the ESCA engagement, the first collecting entity must apply the appropriate sanctions described in 2BS-PRO-03 and maintain all records. This information is communicated annually to 2BS.*

*Verifier: Spreading notebook (agricultural practices)*
*Verifier: ESCA self-declaration for each farmer*
*Verifier: list of farmers excluded from the ESCA system*
*Verifier: list of sanctions applied to each farmer*

**3. If real CSA > modeled CSA**

If the soil analysis result (actual CSA) is greater than the value predicted by the model (modeled CSA), the difference between the actual CSA and the modeled CSA is added into the ESCA bonuses for the following five years.

**4. If actual CSA > ESCA cap (45 or 25 gCO2eq/MJ)**

When the result of the soil analysis exceeds the ESCA caps (45 or 25 gCO2eq/MJ depending on the case), the cap prevails.

*STD-01 Indicator 2.4.8 (major indicator): In case of non-correlation between the model and the measurement, the first gathering point must apply the appropriate sanctions described in document 2BS-PRO-03 and keep all records. This information must be communicated annually to 2BS.*

*Verifier: Soil analysis report and latest ESCA value from the modeling*
*Verifier: list of farmers concerned*
*Verifier: list of penalties applied to each farmer*

# TENANT FARMERS

For farmers who rent agricultural land, participation in the ESCA program is subject to the following condition : From the date of the CSR, the farmer must commit to stay on the same plot of land for the entire duration of the engagement, which is 10 years. This requirement is independent of the lease agreements, which can be for 1, 3, or 5 years.

Farmers must be able to demonstrate their long-term commitment by providing evidence of the renewal of their lease agreements. This evidence can include copies of successive lease contracts or any other official documents confirming their continuous presence on the specified plot.

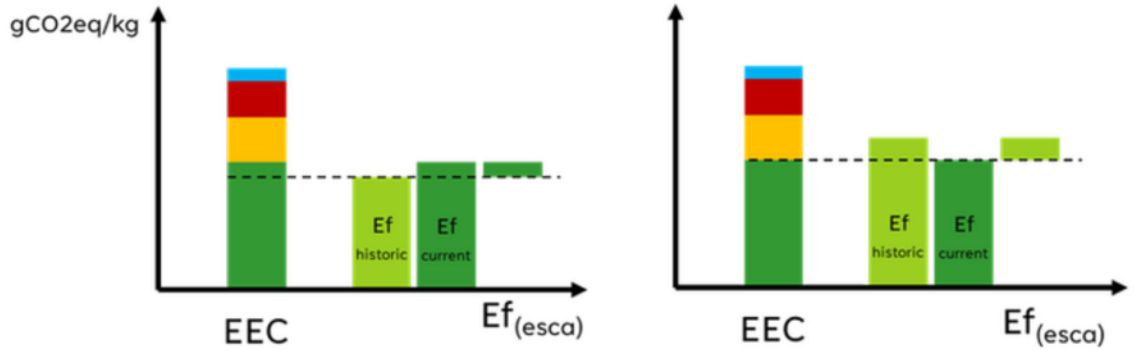
If, for any reason, farmers terminate their lease before the end of the 10-year engagement period, they will be subject to the penalties applied to farmers who withdraw from the ESCA program. These penalties are intended to maintain the sustainability of the agricultural practices promoted by the ESCA program.

In cases where the owner refuses to renew the lease of a tenant farmer, the "cessation of activity" rules explained in the "special cases" paragraph apply.

# “EF” FACTOR

**Ef = Efhistoric - Efcurrent**

The factor "ef" represents the emissions associated with the increased use of fertilizers and herbicides. Nitrogen-fixing crops, which help reduce the need for additional fertilizers, can be included in the calculations. The increase in the use of fertilizers and herbicides is determined by comparing consumption before (Ef-historic), calculated as the average of the three years prior to entering the new ESCA approach (commitment year), and after the adoption of new practices, taking into account the emissions for the current year (Ef-current).




If Ef-historic is lower than Ef-current, the difference in additional emissions is already accounted for in the calculation of the "eec" factor. Therefore, to avoid double counting, the "Ef" emissions should not be included.
On the other hand, if Ef-historic is higher than Ef-current, the difference corresponding to the saved emissions can be calculated.
Economic operators have the option to choose a conservative scenario by estimating an Ef-historic lower than Ef-current. In this case, the calculation of "Ef" is not mandatory.

# THE 2BS REPORT

Each year, during the annual declaration, the first gathering point must communicate to 2BS:

- The number of suppliers using the GHG calculation methodology in real value and among them, the number of farmers claiming an ESCA bonus.
- Information relating to the non-correlation between the model and the measurement. The declaration will include, for each claimed lot, the contributors, the elements necessary and sufficient for the determination of the ESCA.
- The list of farmers excluded from the ESCA system as well as the list of sanctions applied to each farmer.

These elements will be verified by the auditor during the annual audit. They will allow 2BS to report to the European Commission and can be used for statistical purposes.

# SPECIAL CASES

As part of the 2BS-PRO-03 procedure, particular attention is paid to specific cases that may arise. In paragraph 2.7.7.15, entitled "Special cases", these situations are discussed in detail and explained exhaustively.

**Cessation of Activity**
If a farmer ceases their activity (e.g., due to retirement or the termination of a lease by the landowner) and the activity is taken over by another farmer who wishes to continue with the ESCA approach:

- Case 1: If the new farmer is not already engaged, they commit to the OE to apply the good practices; the OE must then update the list of engaged farmers.
- Case 2: If the new farmer is already engaged in other farms with similar climatic and soil conditions to the new farm, they must continue to apply the same virtuous practices across all farms to declare an ESCA.
- Case 3: If the new farmer is already engaged in other farms, but these farms have different climatic and soil conditions compared to the new one, they must apply virtuous practices on the new farm, and a specific declaration for this new farm must be made.

If the new farmer does not wish to continue the ESCA approach, the commitment of their predecessor does not apply to them.

**Extension of the surface of a farm**

- Case 1: If new land has the same type of soil and similar farming practices, the farmer manages the esca bonus in the same way as his other parcels.
- Case 2: If new land has different soil types and/or farming practices, a differentiated management of the esca calculation is required.

# TRANSITION PERIOD

Any seed harvested up to and including December 29, 2023, may follow the real-value GHG calculation methodology in force at the date of harvest. For seeds harvested on or after December 30, 2023, the new GHG calculation methodology must be applied (procedure 2BS-PRO-03):

**When a farmer claims carbon storage:**

He must make a formal written commitment to his first gathering points (cooperative, agricultural trading), over 5 years, renewable at least once.

He must apply at least one of the best agricultural management practices each year :

- no till
- reduced tillage
- intermediate cutlery,
- organic fertilization,
- mulching or mulching using crop residues,
- rotation triennale,
- restitution of crop residues.

He must carry out soil analyzes at a regular interval from its CSR date, as specified in the cases above.

On the other hand, any Esca claim that took place before the application of the new sustainability certification rules must not comply with the caps provided for in Implementing Regulation (EU) 2022/996.

Thus, the rules provided in Implementing Regulation (EU) 2022/996 would not apply to the certification of any biomass having been declared before December 29, 2023, regardless of whether this biomass was transformed before or after December 29, 2023.

# DEFINITIONS

- **Esca:** reductions in emissions due to the accumulation of carbon in soils via better agricultural management expressed in grams of CO2 equivalent per MJ
- **CSA:** is the estimated mass of carbon stock contained in the soil per unit area associated with actual crop management practices after at least 10 years of application expressed in Mg of C per ha.
- **CSR:** is the mass of carbon stock contained in the soil per unit area associated with the reference crop management practice expressed in Mg of C per ha.
- **IPCC Tier 2:** IPCC Tier 2, or Tier 2 of the Intergovernmental Panel on Climate Change (IPCC), refers to a method of calculating greenhouse gas (GHG) emissions that involves a more detailed and specific analysis of activities, as opposed to Tier 1 which uses generic emissions factors.

# ANNEXES

# ANNEX 1: SUMMARY TABLES OF SCENARIOS

## CASE NO.1

Farmers already engaged in authorized improved agricultural management practices and having submitted ESCA claims before June 30th, 2022.

| Dates | Evidence | Date of submission of the ESCA declaration | CSR | CSA | cap |
|---|---|---|---|---|---|
| **The start date of good agricultural practices** corresponds to the date of application of improved agricultural management practices.<br><br>**The commitment date** corresponds to the date signature of the new ESCA approach, over 5 years renewable at least once. Moreover, it corresponds to the date of the first declaration of the farmer's EEC and ESCA values to the First gathering point. | Evidence indicating the start of the application of improved agricultural management practices: proof attesting to the information to\by the OS of ESCA practices before 30.06.2022 (e.g. date to which the calculator was informed, attestation) | The operator can submit an ESCA declaration without a waiting period | The CSR shall be measured as follows.<br>**Option 1:** Individual soil analysis carried out before the start of good agricultural practices.<br>**Option 2:** Measurement from a neighboring field if analyses exist for the year in which good agricultural practices were implemented.<br>**Option 3:** Use of a reference chosen in an interval indicated in the database compiled by 2BS* | After the CSR date, the operator calculates a CSA based on the model (modeled CSA) for 5 years. No later than December 31st of the 5th year following the CSR date, the operator must conduct an initial soil analysis (actual CSA).<br>The soil analysis to obtain the actual CSA must be carried out only on plots where an ESCA claim has been registered at least once between the year of commitment and January 1st of the fifth year following the CSR date. | Producers engaged before June 30, 2022 benefit from the ESCA cap at 45g eq. CO2/MJ of biofuel or bioliquid for 5 years, i.e. until the date of the 1st actual CSA. This cap is possible for a CSA occurring before June 30th, 2027. Subsequently, the increase in carbon stock measured no later than the 5th year (actual CSA) will become a cap for annual declarations to be submitted in the following 5 years. |

**The first option should be preferred, if the measure does not exist, the second or third option should be used.*

# CASE NO. 2

Farmers already engaged in authorized improved agricultural management practices but who have not submitted an ESCA claim before June 30th, 2022.

| Dates | Evidence | Date of submission of the ESCA declaration | CSR | CSA | cap |
|---|---|---|---|---|---|
| **The start date of good** agricultural practices corresponds to the date of application of improved agricultural management practices.<br><br>**The commitment date** corresponds to the date of signature of the commitment to the new ESCA approach, over 5 years renewable at least once. | Evidence indicating the start of the application of improved agricultural management practices (e.g. spreading notebook, manuring plan, satellite images, etc.). | A minimum continuous period of 3 years for the application of the improved management practice is required before the commitment date, for the farmer or economic operator to submit a declaration. | CSR should be measured as follows.<br>**Option 1:** Individual soil analysis must be based on analyses conducted between one and three years prior to the commitment year<br>**Option 2:** Measurement from a neighboring field if analyses exist for the period between three and one year prior to the commitment year. If there is no data available, a first measurement is taken immediately, at the time of commitment (no later thant December 31st of the CSR analysis year).*<br>The surface area to be considered for CSR soil analyses may correspond either to all of the farm's sustainable plots or, when this information is available, to the surface area of the plots that will be included in the ESCA initiative. In all cases, the surface area taken into account cannot be less than that of the plots scheduled to be used in the ESCA initiative. | After the CSR date, the operator calculates a CSA based on the model (modeled CSA) for 5 years. No later than December 31st of the fifth year following the CSR date, the operator must conduct an initial soil analysis (actual CSA).<br>The soil analysis to obtain the actual CSA must be carried out only on plots where an ESCA claim has been registered at least once between the year of commitment and January 1st of the fifth year following the CSR date. | The maximum possible total value of the annual reporting of emission reductions from soil carbon accumulation through improved agricultural management (ESCA) is capped at 25g eq. CO2/MJ of biofuel or bioliquid for the entire period of application of ESCA practices. |

**The first option should be preferred, if the measure does not exist, the second option should be used.*

# CASE N°3

Farmers starting the application of improved agricultural management practices after June 30th, 2022.

| Dates | Evidence | Date of submission of the ESCA declaration | CSR | CSA | cap |
|---|---|---|---|---|---|
| **The commitment date corresponds to the start date of application of good practices and therefore to the date of the CSR measurement.** | Proof of the application of good agricultural practices (e.g. spreading notebook, manuring plan, satellite images, etc.). | A minimum continuous period of 3 years for the application of the improved management practice is required before the farmer or economic operator can submit a declaration | The CSR estimate will be based on a soil analysis on the date of commitment (until December 31st of the year in which the CSR analysis was performed).<br>The surface area to be considered for CSR soil analyses may correspond either to all of the farm's sustainable plots or, when this information is available, to the surface area of the plots that will be included in the ESCA initiative. In all cases, the surface area taken into account cannot be less than that of the plots scheduled to be used in the ESCA initiative. | Between the 3rd and 5th years, it calculates a CSA based on the model (modeled CSA). No later than December 31st of the 5th year following the date of the CSR, the operator must conduct a new soil analysis (actual CSA).<br><br>After the CSR date, the operator calculates a CSA based on the model (modeled CSA) for 5 years. No later than December 31st of the fifth year following the CSR date, the operator must conduct an initial soil analysis (actual CSA).<br>The soil analysis to obtain the actual CSA must be carried out only on plots where an ESCA claim has been registered at least once between the year of commitment and January 1st of the fifth year following the CSR date. | The maximum possible total value of the annual reporting of emission reductions from soil carbon accumulation through improved agricultural management (ESCA) is capped at 25 g eq. CO2/MJ of biofuel or bioliquid for the entire period of application of ESCA practices |

# ANNEX 2: SUSTAINABILITY DECLARATION (SD) TEMPLATE

The sustainability declaration template has been updated to add a field relating to ESCA caps. Information regarding the ESCA cap must be communicated throughout the supply chain so that the final interface can apply the appropriate cap. Depending on the farmers' situation, a percentage of the material may be subject to a cap of 45gCO2eq/MJ, while another portion may be subject to a cap of 25gCO2eq/MJ.

**Raw Materials & intermediate products - RED II, Sustainability declaration**

in the framework of Renewable Energy Directive (EU) 2018/2001 (RED II)

| | |
|---|---|
| Unique number of Sustainability Declaration | EU-2BSvs-SD |
| Date of issuance of the SD | DD/MM/YYYY |

| Supplier certified by ..... | | Recipient | |
|---|---|---|---|
| Company | | Company | |
| Entity Address | | Entity Address | |
| Shipping / dispatch address if different | | Receipt / receiving address if different | |
| Certificate number | | Contract number | |

**General Information**

| | |
|---|---|
| Type of raw material (1), or | |
| Type of intermediary product (2) | |
| Additional information (3) | |
| Country of origin (raw material) | |
| EU RED II compliant (4) ☐ | |
| Quantity | m3 ☐ Metric tonnes ☐ |

**Sustainability criteria applicable to raw material (feedstock)**

| | |
|---|---|
| The raw material complies with the sustainability criteria according to Art. 29 (2)-(7) RED II (5) | ☐ |
| The agriculture biomass is an intermediate crop (if applicable) | ☐ |
| The agriculture biomass fulfils the measures for low ILUC risk feedstocks (if required) | ☐ |
| The raw material complies with the definitions of waste or residue according to RED II (6) | ☐ |

**Greenhouse Gas (GHG) information**

- Total default value (grCO2/MJ) according to RED II, Annexe V, Part A (7) to be applied by the last interface — Yes ☐ No ☐
- If disaggregated default values (grCO2/MJ), Annexe V, Part D (8), state DDV in the applicable element of the formula below
- If NUTS 2☐ or actual values ☐state the value (grCO2/dry-ton) in the applicable element of the formula below
- If actual Etd emissions apply, specify the means of transport & the distance (Kms), then the applicable calculated emission in the formula below

Road: Train: Ship:

EB Statement (grCO2/dry-ton) **EB = [Eec + El + Ep + Etd + Eu - Esca - Eccs - Eccr] =**

| | | | |
|---|---|---|---|
| Disaggregated default value for **oil extraction** is applied | Yes ☐ | No ☐ | NA ☐ |
| Disaggregated default value for **soil N20 emissions** is applied | Yes ☐ | No ☐ | NA ☐ |
| **Esca** : bonus of 45 grCO2eq/MJ of manure in the case animal manure is used as a substrate for the production of biogas and biomethane (biogas supply chains) | Yes ☐ | No ☐ | NA ☐ |
| **Esca** : cap of 45 grCO2eq/MJ to be applied on (9) | ..... % | | NA ☐ |
| **Esca** : cap of 25 grCO2eq/MJ to be applied on (9) | ..... % | | NA ☐ |
| **El**: bonus of 29 grCO2/MJ if biomass is obtained from restored land | Yes ☐ | No ☐ | NA ☐ |
| **Incentives / subsidies** received for the production of biogas (biogas supply chains) | Yes ☐ | No ☐ | NA ☐ |

The transmission of SD number without the 2BS certificate number is useless

**Additional explanations**

(1) - **Raw materials** are sustainable materials, collected by certified collection points (agricultural and forest biomass including residues from agriculture, fisheries and forestry, and wastes & residues)

(2) - **Intermediary products** are outputs of a first conversion process where sustainable raw materials have been processed

(3) - Whatever information, enabling a better description of the raw material or the intermediate product (**if appropriate**).

(4) - The claim **"EU complaint"**, means that the upstream supply chain is certified by a voluntary scheme recognized by the EU

(5) - Applicable to **agricultural and forest biomass including residues from agriculture, fisheries and forestry**

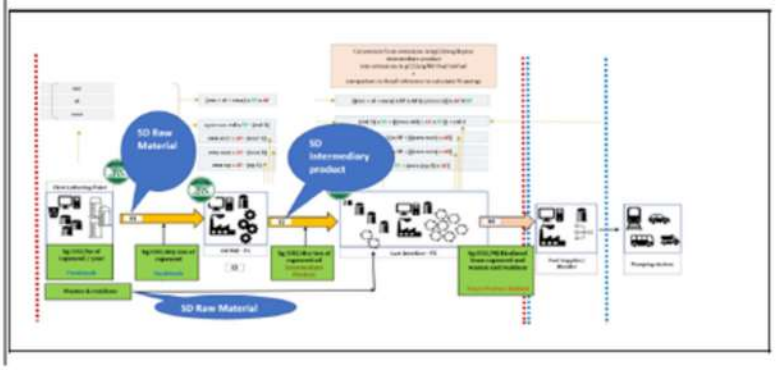
(6) - According to RED II definitions for **wastes & residues**

(7) - The application of the total default value emissions determine the **% of savings** per biofuel production pathways

(8) - The DDV are applicable to the following elements of the formula: **by step**, **eec** (including N20 emissions), **ep** (including the oil extraction process), and **etd** emissions or **total** DDV (**eec+ep+etd**)

(9) - The information regarding the **esca cap** to be applied needs to be **communicated throughout the chain** for the last interface to apply the appropriate cap. Depending on the scenario of farmers, a percentage of the material may be subject to a cap of 45gCO2eq/MJ, while another portion may be subject to the 25gCO2eq/MJ cap.

| | |
|---|---|
| **E** | **Total GHG emissions** from supply and use of the fuel |
| **Eec** | GHG emissions from the **extraction or cultivation** of raw materials |
| **El** | Annualized (over 20 years) GHG emissions from carbon stock change due to **land use change** |
| **Ep** | GHG emissions from **processing** |
| **Etd** | GHG emissions from **transport and distribution**. Etd includes downstream emissions for distribution up to and including the filling station |
| **Eu** | GHG emissions from the **fuel in use** (Biofuels for transport Eu = 0) * |
| **Esca** | GHG emissions savings from **soil carbon accumulation via improved agricultural management** |
| **Eccs** | GHG emissions savings from **carbon capture and geological storage** |
| **Eccr** | GHG emissions savings from **carbon capture and replacement** |



# ANNEX 3: EXAMPLE OF REFERENCE TABLE TO ESTABLISH THE CSR

The reference table below allows to determine the CSR when option number 3 is selected by farmers operating in scenario number 1.

This reference table has been developed specifically for use in France. To construct a reference table for another country, it is the responsibility of the economic operator, representative bodies of operators or the relevant public authorities to provide 2BS with carbon storage data sourced from public research or national databases.

The CSR interval is between the minimum and maximum value depending on the region, with the median and the average serving as indicators. It is imperative to set the CSR for each farmer when committing. This value remains unchanged until the next soil analysis (actual CSA).
When a farm covers several regions, the CSR lies within the range of common values to both regions.

**Carbon stock by region for France (tonnes of carbon per hectare)**

| | Maximum | Minimum | Médiane | Moyenne |
|---|---|---|---|---|
| Nord Pas de Calais | 93 | 42 | 59 | 59 |
| Provence Alpes Cote d'Azur | 88 | 16 | 40 | 43 |
| Picardie | 86 | 26 | 42 | 45 |
| Basse Normandie | 85 | 27 | 55 | 55 |
| Centre | 82 | 10 | 44 | 44 |
| Rhône alpes | 82 | 20 | 45 | 48 |
| Limousin | 81 | 41 | 52 | 57 |
| Auvergne | 79 | 30 | 56 | 54 |
| Haute Normandie | 76 | 18 | 45 | 45 |
| Corse | 43 | 27 | 35 | 35 |
| Franche Comté | 137 | 31 | 61 | 64 |
| Aquitaine | 129 | 23 | 42 | 49 |
| Lorraine | 124 | 37 | 54 | 61 |
| Alsace | 113 | 21 | 52 | 55 |
| Bourgogne | 113 | 27 | 51 | 54 |
| Languedoc Roussillon | 113 | 12 | 36 | 40 |
| Champagne Ardennes | 103 | 32 | 53 | 56 |
| Ile de France | 102 | 21 | 48 | 48 |
| Pays de la loire | 101 | 25 | 47 | 49 |
| Poitou Charentes | 101 | 24 | 48 | 50 |
| Midi Pyrénés | 130 | 18 | 41 | 45 |
| Bretagne | 120 | 25 | 68 | 71 |

# ANNEX 4: COMMITMENT FORM MODEL

The commitment represents an official document, signed by the farmer, and given to the first gathering points where he sells his raw materials. To guarantee the traceability and transparency of the process, 2BS recommends that farmers keep a copy of this document. This not only allows them to have tangible proof of their commitment, but also facilitates any subsequent verification.

| | | |
|---|---|---|
| 2BS | **FARMERS' COMMITMENT TO THE ESCA APPROACH** | **Version:** 2 (en)<br>**Date:** 28/05/2024 |

*I, the undersigned :*

***Applicant identification***

*Name:*_____

*First names:*_____

*Address:*_____

*Applicant's position within the company.*_____

***Farm identification***

*Company name:*_____

*Legal form:* □ GAEC □ EARL □ SCEA □ SARL □ Others_____

*SIRET NO.:*_____

*Business address:*_____

*Phone number(s):*_____

*E-mail address:*_____

*At the date of signature of this document,*

- *Commit for a period of 5 years, renewable once, to apply annually at least one best agricultural management practice (reduced or no tillage, crop improvement/rotation, use of cover crops, including crop residue management, and use of organic amendments), on my farm as part of the ten-year ESCA approach.*
- *In the case of being a tenant farmer, commit to renting the same plot(s) included in the ESCA approach for the duration of the commitment.*
- *Be able to provide all relevant documents (e.g.: spreading book, manure plan, satellite image, invoices, third-party certificate or report, etc.) to justify the implementation of these practices on my farm. These documents must be referenced, transparent and verifiable, so that an auditor can check the veracity and relevance of the information they contain.*

*Signed in duplicate,*

*Place:* _____ *Date:* _____

*Signature:*

**SUSTAINABILITY CERTIFICATION**

## CONTACT US


+33 (0)1.58.12.12.40

11, Rue de Monceau - Paris - France

contact@2bsvs.com

www.2bsvs.org