Issue 31
October 30, 2025

NEWSLETTER

Smart & Net-Zero Project

The Smart Net-Zero (SNZ) project team under the Food and Fertilizer Technology Center (FFTC) for the Asian and Pacific Region regularly collects and shares information related to sustainable agri-food systems and climate-smart agriculture, including research, news, policy, data and event updates around the world on the project website.

Overview

Carbon Markets at a Crossroads: Measurement Challenges and Policy Solutions

Voluntary carbon markets are gaining importance, but concerns about credit integrity, uneven MRV capacity and weak links to biodiversity remain. The main **Research** shows how carbon-farming contracts are evolving in this context, with farmers facing uncertain returns, high costs and complex verification. Supporting studies reveal that agriculture contributes only modestly to credit supply and is sensitive to policy-driven volatility, while joint carbon and biodiversity incentives can direct investment to restoration but require stronger governance. Soil carbon research highlights the need for deeper sampling, better models and long-term monitoring, especially where national data are limited. A global assessment of scandals underscores the risks of weak oversight. Overall, high-integrity markets need consistent MRV, credible co-benefit accounting and clear rules for agricultural participation.

News section covers topics from shade-coffee carbon credits, ICVCM's approval of high-integrity methods and low-emission rice irrigation to Taiwan's NDC consultation, and agrifood innovations. **Policy** section examines OECD carbon-intensity metrics and Ireland's Climate Action Plan, while the **Open Data** section features RiceMoRe, OpenMRV and regional agriculture MRV platforms.

Content

RESEARCH

01 THEME: Policy Incentives, Financing, Pricing; MRV (Measurement, Reporting, Verification)

Incentive mechanisms of carbon farming contracts: A systematic mapping study

February 14, 2024 | Journal of Environmental Management |

Introduction: A research team from the University of Bologna and the University of Urbino Carlo Bo in Italy conducts a systematic mapping study on carbon-farming contracts. The study reviews 52 academic papers and draws from about 40 global case studies to build a consolidated evidence base on contract types, payment structures, and implementation challenges across regions. It responds to a central gap in the literature: information on carbon-farming contracts remains scattered, especially because many initiatives are privately led and lack transparent design details.

Key findings: Carbon farming has shifted from public agri-environmental programs toward market-based mechanisms that deliver both emission reductions and co-benefits such as soil health and biodiversity. Across all contract types, the most cited barriers include limited MRV capacity, challenges with permanence and additionality, and high transaction or implementation costs. **Result-based** contracts offer stronger climate integrity but require rigorous verification, while **action-based** contracts reduce risk for farmers but provide uncertain mitigation outcomes. **Hybrid** schemes appear more practical because they combine predictable incentives with measurable climate benefits. The study highlights the need for standardized contract rules, clearer MRV procedures, and transparent certification to improve trust and farmer participation.

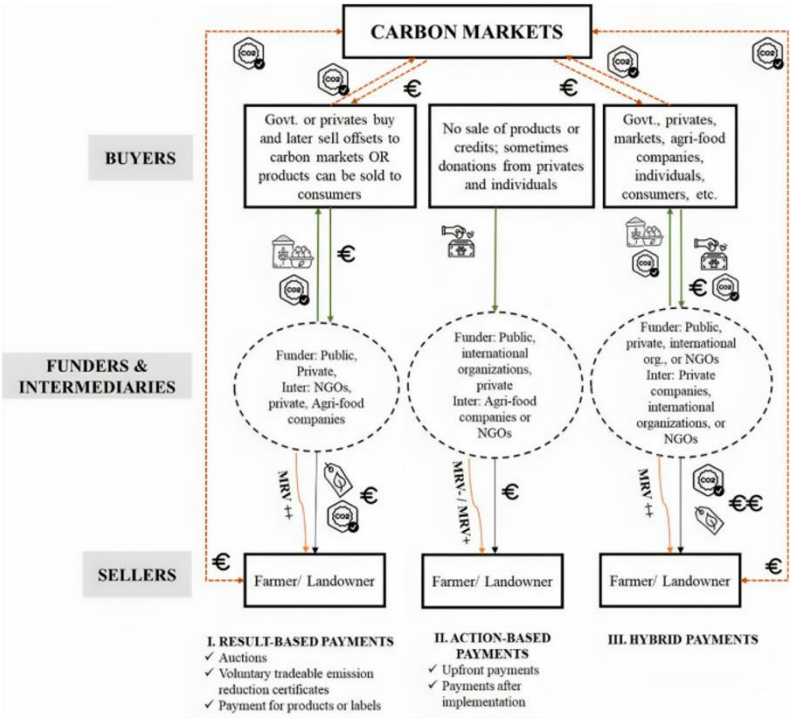


Figure | Different incentive mechanisms for carbon farming contracts

It also recommends closer alignment between public funding and emerging private carbon markets to better monetize co-benefits and distribute risks, creating stronger and more stable incentives for farmers. Further improvements include third-party auditing, streamlined farmer activity reporting, and broader use of ex-ante and ex-post assessments to refine contract performance.

02 THEME: Policy Incentives, Financing, Pricing

Carbon-credit systems in agriculture: A review of literature

May 19, 2022 | The School of Public Policy Publications |

Introduction: This review, conducted by researchers from the University of Alberta in Canada, synthesizes global and national evidence to assess how carbon-credit systems function in agriculture. Alberta receives particular attention as a major agricultural and emission-intensive region, which makes it a relevant testing ground for offset design and farmer participation. The study examines how carbon taxes, cap-and-trade systems, baseline-and-credit mechanisms, and offset protocols influence agricultural practices and identifies structural factors shaping adoption.

Key findings: Farmer participation in Alberta's offset market remains low despite the province having one of the longest-standing systems. The review finds that regulatory uncertainty and limited credit revenue often make participation unattractive, particularly when the cost of implementing mitigation practices exceeds potential earnings. Policy uncertainty is also identified as a major driver of price fluctuations in the province, contributing to hesitation among farmers.

The study finds that agriculture remains a small contributor to global carbon credit supply and that the sector is still in an early stage of market development, with uneven MRV standards and limited evidence on long-term sequestration outcomes. These uncertainties affect the credibility of specific practices. Reduced tillage and zero-till often show variable carbon benefits and higher reversal risks, while **regenerative agriculture** demonstrates more consistent ecological improvements and appears more reliable for long-term carbon outcomes. The review suggests that policy design should guide farmers to adopt carbon-farming practices primarily for their agronomic and ecological **co-benefits** rather than uncertain credit revenues. Emphasizing soil improvement, productivity gains, and resilience can reduce exposure to price volatility and strengthen participation, supported by clearer protocols and more stable market conditions.

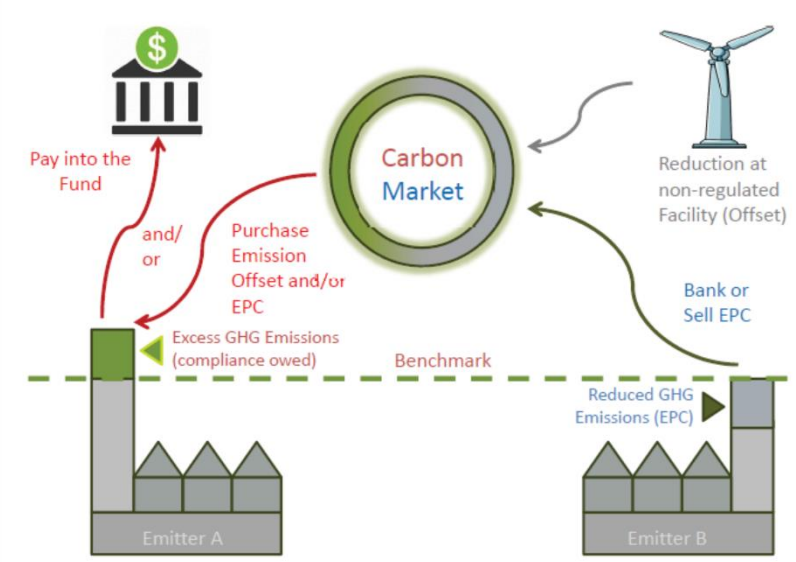


Figure | Alberta's carbon-pricing system
Source: Climate Implementation and Compliance Branch (2019).

03 THEME: Policy Incentives, Financing, Pricing; Carbon Sequestration

Prospects for integration of carbon and biodiversity credits: an Australian case study review

November 12, 2024 | Sustainability Science |

Introduction: This review, conducted by an international research team from Queensland University of Technology and the University of Queensland in Australia, together with Kyushu University in Japan, explores how joint carbon–biodiversity (JCB) credits could better reward co-benefits from land-based mitigation in Australia. Using evidence from agroforestry and assisted natural regeneration (ANR) on marginal agricultural lands, the authors assess whether combining carbon and biodiversity incentives can deliver larger climate and ecological gains than carbon-only schemes, and where such joint offsets are most promising geographically and economically.

Key findings: Australia's extensive cleared marginal lands create strong opportunities for JCB deployment. Evidence from agroforestry and assisted natural regeneration shows that combining carbon and biodiversity incentives can deliver wider ecological and climate gains than carbon-only schemes, often with low establishment cost. The review notes that JCB is gaining relevance because carbon-focused incentives alone may overlook biodiversity decline, while joint credits can shift investment toward restoration outcomes that are frequently underprioritized. Studies indicate that even at relatively low carbon prices, large areas of marginal land could be profitably converted to JCB activities, with biodiversity monetization further expanding economic feasibility.

The study also recognizes significant governance challenges affecting both carbon and biodiversity offsets. International analyses suggest that many existing offsets may be ineffective, and Australia's Emissions Reduction Fund has delivered limited emission reductions, underscoring the need for stronger oversight and more credible methodologies. The authors highlight risks such as biodiversity loss from monoculture plantations and emphasize the importance of accounting rules that prioritize native vegetation. Looking ahead, the review calls for internationally recognized methods to quantify and value biodiversity outcomes and for national regulatory frameworks that define where and how JCB schemes should operate. Clearer governance, consistent measurement approaches and alignment with international policy expectations are presented as essential for scaling JCB markets in a credible and equitable way.

04 THEME: MRV (Measurement, Reporting, Verification); Carbon Sequestration

How to measure, report and verify soil carbon change to realize the potential of soil carbon sequestration for atmospheric greenhouse gas removal

August 30, 2019 | Global Change Biology |

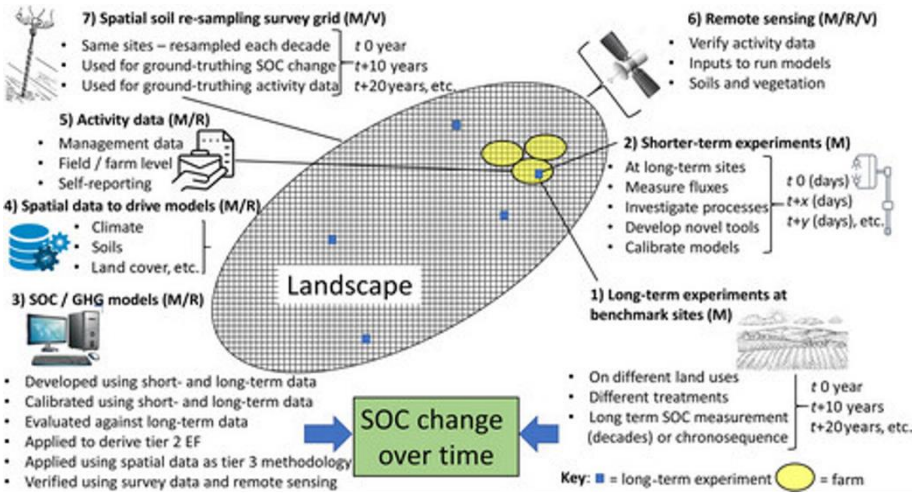


Figure | Components of a soil measurement/monitoring, reporting and verification framework, indicating which components contribute to measurement/monitoring (M), reporting (R) or verification (V).

Introduction: This paper is produced by an international consortium of researchers across Europe, North America, Oceania and Africa, reflecting broad expertise in soil science, modelling and land-based mitigation. The study emphasizes the global significance of soil carbon, noting that soils contain a carbon stock larger than the atmosphere and therefore represent a major potential avenue for climate mitigation. It evaluates current methods for measuring, reporting and verifying (MRV) changes in soil organic carbon (SOC) and outlines how improved MRV can support national and international climate strategies.

Key findings: SOC is difficult to monitor because changes occur slowly within a large and variable soil carbon pool. Direct sampling remains the most accurate method but becomes costly when deeper sampling is required to detect management impacts. The review notes that practices such as no-till often require sampling close to one meter and adjustments for changing soil bulk density. Flux measurements can complement sampling but are less reliable over short periods, becoming more informative only when monitored over longer time frames.

Models help scale MRV but face important uncertainties. Many models cannot fully represent key soil processes or carbon pools with long turnover times, and carbon-input estimates based on simplified relationships add further uncertainty. The review also highlights uneven MRV capacity across countries. Many developing nations rely on lower-tier reporting due to limited national soil data, reinforcing the need for international cooperation, capacity building and more harmonized approaches.

The authors present an integrated MRV vision that combines benchmark sites, calibrated models, spatial databases and repeat soil surveys supported by remote sensing to meet national reporting and market needs. This framework is intended to support major international initiatives to increase soil carbon, including the 4p1000 initiative and FAO's global SOC sequestration assessments.

05 THEME: Policy Incentives, Financing, Pricing; MRV (Measurement, Reporting, Verification)

Addressing scandals and greenwashing in carbon offset markets: A framework for reform

June 15, 2025 | Global Transitions |

Introduction: A study from the Sasin School of Management at Chulalongkorn University in Thailand examines systemic weaknesses in voluntary carbon markets (VCMs) by synthesizing academic evidence, regulatory reports and project-level assessments, noting that credibility concerns have intensified as recent analyses suggest that up to 94% of REDD+ credits may be overestimated, resulting in large volumes of climate finance that do not reflect real mitigation outcomes. The paper investigates why scandals such as inflated baselines, unverifiable claims and governance failures recur across countries and uses this evidence to propose a structured framework for strengthening market integrity.

Key findings: The review identifies weak MRV systems and inconsistent standards as central causes of integrity problems in voluntary carbon markets. It details recurring issues such as fraudulent crediting, overstated baselines, lack of additionality and unverifiable climate claims, noting that these patterns often emerge when oversight is limited or information is uneven. The study also highlights serious social and human-rights concerns, including cases of community displacement and inadequate consultation in countries such as the Congo, Brazil and Kenya. These examples demonstrate that carbon market failures extend beyond technical shortcomings and reflect deeper governance and equity challenges that must be addressed.

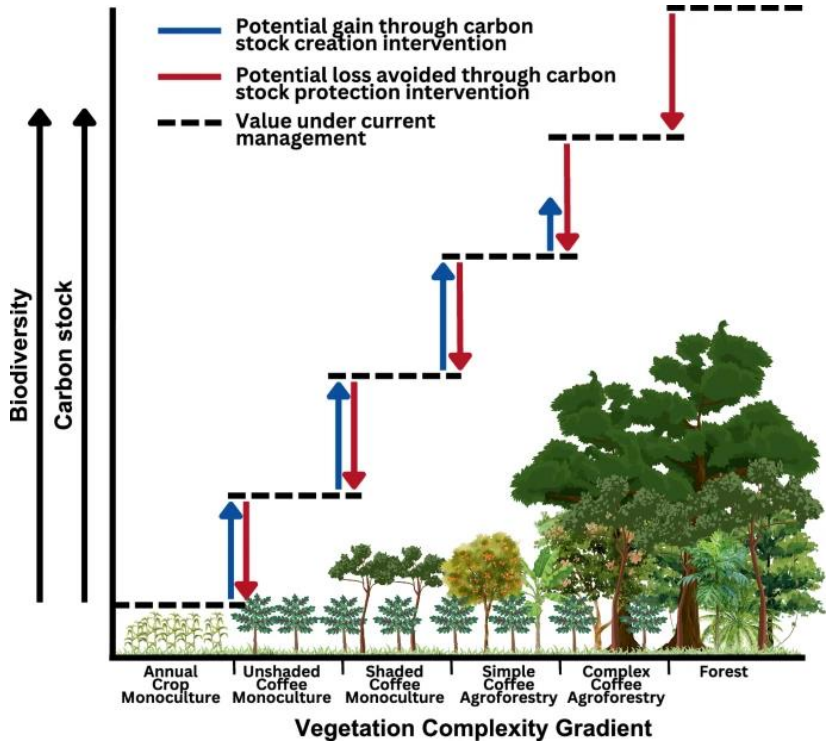
The paper proposes a reform framework focused on **stronger verification integrity, transparent registries, accountability mechanisms and robust social and environmental safeguards**. It discusses the potential of tools such as blockchain registries and AI-assisted monitoring to support transparency, while emphasizing that technology cannot compensate for weak governance or solve challenges like permanence and additionality. The review also stresses that future reforms need to align with the international rules emerging under Article 6 of the Paris Agreement in order to improve transparency, prevent double counting and establish clearer global trading rules. High-integrity carbon markets will require coherent governance structures, rights-based standards and stronger links to national mitigation pathways to ensure credible and equitable outcomes.

NEWS

01 **THEME:** Carbon Sequestration

Coffee and carbon credits: revealing the real value of shade-grown coffee

September 12, 2025 | CarbonCredits.com |



New analysis shows that shade-grown coffee—long recognized for biodiversity benefits—may also represent an undervalued carbon sink within agroforestry landscapes. However, experts caution that most existing carbon credit methodologies capture only a portion of this climate value due to inconsistent measurement boundaries, limited accounting of soil carbon, and undervaluation of co-benefits. As demand for nature-based solutions grows, researchers emphasize the need for robust MRV systems capable of quantifying carbon storage across canopy, root biomass, and soil layers. Strengthening these metrics could enable farmers to access higher-value agroforestry credits and support premium supply chains. The article notes that without improved quantification standards, smallholders risk missing emerging markets despite delivering measurable ecological services.

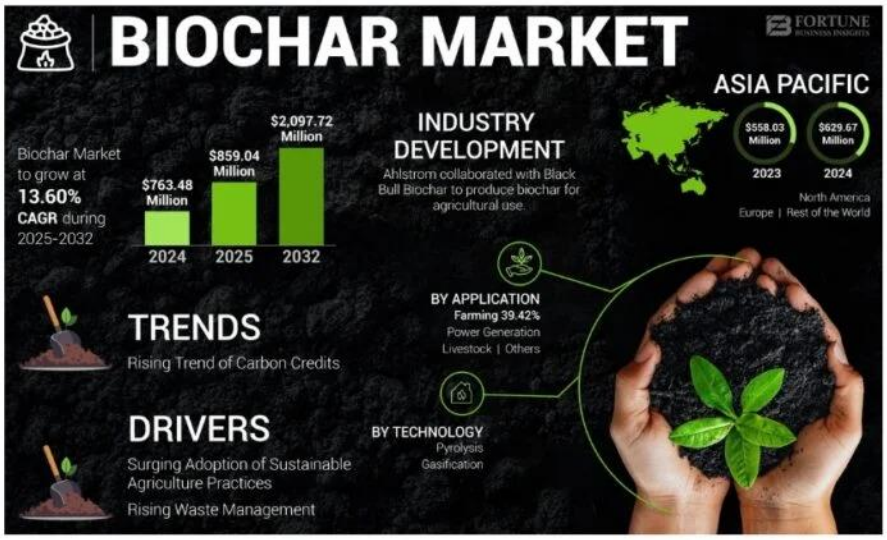
02 **THEME:** MRV (Measurement, Reporting, Verification)

ICVCM backs Verra's biochar and IFM methods as high-integrity climate solutions

September 5, 2025 | CarbonCredits.com |

The Integrity Council for the Voluntary Carbon Market (ICVCM) has granted Core Carbon Principles eligibility to Verra's biochar and Improved Forest Management (IFM) methodologies, a milestone that raises confidence in these high-integrity credit types. The endorsement acknowledges strengthened permanence rules and clearer leakage accounting, yet the article also stresses that large-scale deployment will depend on project developers meeting stringent data and documentation requirements. Biochar projects, in particular, must demonstrate verifiable long-

term carbon stability, while IFM initiatives need detailed baselines and transparent monitoring to avoid over-crediting. ICVCM's decision is expected to mobilize new investment but also sets a higher compliance bar, signaling a shift toward more rigorous quantification and standardized MRV across the voluntary carbon market.



03 **THEME:** ICT in Agrifood Sustainability

Could these five future agricultural innovations slow down climate change?

August 20, 2025 | Nature |

Researchers and start-ups showcased 5 emerging innovations at the F&A Next meeting hosted by Wageningen University & Research, highlighting their potential to reduce agricultural emissions and strengthen global food security. These include grass-based protein extracts with lower life-cycle emissions than imported soy, microbial precision-fermentation that can substitute dairy proteins, and plant probiotics that boost hydroponic yields by nearly 10%. AI-enabled pollination monitoring demonstrated improvements in fruit quality and shelf life, while high-throughput phenotyping facilities are accelerating the breeding of crops resilient to heat, salinity and other climate stresses. Despite promising results, the article notes barriers such as high production costs, regulatory hurdles, uncertain consumer acceptance and the need for long-term investment and independent sustainability assessments. Together, these technologies illustrate how innovation could complement dietary shifts and policy incentives in efforts to slow climate change.

04 **THEME:** GHG Emission Reduction

Viet Nam's green rice revolution: A game changer for farmers and the environment

August 21, 2025 | CGIAR |

CGIAR and Viet Nam are expanding climate-resilient irrigation—most notably alternate wetting and drying (AWD)—as a pathway to reduce methane and improve water productivity. While the program reports strong field performance, researchers emphasize that future impact will depend on scaling proven practices across provinces with tailored water-management protocols and consistent measurement of emissions reductions. Digital irrigation tools and remote sensing are helping quantify water savings and guide field timing, but additional investment in MRV and farmer training is required to verify climate benefits at scale. As Viet Nam targets a low-emission rice sector under its net-zero roadmap, the initiative is expected to shape provincial planning and inform future financing for climate-aligned irrigation.

05 **THEME:** Policy Incentives, Financing

Taiwan's Ministry of Environment hosted national consultation on draft 2035 NDC 3.0 to solicit opinions from all sectors

September 9, 2025 | Ministry of Environment News (In Chinese) |

Taiwan's Ministry of Environment convened experts and stakeholders to review the draft Nationally Determined Contribution (NDC 3.0), which sets 2035 climate targets and outlines sector-specific mitigation pathways. Participants highlighted agriculture's need for clearer measurement standards, stronger financing mechanisms, and quantifiable milestones for soil carbon, fertilizer-related emissions, and renewable energy integration. The consultation underscored that future progress will hinge on transparent MRV, cross-agency coordination, and policy tools that help farmers adopt low-emission technologies. Feedback from the symposium will guide revisions to ensure the final NDC includes actionable indicators, sector budgets, and support schemes aligned with international climate reporting frameworks.

06 **THEME:** GHG Emission Reduction

Taiwan's FRI pioneered the first technology for mass-producing the algae "*Asparagopsis*," which reduces methane emissions from cattle and sheep by 99%

August 27, 2025 | Environmental Information Center (In Chinese) |

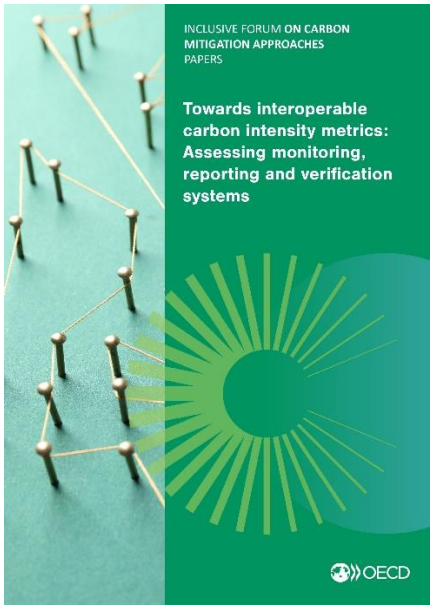
Taiwan's Fisheries Research Institute (FRI, MOA) has shown that algae-based feed additives can substantially reduce enteric methane emissions, offering a promising mitigation pathway for the livestock sector. While trial results confirm clear emission reductions without harming animal performance, researchers note that broader application will require standardized measurement protocols, cost analyses for farm-level adoption, and regulatory clarity for feed approval. The findings support Taiwan's agricultural methane-reduction plans, but scaling will depend on validating long-term effects, integrating additives into existing feeding systems, and establishing MRV systems capable of verifying reductions for potential incentive or crediting programs. Continued collaboration with producers will be essential for national deployment.

POLICY

01 THEME: Carbon Market

OECD – Towards Interoperable Carbon Intensity Metrics

Organisation for Economic Co-operation and Development (OECD) | Source | Report |



This OECD report develops a practical framework to improve interoperability across carbon-intensity metrics, focusing on regulatory MRV systems used in carbon pricing instruments such as emissions trading systems (ETSs) and carbon taxes. The analysis excludes MRV systems for land use, land-use change and forestry (LULUCF), though it notes that non-CO_2 gases—particularly methane and nitrous oxide—remain challenging due to heterogeneous sectoral coverage. Rather than requiring full harmonisation, the report proposes a tiered approach to interoperability: (1) *disaggregation and transformability* for sectoral and gas coverage, allowing jurisdictions to translate data into comparable units; (2) *alignment of estimation methods* only where necessary; and (3) *mutual recognition* for verification and assurance frameworks. A critical implementation gap highlighted in the report is the lack of facility-level output data needed for product-level carbon-intensity indicators. To address this, the analysis draws on ETS free allowance allocation (FAR) rules—such as benchmarking and sub-installation classification—which already require output reporting and can serve as an initial foundation for product-level metrics. The report identifies remaining challenges including inconsistent system boundaries, uneven data quality, and the need for digital infrastructure to support cross-border carbon-market interoperability.

02 THEME: Net Zero Strategy

Ireland – Climate action plan 2025

Department of the Environment, Climate and Communications (DECC), Government of Ireland | Source | Report |

Ireland's Climate Action Plan 2025 (CAP25) updates the country's legally binding pathway toward a 51% emissions reduction by 2030 and climate neutrality by 2050, while emphasizing delivery and cross-agency accountability. The plan reinforces the electricity sector's central role, targeting 80% renewable electricity by 2030—a major increase required not only to decarbonize power generation but also to support electrification across transport, buildings, and industry. Agriculture, responsible for 34.3% of emissions in 2023, will continue fertilizer reductions, advance methane-mitigation R&D, and expand diversification to remain within sectoral ceilings. CAP25 also adopts an activity-based approach for land use, prioritizing peatland rehabilitation, afforestation, and improved grassland management amid baseline uncertainties.

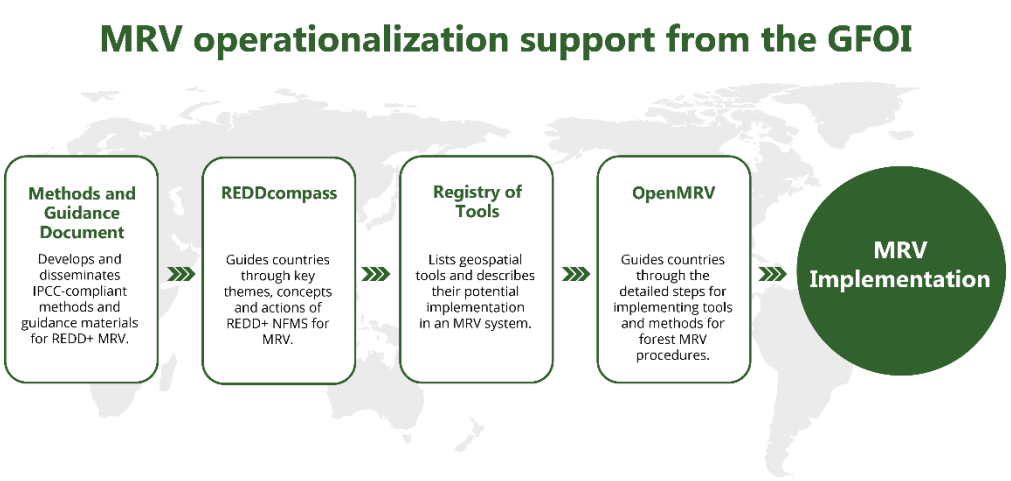
A key section of CAP25 highlights the financial risks of missing EU climate targets: under a With Existing Measures (WEM) scenario, compliance costs could reach €8.1 billion by 2030, while other analyses estimate potential liabilities of up to €20 billion if Ireland must purchase allowances from other member states. To mitigate these risks, the plan scales up carbon-tax funding (€951 million in 2025), accelerates renewables, expands MRV capacity via SEAI and EPA, and strengthens governance structures to keep Ireland within its carbon budgets.

OPEN DATA

01 THEME: Climate Smart and Net-Zero Toolkit; Climate Action Plans and Programs

OpenMRV

OpenMRV |



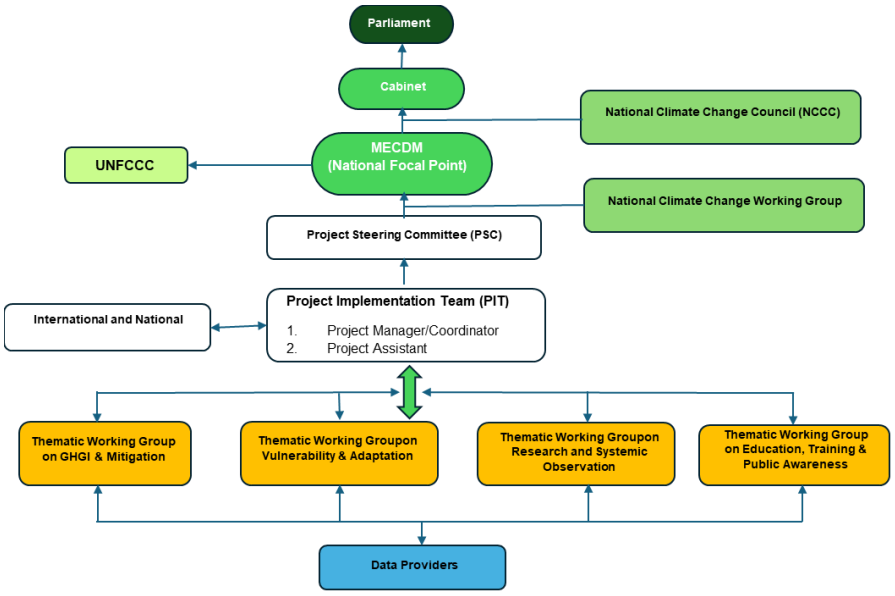
OpenMRV is a free, open-source knowledge platform that helps countries and other users operationalize forest MRV (Measurement, Reporting and Verification) processes for REDD+ (Reducing Emissions from Deforestation and Forest Degradation) and broader climate objectives. It curates forest-related MRV support resources, including training materials, tool manuals, technical guidance, and country examples, organized around the MRV cycle from measurement to reporting and verification. By serving as a central repository linked to initiatives such as GFOI (Global Forest Observations Initiative) and REDDcompass, OpenMRV makes it easier for national teams and practitioners to design, improve, and sustain transparent forest monitoring systems that meet international reporting requirements.

02 THEME: Climate Action Plans and Programs; GHG Emission Inventory

Solomon Islands iMRV Tool

Solomon Islands Government |

This tool is an integrated national system that supports the implementation of the Paris Agreement and the Enhanced Transparency Framework by monitoring, reporting, and verifying (MRV) climate actions and the country's Natioally Determined Contributions (NDCs). It consolidates data on the national GHG

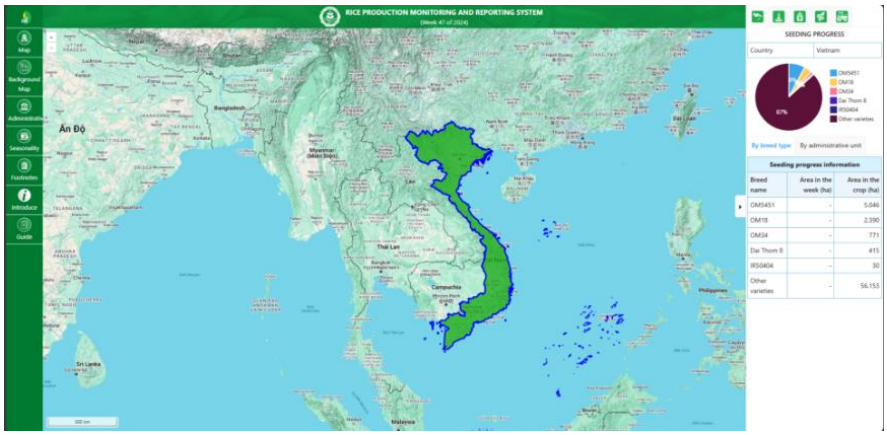


inventory, mitigation and adaptation projects, climate finance flows, and co-benefits such as SDG and gender impacts, providing a structured database and reporting interface for government agencies, development partners, and other stakeholders. Through modules on GHG emissions, mitigation and adaptation tracking, and climate finance, the tool enhances transparency, enables evidence-based planning, and communicates Solomon Islands' climate actions to both domestic and international audiences.

03 THEME: Climate Smart and Net-Zero Toolkit; Climate Action Plans and Programs

RiceMoRe

International Rice Research Institute (IRRI) |



RiceMoRe (Rice Activity Monitoring and Reporting) is Viet Nam's national digital platform for monitoring rice production, integrating a web interface, mobile app, and geographic information system (GIS) to collect and standardize near–real-time data on cropping calendars, varieties, and planted areas. Developed by the Ministry of Agriculture and Rural Development with IRRI, the system enables commune-to-central reporting through unified templates, feeding provincial and national databases for planning, forecasting, and policy use. Now expanded to 29 provinces, it supports MRV for low-emission rice initiatives, including the "One Million Hectares" program. By providing geo-referenced, time-series activity data, RiceMoRe improves accuracy and transparency in production monitoring and strengthens climate-responsive decision-making.

EVENT

01

The 4th International Conference on Business Models in Agriculture (IBMA 2026)

March 8-11, 2026 | In-person | Eastern Cape, South Africa |

IBMA International Conference on Business Models in Agriculture 2026

The 4th IBMA Conference 2026 will gather researchers, agribusiness practitioners, and policymakers to examine innovative models that strengthen agricultural value chains and rural prosperity. The conference highlights Africa's role in shaping globally relevant agri-enterprise innovation and building more competitive, inclusive, and resilient food systems. Sessions will explore business model transformation, digital and organizational innovations, and pathways for connecting African agricultural markets to global opportunities. The event provides a platform for cross-disciplinary exchange and collaboration among stakeholders seeking to advance agribusiness development and food security.

02

The 11th International Conference on Chemical and Food Engineering (ICCFE 2026)

April 3-6, 2026 | Hybrid | Osaka, Japan |

The 11th ICCFE Conference 2026 will bring together academics and industry experts to exchange scientific knowledge and advances in chemical and food engineering. The event provides a forum for presenting new research, discussing engineering challenges, and sharing developments across areas such as processing technologies, material science, and system design. While the conference's core aim is disciplinary knowledge exchange, many of the engineering topics discussed—from process optimization, innovation in food manufacturing, to digital or analytical tools—offer potential relevance for improving resource efficiency and strengthening sustainable practices in agrifood systems. ICCFE 2026 also encourages international collaboration and cross-sector dialogue. Abstract submission closes on December 25, 2025.

03

The 18th International Conference on Climate Change: Impacts & Responses

April 20-22, 2026 | Hybrid | Rhodes, Greece |

The 18th International Conference on Climate Change will explore emerging and often overlooked climate risks under the 2026 special focus on "unseen unsustainability." Hosted by the University of the Aegean, the hybrid event brings together researchers, practitioners, and policymakers to examine scientific evidence on climate impacts across ecosystems and societies, and to discuss technical, political, and social responses. Core themes include risk identification, resilience strategies, and the assessment of long-term wellbeing under accelerating climate change. While broad in scope, several sessions—such as those on risk modelling, vulnerability assessment, and adaptation planning—may offer insights applicable to sectors including agriculture, land management, and rural development. Abstract submissions close on January 20, 2026.

04

European Geosciences Union (EGU) General Assembly 2026

May 3-8, 2026 | In-person | Vienna, Austria |

The EGU General Assembly 2026—one of the world's largest meetings in Earth, planetary, and space sciences—will convene thousands of researchers to present new findings across geoscience disciplines. The hybrid format supports both in-person and fully online participation, with dedicated opportunities for early-career scientists to showcase their work. While the conference covers a broad scientific spectrum, selected sessions in biogeosciences, hydrology, and Earth observation may offer insights relevant to agricultural monitoring, ecosystem processes, and environmental assessment. The event also provides financial support schemes and an online-participant waiver for eligible applicants. Abstract submission closes on January 15, 2026.

05

The 2nd International Conference on Smart Agriculture and Artificial Intelligence (SAAI 2026)

May 29-31, 2026 | In-person | Harbin, China |

The 2nd SAAI 2026 will bring together researchers and industry experts to explore advanced digital and AI-driven technologies for agriculture. The Call for Papers highlights key technical themes including intelligent sensing, robotics, crop and soil modelling, digital twin applications, UAV-based remote sensing, deep neural networks, cyber-physical systems, and hyperspectral imaging for crop health assessment. Accepted papers will be published in the conference proceedings and submitted to EI Compendex and Scopus for indexing. The event provides a platform for global researchers to exchange emerging methods and innovations shaping the next generation of smart agriculture. Full paper submissions close on March 24, 2026.