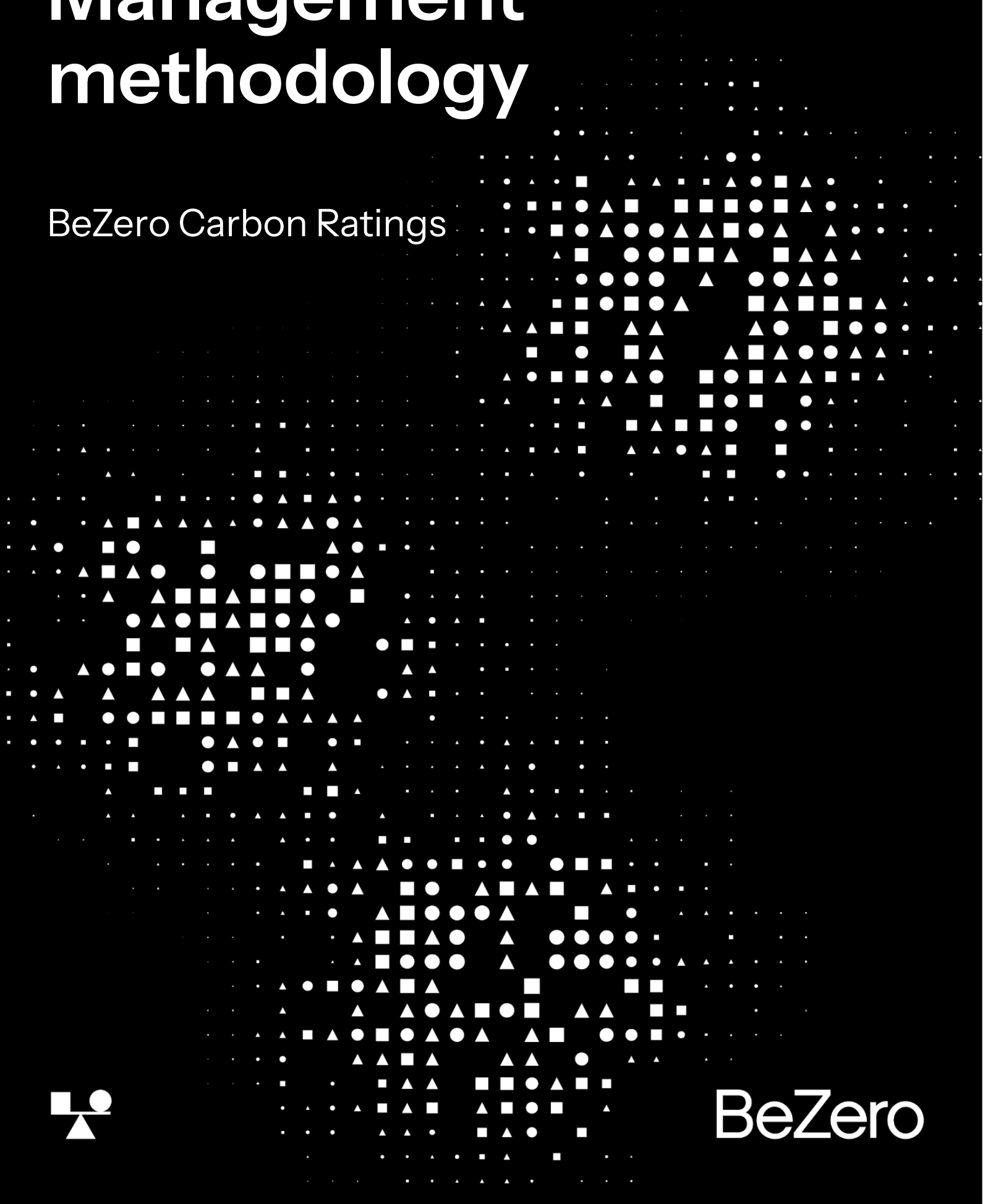
Improved Forest Management methodology

BeZero Carbon Ratings



BeZero

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Glossary

Baseline: A baseline is a state that change is measured against. An emissions baseline is the amount of emissions that have previously occurred and would continue to occur in the absence of any mitigation strategies.

BeZero Carbon Rating (BCR): The BeZero Carbon Rating is a hybrid analytical framework that fuses financial, scientific, and policy-based analysis. It provides an opinion on the likelihood that a given credit achieves a tonne of CO_2e avoided or removed.

Buffer pool: The buffer pool is an account of non-tradable credits that projects contribute towards and serves as a communal reserve for Nature Based Solutions. Contribution amounts are based on the methodology. If a project loses its carbon stocks, for example to fire or disease, buffer pool credits can be used to compensate for the loss. Alternatively, projects that effectively mitigate the risk of carbon loss can regain the credits they contributed to the buffer pool.

Carbon finance: Financial resources allocated to activities that reduce or avoid greenhouse gas emissions. It is a source of revenue that seeks to make such activities more financially viable.

Carbon pool: Ecosystem components that have the capacity to release, sequester and/or store carbon. These include above- and below-ground biomass, soil organic carbon, soil inorganic carbon, deadwood, litter and harvested wood products.

Commitment period: The duration or horizon over which a project commits to carbon sequestration or abatement as a result of project activities. Commitment periods differ from crediting periods, which are the timeframes over which reductions or removals are eligible for issuance as verified carbon credits.

Methodology: A framework that sets out a process and parameters for quantifying the carbon benefits of a project. Methodologies enable project developers to quantify baselines, assess key aspects like additionality, and define necessary monitoring practices to ensure the greenhouse gas emission reductions are verifiable, additional and quantified.

Project area: The geographical boundaries within which project activities take place.

Rating Committee: A group of members with extensive experience within and across all sectors who discuss and debate the assignment of ratings. The Rating Committee oversees the analytical process and ensures consistency in the application of ratings criteria, methodologies, and comparability of ratings across sectors and countries.

Stakeholders: Individuals, and/or groups of people who may be affected by the implementation and activities of a project.

Standards bodies: Organisations that develop and revise methodologies to determine the greenhouse gas benefits of various types of carbon projects, and inform when and how many credits projects can issue.

Vintage: The vintage year refers to the period of time when the emission reduction or removal associated with a credit occurred.

Introduction

BeZero Carbon is a global ratings agency for the carbon market. Our ratings provide a publicly available, risk-based framework for assessing carbon efficacy. We rate qualifying carbon credits in all sectors.

We take a research-first mindset, fusing traditional capital markets research practices with expertise in environmental sciences and technology. We think creatively about climate problems and build solutions the whole market can use.

We have developed extensive analytical frameworks to rate carbon credits on their likelihood of delivering on their promised carbon emissions avoidance or removal. These analytical frameworks are deeply sector nuanced and bring to the fore our extensive experience in rating hundreds of projects across dozens of sub-sectors.

Our ratings team is made up of circa 60 analysts who create the models and perform the analysis for every rating. They combine expertise in climatic, biological, and Earth sciences, in disciplines from remote sensing, forest ecology, ecosystem disturbance, peatlands and blue carbon through to statistics, machine learning, artificial intelligence, sell-side financial research, industrial engineering, and public policy. They hold over 20 PhDs, have published over 200 academic papers and have been cited over 10,000 times in peer-reviewed, scientific academic literature.

As the market's number one risk metric, our ratings are available on our website and dozens of marketplaces, and alongside extensive analysis and research on our BeZero Carbon Markets platform.

What is Improved Forest Management?

IFM is the practice of managing existing forests to increase carbon stocks relative to a baseline, particularly a baseline that does not involve permanent forest clearance. BeZero Carbon's Improved Forest Management (IFM) methodology is a tool for users of the BeZero Carbon Rating to better understand our multifaceted ratings approach to the sub-sector.

In the Forestry sector, the market broadly categorizes credit issuance as both avoidance and removal. IFM, along with J-REDD+ and Forested Peatlands, are the Forestry sub-sectors that can issue both types of credits, but our IFM methodology is agnostic to which type of credit is generated, except in certain technical elements of how we assess market leakage. We otherwise treat avoidance and removal credits equivalently under our IFM methodology, as both avoidance and removals in IFM derive overwhelmingly from similar activities of avoided timber harvest. In IFM, avoidance credits are generated by avoiding timber harvests to a degree that avoids a carbon stock drawdown at the scale of the project area, and removal credits are typically generated by avoiding timber harvests to a degree that drives project-level carbon stock accumulation via tree growth across the entire project area. A small minority of projects generate removals via management actions that directly enhance forest growth rates. BeZero takes no view on the utility of categorizing IFM credits as avoidance versus removal via this criterion.

In the BeZero Sector Classification system, IFM is one of five Forestry sub-sectors within the Nature Based Solutions (NBS) sector group (Figure 1).

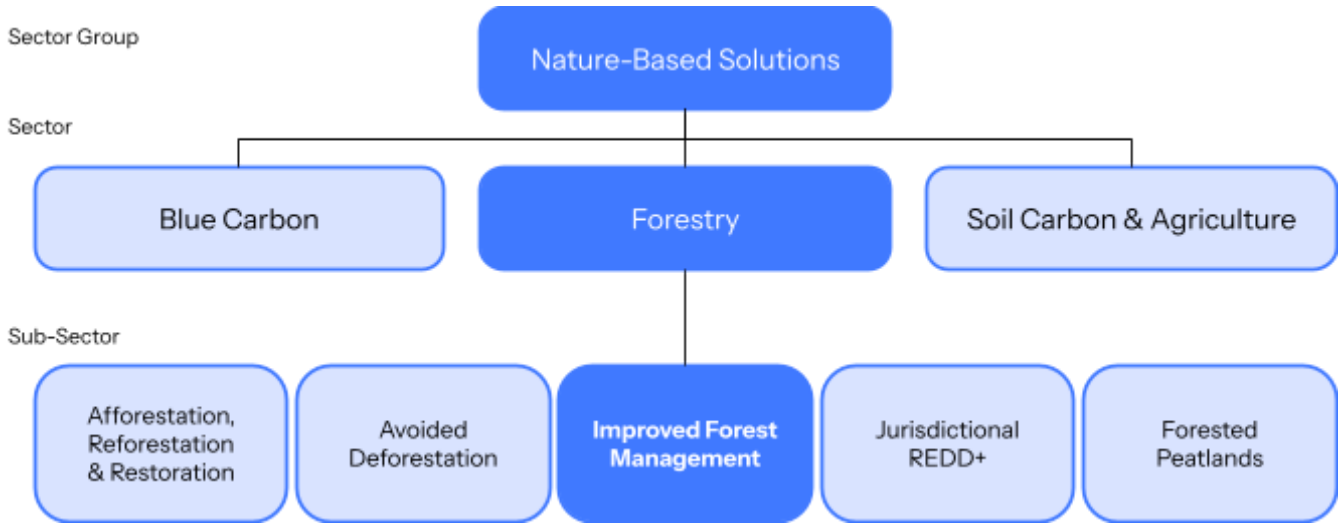


Figure 1. The location of the IFM sub-sector within BeZero's Sector Classification System.

IFM can be summarised as a series of measures that aim to alter harvest practices or regimes to increase net carbon stocks and/or reduce greenhouse gas emissions in a given area when compared to business as usual forestry practices. IFM techniques can reduce CO_2 emissions both from the avoidance of forest clearing and reduction in selective logging. Less frequently, projects may deliver impact by enhancing forest growth via specific silvicultural practices, or altering harvesting strategy to produce a greater proportion of long-lived harvested wood products. Finally, reduced impact on carbon-rich forest soils can also reduce emissions to the atmosphere, though IFM project methodologies typically do not account for changes in soil carbon dynamics.

Within the sub-sector, different project activities can be carried out depending on the goals of a given project and the history of management practices in the area. A non-exhaustive list of silvicultural management practices that can be encompassed within the sub-sector is found below:

- Halting harvest
- Reducing harvest levels
- Extending rotations
- Thinning for stand improvement and fuel management
- Promoting uneven-aged forest management
- Facilitating stand re-establishment/regeneration
- Avoiding logging damage to remaining trees
- Selecting for specific species
- Minimising soil disturbance
- Retaining coarse woody debris in a stand
- Implementing silvicultural practices to enhance growth rates

Additional sub-sector qualifiers for IFM

IFM encompasses a broad range of project activities that generally relate to altered management of existing forest. The specifics of the proposed changes in forest management largely determine how we assess each risk factor. To determine our approach at the most basic level, we use unique sub-sector qualifiers, which enable project labelling and grouping. For the IFM sub-sector, these qualifiers are harvesting strategies and forest type. Below we describe the key features that determine qualifying labels:

Harvesting strategies

- **Ongoing commercial harvest:** Projects that do not result in the cessation of commercial harvesting within the crediting period, but aim to harvest at reduced levels or in a manner that promotes improved forest growth.
- **Medium-term harvest cessation:** Projects that result in the arrest of commercial harvesting over the first crediting period, with no legal encumbrances to continue harvest cessation after this point.
- **Long-term harvest cessation:** Projects that result in the arrest of commercial harvesting, usually via legal designation as protected area, lasting longer than the first crediting period.

Forest type

- **Plantation forest:** These projects occur in managed forests in which the trees are planted.
- **Natural forest:** These projects occur in forests in which the standing trees were not, in the main, planted by humans.

Market context

In this section, we continually refer to the data for the entire carbon market as of September 2026. Data here are mostly collected from four major standards bodies: American Carbon Registry, Climate Action Reserve, Gold Standard, and Verra, and reflect a sample of 16,731 projects for which BeZero has individually assessed sector classification. These projects represent 95.3% of total carbon market issuance.

IFM projects are able to generate both avoidance and removals credits (i.e., avoided harvest and enhanced carbon sequestration), though IFM project methodologies have only been distinguishing between these two types of credits since May 2022. As of September 2026, projects in the IFM sub-sector had issued more than 328 million credits. This represents around 7% of total issuance classified. Compared to other project sub-sectors, IFM projects have issued the sixth-most credits of all listed sub-sectors, after Wind, Ozone-Depleting Substances & Other Refrigerants, Hydro, Avoided Deforestation, and Nitrous Oxide (N_2O). IFM projects also represent 5% of the total number of projects classified, with 791 projects distributed across 33 countries - primarily the USA, Mexico, China, and Canada (Figure 2). This emphasises the comparative importance of the sub-sector for the carbon market.

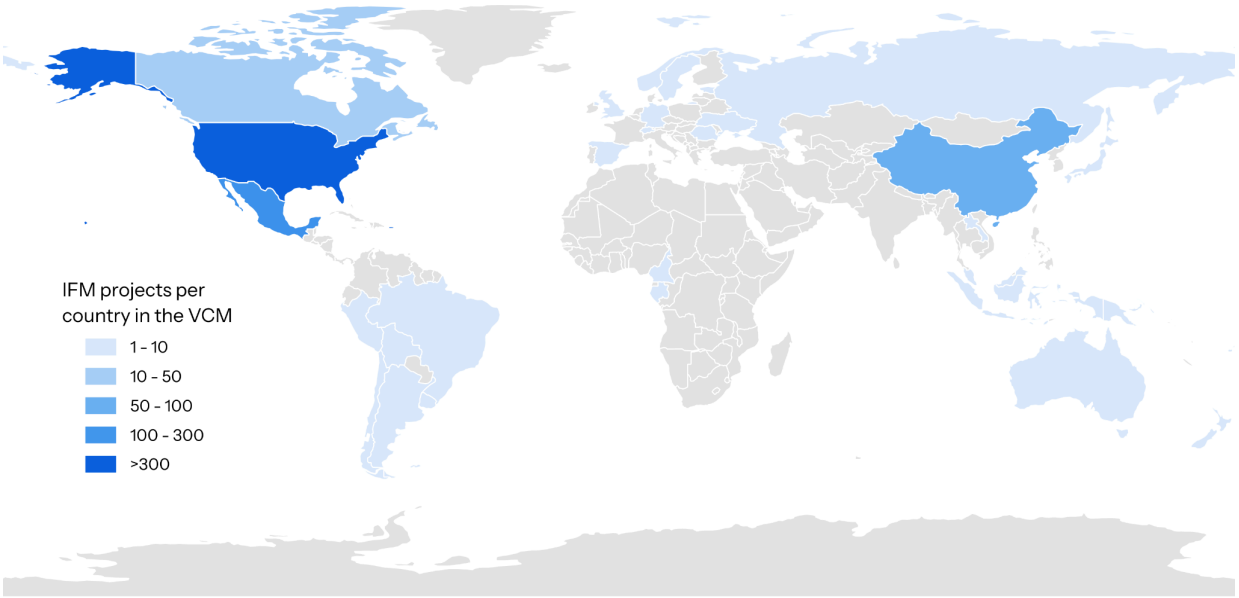


Figure 2. The global distribution of IFM projects as of September 2026.

Most of the issued credits in the IFM sub-sector (87%) are from projects in the USA, due to the high concentration of IFM projects there. The largest number of retired IFM credits is also seen in the USA, with more than half of all retirements in the sub-sector.

There are 19 methodologies currently used by the 791 IFM projects across our sector classified dataset; five of these methodologies, used by 10 projects, are yet to issue credits (Table 1). The most frequently used is ACR's *IFM on Non-federal U.S. Forestlands*, which is used by 27% of IFM projects, resulting in 17% of the sub-sector total issuance. The CARB *U.S. Forest Projects* methodology accounts for 25% of IFM projects but more than 60% of sub-sector total issuance.

Table 1. Methodologies applied by IFM projects, as of September 2026.

IFM methodology	Number of projects	Percentage of total issuance (%)
ARB compliance offset protocol: U.S. forest projects	197	61
ACR protocol: improved forest management (IFM) on non-federal U.S. forestlands	216	17
CAR protocol: U.S. forest protocol	35	8
CAR protocol: Mexico forest protocol	138	6
VM0010	113	4
VM0012	17	2
BC protocol: forest carbon offset protocol (FCOP)	5	1
VM0003	19	<1
VM0005	4	<1
ECY compliance offset protocol: U.S. forest projects	11	<1
ACR protocol: improved forest management (IFM) on Canadian forestlands	17	<1
VM0011	1	<1
VM0034	1	<1
VM0045	9	<1
ACR protocol: improved forest management (IFM) on U.S. timberlands	1	0
M-ICR015	1	0
Nakau methodology framework	2	0
VM0035	1	0
WCC protocol: UK woodland carbon code	3	0
Total	**791**	**100**

BeZero Carbon Rating analytical framework and process for IFM

We have designed an approach to assessing the carbon efficacy risk for issued carbon credits. This framework is applicable to any project type in any sector accredited by any standards body, and leverages a blend of qualitative and quantitative factors; financial, environmental, policy assessment techniques; and primary and secondary data sources.

Our BeZero Carbon Rating Methodology details our risk based assessment for understanding and interrogating the efficacy of issued carbon credits of any type, in any sector and country.

The BeZero Carbon ex ante Rating Methodology similarly describes our framework for assessing carbon efficacy of credits yet to be issued from projects of any type, in any sector and country. Ex ante ratings will also consider project execution risk.

Sector methodologies can be seen as nested within the overarching ex post or ex ante methodologies. The overall rating definitions, risk factors and risk driver categories are common across all projects while the sector methodologies complement the overarching methodologies.

This document provides an extension to our overarching rating methodologies. It presents BeZero's detailed analytical framework and process for IFM projects. It showcases the various parameters through which we assess risk to the carbon quality of these credits, and how this sub-sector relates back to our overarching ratings methodologies.

Holistic assessment

The assessment of a carbon credit's efficacy includes a detailed, project-specific, bottom-up, and top-down analysis, to provide a comprehensive assessment of risk. Further details on the risk factor definitions, the rating process, and the overall risk assessment can be found in our BeZero Carbon Rating Methodology. For pre-issuance ratings please consult the BeZero Carbon ex ante Rating Methodology.

Important elements of the BeZero Carbon rating process that are applicable to all project types are described in detail in these documents (but not repeated in this document). These include:

- The steps in the rating process
- The project governance assessment
- Project boundary auditing
- Assessing the risks of double counting
- The integrity of reported issuance
- Assessing rating eligibility (whether projects meet our three primary qualifying criteria)
- The rating assignment process
- The role of the BeZero Carbon Rating Committee
- Ongoing monitoring and 'rating watch' process

Sector and country analysis

Our assessments are based on all available project documentation - for example, project design documents, monitoring reports, and verification reports - in combination with our in-house models, frameworks and databases. These include geospatial and Earth observation evidence and techniques where relevant, and a curated database from peer-reviewed literature, industry research and third-party datasets totalling more than 23,000 sources as of September 2026.

Specific to the IFM sub-sector, the number of relevant top-down sources runs almost 1,500 as of September 2026.

Standards and methodology screening

Our analytical approach evaluates the rules of each standards body and each methodology on an individual basis, and how they may contribute to the carbon efficacy risks of implemented projects. This screening includes an assessment of methodology development and consultation (for an overview of why this is important, see our Insight on carbon market methodologies). Further to this, we consider all deviations from methodologies exhibited by projects. For IFM, this may include deviations in for example baseline assessments, minimum monitoring standards, and eligible ecosystems. We also consider the risks associated with projects that apply older or invalid methodologies, for example, due to outdated emission factors and global warming potentials.

Under the top-down analytical lens of evaluating risks associated with methodologies and whether projects conform to them, we present key parameters in the assessment of IFM in Table 2.

Table 2. Key parameters of methodology screening for IFM.

Top-down parameter	Additionality	Carbon Accounting	Permanence
Methodology	Robustness and qualitative nature of certain additionality tools	Various allowed approaches to predicting baseline forest management practices	Minimum allocation to the buffer pool
	Inclusion of ecosystem types (e.g. old-growth forest)	Inclusion of carbon pools	Requirements to re-evaluate permanence risks
	Project area definitions (e.g. national definitions of forests and wetlands)	Approach to calculation of leakage deductions	

Monitoring of registry operations and credit tracking also form part of our analytical process. We screen registry and standards body rules and processes, and take account of any strengths or weaknesses, in our assessment of relevant risk factors. This includes reconciliation of data and risk buffer rules (see our report on buffer pools) and their potential implications for over-crediting and permanence risk respectively.

Project-and vintage-specific analysis

Our bottom-up assessment considers all publicly-available project documentation and data, including that provided by the standards body, registry, or project developer, and any information from third-party sources, and data sourced using our internal models, notably including proprietary geospatial and Earth observation evidence and techniques where relevant.

Vintage-level assessments are made on two fronts:

1. **Project reporting and crediting:** Our analysis ensures that, across each ratable vintage for a project, we identify whether projects correctly issued credits towards the market and buffer pool and that where credits are transferred, vintage labelling correctly maps onto cancellation certificates.

2. **Risk factor assessments:** For each of our carbon efficacy risk factors, our analysis spans each ratable vintage of a project. This allows us to incorporate changes in project boundaries, baselines, issuance and buffer contributions over time. It also enables a dynamic process for assessing the role of policy, changes in forestry investment landscapes, and other exogenous factors in reducing forest loss and productivity relative to the project.

Geospatial and Earth Observation

For all NBS projects, data and analysis from our Geospatial and Earth Observation team forms a core part of the analytical process. The team draws on a diverse set of data inputs, including but not limited to airborne and spaceborne LiDAR, synthetic-aperture radar, and multispectral measurements, with spatial resolutions ranging from centimetres to kilometres, and temporal frequency and coverage from days to decades.

Other geospatial inputs include data on road and river networks, human demographics, land ownership and governance, soil and climate data, and biodiversity. We also draw on our extensive database of ground-measured carbon, spanning thousands of forest inventory sites globally. These geospatial data are combined in statistical and machine learning frameworks to inform project- and vintage-level risk associated with common practice, over-crediting, leakage and non-permanence.

Three geospatial capabilities are central to our current IFM analysis and are referred to throughout this document.

1. **Statistically-matched dynamic baselines.** We construct a counterfactual for the project area by matching each forest pixel within it to control pixels in the wider landscape. Controls are selected so as to be similar to the project area in all relevant observable respects - including land ownership class, land designation, jurisdiction, topography, and forest characteristics - and to be subject to similar pressures, but to have no carbon project intervention. Because there is no perfect set of controls, we repeat the matching process many times to characterise uncertainty, and we track outcomes in matched pairs through time. For IFM we use this approach in two ways: to compare harvesting activity inside and outside the project area, and to compare change in carbon stock density. This procedure is led at every stage by our geospatial and ratings analysts, so that models do not become black boxes, and analyst feedback is incorporated to ensure conclusions are grounded in ecological reality and in the local context of the project being assessed.

2. **High-frequency forest carbon and structure monitoring.** Through our partnership with Planet Labs, we use Forest Carbon Diligence and Forest Carbon Monitoring products to observe canopy cover, canopy height and aboveground carbon density at high spatial resolution and regular temporal frequency. This allows us to detect not only stand-replacing harvest but also partial-canopy events such as thinning and selective logging, which are poorly captured by conventional tree cover loss products and which are central to IFM. We are explicit about the limitations of these data: they capture the avoidance component of an IFM intervention (i.e., the absence of loss under the project scenario) considerably better than they capture gradual biomass accumulation in standing trees. Where we rely on them to interrogate removals, we do so qualitatively and in combination with inventory and literature evidence, rather than treating them as a precise measure of carbon stock change. We also note that these products use the following year's observations to bias-correct the current year, so the most recent year in a series can exhibit spurious variation and is interpreted with corresponding caution.

3. **Forest inventory integration.** We maintain the BeZero Carbon Plots Database, which combines ground-measured carbon from private collections, national inventories, international plot networks, academic studies and research partnerships, spanning more than 300,000 sites across all six forested continents as of September 2026. It harmonises stem-level estimations of tree volume and species-specific wood density, linked with allometries, geospatial information and our markets data. For IFM specifically, we integrate national inventory programmes (such as the Forest Inventory and Analysis (FIA) programme of the U.S. Forest Service and Mexico's Inventario Nacional Forestal y de Suelos (INFyS)) which allow us to benchmark project-reported carbon stocks, growth rates and root-to-shoot ratios against measured values for comparable forest types in the vicinity of the project area. Where

national inventories are absent or otherwise unreliable, our analysis is driven by literature values and, where appropriate, remote sensing.

The BeZero Carbon Rating reflects the balance of evidence across all types of information, geospatial or otherwise. Subject to project-specific characteristics and evidence, our geospatial analysis may not be paramount in the final rating view if, for example, financial, policy or other analysis is deemed more decisive. In all cases, non-spatial data - for example buffer pool contributions - provide essential context. Where the quality of matching or of the underlying data is insufficient to support a conclusion, we say so and weigh the evidence accordingly rather than relying on it.

Carbon efficacy assessment

Additionality

'The risk that a credit purchased and retired does not lead to a tonne of CO_2e being avoided or sequestered that would not have otherwise happened.'

Whilst the foundational questions that underpin a BeZero Carbon Rating converge at the risk factor level, the inputs used to answer these questions show increasing specificity at the sub-sector and project levels.

Table 3 sets out the risk drivers within our assessment of additionality. In the sections that follow we detail the key parameters that factor into each level of risk assessment.

Table 3. Sub-components of additionality assessed.

Risk factor	Risk driver category	Risk driver
Additionality	Activity analysis	Common practice
		Alternatives to the proposed project
		Project effectiveness
	Financial analysis	Prior consideration of carbon finance
		Investment analysis
		Barrier analysis
		Benefit sharing
	Legal and policy	Land and carbon rights
		Policy support

Activity Analysis

Common practice

Common practice is a major driver of our additionality analysis for IFM projects. Our objective is to determine whether the project's forest management would be practised as standard on similar regional forestland in the absence of carbon finance. If it would, then absent mitigating landowner- or property-specific circumstances, the project activities are unlikely to be additional. The assessment is specific to landowners operating under similar land tenure regimes, forest conditions, and geographies, and considers both the harvest levels and the specific silvicultural practices adopted under the project scenario.

We approach common practice analysis from two directions.

First, we establish what constitutes common practice through a review of the literature and of third-party data, identifying forest management under contexts similar to the project area. Relevant similarities include geography, topography, land ownership class, jurisdiction, forest type, and forest condition. We leverage our internal markets and geospatial databases to assess the prevalence of other voluntary carbon market projects in the area registered on the major standards bodies, and we draw on the World Database on Protected Areas and national-level data on conservation and land use to identify similar initiatives. Where appropriate, we exclude such lands from our view of common practice, as they may not be informative regarding without-project counterfactuals for the

project area. We conduct detailed literature review to unearth any programmes or interventions conducting similar activities that may otherwise have been overlooked, and we assess their relevance to the without-project counterfactual. Our overall view contextualises these findings with data on national, regional and local trends, and with industry and academic literature on harvest levels, rotation length, policy and market conditions.

Second, we compare remotely sensed harvesting activity inside the project area with that observed in our statistically-matched control area over the rated vintages. Where harvest levels within the project area are at or above those observed in the control area, project activities likely represent - or are more intensive than) common practice which implies that they are not additional. Where harvest levels within the project area are below those observed in the control area, project activities likely do not represent common practice, which supports additionality. The magnitude and consistency of any difference informs the strength of that conclusion.

Our conclusion on common practice therefore reflects both whether the project's activities are commonly applied on similar lands in the region absent carbon finance, and whether we can discern a difference in harvesting between the project area and its matched controls. Risk is highest where both point in the same unfavourable direction, and lowest where both point in the same favourable direction.

There are cases in which a project's context is sufficiently unusual that a common practice assessment is neither possible nor informative; for example, where the landowner is a conservation-minded institution with few or no comparable landowners within the relevant geographic range, such that any comparison would be to landowners with materially different forest management attitudes and capabilities regardless of carbon finance. There are also cases in which data quality or matching quality are too low for the dynamic baseline to be relied upon. In both situations we state the limitation and weigh the remaining evidence accordingly.

Alternatives to the proposed project

This risk driver addresses the range of likely counterfactual scenarios - regardless of the baseline scenario the project has selected - and asks whether the counterfactual would involve forest management practices which avoid and/or sequester less carbon than the project scenario. If so, this implies additionality. Our assessment has three components, and a fourth where a project enrols multiple landowners.

Historical practice. We compare forest management under the project scenario to that historically implemented within the project area, drawing on harvest reports, historical forest management plans, timber inventories, and our own observations of forest loss and thinning before and after the project start date. Where we can discern no material difference, this implies that the project represents a business-as-usual scenario. Where the project does appear to represent business-as-usual, we then assess whether there was reason for that to change (in response to market conditions or a change in ownership, for example) because the absence of any such reason weighs materially against additionality.

Market conditions. We assess whether local and regional timber market conditions would incentivise harvest levels greater than those under the project scenario. This includes an assessment of regional mill capacity, specified by the wood product types relevant to the project's baseline, addressing both whether capacity exists to absorb harvest volumes greater than those under the project and whether that capacity has grown in recent years and during the project. Alongside this we assess regional trends in harvested volumes and in stumpage prices for the relevant species and products. Favourable market conditions for a higher-harvest counterfactual generally strengthen additionality, and also reduce the materiality of a finding that project activities resemble business-as-usual.

Readiness for harvest. We assess the propensity for commercial harvesting within the project area at levels greater than under the project scenario. Relevant considerations include whether the

proponent or landowner is a vertically integrated forest products company, a timber investment management organisation, or a real estate investment trust - ownership classes which generally imply a greater propensity for more intensive harvesting; whether the project area has recently changed hands to such an owner, since a change in land ownership is a common trigger for harvest on private lands; and whether stand conditions, such as age and diameter distribution, are consistent with the harvest prescriptions asserted in the baseline.

Adverse selection. Where a project enrols multiple landowners, we additionally assess the risk of adverse selection: that expected harvesting behaviour depends on information known to enrolled landowners but not observable to the project developer, and therefore not reflected in the baseline. This becomes material if participating landowners are systematically less likely to harvest under business-as-usual conditions than the wider population of comparable forestland owners. Data availability significantly constrains this analysis, and our objective is not to prove that adverse selection is occurring across the enrolled population but to establish whether there is evidence that it may be. Relevant evidence includes whether enrolment provides financial benefit to enrollees comparable to baseline forest management (where it is materially lower, the risk of adverse selection increases), the structure of participant outreach and communication, and the existing forest management intentions of enrollees, as indicated by testimonials, land encumbrances such as conservation easements with project-equivalent timber restrictions, and merchantable timber inventory.

Our conclusion ranges from a finding that the project represents business-as-usual with no verifiable evidence that greater harvest levels would have occurred absent carbon finance, through to positive and specific evidence in support of a higher-harvest counterfactual which is not undermined by changes in market conditions or other context.

We note two qualifications. Some projects, by design, involve greater harvesting under the project than previously occurred, most commonly through increased thinning treatments intended to promote growth. For these projects the assessment reduces to whether project activities represent a business-as-usual scenario. Separately, there may be characteristics of a project property or its context which mean that deviations from regional common practice would be expected in the counterfactual, and these are considered on their merits.

Project effectiveness

The extent to which project activities are effectively implemented is a component of our additionality assessment for IFM projects, and applies to ex post ratings. If project activities have not been effectively implemented, then it is unlikely that the project has had an additional impact beyond a without-project scenario. Where a project has been effective in suspending or reducing harvest, the greater implied opportunity cost may in turn support additionality.

To inform this assessment we rely primarily on geospatial observation, comparing levels and patterns of tree cover loss and thinning within the project area since implementation against the harvesting levels and patterns set out in project documentation and associated management plans, as well as on project-reported harvest activity and volumes and any other project-reported activities.

For projects involving a cessation of harvesting, we would expect to observe near-zero tree cover loss and thinning within the project area. Where a project commits to reduce (but not cease) harvest, we would expect to observe a material decrease in observed loss or thinning. Detection of increased harvesting activity since the project start, or activity that appears unchanged, indicates ineffective implementation and elevated risk.

For projects involving an increase in harvesting - typically the introduction or intensification of thinning - we assess whether those activities have occurred as claimed, and whether they have delivered, or are likely to deliver, a material carbon benefit. Where thinning activity appears unchanged, this is properly a consideration for *Alternatives to the proposed project*, and we are careful not to penalise the same finding twice across two risk drivers.

Where trends before and after implementation are inconclusive over the rated period, we say so rather than inferring effectiveness in either direction. In interpreting forest change data we consider its accuracy for the forest type and geography in question, including through visual inspection of imagery and benchmarking against other products. We treat detections of thinning with particular care, since apparent canopy thinning can arise from other causes such as drought.

Financial Analysis

Prior consideration of carbon finance

This risk driver is typically not applicable for IFM projects. The material question for this sub-sector is whether a project's ongoing implementation depends on carbon finance, rather than whether carbon finance was contemplated before implementation began; that question is addressed under *Investment analysis*.

Investment analysis

Our objective is to determine whether the project's ongoing implementation is dependent on carbon finance. If the project's activities are financially attractive in the absence of carbon finance, then it is reasonable to assume that the project is not reliant on carbon finance, and the project is unlikely to be additional.

For IFM projects, the analysis is framed around opportunity cost. The relevant comparison is between the net present value expected under the project's baseline scenario and that expected under the project scenario in the absence of carbon finance; the difference between the two is the opportunity cost the project must overcome. We then assess the extent to which carbon revenues are capable of mitigating that opportunity cost. Where there is little or no opportunity cost associated with the project scenario, or where carbon finance covers only a small proportion of it, additionality risk is elevated. Where the opportunity cost is large and carbon finance covers the great majority of it, additionality risk is reduced.

Constructing this comparison requires estimates of timber revenue disaggregated by product type where possible, forest management costs under each scenario, the incremental costs of carbon project development including registration and monitoring, reporting and verification, carbon revenue based on the project's achieved or targeted credit price, any other revenues such as recreation, hunting licences or grants, and an appropriate discount rate. We seek to corroborate the validity of the data underlying a project's own financial assessment using independent sources including industry data, peer-reviewed research, stumpage price series for the relevant species and products, and in-house expertise. Where the project has provided its own analysis, we attempt to replicate and validate it. We also screen methodologies to assess risks associated with the application of outdated or overestimated investment benchmarks, and subjectivity around future costs, and we cross-examine project-specific assumptions related to the role of subsidies and the sale of forestry products.

We are explicit about the limitations of this work. Our ability to perform it is highly dependent on disclosure, and in the absence of project-provided figures it requires assumptions - particularly around variable costs, which such analysis will often not capture. Where the net present values for each scenario are either not provided by the project or cannot be validated in-house, we do not present numerical results from our own modelling, and confine ourselves to a directional conclusion.

Barrier analysis

This risk driver is typically not applicable for IFM projects. The barriers most relevant to IFM are financial, and are assessed through the opportunity cost framing described under *Investment analysis*. Case-by-case exceptions may apply if projects are overcoming culturally entrenched management practices.

Benefit sharing

This risk driver is typically not applicable to the additionality of IFM projects. Benefit sharing does, however, have a strong association with permanence, and for IFM projects it is assessed under the *Project management and carbon rights* and *Stakeholder engagement* risk drivers within Permanence. Where our assessment of benefit sharing uncovers information pertinent to additionality, it is reflected in the relevant additionality risk driver.

Legal and policy

Land and carbon rights

This risk driver is typically not applicable for IFM projects. Land and carbon rights are material to permanence in IFM and are assessed under the *Project management and carbon rights* risk driver within Permanence. Verifying land ownership can nonetheless be relevant to our assessment of the baseline scenario: if an identified logging agent does not hold, or would not have held, land or logging rights, there is a risk that the asserted baseline harvest would not have been legally sanctioned. Where this arises, it is reflected in our assessment of *Alternatives to the proposed project* and *Baseline scenario*.

Policy support

Our objective is to determine the extent to which existing policies, incentives and mandates encourage or require the project activities in the absence of carbon finance. Projects in jurisdictions that benefit from robust, effectively-enforced policy environments which reduce barriers to implementation are likely to present higher additionality risk. Conversely, carbon finance may be essential to a project's successful implementation where relevant policies are weak, poorly enforced, or actively undermine project activities.

Our approach for IFM focuses only on those policies which directly shape forest management decisions. Broader policy considerations are addressed in our overarching rating methodology and, where they affect double counting, through the separate assessment of that risk described there.

Our analysis has two components. First, we identify policies that restrict forest management within the project area in a manner consistent with the project activities using both our internal policy database and primary research. These may include conservation mandates, mandatory best management practices, harvest restrictions, trade restrictions and similar. We comment on the effectiveness with which those policies are implemented and enforced. Where activities are mandated by policy in a jurisdiction where that policy is effective, additionality risk is high. Second, we identify government programmes such as tax incentives and financial support mechanisms which could incentivise the project activities or other conservation approaches that sequester carbon beyond the counterfactual. We establish which programmes the project area or landowner is eligible for, which they are or have been enrolled in, the level of uptake of those programmes in the region, and the level of support they provide relative to the carbon finance received under the project. Risk is elevated where project activities are heavily supported by government programmes, tempered where such programmes exist but the project has not enrolled in them or does not derive sufficient benefit from them to meaningfully incentivise project activities, and lowest where no supporting programmes exist and existing policy actively undermines project activities.

The practical significance of a given policy instrument to an individual landowner is often not evident from formal descriptions of the policy, including the text of relevant laws and regulations. Each policy identified is therefore assessed with input from analysts with experience of the relevant jurisdiction, and we are explicit where a policy's status or effect on forest management decisions is uncertain.

Carbon Accounting

'The risk that the carbon accounting underlying a credit does not fully achieve a tonne of CO_2e avoided or removed.'

Table 4 sets out the risk drivers within our assessment of carbon accounting.

Table 4. Sub-components of our over-crediting assessment.

Risk factor	Risk driver category	Risk driver
Carbon Accounting	Direct accounting	Baseline scenario
		Project scenario
		GHG conversions
	Leakage accounting	Activity displacement
		Market leakage

Reconstructing the project's crediting structure

Our assessment of carbon accounting begins by reconstructing how a project arrived at its net issuance across the rated vintage period, so that the effect of each subsequent finding can be located within that structure.

Using project-reported values, we establish the project's total gross emissions reductions as the difference between project-area carbon stocks under the baseline and project scenarios. We then decompose that total into its avoidance and removals components following the distinction outlined by major registries and described above (What is Improved Forest Management?). Removals reflect increases in project-scenario carbon stocks beyond any increase that the baseline itself assumes; avoidance reflects the carbon loss assumed in the baseline that the project scenario avoids. From gross emissions reductions we then account for the project's leakage deduction and its buffer pool contribution to arrive at claimed net emissions reductions.

We then construct the equivalent quantity on our own terms. Where our analysis of the risk drivers below leads us to a different view of the counterfactual, of reported project emissions, of growth rates, or of the appropriate leakage deduction, we quantify the emissions reductions that our own assumptions would imply, and arrive at a BeZero view of net emissions reductions for the rated vintages. The proportion of the project's claimed net issuance that our analysis does not support is the central output of our carbon accounting assessment, and the primary determinant of the risk factor score.

Two points of method follow from this. First, quantification is attempted wherever the evidence permits it, including where we conclude that a project's accounting is conservative rather than aggressive. Second, non-trivial assumptions are unavoidable, particularly in establishing an alternative counterfactual. Where the evidence supports a range rather than a point estimate, we present a range, and in conditions of material uncertainty we prefer to do so.

Direct accounting

Baseline scenario

Our objective is to determine the range of plausible without-project carbon-stock trajectories, to determine whether the project's selected baseline scenario is conservative with respect to this range, and if not conservative, to quantify the effect on issuance. This is a major risk driver for IFM projects, and often the most consequential single component of the carbon accounting assessment.

We begin by establishing what the project's baseline represents and how it was determined, the change in project-area carbon stocks it implies over the rated vintage period, and the proportion of issued credits attributable to avoidance. Baseline setting varies materially between IFM methodologies: baselines may be derived from verified historical harvest plans, long-term sustainable yield scenarios, the net present value of wood products harvested, or on-site stocks at project inception, and each approach can produce substantially different baseline emissions. Some methodologies predetermine the baseline across the crediting period; others require it to be re-evaluated against observed outcomes on comparable land. We evaluate the parameters used in the project's model, the assumptions made within it, and the historical land use of the project area.

We interrogate the baseline against two independent references.

The first is the alternative scenarios identified under *Alternatives to the proposed project*. Where those scenarios include business-as-usual (that is, consistent with historical management) we translate observed historical forest loss and thinning within the project area into an average annual carbon stock change, which forms a plausible counterfactual for the rated vintages. For other alternative scenarios, still less intensive than the project's asserted baseline, we establish what that scenario implies for carbon stock change using evidence such as forest management plans, regional trends, timber asset characteristics including stand age, or property appraisals. Where more than one alternative scenario is credible and no single candidate stands out, we quantify each and present a range.

The second is our statistically-matched dynamic baseline, which shows the change in carbon stock density implied by the project's asserted baseline against that observed in matched control pixels over the rated vintages. This provides an independent check on whether the direction and magnitude of the project's asserted baseline are plausible.

Where the project's baseline implies greater carbon stock loss than our counterfactual, the project is likely over-crediting, and we characterise the extent of that overestimation in proportion to the difference between the two. Where the project's baseline is consistent with our counterfactual and with our dynamic baseline, we state that the baseline is appropriate and quantification of an alternative is unnecessary.

Several limitations bear on this analysis and are disclosed where they apply. Our ability to construct a robust counterfactual depends on data availability and varies by project. There are land governance contexts in which the dynamic baseline is uninformative, or requires heavy contextualisation. And, as set out above, high-frequency remotely sensed carbon products capture harvest events considerably better than background forest growth, which means that the difference between our dynamic baseline and a project's asserted baseline may understate the true divergence between them. We therefore generally use these data as a coarse approximation of potential overcrediting, rather than a precise measure of it.

Project scenario

In many IFM projects, some degree of timber harvesting continues under the project scenario. The accuracy of claimed emission reductions therefore partly relies on those activities being appropriately monitored and reported. Our objective is to determine whether a project is accurately monitoring and reporting its own emissions. This risk driver applies to ex post ratings of projects involving some level of harvesting activity. Note that project-scenario carbon stocks are also influenced by tree growth; we treat this issue under 'GHG conversions' (below).

We first establish the level of harvest reported within the project area over the rated vintage period, from verification reports, monitoring reports and harvest reports. Where these are not provided, harvest levels may be inferred from intended levels reported in project design documentation or from verified emissions reductions. We then compare reported harvest against our own observations of forest loss and thinning.

Where harvest levels are clearly disclosed and align reasonably with our observations, reporting is likely accurate. Where they are clearly disclosed but materially diverge from our observations, reporting may be inaccurate. Where they are not clearly disclosed and our observations indicate that harvesting has occurred, there is material uncertainty as to whether reporting is accurate. In the latter two cases we approximate the emissions associated with the observed level of forest loss and thinning, using assumptions of average carbon stock and extraction volume appropriate to the harvesting activity in question, deduct these from the gross emissions reductions reported over the rated vintage period, and express the resulting difference as a proportion of the project's claimed net issuance. Risk rises with the size of that proportion, and is lowest where our observations verify the extent of harvesting the project reports - which may be none at all.

Disclosure in project documentation is frequently poor in this area. Where it is, our assessment is correspondingly brief and high level, and we are explicit that the resulting uncertainty is a limitation of the evidence rather than a finding against the project.

GHG conversions

This risk driver addresses three questions: whether initial carbon stocks have been accurately measured; whether appropriate carbon pools have been included in the project's accounting; and whether claimed forest growth rates are accurate and appropriately applied across both the baseline and project scenarios. In practice, the project's assumed forest growth rate is often the key driver of risk in this section.

Initial carbon stocks. We assess the project's approach to measuring on-site carbon stocks, with particular attention to the sampling design (including use of field measurement, sample sizes, plot size, plot stratification, and whether sampling is random, systematic or transect based) and the appropriateness of the allometric and volumetric equations applied by the project and of any conversion factors, including their specificity to the study region, tree species, vegetation type and sample size, and whether they deviate materially from the literature. We also directly interrogate the carbon stock values that the project reports, and we benchmark those values against measured and published comparators: inventory data for plots in the vicinity of the project area, expressed as an interquartile range so that the comparison reflects natural variation rather than a single point; literature values relevant to the project's forest types, geography and activities; and, where appropriate to the geography and forest type, remote sensing estimates. Where sample sizes within the immediate vicinity are too small to be informative, we widen the search radius, and we state the radius used. Reported carbon stocks outside the credible range established by these comparators does not automatically represent a risk to the project when the sampling approach is highly robust and/or clear explanations exist for a difference in stand structure between the project area and regional comparators. However, regionally atypical reported carbon stocks do pose a risk to carbon accounting when the accompanying evidence base is unconvincing, particularly where the project has undertaken no or insufficient in situ ground measurement.

Carbon pools. As a general rule, IFM projects are expected to account for above- and below-ground biomass, harvested wood products, and standing deadwood. Above- and below-ground biomass are the primary pools subject to project activities and are expected to increase under the project scenario. Harvested wood products are in most projects expected to decrease under the project scenario, which means their exclusion is usually non-conservative. Because different products store carbon over very different timescales, we also assess the mix of product types assumed, and we pay particular attention where the baseline scenario is expected to produce durable products such as saw logs or panel products, or where the project scenario produces durable products and the pool is included in the project's accounting. Exclusion of standing deadwood, which is also expected to decrease under the project scenario, is non-conservative but generally immaterial to our assessment. Exclusion of other pools, such as soil organic carbon, is conservative and likewise generally immaterial.

Growth rate. We establish the growth rate the project relies upon, either as reported, or by combining project-scenario harvesting volumes with project-scenario biomass change, noting that

biomass change alone understates growth where harvest occurs. This is then benchmarked against inventory-derived carbon stock change for comparable plots and against literature sequestration rates for the relevant forest types, geographies and management activities. Where the project's growth rate falls outside both the inventory-observed interquartile range and the range observed in the literature, we substitute a conservative value drawn from the upper end of the observed distribution and carry the difference through to our view of net emissions reductions. Where it falls within those ranges, the project's rate is accepted, but may contribute minor risk when it is notably high and/or poorly substantiated.

Risk under this driver is lowest where reported initial stocks and sequestration rates are consistent with inventory and literature comparators and carbon pool treatment is appropriate or conservative, and highest where reported stocks exceed observed comparators, pools are non-conservatively excluded, and the reported growth rate materially exceeds what inventory and literature support.

Leakage accounting

Activity displacement

For IFM projects, activity displacement is confined to other forestlands owned or managed by the project proponent or landowner. Our objective is to determine whether harvesting has increased on those other lands following the onset of project activities, with no other apparent proximate cause (e.g. timber stands reaching merchantable size). If it has, activity displacement is likely occurring, and the project is over-crediting to the extent that this is unaccounted for.

We first establish whether the proponent or landowner holds or manages forestland outside the project area, and where they do, obtain boundaries for it whenever possible (lack of boundaries generally leads us to assess some degree of information risk around activity shifting leakage). Project documentation is frequently opaque on this point, so this often requires direct information requests to the project developer alongside independent research, and may involve boundary reconstruction and desk-based review of land titles. We then compare tree cover loss and thinning on those lands before and after the project start date, using our own geospatial observations and, where available, harvest reports specific to those forestlands. A notable increase in harvesting activity indicates that activity displacement has potentially occurred; the absence of such an increase indicates that it is unlikely.

Where displacement is observed, we approximate the associated emissions using assumptions of average carbon stock and extraction volume appropriate to the harvesting activity, and express them as a proportion of the project's achieved emissions reductions over the rated vintage period. Risk rises with that proportion.

We also consider forestry policy that may serve to mitigate leakage risk, such as strict enforcement of harvest limits. A comprehensive assessment requires combining geospatial analysis, assessment of the regulatory environment, and monitoring evidence.

Market leakage

Market leakage occurs when project activities alter the supply and demand equilibrium, shifting market dynamics such that emissions avoided or removed by a project are offset by market activities elsewhere. A reduction in harvest volume within the project area may materially reduce wood supply, increasing prices for wood products and incentivising other forest managers to harvest where they would not otherwise have done so. IFM projects that do not reduce harvesting within the project area generally have limited to no market leakage, since there is no impact on market supply. Positive market leakage can also occur, where a project supplies timber to the market that is produced in a manner resulting in fewer emissions than the timber it displaces.

Attributing market leakage to any individual project is extremely difficult and arguably not possible. Our assessment therefore addresses whether any degree of market leakage is likely to be occurring

as a result of project activities, and whether the project's leakage deduction is sufficient to account for it. It has five components.

Broad-scale leakage estimates. We obtain leakage estimates for forestry projects from the peer-reviewed and gray literature, at global scale and, where available, at national or regional scale. Published estimates are used to support and triangulate our conclusions rather than relied upon in isolation. As much as possible, we rely on estimates that are specific or relevant to the project conditions and/or to the programmatic carbon incentives in which the project participates. For example, some evidence suggests that programmatic incentives to situate projects in rapidly growing forests (e.g. due to a focus on credits labeled as removals) may yield different leakage dynamics from programmatic incentives to situate projects in mature and over-mature stands.

Market conditions. We assess whether local and regional timber market conditions would facilitate or constrain leakage, through regional trends in harvested volumes, stumpage prices for the relevant species and products, and mill capacity, specified by wood product type.

Substitutability. We establish the merchantable species comprising the project area and the wood products that would result from harvesting under the baseline, whether those species are abundant in the wider landscape, and whether the same products can be manufactured from alternative species. Where substitutability is high, supply from the project area is more readily replaced and market leakage risk is higher; where it is low, displacement is more difficult and the risk is lower.

Carbon impact of displaced harvest. We compare carbon density within the project area to that of the surrounding region, using inventory data for comparable plots within the wider vicinity and relevant literature values, in order to establish whether displaced harvesting would fall on forests of higher or lower carbon density than the project area. This allows us to understand whether a given volume of displaced harvest implies greater or lesser emissions than the project has avoided.

Risk is highest where market leakage is likely and the project has made no deduction, and reduces as deductions become more commensurate with the leakage our analysis implies. Conclusions that market leakage is negligible or positive are reserved for genuine edge cases and are subject to additional internal review.

Adequacy of deduction. We establish the project's market leakage deduction and the rationale it gives for selecting that value, and we compare it to the balance of evidence arising from the four previous components to arrive at a view of potential overcrediting from unmitigated market leakage. This view is necessarily imprecise, and is not expected to entail an exact value.

Permanence

'The risk that the carbon avoided or removed by the project will not remain so for the time committed.'

Our analysis of this risk factor considers the permanence of climate benefit as it relates specifically to the contractual commitment of a given project and its credits. While permanence is often taken to mean the durability of carbon avoided or removed over 100 to 1,000 years or longer, the concept as applied in the carbon market is beset by inconsistencies and contradictions. To avoid confusion between contractual reality and theoretical debate, our assessment focuses on how long is actually committed to ensuring the carbon avoided or removed remains so, the mechanisms in place to guard against losses, and the strength and accuracy of the claims made.

Our assessment addresses four questions:

- How likely is it that the project's carbon stocks will reverse before the end of its commitment period?
- What is the severity of any carbon stock losses, and how does this compare to the project's credit issuance?
- How likely is it that carbon losses are transient - that is, recovered through regrowth or replanting?
- Is the project properly mitigating this risk through a risk buffer and/or other mechanisms, so as to limit the risk to its issued credits?

Identifying the commitment period

Because our assessment is of reversal risk over the period actually committed, the first step in any permanence analysis is to identify that period. Commitment periods are labelled differently by different standards bodies - as commitment period, project longevity, or minimum project term, among others. In some cases, the commitment period coincides with the crediting period. All identified risks to permanence are then considered in relation to the identified commitment period.

Assessing risk within the committed period allows for comparability between credits on the basis of what has actually been promised. It also means that the variability of commitment periods within and between standards bodies is itself material to a rating, although these appear to be converging (Table 5).

Table 5. Commitment periods for Forestry projects over time, for three standards bodies.

Standards body	Previous commitment periods (years)	Current commitment periods (years)
American Carbon Registry	40 +	40 +
Climate Action Reserve	100	40[1]
Verra	20 - 100	40[2]

[1] As of June 30, 2026

[2] As of January 1, 2024

For each permanence risk driver, we estimate the likelihood that a reversal occurs before the end of the commitment period, and the proportion of the project area expected to be affected. Together these give an expected reversal, which we then translate into an impact on the project's carbon stocks per hectare and compare against the project's issuance. We then consider the effect of the risk buffer and of any other mitigation, such as replanting or committed future deductions, to arrive at a residual, unmitigated risk to the carbon stocks over the commitment period.

Framing the assessment as an expectation rather than a binary outcome matters, because the same expected reversal can be constructed in different ways: a high likelihood of a small reversal and a low likelihood of a total reversal may imply comparable expected losses, and both are captured. Individual risk drivers are assessed on this common basis, which allows risks of very different character - fire, drought, pests, encroachment, loss of rights - to be compared and aggregated coherently.

Table 6 sets out the risk drivers within our assessment of permanence.

Table 6. Sub-components of permanence assessed

Risk factor	Risk driver category	Risk driver
Permanence	Natural risks	Fire
		Extreme weather
		Pests and diseases
		Sea level change
	Anthropogenic risks	Project management and carbon rights
		Encroachment risk
	Risk mitigation instruments	Risk buffer and mitigation
		Stakeholder engagement

Natural risks

Fire

Our objective is to determine the extent to which project carbon stocks, and specifically the carbon benefits delivered by the project, are at risk from fire over the commitment period. If fires are likely to occur within the project area during that period and the tree species present are not generally fire-adapted, reversals are likely and permanence risk increases.

We establish the fire history of the project area and of the surrounding landscape from Earth observation records of burned area and of active fire detections, comparing the periods before and after the project start date. Burned area captures the spatial extent of burning; active fire detections reflect the count of hot pixels at satellite overpass. Combining a historical perspective on fire activity within the project area with a wider view of fires across the landscape allows us to distinguish project-specific risk from regional background.

Where the project has reported a loss event within the rated vintage period, we assess whether its reported magnitude is consistent with our observations of burned area, and where there is notable inconsistency we estimate the potential impact on claimed emissions reductions. Where we observe significant fire activity within the project area since the project start, but no loss event has been reported and fire is otherwise unaccounted for, we estimate the emissions associated with those events and their effect on the project's claimed emissions reductions.

Interpretation is heavily context-dependent. Fire plays a natural role in many dryland and grassland ecosystems, and can be a fundamental ecological process in some forest systems, while causing tree mortality and long-term carbon loss in others. We therefore assess whether the project sits within a fire-adapted ecosystem and what proportion of the species composition within the project area is fire-tolerant. Fire activity across the wider landscape does not necessarily indicate high risk to the project. Conversely, where fire activity in the region is closely related to climate extremes, or is increasing over time, this may indicate rising risk of degradation, and we use climate projections and regional literature to form a view on fire risk over the remainder of the commitment period.

We also assess mitigation. This includes activities specifically directed at fire risk, such as fire breaks, fire marshals and patrols, and their likely effectiveness. It also includes the effect of the project's core IFM activities themselves, which can cut both ways: avoiding clearcuts of uneven-aged stands containing large trees may inherently reduce fire risk, whereas deferring the thinning of dense young stands may increase it.

Extreme weather

This risk driver addresses drought and cyclones. Drought is assessed for all IFM projects; cyclones are assessed where they are recorded within or near the project area.

Drought. We characterise drought history for the project area using the Standardised Precipitation Index (SPI) and the Standardised Precipitation Evapotranspiration Index (SPEI). Values are calibrated to the project's own location and to typical climatic conditions there, and are therefore not comparable across projects. We interpret the frequency, magnitude and trend of drought events, and consider whether decadal conditions are stable, deteriorating, or improving. A future drought analysis is then performed for the time period present-2100, based on CMIP6 climate models for four future scenarios: SSP1-2.6, SSP2-4.5, SSP3-7.0, and SSP5-8.5. Analysis results include future projections of the SPEI drought index up to 2100, and derived future return period of drought extremes.

The consequence of drought for carbon stocks depends on the forest. We therefore establish which species within the project area are drought-tolerant and their share of the composition, and form a view on whether projected conditions would push species beyond their tolerance to the point of materially increased mortality. We place these metrics in a wider context using academic and industry sources. Such context includes ecosystem type, topography, hydrological regime, regional land use, predominant species, and oceanic circulations such as El Niño.

Cyclones. Where cyclone tracks are recorded within the project's vicinity, we detail the events identified and the damage level implied by their intensity. Where tracks intersect the project area within the rated vintage period, we cross-reference our forest loss observations to establish whether loss resulted and whether it has been sufficiently accounted for. Forward-looking risk is assessed by reference to the probability of damaging events occurring near the project under the most likely climate scenario over the commitment period.

Pests and diseases

The presence or threat of pests and diseases can cause loss of vegetation within IFM projects, lowering carbon stocks and resulting in a reversal, either directly via tree mortality or indirectly by favoring aggressive harvesting and management approaches.

Our objective is to establish both the current presence and the future risk of outbreaks affecting the project area, and their potential impact on the project's carbon stocks. Where an outbreak has occurred within or proximate to the project area, we assess whether it is likely to have affected project carbon stocks, whether the project has accounted for it in its claimed emissions reductions or reported it as a loss event, and where it has not, we estimate the impact using published evidence on the effect of the pest or disease on comparable forests and stands. We use our observations of carbon density change and thinning within the project area to corroborate reported and unreported outbreaks alike.

Looking forward, we identify the pests and diseases presenting the greatest risk to the species that make up a significant share of the project area's composition, drawing on national, regional and sub-regional forest health reporting, risk and hazard mapping where available. Academic literature, together with projections of outbreak risk for the project's region over the commitment period, complement our analysis. Two considerations govern interpretation: that identified pests and diseases are genuinely relevant to the tree species present, and that their documented effects on

tree health and mortality are understood, since presence in a region does not by itself imply material loss of carbon stocks.

Sea level change

Sea level change is assessed where the project area contains substantial areas of very low-lying coastal forest vulnerable to tree mortality through flooding, saltwater intrusion, or storm surge. Where applicable, we predict the extent of sea level change within the project area over the commitment period relative to a recent baseline period, using published projections under more than one warming scenario together with their associated uncertainty, and place those predictions in local context. Where the project has made its own assessment of sea level risk, we interrogate whether it has adequately accounted for and mitigated that risk through its buffer contribution.

Geological hazards

This risk driver is typically not applicable for IFM projects. Where salient geological hazards - such as earthquakes, volcanic eruptions, landslides or tsunamis - are identified during analysis, they are assessed and reflected here.

Other natural risks

This risk driver is typically not applicable for IFM projects. Where salient natural risks not captured by the drivers above (such as flooding unrelated to extreme weather) are identified during analysis, they are assessed and reflected here.

Anthropogenic risks

Anthropogenic risks are those introduced by human activities which could result in the reversal of carbon avoided or removed. In IFM these risks are often comparatively low, given that project areas are most commonly located on properties with secure land rights which have historically been managed by the project proponent or a lessee.

Project management and carbon rights

Our objective is to assess whether the project has established sufficient land and carbon rights for the commitment period, and whether project stakeholders are sufficiently equipped to implement the project throughout its lifetime. Failure to secure land ownership, or reliance on traditional or contested land rights, can constitute a permanence risk, since the project may occur on land to which it does not hold the legal right. If project stakeholders lack the experience to implement project activities over the project's lifetime, permanence risk is likewise greater. In ex ante ratings, this risk driver is superseded by the *Project execution* risk factor.

We establish whether the appropriate stakeholder holds both land and carbon rights for the project area, and whether we are able to confirm this independently; this may require contractual agreements to be requested from the developer. Carbon rights are a form of property right allowing accredited carbon units to be owned and traded; they may be detailed in project documentation, or established through review of national and jurisdictional carbon market policy and the relevant literature. Risk may be reduced where carbon rights are held by the project developer, and introduced where they are held by the government, since the project may not hold the legal right to sell credits. A number of jurisdictions are currently establishing policies and legal frameworks for carbon markets, with material implications for projects and standards within them.

We also assess the strength and stability of land rights within the relevant jurisdiction. In some regions it is more common for multiple groups to claim ownership of the same land, which convolutes ownership and increases risk. Where commercial projects rely on leased land, we examine the length of those leases and the terms on which they may be renewed relative to the

commitment period. Clear ownership by the developer or by local communities reduces risk, as it decreases the likelihood of discontinuation through legal conflict. We consider whether the project faces permanence risk from displacement of community landowners or from land conflict which may affect compliance or carbon rights.

Finally, we assess the technical capability of the proponent and landowner, including the number of forest carbon projects they have previously been involved in and whether there is precedent for them carrying out the specific activities the project requires.

Risk is highest where land or carbon rights have not been secured and the proponent has little relevant experience; and lowest where rights are secured and verified for the full commitment period, land rights in the jurisdiction are stable, and the relevant stakeholder has extensive implementation experience. Our ability to reach a conclusion is highly dependent on disclosure, and where rights are asserted but unverifiable we treat that as a source of risk in itself.

Encroachment risk

Our objective is to determine whether human encroachment is likely and, if so, whether it would result in material loss of project carbon stocks. In IFM this most commonly arises through the presence of natural resource extraction concessions within the project area, or through illegal deforestation or illegal selective logging pressure. It may also arise from armed conflict or other situations of social instability.

Where concessions overlap the project area, we establish the proportion of the project area affected and use it to estimate the proportion of carbon stocks at risk. The presence of concessions does not in itself equate to a material risk to carbon stocks, and reaching an informed view requires an understanding of land use rights, mineral rights, mining law and extraction technique.

Where illegal deforestation pressure is present, we assess whether it is occurring in the region and the form it takes, whether it has occurred within the project area over the rated vintage period, and whether the project has accounted for it. We use satellite imagery to establish whether access routes have been created within the project area which may facilitate agents of deforestation, and we identify mitigatory activities implemented by the project, such as forest patrols, and assess their likely effectiveness.

Risk is highest where a large proportion of the project area is subject to concessions, or where illegal deforestation is occurring unabated within the project area without mitigation; and lowest where there are no concessions within the project area and no observable illegal deforestation in either the region or the project area.

Risk mitigation instruments

Risk buffer and mitigation

Our objective is to determine whether the project's buffer pool contributions, or comparable mitigatory measures, are sufficient to counter the residual permanence risk our analysis identifies. If contributions do not adequately reflect the risks the project faces, reversals are less likely to be appropriately accounted for.

Procedures for assessing and calculating buffer contributions vary across standards bodies. Some require a fixed contribution from all nature-based projects, while others require an independent, project-specific risk assessment.

There is strong evidence that risk buffer rules are not always fully implemented, and registries diverge not only in the size of contributions they require but in how those contributions are managed once a crediting period ends. Our first step is therefore always to use registry issuance records and project documentation to establish whether a project identified a risk buffer allocation, whether those credits were in fact deposited, and where they were not, what accounts for the shortfall.

Our assessment then proceeds in two parts. The first concerns adequacy. We extract the project's own permanence risk assessment and the breakdown of its buffer contribution, and compare the materiality of the risks the project has identified against those identified through our own analysis. A buffer contribution consistent with our assessment of residual risk indicates adequate mitigation; a contribution that falls short of it indicates that reversal risk is unaccounted for.

The second concerns the provenance of the buffer credits themselves. Under some registries it is permissible to transfer credits to the buffer pool from a separate project, rather than to issue credits from the project being rated. Where credits have been transferred, we establish the proportion of the total this represents and, where the source project is identifiable, compare its risk profile against that of the project being rated. Where the source cannot be identified, the unknown risk profile of those credits is itself a source of risk - a buffer contribution is only as protective as the credits standing behind it. Risk is elevated where a substantial share of the buffer has been transferred rather than issued and the project also faces acute permanence risks in its own right.

Mitigatory activities beyond the buffer are also considered, and are assessed within the individual risk drivers to which they relate. Where a project faces no residual permanence risk once the mitigation embedded in individual risk drivers is accounted for, that is reflected here.

Stakeholder engagement

This risk driver is assessed for IFM projects where there is evidence of, or clear potential for, community or landowner discontent. Where it is assessed, it is typically material. Where stakeholders are not compensated or included, there is a risk of non-compliance or of conflict, which could reduce project effectiveness or lead to termination. Ensuring free, prior and informed consent through a robust consultation process mitigates permanence risk by establishing community support; failing to secure it creates risk for the project's permanence as well as leading to unfair outcomes for communities.

We identify the relevant stakeholders from project documentation and from literature on the communities the project affects, and establish whether any are at risk of withdrawal or dissatisfaction. Where they are, we examine whether free, prior and informed consent was obtained; whether the project has a grievance mechanism and conflict resolution plan; whether communication has been appropriate to the context, including distribution of information in the relevant language or dialect and orally where literacy rates are low; whether the correct stakeholders have been identified; whether there are reported disputes without a plan for resolution; and, where the project enrols landowners under contract, whether those contracts contain stipulations limiting withdrawal and whether the associated penalties are sufficient either to deter withdrawal or to recoup the resulting carbon losses.

We then assess what withdrawal or dissatisfaction would mean for project carbon stocks. Where landholders present the risk, we consider whether they are likely to change land use practices given the opportunity costs of the project activities. Where other stakeholders present the risk, we consider the routes through which they might influence carbon stocks on the land.

Risk is highest where grievance or conflict has already placed the project on hold or resulted in litigation, and lowest where there is no evidence of grievance or conflict and effective grievance mechanisms and secure consent are in place. An absence of evidence of grievance is not by itself sufficient for the lowest risk assessment, where there is also an absence of evidence that consent and grievance mechanisms are secure. In assessing this driver we are careful not to duplicate analysis undertaken in relation to benefit sharing, and confine it to circumstances in which there is evidence of discontent capable of giving rise to a permanence risk.

Appendix I: Sources as of October 2026

Geospatial data sources

Our Geospatial and Earth Observation team uses data from, but not limited to, the following:

Aboveground carbon in mangroves (Caltech / Simard et al. 2018), Aboveground carbon northern Africa (NASA / Tucker et al. 2023), Administrative districts (OpenStreetMap), Amazon indigenous territories (RAISG), American Indian, Alaska Native, and Native Hawaiian Areas (U.S. Census Bureau), BeZero Carbon Boundaries Database (curated in-house from registry data and other public sources), BeZero Carbon Plots Database (curated in-house from private collections, national inventories, international plot networks, academic studies, research partnerships, and other sources), Brazil indigenous lands (Terrabrasilis), Brazil mining concessions (Brazil National Departament of Mineral Production), Brazil protected areas (National Registry of Conservation Units - CNUC), Brazilian Cadastro Ambiental Rural (Brazilian government), Brazilian Sistema de Gestão Fundiária (Brazilian government), California timber harvesting plans (California Department of Forestry & Fire Protection), Cambodia mining concessions (Open Development Cambodia), Cameroon community forest (Ministère des Forêts et de la Faune), Cameroon Forest Management Units (Global Forest Watch), Cameroon mining permits (Cameroon Ministry of Mines and Technological Development), Cameroon production forests (Ministère des Forêts et de la Faune), Canada mining permits (various open sources), Chloris Above-ground biomass stock (Chloris Geospatial), Colombia agricultural frontier (El Sistema de Información para la Planificación Rural Agropecuaria (SIPRA)), Colombia mining titles (Tierra Minada), Colombia national parks (Parques Nacionales Naturales de Colombia), Congo peat maps (University of Leeds), Consejo Comunitario Titulado (Datos Abiertos Agencia Nacional de Tierras Colombia), CORINE landcover (Copernicus), Cost maps for ARR (Busch et al. 2024), Crop Sequence Boundaries (USDA), Cropland extent and change (GLAD/UMD), Decadal Land Use and Land Cover Classifications across India (Roy et al. 2016), Democratic Republic of the Congo mining permits (DRC Cadastre Minier), Dynamic World (Brown et al (2022)), EBA Brazil aboveground carbon (INPE), Ecoregion map (Resolve), Ejido territories (Registro Agrario Nacional - Catastro Rural), ERA5 Land climate variables (ECMWF), ESA Biomass Climate Change Initiative (Santoro, M.; Cartus, O. (2026)), ESRI Sentinel-2 10m land use land change time-series (ESRI), EU Farm Structure Survey (European Commission), European Union Tropical Moist Forests (IFORCE), Florida conservation lands (FLMA) (Florida Natural Areas Inventory), Forest Extent and Height Change, 2000-2020 (GLAD/UMD), Forest/Non-Forest (JAXA), Forest Type Groups of the United States (USDA Forest Service - Forest Inventory and Analysis (FIA) Program & Geospatial Technology and Applications Center (GTAC)), Forest ownership in the conterminous United States circa 2022 (Harris et al. (2025)), Forest Planning Open Data (Hokkaido Forest Planning Division, Forestry Bureau), Forisk North American Mill Capacity Database (Forisk), Gabon mining permits (Gabon Ministry of Mines, Petroleum, and Hydrocarbons & WRI), GEDI L2B canopy cover (NASA/UMD), GEDI L4A Footprint aboveground carbon (NASA/UMD), GEDI L4B Gridded aboveground carbon (NASA/UMD), GEDI Level-2A vegetation height (NASA/UMD), Global Canopy Height (ETH Zürich), Global Distribution of Mangroves (UNEP-WCMC), Global Forest Change (GLAD/UMD), Global Human Settlement Layer (GHS-SMOD) (Schiavina M., Melchiorri M., Pesaresi M. (2023)), Global Mangrove Watch (JAXA), Global mining extent polygons (Maus et al. 2022), Global mining extent polygons (Tang & Werner 2023), Global naturally regenerating forests (UN FAO), Global peatlands (CIFOR, Wetlands International, Indonesian Ministry of Agriculture, Indonesian Ministry of Transmigration and Land Resources), Global planted forest (UN FAO), GlobBiomass above and below ground carbon (ESA), HURDAT2 hurricanes (NOAA), IBTrACS hurricanes (NOAA), Integrated Deforestation Alerts (Global Nature Watch), IPCC AR6 Sea level rise (NASA/IPCC), IUCN Red List of Threatened Species (IBAT), Key Biodiversity Areas (IBAT), Köppen-Geiger climate classification (Beck et al. (2023)), Landsat 5, 7, 8 and 9 L2 Surface Reflectance (NASA/USGS), Land cover (JAXA), Malaysia logging concessions (Global Forest Watch), MapBiomas Brazil land cover (MapBiomas Brazil), MapBiomas Colombia land cover (MapBiomas Colombia), MapBiomas Paraguay land cover (MapBiomas Paraguay), MapBiomas Peru land cover (MapBiomas Peru), Mapbox visual basemap (Mapbox), Maxar Imagery Surface

Reflectance (Maxar Technologies), MCD12Q1 Land Cover Type (NASA), MCD64A1 Burned area (NASA/UMD), Mexico mining concessions (Secretaria de Economia), Mineral Resources Data System (USGS), Minnesota DNR Management Units (Minnesota Department of Natural Resources), MOD44B Vegetation Continuous Fields (NASA), MYD10A2 Snow cover (NASA), MYD13Q1 Vegetation Indices (NASA), National Cropland Data Layer (USDA), National Flood Hazard Layer (FEMA), Navigable water (OpenStreetMap), New York Protected Area Database (NYPAD) (New York Natural Heritage Program), New York state (DEC) lands (New York State Department of Environmental Conservation), NEX-GDDP-CMIP6 (NASA/NCCS), Northern Forest land ownership map (Northern Forest Center), Oil and gas concessions (various government sources), Peru cadastral and concessions (Digital Government Secretariat Peru), Peru mining concessions (Ingemmet), Peru native community boundaries (Peru Ministry of Culture), Planet Forest Carbon Diligence (Planet Labs), Planet Quarterly visual basemaps (Planet Labs), PlanetScope Imagery Surface Reflectance (Planet Labs), Population density (WorldPop), Primary designated management objectives of forest (UN FAO), Primary humid tropical forests (GLAD/UMD), PRODES Amazon deforestation (INPE), Regrid US land parcel data (Regrid), Republic of the Congo mining permits (Republic of the Congo Ministry of Mines and Geology), Roads (OpenStreetMap), Root-shoot ratios (Huang et al. 2021), SDPT plantations, planting year and planted species (WRI / Du et al. 2022), Sentinel-2 L2A Surface Reflectance (ESA Copernicus), SkySat Imagery Surface Reflectance (Planet Labs), Soil cation exchange capacity (ISRIC), Soil nitrogen (ISRIC), Soil organic carbon (ISRIC), Soil type classification (ISRIC), Soil water pH (ISRIC), Species Rarity-weighted Richness (IBAT), SRTM Digital Elevation Model (NASA), STAR Species Threat Abatement and Restoration Metric (IBAT), STORM Cyclone historical baseline (Bloemendaal et al. (2020)), STORM Cyclone future projections (Bloemendaal et al. (2022)), US Forest Type Groups of the United States (U.S. Department of Agriculture - Forest Inventory and Analysis (FIA) Program & Remote Sensing Applications Center (RSAC)), US National Conservation Easement Database (U.S. Endowment for Forestry and Communities), US Native lands (U.S Department of the Interior Bureau of Land Management), US Protected Areas Database (United States Geological Service (USGS)), US stand age (2005) (United States Geological Service (USGS)), US state boundaries (United States Census Bureau), USA Census of Agriculture (USDA), VARDA Global FieldID (VARDA), VNP14IMGML Active fire detections (NASA/UMD), World Database on Protected Areas (IBAT), Worldclim climatology (SEI), Global Population Data (unconstrained 100m) (WorldPop)..

Other third-party datasets

In addition to our geospatial sources, we also incorporate many other third-party or industry datasets and sources into our assessments of individual risk factors. These include but are not limited to:

National and regional government information on climate change, GHG emissions, forestry and food production, domestic and international trade, pricing and distribution statistics; national forestry inventories, protected areas and easements; national and regional natural risk maps; policy trackers for impact, legislation, governance and action; land registration and titling databases including regional cadasters, mining concessions and indigenous territories; NDC registry; carbon credit pricing databases; national and regional mill capacity databases.

Literature sources

Our curated database of literature sources spans all types of peer-reviewed literature and industry research, with hundreds of entries for every sector, region or risk factor.

The number of relevant literature-based sources specific to the Improved Forest Management sub-sector runs to almost 1,500 as of September 2026.

Appendix II: Additional reading

Check out the ratings resources page on our website to find links to all of our published methodologies, in addition to our series of risk factor assessment frameworks, our frameworks for assessing project methodologies and country-level risks, deep dives on factors influencing the carbon efficacy of projects in various sectors, and more.

Updates and reviews

Version number	Date	Description
1.00	21/12/23	Initial release
1.01	31/01/24	Formatting updates
1.02	03/10/24	Formatting updates and clarification on additionality as a limiting factor
2.0	25/03/25	Updated risk factor framework
3.0	27/10/26	Formatting updates, edits, and revisions to align with ESMA regulatory requirements

Disclaimer

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