INTERNATIONAL OLIVE COUNCIL (IOC)

User's Guide CO2 Balance Tool

CARBON BALANCE PROJECT

Version 0 [MVP]
11-7-2025

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1. INTRODUCTION

The **International Olive Council (IOC)** presents this guide alongside the CO_2e Balance Tool for olive groves, developed under the Carbon Balance Project, with the aim of easing user registration and interaction with the software.

The **CO_2e Balance Tool** is designed to help olive growers, technicians, and other stakeholders to estimate the GHG emissions and removals of their olive groves. The main goal is to enable olive growers to introduce their orchards into the voluntary carbon market, both to promote sustainability and to provide access to a potential new source of income for the farmers.

This guide outlines the steps users must follow and addresses common questions that may arise during the process. It also explains the purpose and relevance of the data required, offering optional recommendations for data collection that may assist users in initiating their participation in the Carbon Balance project.

2. USER'S REGISTRATION

New users should navigate to the Carbon Balance Tool webpage, accessible through the link provided below.

 Carbon Balance Tool

To begin the carbon calculation and registration process, the user must create a new account. This can be done by clicking the "Register" link on the webpage and entering the required information:

- Email Adress
- Username
- Password

Optionally, the user can upload a profile image to be visible to others. Additionally, there is a feature that allows the user to receive personal contact forms from other participants without disclosing any email addresses.

Once these data have been set, the "Create new account" button finalize the registration. The validation process is estimated to be completed in approximately 2 to 5 working days.

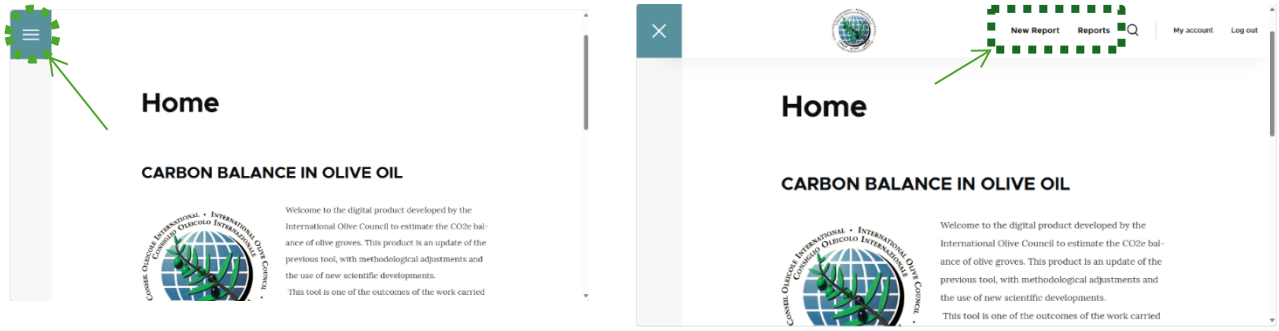
Once validated, the user can access the web tool with the registered username and password. The password can be retrieved by clicking on the button 'Reset my password'.

3. SOFTWARE MODULES

3.1. Home Page

Once logged in, the users have access to make a CO_2e balance report.

From the main 'Home page', these options can be accessed by clicking on the icon with three horizontal lines located in the upper right corner, as shown in the pictures below, and a small menu will open with 2 main options: "New report" and "Reports".



New report is the tool the user shall use to generate new reports for the olive groves associated with the project.

Reports directs to a menu that contains summarized information of the reports the user have already submitted.

3.2. New Report

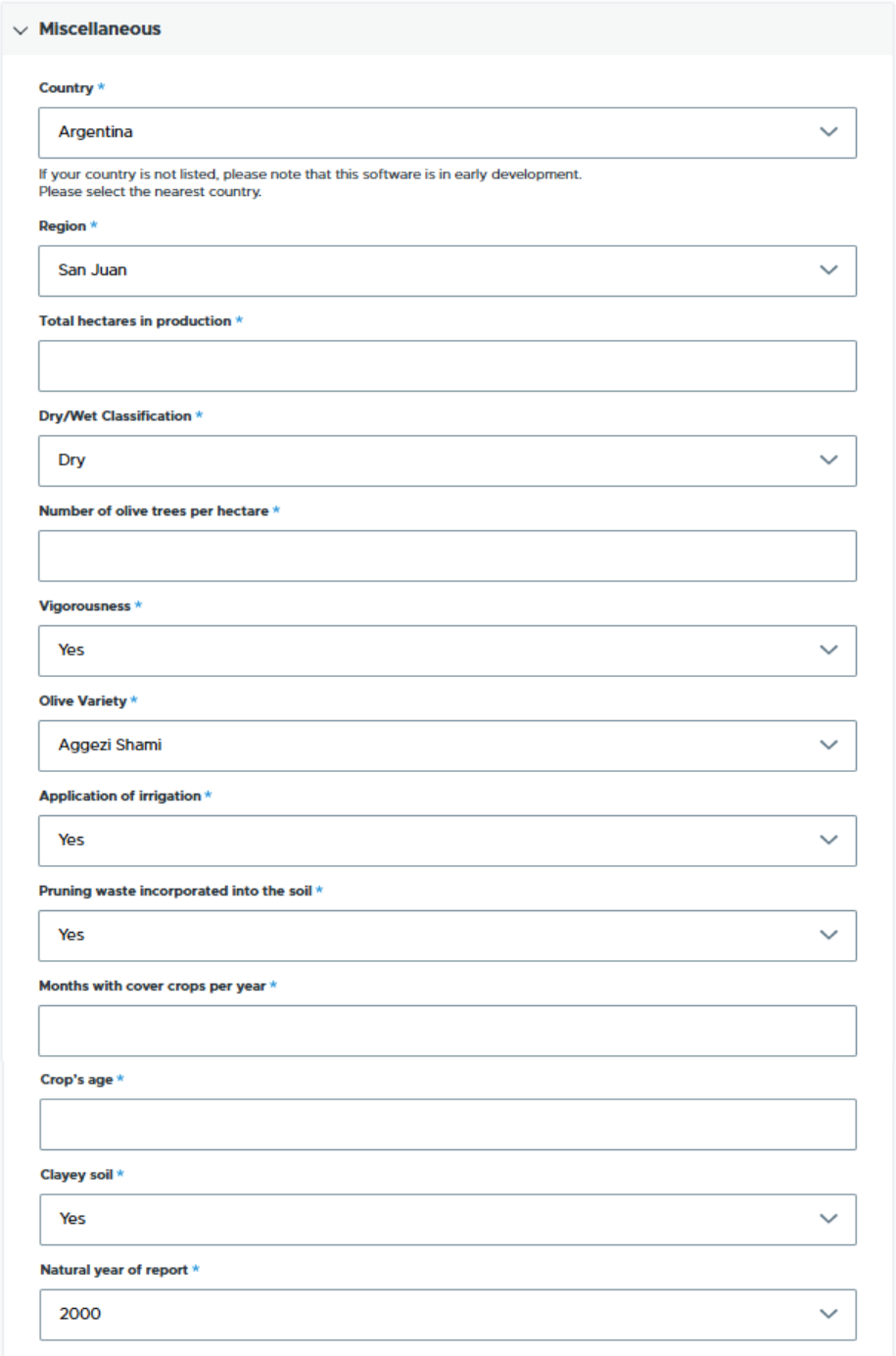
The software tool is prepared to perform the CO2e balance of olive groves in tCO_2e per hectare.

The quantification needs homogeneous conditions of the olive grove, in all the attributes required by the tool. Therefore, olive groves with different management practices or attributes must be subdivided into homogeneous quantification units. All data entries should refer to this homogeneous unit.

The same user has the possibility to create multiple reports. If a user needs to submit orchards with different attributes or different agricultural practices, it must fill in different reports.

3.2.1. Miscellaneous

General information to describe the olive grove and its surrounding context is requested in the section 'miscellaneous data', as shown in the following illustration.



Specifying the **country** and **region** helps to locate the olive grove, which helps to facilitate key information, such as climatic values and soil conditions. For the pilot phase, if the region where the olive grove is located is not listed, the nearest one should be selected. It is intended to implement satellite technology for the definition of the location in the final software.

'**Dry/Wet classification**' referrers to the climatic zone where the orchard is located, considering the annual precipitation and IPCC guidelines. Generally, olive groves are planted in dry regions, so the option 'Dry' is set as default . However, this parameter has an impact in the GHG emission factors, so the user could change the value if the correction is required.

The **crop's age** must be defined from the year in which the olive trees were planted, regardless of the month. This implies a possible mismatch with the calendar year, but the effect is negligible in the medium/long term.

Total hectares in production and **Number of olive trees per hectare** refer to the area of the orchard that is going to be submitted to this report for the Carbon Balance Project, not the full extension of the cultivation. Consider that the report will calculate GHG emissions and removals per hectare.

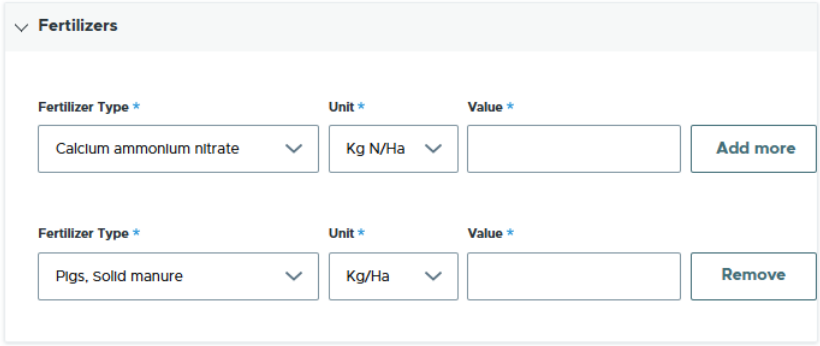
3.2.2. Fertilizers

Fertilizers used for olive management as N_2O emissions associated.
The user should use the information available to them to fill in this box. Industrial produced fertilizers may contain the nitrogen content in the product and the kilograms of nitrogen can be submitted to the report. Solid manure is variable, and its use can be submitted as total kilograms used.

Consider that the tool asks for **kilograms per hectare**, whether is for nitrogen or total mass of fertilizer. The user must submit the mass used **annually**.

If different fertilizers are used, they can be added in different boxes clicking on "Add more".

This section does not account for manure directly excreted by animals in the field, as it is addressed separately under the livestock module.



Example of different fertilizers. Calcium ammonium nitrate can be measured in nitrogen kilograms per hectare, while solid manure from pigs is measured in kilograms per hectare.

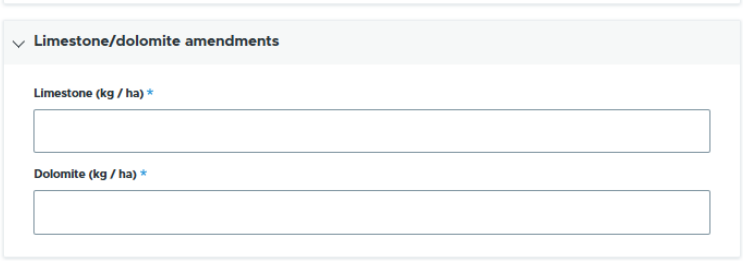
3.2.3. Limestone/dolomite Amendments

Carbonate compounds such as limestone and dolomite are commonly applied to agricultural soils to correct acidity and improve fertility, among other uses. When these materials react with the soil, they release CO_2 because of chemical reactions.

Limestone and dolomite have a different emission factor. Therefore, the tool requires the user to report them separately.

Users should enter the amount of limestone and/or dolomite applied to the reported orchard. If specific data for the orchard is not available, it is acceptable to use the total **amount used** across the entire cultivation and calculate an average **per hectare**.

If no amendments were applied, or if only one type was used, enter 0 in the corresponding field.



Information required by the tool for carbonates amendments.

3.2.4. Crop residues

Biomass residues generated from agricultural land management, such as pruning and harvesting, have a certain percentage of nitrogen and carbon associated with GHG emissions and removals, depending on how they are managed.

The software considers Scope 1 and 2 emissions associated with biomass waste management. For the estimation, the user should gather information on the annual amount of pruning residues generated and specify how much of it is left on the field as biomass (or is shredded and integrated into the field), and how much is burned on-site. In case pruning residues are removed and managed externally, these tons should not be added up.

The quantity of crop residues left on soil also account as a carbon input to the soil, that will improve the Soil Organic Carbon Stock and act as a removal source.

As with other sections, the tool requires data to be entered in **tons per hectare**. Therefore, users must divide the total measured amount of residues by the number of hectares considered in the measurement.

If the measurement was taken specifically for the orchard included in this report, use the corresponding number of hectares entered in the tool. If the measurement includes multiple orchards and cannot be disaggregated, use the total area of cultivation to calculate the per-hectare value.

Information required by the tool regarding crop residues, expressed in tonnes per hectare. Each field must be completed based on the annual amount of residue generated and its management method.

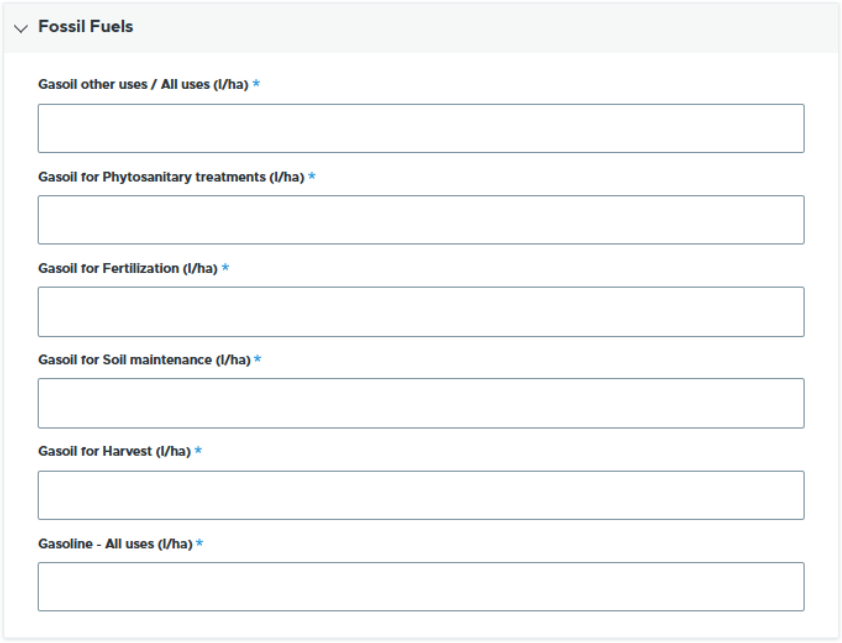
A complement to this module is currently under development in case the user does not know the amount of pruning waste, in which only the % destined for burning, the % left in the field and the % managed externally must be reported. In such cases the quantification will be performed considering the age of the crop, the number of trees per hectare and scientific metadata analysis studies.

3.2.5. Fossil Fuels

Emission factors for gasoil vary depending on its specific use. Fuel consumption can be recorded based on purchase data for the different machines involved in olive grove operations. All fuel consumption must be reported in liters per hectare, considering only the fuel used in the orchard covered by this report.

However, in some cases, estimations may be necessary—for example, by considering the months of use (e.g., during harvest or fertilization periods). All estimations must be recorded, specially if a verification stage is performed afterwards.

In case there are other uses, or the specific use of the fuel is not known, the information on litres consumed should be provided under “Gasoil other uses / All uses”. To avoid double counting, if fuel consumption is reported in one of the categories (e.g. for harvesting), it must not be put back into other/all uses.



Fossil fuels data required by the tool to be filled by the user.

If the user cannot determine the exact amount of fuel used specifically for the reported olive grove, it is recommended to calculate the total fuel consumption for the entire cultivation, divide it by the total number of hectares, and use that average value. The tool will only process the data based on the area specified in the report.

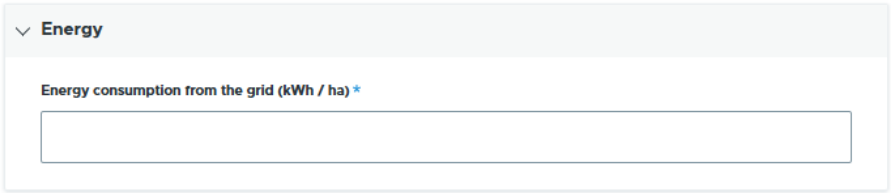
The use of gasoline does not require a breakdown of its use. All consumptions

3.2.6. Energy

This section refers specifically to electricity. Users should report the amount of **energy drawn from the grid** and used by installations related to olive grove operations, such as irrigation systems, milling facilities, or garages.

Self-produced energy from **renewable sources** (excluding wood combustion and fossil fuels) or electricity purchased with a certified 100% renewable origin **should not be included**, as its emission are considered as zero in a year basis.

The tool requires energy consumption to be reported in **kilowatt-hours (kWh) per hectare**. KWh consumed can typically be found in the electricity bill. If specific data for the reported orchard is not available, it is recommended to calculate an average consumption per hectare based on the best available information.



Information required by the tool for electricity consumption.

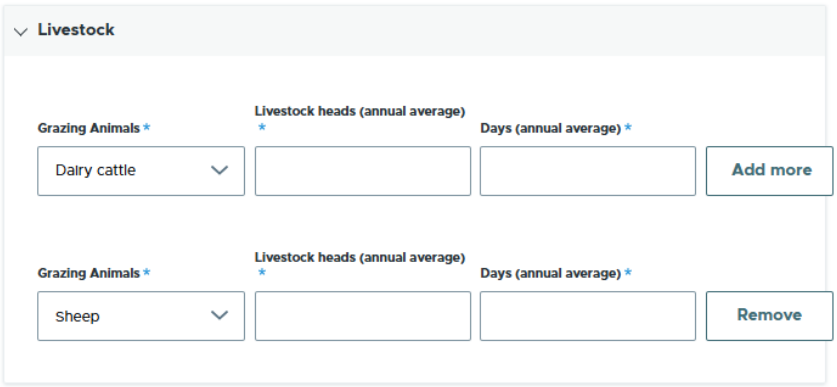
3.2.7. Livestock

In many olive groves, **livestock** are allowed to graze in the fields, whether to control grass growth, provide shelter, or fertilize the soil through manure deposition, among other uses.

These animals **contribute to greenhouse gas emissions**, primarily through **enteric fermentation** and **manure left directly in the field**. Since this manure is not managed or applied by the user, it is not considered in the Fertilizers section. However, because livestock grazing is part of the olive grove management system, these emissions must be accounted for.

Users must report the number of animals allowed to graze in the reported orchard and the duration of their presence throughout each year. **If different types of livestock are present, the user can click "Add more" to include multiple animal types**. Clicking on the animal button will display a list of available species to select from.

The user must report the type of livestock, the average number of livestock kept throughout the year, and the number of days per year that livestock are left in the olive grove. If no animals are allowed in the orchard, the user must leave the default entry with one animal, and set both the heads of livestock and the days present to 0.



Information required in the livestock section, with one added type of animal incorporated. It can be removed using the "Remove" button, and even more types using "Add more".

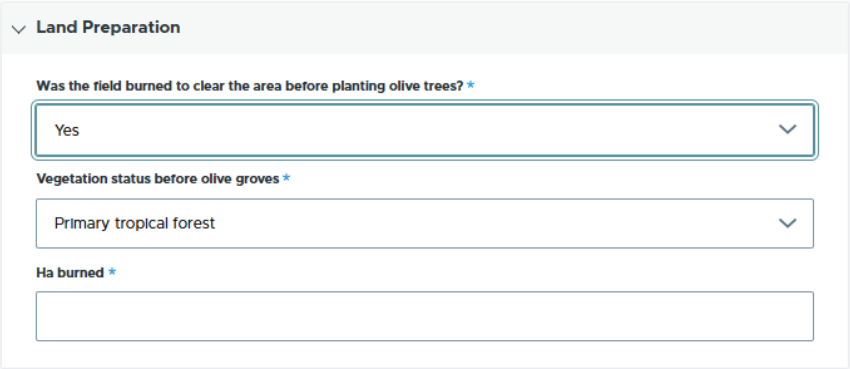
List of selectable livestock in the tool

3.2.8. Land Preparation

If the land was cleared using fire prior to the establishment of the olive orchard, the combustion of existing biomass would have released significant amounts of GHGs into the atmosphere. The tool accounts for these emissions using average carbon content based on the type of vegetation previously present.

Users must indicate whether fire was used to clear the land before cultivation. If so, they should report the area affected in hectares and the type of vegetation that was burned.

If the orchard was established 20 years ago or more, or if no fire was used during land preparation, this section should be answered with “No” and “0 hectares burned”.



3.2.9. Soil Organic Carbon Stock (SOCS)

Soil Organic Carbon Stock (SOCS) represents the amount of carbon stored in the soil as a result of organic matter decomposition and accumulation. This carbon pool plays a key role in the carbon balance of olive groves, as it can act as a significant carbon removal.

To report SOCS accurately, a soil analysis must be performed to characterize the soil of the olive orchard. For the pilot phase, the methodology for this analysis is left to the user's discretion. Further definitions and minimum conditions of the soil sampling are going to be defined in the final version of the methodology.

To perform the initial SOCS calculation, the user is asked to provide the following information from the soil analysis:

- Soil Organic Carbon (g/kg): This is the amount of organic carbon present in the soil, expressed in grams per kilogram of soil.
- Bulk density (tons/m3): The mass of soil divider by its bulk volume, which includes the volume of the particles themselves as well as the voi spaces between them.
- Soil depth (cm): depth at which the sample was performed to obtain the reported analytical values (SOC, bulk density and particle <2mm).
- Fraction of soil particles smaller than 2 mm (fraction): value of the analytical measures. Soil mass (and therefore analytical results) must not include particles greater than 2 mm in diameter (i.e., gravel/stones) nor plant material. Any coarse material must be prevented from passing through a 2 mm sieve.

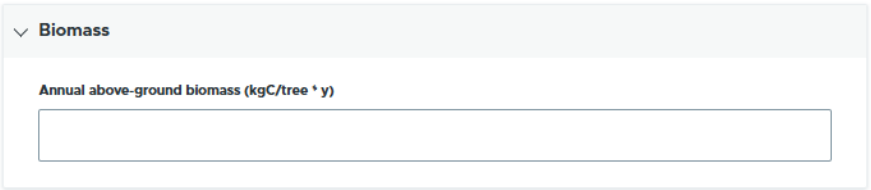
Information required by the tool to estimate SOCS includes laboratory soil analysis data. All values must be representative of the reported orchard.

3.2.10. Biomass

Biomass refers to the carbon stored in the living plant material of the olive grove, in both the above-ground and below-ground biomass. This component contributes to the carbon balance as a carbon removal.

The information required for the quantification on this section is **optional, as the tool has different ways to make the estimation**.

The tool provides users with the possibility to **enter specific data of above-ground biomass developed in the year**, based on field data and allometric equations. If the user does not have access to this data, the section can be left empty and the tool will proceed with default estimations, using metadata analysis of scientific bibliography.

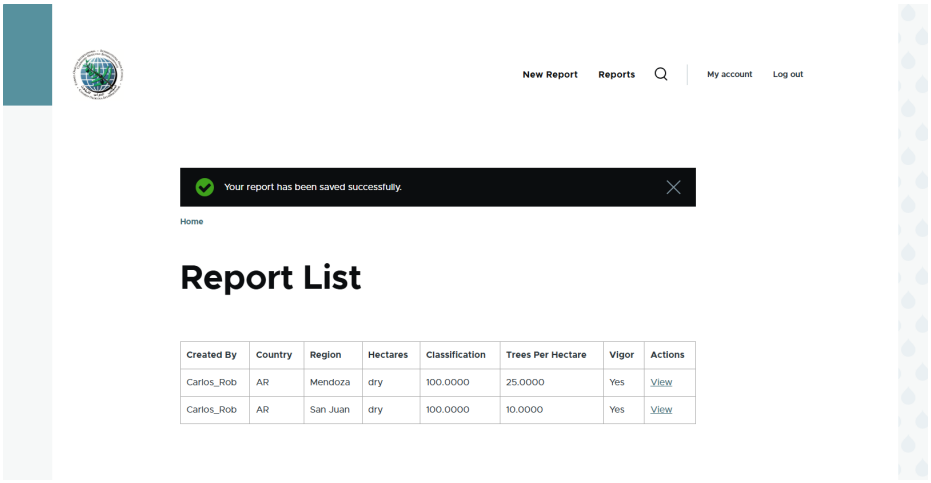


Information required by the tool to estimate above-ground biomass.

3.3. Reports

Once all required data has been submitted, **the tool will generate a report** and redirect the user to the Reports area of the platform.

This section is accessible via the "***Reports***" link in the main menu. It displays a summary of all submitted reports, including the most recent one. Each report entry includes a "***View***" option, which opens a detailed version of the report showing all calculated emissions and removals.



Example of the reports area, where reports submitted are stored and can be accessed.

The current layout of the report is temporary but includes all relevant information. To access the raw data or manage the report, users can scroll to the bottom of the report page, where the following options are available:

- **PDF Version**: provides a PDF redacted version of the report.
- **CSV Version**: download a file with raw data provided and the calculated emissions and removals.
- **Edit Report**: allows the user to change input data of the report.
- **Delete Report**: erased the report from the stored reports online.

Results	Year 1	Total Value
	tCO2e/ha	tCO2e
Emissions	0.1	0.1
Removals: SOCS	4.35	4.35
Removals: Biomass	-0.17	-0.17
CO2e balance	-0.08	-0.08

PDF Version CSV Version Edit Report Delete Report

The final section of the report displays the overall carbon balance and displays options to download data, modify or delete the report.

Guide prepared by Aenor Conocimiento SLU for the International Olive Council, in July 2025.

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