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Unlocking data for MRV: Data sharing for effective carbon farming

–Insights from 2nd European Carbon Farming Summit and Credible Focus Group 3.4

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Key messages

- Robust data collection and sharing across the value chain are essential for accurate MRV in carbon farming.
- Long-Term Monitoring data is invaluable for model calibration and MRV validation, yet **greater trust and clear incentives** are needed to encourage data sharing between the public and private sectors.
- “**Collect once, use many times**” principles can reduce the reporting burden on farmers and streamline compliance with multiple purposes.
- **User-friendly digital tools** and **data-sharing platforms**—supported by clear licensing agreements and federated learning approaches—can balance privacy, competition, and openness.

Introduction

The European Commission is making significant progress in defining certification methodologies for the Carbon Removals and Carbon Farming Certification (CRCF) Regulation. The digitization and automation of robust Monitoring, Reporting, and Verification (MRV) systems within the CRCF framework are critical to scaling carbon removal activities effectively. Accurate MRV systems rely on high-quality soil carbon (meta)data and associated farm activity data at parcel level, which are crucial for calibrating, validating and running models.

Building on insights from Credible Focus Group 3.4 (FG 3.4) discussions, we emphasize the critical role of long-term monitoring (LTM) data in i) calibration, validation, and simplification of models, ii) validation of MRV approach, iii) upscaling results from local to regional level, and iv) support for digitalization. One major challenge highlighted in our earlier analysis was the limited access to open data and the lack of effective data-sharing mechanisms. Similar issues were observed from the 1st European Carbon Farming Summit (ECFS) that soil databases that are not shared. This highlights the urgent need for greater inter-sector transparency and collaboration.

During the 2nd ECFS, we expanded the scope of discussion beyond LTM data to include both public and private datasets, and discussed four questions previously identified within FG 3.4

Current scientific and market context

When discussing data sharing, several key challenges emerged from both the public and private sectors. Researchers are often reluctant to collaborate with private actors because of:

1. concerns about how private actors might misuse or redistribute research data;
2. LTM data often lacks clarity on permissions —especially when funded by different sources (e.g., public grants, own institutional resources or private capital);
3. LTM data lacks [FAIRness](#) (i.e., findable, accessible, interoperable, and reusable) and is not in a readily shareable format, requiring significant time and effort to reformat for broader sharing.

Meanwhile, private companies generate significant soil and farm-management data—the costliest part of research—but competitive pressures, concern about privacy and permissions make them cautious about open data sharing. Still, many argued it would benefit everyone if these datasets were more widely accessible for model improvements and soil science advancement.

Recommendations

- Adopt “**Collect Once, Use Many Times**” principle by utilizing user-friendly software connecting with data-sharing platforms
 - Farmers face repetitive data requests from CAP, carbon farming projects, and scope 3 emissions, leading to fatigue and errors.
 - Invest in **interoperable digital platforms** to connect existing systems via **APIs**, so that data entered once can serve multiple reporting needs.
 - **Goal:** reduce administrative burden and improve data accuracy.
- Implement clear data sharing agreements & incentivize data exchange
 - Researchers and private companies often mistrust each other over data ownership and usage rights.
 - Create **standard data sharing agreement templates** (e.g., dual licensing for LTM data or including third parties in case of joint ownership of data) that define commercial vs. non-commercial use, ensure proper citations, and offer federated modeling without sharing raw data.
 - Introduce a “**research commenting period**” where project developers share relevant documents with data contributors for review (e.g., within 30 days); install procedures for transparent publication of the reviews.

- Enhance trust, and incentivize data exchange for maintaining LTM. A transparent environment where stakeholders feel confident about the fact that their data is used ethically and effectively.
- Extend LTM networks to **on-farm monitoring networks**
 - Current LTM sites were not specifically designed for carbon farming, resulting in limited representation across pedoclimatic regions, lack of certain management practices, and smaller plot sizes.
 - Establish on-farm monitoring networks, including commercial farms, to capture real-life conditions relevant to carbon farming.
 - Expand LTM design to an on-farm monitoring network with real-life data can help validate MRV tools at field scale and improve overall accuracy.
- Enhance trust in **data sharing along the value chain**
 - With diverse stakeholder interests, data-sharing arrangements must prioritize **transparency, accountability, and mutual benefits**.
 - For the 3rd ECFS, we will dive deeper into secure infrastructures and privacy regulations to engage all stakeholders along the value chain for a sustainable transition.

Background information

Our discussion focused on 4 questions:

- What data is required for farmers to claim public subsidies (e.g., under the Common Agricultural Policy) and to participate in voluntary carbon markets?
- How can we reduce the burden on farmers when reporting and collecting data for multiple purposes?
- What business models or reward systems could incentivize effective data sharing in public and private sectors?
- How do companies enable trust in data sharing along the value chain?

Firstly, we summarized the data needed for public subsidies and environmental legislation, such as CAP (at field level), including:

- Farm data: exact field locations, surface area, parcel boundaries and parcel identifiers are often recorded in national or regional databases (e.g., LPIS);
- Crop data: crop types, crop rotation, cover crops, agroforestry or hedges, grassland type, vegetation cover, etc.;
- Soil data: soil organic carbon content, soil pH, etc.;

- Farm activity data: tillage (type, depth and date), sowing and harvesting dates, irrigation (date and amount), rewetting, fertilizer and amendment (type, amount);
- Livestock (if applicable): number of animals and manure management details (for integrated livestock-cropping systems);
- Earth Observation data: used for IACS; it's unclear whether real-time monitoring tools are already available at member states or how data sharing is handled.

While for Voluntary carbon market the required data typically includes:

- Soil data (a.o. soil texture, soil carbon measurements (for initial content, baseline));
- Farm activity data: fertilizer/amendment use (type, amount), tillage operation, cover crop, crop rotation, agroforestry, manure management, grazing patterns, animal (number, size);
- Remote sensing & Earth observation data for biomass estimates, land-use change detection, etc.

For each of these data types, there are multiple sources—such as IACS data (mandatory for CAP) or Farm Management Information Systems (FMIS) offered by private companies—and various ways they may be shared. In practice, farmers face different scenarios, each with distinct constraints on accessibility and use. For example,

- i. some data must be reported to authorities (e.g., IACS for CAP) but is not fully open access;
- ii. other data is exchanged with private service providers, remaining strictly between the farmer and that operator;
- iii. data shared with a multi-stakeholder group—such as in carbon farming projects—circulates among participants without broader public access;
- iv. data can also be shared with other actors in the downstream agri-food value chain (e.g., grain offtakers) in return for remuneration or purchase contracts, with compensation sometimes extending to technical operators who validate and process the information.

Generally, farmers are willing to share when it delivers clear benefits—such as agronomic advice (e.g., precision fertilizer optimization), direct remuneration (e.g., a sector bonus), or benchmarking insights (comparing practices against local average farming).

Secondly, we explored how to reduce the administrative burden on farmers when collecting and reporting data for multiple purposes. Typical **data flow** includes primary data collection, data control/processing, and final reporting. A range of **private-sector tools**—such as [MySoilCapital](#), [SMAG](#), and [Improvin'](#)—already exists to help gather primary data (e.g., yields, crop rotations, soil health, tillage operations, fertilizer and pesticide application rates), support CAP declarations and align with guidelines from the SBTi and GHG Protocol for scope 3 reporting for agri-food businesses. Some tools integrate farmers' existing FMIS, alongside remote sensing and supplier data, enabling farmers

to continue using their preferred systems while ensuring data can be integrated and understood for processor clients. Data can then be shared across the value chain with customizable levels of privacy and access control, thereby reducing the administrative burden on farmers.

This **digital infrastructure** can further enable relevant data sharing across the value chain, connecting farmers, technical advisors, and agro-industrial or seed companies. However, many businesses have their own FMIS and are hesitant to invest in stand-alone data-sharing platforms. This is where **publicly funded initiatives**—designed to connect different systems via APIs—can play a role. By acting as secure “brokers” of data, these platforms let farmers decide who to share it with, government entities, researchers, downstream buyers, or carbon project operators.

An example in Flanders is [DjustConnect](#), a data-sharing platform that provides a secure infrastructure for transferring data via APIs while respecting farmer consent. Connected tools, such as Soil Passport (Bodempaspoort), showcase how data sources combining parcel information, lab analysis results, open data (e.g., soil surveys, crop records), and CAP declarations can be used for MRV purposes. Other linked applications—like Vegapan for control and audits, Klimrek for climate impact, and WatchITgrow for farm-specific advice—illustrate how DjustConnect can reduce administrative tasks by eliminating repetitive data entry.

Multiple regulations (e.g., CAP, CRCF) often require similar datasets, underscoring the principle of “collect once, use many times.” Implementing user-friendly platforms can significantly reduce the administrative load by allowing multi-purpose reporting. Moreover, in-person workshops and helpdesk support help farmers and their advisors efficiently input or verify data, ultimately streamlining compliance while maintaining data quality.

Thirdly, we focussed on the challenge of using LTM data for MRV, particularly between public and private sectors.

Establish a European register of LTM sites, based on existing systems e.g., EJP Soil & BONARES, listing essential metadata (e.g., location, treatments, affiliated publications), so it is clear which sites are public or private and what (type of) data is publicly available.

1. Adapt dual licensing, defining commercial vs. non-commercial use, to ensure researchers are properly cited and to mitigate data misuse.
2. Implement Controlled-Access or federated learning system to keep raw data confidential while allowing external parties to run their algorithms and receive aggregated outputs. Such approaches can help fund the maintenance of LTM sites by charging fees for data accessing or processing.



3. Introduce a “research commenting period,” wherein project developers in the voluntary carbon market share relevant reports for open review, ensuring transparent feedback loops within a certain period (e.g., 30 days); install procedures for transparent publication of the reviews.
4. Expand LTM design to an on-farm monitoring network with real-life data can help validate MRV tools at field scale and improve overall accuracy. Current LTM sites were not specifically designed for carbon farming, resulting in limited representation across pedoclimatic regions, certain management practices, and smaller plot sizes.

Lastly, we recognized the importance of exploring how companies can foster trust in data sharing across the value chain—a topic we were unable to fully address during this session. Given the diverse interests and priorities of different stakeholders, **transparency**, **accountability**, and **mutual benefits** are paramount in any data-sharing arrangement. This will remain a significant topic for the **3rd ECFS**, where we can dive deeper into secure infrastructures and privacy regulations to engage all stakeholders along the value chain for a **sustainable transition**.