

European ecosystem restoration carbon standards database

Guidance for v.2.0 (May 2023)

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Purpose

The goal of this database is to present and categorise the various voluntary carbon market standards available on the European continent for landscape restoration projects. The approach views these carbon standards from the perspective of restoration practitioners who are exploring carbon finance options, rather than buyers of credits. The database demonstrates the various requirements and suitability of available carbon standards for generating income from ecosystem restoration activities that sequester carbon or avoid greenhouse gas (GHG) emissions.

Changes in v.2.0

The guidance has been updated based on changes introduced by standards already reviewed, addition of relevant methodologies, and new standards that were found through news reports, word of mouth and social media.

New additions: Andalusian carbon standard, UK Saltmarsh Code, UK Seagrass Code, UK Agroforestry Code, Ecosystem Restoration Standard, UK Carbon Code of Conduct, Label Bas Carbon seagrass methodology, Inclusive Carbon, SeaForest LIFE, Single Earth

Standards updated: Woodland Carbon Code, Peatland Code, Wilder Carbon

Methodology

Identifying standards

To identify carbon standards, we used a combination of systematic search and snowballing approaches. We read academic papers and reports recommended by experts, as well as relevant studies referenced in these papers. In addition, we constructed a search string for a Web of Science keyword search, shown below, and used elements of this string on Google and Twitter to find relevant grey literature as well as more recent programmes that have not been mentioned in literature yet.

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TS=(("carbon standard*" or "carbon code*" or "certification standard*" or "carbon credit*" or "carbon project*" or PES or "payment* for ecosystem services") AND (Europe* or Britain or UK or Ireland or Norway or Sweden or Finland or France or Spain or Portugal or Germany or Belgium or Netherlands or Denmark or Italy or Switzerland or Austria or Greece or Albania or Turkey or Bulgaria or Serbia or Bosnia or Romania or Hungary or Moldova or Ukraine or Belarus or Estonia or Latvia or Lithuania or Russia or Poland or Czech or Slovakia or Slovenia or Croatia) AND (grassland* or meadow* or cropland* or scrub* or forest* or heath* or wetland* or peatland* or coastal* or "saltmarsh*" or seagrass* or bog* or mire*))
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Figure 1: Search string used in the Web of Science search on 23/3/2022.

Inclusion criteria

Carbon standards were considered in scope if they satisfied the following criteria:

- a). They support projects on the European continent. This includes global carbon standards for which European projects are eligible.
- b). They work with land-use projects focused on nature-based solutions or conservation. This may include restoration of natural habitats and adoption of regenerative agriculture practices with the goal of soil decarbonization. Approaches requiring technology or additional inputs were considered out of scope. These include projects in biochar, waste management, energy efficiency, or application of fungi to soil.
- c). They generate carbon finance through using methodologies that determine the volume of emission reduction or carbon sequestration, and then sell this amount, whether directly or indirectly, to buyers. They may sell carbon in carbon units (1 tonne of CO₂ equivalent), sometimes giving these units specific names. Organizations providing only brokering services or a marketing platform for carbon reduction projects were considered out of scope.

Organization of the database

There are two main categories in the database, natural ecosystem restoration and generating carbon units through changing agricultural practices. Some of these agricultural soil carbon methodologies can apply to grasslands, while others can be broadly categorized as “carbon farming.” While not immediately relevant to European ecosystem restoration projects, they were still included in the database due to the mosaic nature of many European landscapes, where natural ecosystems can be interspersed with agricultural land. For the purposes of this database, the carbon farming frameworks within the global standards VCS and Gold Standard are presented separately. These frameworks have some requirements that differ from other land use frameworks, and because carbon farming may present a specific interest to land users that are not specializing in restoration of natural ecosystems.

Two other categories in the database are schemes that are under development or being piloted, and schemes that provide additional certification to monetize their additional ecosystem services. These were considered in scope because the European carbon market is in a state of flux and development, and because landscape restoration provides many other co-benefits besides carbon sequestration. Restoration projects often have the capacity to monitor and measure these co-benefits such as biodiversity conservation.

Table 1: Categories in the carbon standards database. N.B. for some categories carbon standards may be incomplete where data is not available.

| Database Categories | |
|----------------------------------|-----------------------------------|
| Description | Eligible ecosystems |
| Project types | Verification provider |
| Minimum project area (hectares) | Approach to risk mitigation |
| Permitted project length | Approach to land ownership issues |
| Additionality requirements | Permanence requirements |
| Leakage calculation requirements | Required safeguards |
| Fees | Co-benefits premiums |
| Methodologies | Verification process |

| | |
|---|--|
| Allowances for income sources additional to carbon finance | Reputation (public sources) |
| Options for credit sales (<i>ex-post</i> or <i>ex-ante</i>) | Website, registry and supporting documentation |

While some of the established carbon standards had information all database categories (*Table 1*), we found that many smaller national and regional schemes did not. In addition, our research relied mostly on publicly available documentation, and not all carbon standards in the database had such documentation available. Therefore, it was not possible to complete all database fields due to lack of information.

Projects considering carbon finance may use the database as a broad overview, rather than a prescriptive tool. For example, few standards set a minimum project area requirement, although small projects may not generate enough income to offset costs of development and verification. An additional caveat is that voluntary carbon finance is a fast-evolving space. This database captures new and developing standards as of May 2023. However, new carbon standards may emerge, and existing carbon standards may change their requirements or methodologies in the future.

Findings and analysis

We have identified a total of 17 working carbon standards which have sold carbon credits. The oldest was established in 1994 and the most recent in 2021. Eleven are focused on natural ecosystems while five are focused on agricultural systems. One (CCB) is a standard for ecosystem benefits other than carbon. In addition, we have identified fifteen potentially relevant carbon standards that are either in process of development (including early piloting stages) or have been developed but not implemented.

Types of carbon schemes

The voluntary carbon market in Europe is very fragmented, and we have identified three types of carbon standards that have a particular relevance to ecosystem restoration projects in Europe. The first consists of carbon standards VCS, Gold Standard and Plan Vivo. These are established market leaders that position themselves as having global coverage. The second category is country-specific (or domestic) carbon standards. These are often endorsed by national governments and developed to serve the interests of producers and buyers of carbon units within a particular country while progressing toward the goal of carbon neutrality. These include the French Low Carbon Label, the Spanish Carbon Footprint Registry, and the Dutch National Carbon Market Foundation. The third category includes habitat-specific carbon standards focusing on a single ecosystem, such as the UK Forest and Peatland Codes and the German standard Moor Futures (peatlands). The remaining schemes do not fit into these categories: these include carbon farming initiatives CarboCert and Okoregion Kaindorf, UK biodiversity-focused standard Wilder Carbon, an emerging scheme on a blockchain platform Regen Network and Rabo Carbon Bank, a regenerative agriculture programme created by a prominent Dutch bank.

Ecosystems represented

Forest ecosystems are covered by seven standards, peatlands by five standards and grasslands by just one. Coastal wetlands such as saltmarshes and seagrasses are a focus of several schemes, including VCS (though with no projects certified in Europe) and standards that are under development. Among the carbon farming schemes, some of the regenerative eligible agriculture practices include reduced tillage and inputs, crop rotation, optimised grazing and composting.

Type of buyer-seller relationship

Carbon standards differ in the way they structure the relationship between buyers and sellers. Market leaders like VCS and Gold Standard have established exchanges where credits (1 tonne CO₂ equivalent) can be bought and resold. Many of the national and ecosystem-specific schemes are intermediary types, where credits and offset labels can be bought from projects but cannot be traded further.

Expenses

Global carbon standards have considerably higher fees for projects joining their registries than domestic carbon standards. Registration alone can cost thousands of euros, with additional expenses for project design review. These initial expenses can vary depending on the volume of emission reductions of the project. National and ecosystem-specific schemes are generally considered considerably cheaper options. Most of these smaller carbon standards have not published any fee structures. Moreover, costs of participation in any carbon standard must be determined individually as they depend on the size and complexity of the project, and the methodology used to calculate baselines and monitor changes to GHG emissions and removals.

Market innovations

High cost of participation for ecosystem restoration carbon projects has been widely recognised, and some standards are attempting to lower development costs. Regen Network is one scheme aiming to do this with remote-sensing technology and machine learning. Other methods to lower costs for projects include models based on available regional or national data. Here, an uncertainty discount is applied to the calculated emission reduction (Low Carbon Label, UK Woodland Code) so that the production of carbon units is calculated conservatively.

Risk management

Most carbon standards manage risks associated with land use carbon projects by establishing a risk buffer. Risk buffers consist of carbon units which have been generated by projects but are reserved by the standard as insurance against non-permanence. Non-permanence (also known as reversals) can be caused by natural disasters (e.g. wildfires) or other threat factors which result in stored carbon being released back into the atmosphere. The size of the risk buffer ranges from 10% to 30% across different carbon standards. This figure is not always fixed and some carbon standards require projects to calculate it individually.

Ex-ante vs. Ex-post

Most carbon standards provide projects with the option of selling carbon units before these are verified (known as '*ex-ante credits*'), calling them "Planned Emission Reduction" credits (Gold Standard), "Pending Issuance Units" (Woodland Carbon Code and Peatland Code) or similar. For example, the UK Woodland and Peatland Codes allows registering such pending carbon units after validation but prior to verification. After verification, the units are converted into real carbon units and companies who purchase them can claim carbon offsets.

Projects also have the option to sell their credits '*ex-post*', after they have been validated and verified by a third party.

Future prospects

Of the schemes that are not fully operational, we have identified two (Spain's ValVolCar and Italy's Forest Carbon Code) as pilot projects that have not been implemented further. The rest of the schemes

were in various stages of development and may be introduced to the market in the future. Some of these (UK Saltmarsh Code and Seagrass code and the Andalusian carbon standard for the certification of blue carbon credits) aim to introduce carbon standards for blue carbon projects, which are hitherto underrepresented on the market. Several focus on soil carbon in agricultural systems. One (Waldklima Standard) is a new German carbon standard for forestry projects, and one (Restoration Carbon Standard) is envisioned as a carbon standard specifically designed for restoration projects bundling carbon, biodiversity and social benefits together into 'restoration units'. Another emerging theme on the market is blockchain. We have identified two schemes using blockchain technology, one of which (Dovu, under development) aims to specifically work with buyers offsetting their carbon footprint from cryptocurrency mining.

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