2022

Our Carbon Credit Ratings Framework For IFM Projects

Improved Forest Management (IFM)

Our mission is to be a source of truth for carbon markets



Introduction

Sylvera carbon credit ratings are the most reliable and trustworthy in the market.

Sylvera has developed a rigorous bottom-up approach in order to produce the most accurate ratings and analyses for carbon projects in the VCMs.

What sets Sylvera apart

• Unparalleled depth & accuracy: We build robust and bespoke ratings frameworks and production systems for each project type. Our ratings are not generated by algorithms alone, but by a team of experts analyzing a variety of quantitative and qualitative data, who then distill it into detailed reports.

Read our white paper for more information.

- Technical and scientific expertise: We have a large and growing team of experts who hold advanced degrees, working across our Multi-Scale Lidar, Geographic Information System (GIS), Commodities, Finance, Policy, Ratings and Machine Learning disciplines.
- Independence: We don't sell carbon credits and we never have. We also aren't paid by developers to rate carbon projects. This means we avoid conflicts of interest, and you can trust that our ratings and reports are unbiased.



Key accounting variables and concepts

This refers to the above ground tree (live) biomass carbon pool of the project area.
The manipulation of spatial boundaries with the intent of inflating the volume of credits issued by the project.
The displacement of emissions outside of the project area as a result of project activities.
A forest stand is a group of trees with uniform characteristics across age, structure, composition, size, class, etc.
The time between final harvests, i.e. the period between when the stand is established and the final harvest.
The targeted removal of trees to improve the growth of remaining trees.
The area in which activities are implemented by the IFM project to increase carbon stocks in above ground biomass, and sometimes soil.
The area covered by the crown (leaves, branches and foliage) of a tree . Canopy cover models are used to assess forest change behavior.
A type of machine learning (ML) model that essentially learns by example. A model is trained using a large set of labeled data. These models and algorithms look at data in the context of their adjacencies, allowing for greater accuracy in estimation and analysis, and for generalized prediction across different geographies and time periods, resulting in lower error and noise rate in comparison to classical ML.
This refers to the risk that the project has issued credits in excess of what is justifiable against the business as usual scenario.
Registries mandate a share of verified gross emissions reductions be set aside in a "buffer pool," and not initially sold as carbon credits. This helps increase the integrity of issued carbon credits in the case of future forest loss and acts as an insurance policy for issued credits to mitigate the risk of previously issued credits being reversed. The share set aside is proportional to the non-permanence risk of carbon stored in the project.
A tradable unit representing one metric ton of carbon dioxide (CO2), or an equivalent amount of another greenhouse gas (GHG), avoided or removed from Earth's atmosphere.

Improved Forest Management (IFM) projects can increase net carbon stocks or reduce greenhouse gas (GHG) emissions through changes in existing, or business as usual (BAU), forest management practices. Forest management activities could include rotation extension, thinning and change in harvesting techniques. Exactly which management activities are allowed in the projects is determined by registry methodologies.

Uniquely, 93% of the issued IFM credits are from North American projects and 78% of all projects sit within the Climate Action Reserve (CAR) registry--and only 4% on Verra. North American, specifically Canadian and the United States, projects are prevalent because they are a legacy of the California compliance market and the compliance forest offset protocol or, California Air Resources Board (ARB).



A reminder of our scoring pillars

We assess the quality of IFM projects using defined processes and frameworks, as outlined in our white paper.

Our top level Sylvera Ratings span from AAA-D and reflect whether each credit associated with the project is likely to avoid 1 metric ton of CO2e emissions.

This rating is derived from a combination of scores that assess the **carbon** performance, **additionality** and **permanence** of the project. The scores in these three core pillars are combined in a series of matrices to ensure that underperformance in one key area does not get overshadowed by high performance in others.

Co-benefits are also assessed but they do not feed into the Sylvera Rating, as they do not have a direct bearing on the climate impact of carbon credits. Including them in the Sylvera Rating could lead to a high co-benefits score obscuring poor performance on carbon avoidance. Aspects of the project relating to co-benefits that could materially impact the project's ability to deliver it's stated climate benefit are, however, reflected in the Sylvera Rating.



Carbon score

Sylvera's carbon score compares the emissions reductions we calculate, using forest change estimates from our proprietary machine learning algorithms, with carbon pool changes and harvesting that have been reported by the project and verified by the registry.

Additionality score

Sylvera's additionality score assesses the likelihood the project activities would have been implemented in absence of the project. It also quantifies the likelihood and extent the project is inflating the business as usual (BAU) emissions or potential leakage, therefore issuing too many credits.

Permanence score

Sylvera's permanence score is a measure of confidence that carbon will remained stored in the project for the long-term. This can also be thought of as risk of reversal.

Co-benefits score

Sylvera's co-benefits score assesses the scope and relative impact of project activities on local biodiversity and communities - which are linked to UN Sustainable Development Goals (SDGs).



Carbon score

What is it?

Sylvera's carbon score verifies whether a project is accurately reporting on the emissions reductions achieved by the activity. Our carbon score is based on both net change observed across the forest area and the levels of harvesting. It measures the match between detected and reported forest changes for verified vintages, but does not assess the appropriateness of the baseline. Carbon scoring is applied to expost project reports for verified vintages.

Note: The carbon score must be considered alongside the additionality score, which considers the overcrediting risk, to understand the climate impact of the project.

Why does it matter?

Accurate carbon accounting underpins the validity of a project's issuance and material under or over reporting of emissions will impact the number of credits that have been issued. This could either reduce the risk of overissuance or call into question whether too many credits were issued.

Sylvera conducts an independent assessment of tree coverage and loss events using satellite data across the entire project to give buyers confidence that the carbon removals reported have actually been achieved by the project.

What is included in the carbon score?

The carbon score is based on activities in the project area, which Sylvera estimates based on canopy cover change predicted by Sylvera's proprietary machine learning models. To verify whether the project has delivered on its claims, we compare Sylvera-detected canopy cover changes to carbon pool changes and harvesting levels reported by the project.

CARBON SCORE

Live Wood Score (i.e. net change)

Harvesting Score

Sylvera's Machine Learning outputs

VS

Reported carbon pool changes

Sylvera's Machine Learning outputs

VS

Reported harvesting levels



Introduction

Our proprietary machine learning (ML) models predict canopy cover change. Sylvera's machine learning model was trained on the global forest canopy cover labels on annual composites of Landsat 7 and validated against Lidar data in order to predict canopy cover every single year over the United States and Mexico between the 2000 and 2022 period. Using these relative canopy cover changes over the 2000 to 2022 period, we can classify different types of activities taking place in the project area (PA). Using a separately trained model, the dominant forestry activity per pixel is estimated from the canopy cover time series, and every project area prediction is tested again against at least 400 human labels as part of our quality assurance process to ensure we are completely confident in our carbon score assessment. Both the ML models and our carbon scoring approach have been reviewed by our external Technology Advisory Board, consisting of industry experts and academic leaders from top universities.

Categories of forest change

A model classifies the temporal canopy cover into forest change categories. These categories are then used to infer the amount of harvesting taking place in the project, and the direction and degree of total carbon stock change in the project.

Sylvera assesses the project's carbon stock change by weighting each forest change category based on its magnitudinal relationship with carbon change and then combines these to give an overall measure of carbon stock change. This analysis underpins Sylvera's view of the project activities which is compared to the projects claims. We have taken this approach because these different forest change events, brought about by forest management practices, create the biomass change used for in the project's reporting.



Timeseries

Matrices of agreement

We consider the proportional magnitude of change Sylvera has observed versus the proportionate magnitude of carbon stock change and harvest volume reported by the project. Matrices of agreement are used to compare these two magnitudes of change.

(i) Live wood score: We take the net change reported across all of the project's verified vintages and comparison against the Sylvera carbon change we derive from the canopy cover changes and forest behaviors. A carbon score below 100% arises only when the Sylvera detects higher carbon stock loss than the project reports.

(ii) Harvesting score: We assess the likelihood that the amount of wood the project claims to have lost to harvesting is valid by comparing the Sylvera detected deforestation to the amount of wood harvested that is reported by the project. A project's score will be negatively impacted when a project reports small harvested wood, but Sylvera detects large clear cutting.



Note: these matrices are representative, and are not meant to be interpreted as the matrices used for scoring.

Additionality score

What is it?

Sylvera's additionality score assesses whether (1) emissions reductions above and beyond what would have occurred in the "business as usual" case have materialized as a direct result of revenue from carbon revenue and (2) the likelihood and severity of over-crediting risk that emanates from baseline quantification, gerrymandering or leakage. The additionality score is a blended view of whether the projects' activities would only have taken place as a result of the offset project revenue (additionality of activities) and a measure of whether any additional climate benefit has been overstated in terms of crediting volume (over-crediting risk).

Additionality is scored on a 1 to 5 scale that distinguishes the relative degree of additionality between projects. The additionality score is the result of the integration of additionality of activities and over-crediting risk utilizing an asymmetric matrix with applied thresholding logic. The thresholds ensure poor performance in one component is not obscured by high performance in another.

Why does it matter?

If the emissions reductions claimed by a project would have occurred without revenue from the sale of carbon credits then they are not additional. Additionality can also be undermined if a project has issued too many credits. Additionality underpins the validity of credits issued by a project. If the project is not additional, then one credit purchased does not equate to 1 metric ton of carbon sequestration and yields no climate benefit above the business as usual scenario. A measure of the likely additionality of carbon credits is, therefore, essential to understand their true climate impact.



Improved Forest Management Project Scenario

IFM includes activities such as growing older forests, stocking improvement, retention of the best-growing trees avoiding damage of retained trees at harvest, etc.

Potential Baseline Scenarios

There are multiple potential outcomes for a given project area, most of which are based on management that is focused on short-term economic returns. This may occur through short rotations, harvesting the best-growing and most valuable trees, and leaving only slow growing or poorly formed trees, or oven conversion to other land use.

Standardized Baseline

A representation of business-as-usual for the project, which is based on an analysis of legally-binding and financially feasible criteria, and further governed by a performance standard, which is a statistic of average carbon stocking within a given forest community (common practice) and is conservatively defined to avoid over-crediting.



What is it?

A project is additional if the carbon revenue bridges the economic viability gap such that emission reductions that are realised though project activities, would not have taken place without carbon revenues. Revenue that is sacrificed as a result of reducing emissions from improved practices in the business case where carbon revenues don't exist, and whether or not that revenue gap is significant enough that these improved practices would have never taken place. Sylvera leverages diverse sources of evidence to assess the viability gap of a project through the lens of financial additionality, policy and regulatory landscape, and common practice analysis.

Additionality of activities	Financial additionality: We check the project economics to see if the project activities would be sub-economic in BAU scenario and that the offset revenue bridges the economic viability gap of the project. If the IFM practices are financially viable and attractive without offset revenues then the carbon credits issued by the project are likely not additional.
	Policy & regulatory landscape: We evaluate country and state regulations and defined best practices to understand whether the legal and likely IFM practices benchmark is truly being exceeded in the project activity. If there are regulations or incentives in place that enforce or encourage the IFM practices in the project-scenario, or would have hindered the activities described in the BAU scenario, then the carbon credits issued by the project are likely not additional.
	Common practice analysis: We assess both the project area's activities with respect to a relevant proxy and the BAU proponent's historic forest management practices. If the BAU proponent does not have a demonstrable history conducting the activities in the BAU scenario or the BAU practices are more aggressive than common practice in the area then the carbon credits issued by the project are likely not additional.



Scenario

An additional project is one where the improved forest management activities would not have taken place without the carbon offset revenue. The improved forest management activities in place are conclusively going above and beyond what is common practice in area and what would likely to have been put into place by the BAU proponent. The IFM project activities must be sub-economical without the offset revenue and the offset revenue directly triggers the behavior change between the BAU and with IFM project scenario activities.

(i) A project may claim that the land would have been harvested aggressively by either a proponent with no history of harvesting and no real intention to do so, or at atypical aggressive levels compared to regional or nearby levels. In these cases, the forest management practices put in place in the project case may not represent any real additional carbon sequestration due to the reliance of the BAU scenario.

(ii) A project may claim that they planned to continue managing a forest utilizing the same practices they have a demonstrable history of using. They have chosen to forego revenue through reduction of harvesting rates, which makes the project a sub-economical pursuit without offset revenue, rendering it an additional project.



IFM scenario

What is it?

While additionality of activities is challenging the BAU scenario, over-crediting risk is challenging the quantification of that scenario and factors that contribute to the crediting, such as leakage and gerrymandering. Our assessment of over-crediting risk is broken down into three elements: strength of baseline, gerrymandering, and leakage.

Over-crediting risk	Strength of baseline: This assessment is dependent on the protocol used by the project, as the issuance mechanisms vary significantly. For example, if the methodology is set such that baseline quantification is determined by a control area then we test the validity of that control area. Alternatively, if the baseline quantification is based on prior harvest rates present in the project area, then we validate the rates historically observed. A project's issuance is considered reasonably estimated if the baseline carbon stocks proposed for the project are truly reflective of the BAU case.
	Gerrymandering: We assess the shape of the project area and whether biomass, using canopy cover as a proxy, is significantly greater within that project that the immediate surroundings. Buffer zones and physical landscape influence on PA shape are taken into account. As crediting derives from the ongoing carbon stock pools in the project area, if the project has chosen to disingenuously exclude lower carbon stock areas, this may result in inflated issuance.
	Leakage: This assessment is dependent on the protocol used by the project, as the issuance mechanisms vary significantly. Parameters specific to the protocol are tested. If the project does not appropriately account for potential leakage, as a result of activity shifting or market leakage, then this will lead to inflated issuance.

Permanence score

What is it?

Permanence refers to the risk that the avoided emissions will later be reversed and released back into the atmosphere. Our permanence score uses a risk matrix approach for each of the six major risks to carbon stock. The final score is calculated considering the additive and maximum risks present in the project. The input of climatic variables, record of past events, project specific conditions and mitigative activities are used to inform the risk scoring. We also consider the interactivity of any risks present (e.g. drought events can exacerbate the likelihood of a pest outbreak). Permanence is conceptualized as a scale that distinguishes the relative degree of non-permanence (or reversal) risk between projects.



Likelihood of loss event

Input data

The permanence score leverages a range of observational and modelled data, meaning we are able to assess historically and into the future under different IPCC emissions pathways. The analysis utilizes cutting-edge scientific standards and remote sensing in conjunction with local project conditions and any mitigative activities in place.





Note: the data displayed is real but the underlying index data has been manipulated for the sake of visualization, not interpretation.



Co-benefits rating

What is it?

Sylvera's co-benefits rating examines the extent to which the project is implementing activities to support local biodiversity and communities, as well as the scale and likely impact of these activities.

How do we assess the co-benefits of IFM credits?

As IFM projects are managing a semi-natural ecosystem, that background level of biodiversity can either be protected, promoted or come to harm as a result of project management activities. We verify that the project is adhering to the requirements of methodology, which sets the benchmark of contributions. Whether the project has taken step to exclude buffer zones, obtain certification and have comprehensive sustainable management plans are all positive indicators. Further, we use geospatial analysis and leverage our partnership with IBAT to assess the background level of biodiversity that is within the project area, using threatened species, biodiversity, and protected area data.

When assessing community impact, we utilize data disclosed by project developers and the SDG framework to triangulate a project's community impact. IFM project activities by their nature require a large workforce. We assess whether this employment contributes to SDG 5 (Gender Equality) and SDG 8 (Decent work and economic growth), benchmarking against the country's performance for that SDG. So if a project is in a country that is performing poorly against SDG 5, but the project has ensured a more even gender split in its employment, it will get a very good score.

BIODIVERSITY

BIODIVERSITY RISK CHECK

A project area that was highly degraded and implements minimally disturbing land preparation activities would achieve a high score.

RICHNESS & DIVERSITY

Projects planting a variety of native species in a majority of the project area with minimal chemical application would achieve a high score. Projects which create a wildlife corridor are also rewarded with points.

PROTECTION & PROMOTION

Projects that maintain a biodiverse forested area are considered to have greater biodiversity impact.

COMMUNITIES

SUSTAINABLE DEVELOPMENT GOALS

We independently identify which UN SDGs the project is contributing towards by assessing the activities implemented by the project.

SCHEME

We determine whether the scheme is novel or ongoing, and if it goes beyond activities currently implemented in the region. We also assess whether the project makes a foundational contribution to activities that support SDGs.

IMPACT

We determine the relative impact of activities on local communities by scaling the SDG impact against country level performance, the size of the population affected, and the carbon removals achieved by the project.



Our rating categories



The terms "investment grade" and "speculative grade" are market conventions and do not imply any recommendation or endorsement of a specific project for investment purposes.

Investment grade categories indicate relatively low risk, while ratings in the speculative categories signal either a lower level of potential impact, a relatively high risk to the project in the future or that an important negative event has already occurred.

Sylvera may also disclose issues relating to a project that means that it can not be rated. Such issues can be fundamental red flags (such as potential fraud) or the absence of the necessary data to produce a rating (such as high error shapefiles).

To arrive at our Sylvera rating (AAA-D) we first integrate additionality of activities and over-crediting risk to get an overall additionality score. Next, we use a matrix to generate our impact score by combining our carbon and additionality scores. Lastly, we integrate the impact and permanence scores via a matrix to arrive at our top level Sylvera Rating.

This same process is followed for the different types of projects, however, matrices are adjusted to each project type.

When we don't have access to all the key project data required to evaluate the carbon performance, additionality and permanence of a project, we cannot publish a complete Sylvera rating. Instead, we issue a Provisional Rating (P) based on the best data available today.

Sylvera undertakes a developer engagement process as part of our ratings process, giving developers the right to respond and provide additional data (such as more accurate geospatial reference information or maps). Many project developers model transparency and make project information readily available, but there are some who manipulate data and are not as forthright and transparent. Missing project information is a major red flag, as it is often an indicator of a poor quality project.



The project has delivered the verified emissions reductions relative to the baseline.

Sylvera detects the same level of carbon stock change as the project.



The project has under delivered on verified emissions reductions relative to the baseline.

Sylvera detects less net carbon pool change and/or higher deforestation than is reported by the project.



The project has not delivered any emissions reductions and should not be issuing credits.

Sylvera detects significantly more deforestation than the project reports.

Interpreting the additionality score



Indicates very high confidence that a project is additional.

Example: The project has a very low risk of over crediting. There is a significant difference in activities between the "business as usual (BAU)" and the "with project" scenario. The project activities implemented were a direct result of the revenue derived from the carbon project.



Indicates high confidence that the project is additional.



Indicates the project is likely additional.

Example: There is potential risk of over crediting. There is a difference in activities between the "business as usual (BAU)" and the "with project" scenario. The project's activities implemented may be a direct result of the carbon revenues.



Indicates uncertainty about the project's additionality claim.



Indicates we found a serious red flag questioning the project's claims of additionality.

Example: The project has a high likelihood of severe over crediting and/or the activities implemented to increase carbon stock or reduce emissions would have occurred in the absence of carbon revenues.

Interpreting the permanence score



Indicates very high permanence and low risk, the project carbon credits are very likely to remain valid long-term.

Example: Across all pillars of loss, likelihood and severity of carbon stock loss are low. The project also implements effective mitigation activities.



Indicates high permanence, the project carbon credits are likely to remain valid long-term.



Indicates moderate permanence, the project carbon credits may remain valid long-term.

Example: No pillar of loss is above 'Moderate' risk.



Indicates low permanence, the project carbon credits are unlikely to remain valid long-term.



Indicates very low permanence and high risk, the project carbon credits are highly unlikely to remain valid long-term.

Example: At least one pillar of loss component has scored as 'Extreme' or more than four components have scored as 'High' risk.

Interpreting the co-benefits rating



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Sylvera is the leading carbon credit ratings company. We help corporate sustainability leaders, traders and asset managers confidently evaluate and invest in high quality carbon credits. By creating the first carbon intelligence platform, Sylvera is raising the bar on project accounting and analysis, and introducing a much needed source of truth for carbon markets. We are backed by renowned investors like Index Ventures, Insight Partners, LocalGlobe and Salesforce Ventures.

To learn more about Sylvera, <u>contact us</u>.

